State of Idaho, Division of Health
Emergency Medical Services Bureau

Infection Control Manual
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IDAHO DEPARTMENT OF
HEALTH & WELFARE

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Dear EMS Agency,

Several years ago the Idaho EMS Bureau Central Office required agencies that submit for licensure with the State of Idaho to identify an infection control officer as a result of the Ryan White Act. Integral to the role of an Infection Control Officer is the design of an infection control plan. The enclosed State of Idaho EMS Infection Control Manual is a set of guidelines, standards, and procedures compiled in an effort to reduce exposure to pathogens from human blood, tissue or fluids. This manual is a resource for those designated individuals to aid in the coordination and direction of their Infection Control Plan.

This manual is comprised of five sections.

- Section One provides the latest from the Centers for Disease Control and Prevention (CDC) on hand hygiene and immunizations for health care workers.
- Section two includes a number of documents regarding the revised blood borne pathogen standard which now incorporates the Needlestick Safety and Prevention Act, as well as fact sheets and prevention guidelines developed by the Office of Safety and Health Administration (OSHA) and the National Institue for Occupational Safety and Health (NIOSH).
- Section three is dedicated to airborne pathogens and includes documents from OSHA respective to the Respiratory Protection Standard and its revisions and requirements.
- Section four deals with exposure management and provides resources from the CDC and OSHA on what to do when a potential or actual exposure has occurred.
- Section five provides additional sources of information and assistance, a sample Infection Control Officer position description, as well as contact information for Infection Control Practitioners in hospitals across the state.

These documents can provide assistance, but they cannot do the job of an Infection Control Officer. It is essential that each EMS agency commit itself to protecting its patients, its providers, and the relatives of providers from infectious disease by maintaining and improving an infection control program. No Infection Control Officer works alone. Infection control practitioners in hospitals are one of the best resources available. Other Infection Control Officers can be part of a valuable network for sharing information and pooling resources. Together this group of dedicated individuals can prevent the spread of disease and improve the quality of care delivered to Idaho patients in the out of hospital setting.

State of Idaho Infection Control Manual

Table of Contents

Jun-05

Overview of Infection Control in Idaho EMS	Date	Source
What's Spreading in Infection Control (EMS Today article on hand hygiene)	2/1/03	VTEMS
Guideline for Hand Hygiene in Health Care Settings	10/25/02	MMWR
Table: Immunizing Agents and Immunization schedules for Health Care Workers	12/26/97	MMWR
Bloodborne Pathogens		
OSHA Standard 1910.1030 (Bloodborne Pathogens)	1/18/01	OSHA
Hepatitis B Vaccine Consent and Declination Forms	No Date	Manual
Occupational Exposure to Bloodborne Pathogens - Precautions for Emergency Responders	1998	OSHA
Fact Sheet: "Bloodborne Pathogens"	No Date	OSHA
Fact Sheet: "Hepatitis B Vaccination - Protection for You"	No Date	OSHA
Fact Sheet: "Personal Protective Equipment Cuts Risk"	No Date	OSHA
Fact Sheet: "Holding the Line on Contamination"	No Date	OSHA
Preventing Needlestick Injuries in Health Care Settings	11/1/99	NIOSH
Airborne Pathogens		
OSHA Standard 1910.134 (Respiratory Protection)	1/8/98	OSHA
Appendix A to 1910.134: Fit Testing Procedures	1/9/98	OSHA
Appendix B-1 to 1910.134: User Seal Check Procedures	1/10/98	OSHA
Appendix B-2 to 1910.134: Respirator Cleaning Procedures	1/11/98	OSHA
Appendix C to 1910.134: OSHA Respirator Medical Evaluation Questionaire	1/12/98	OSHA
Summary for Respirator Users (Description of Respirator types)	4/9/96	NIOSH
Severe Acute Respiratiory Syndrome: Guidance on Air Medical Transport for SARS Patients	4/23/04	CDC
Severe Acute Repiratory Syndrome: Supplement I: Patient Ground Transport	1/8/04	CDC
Small Entity Compliance Guide for the Revised Repiratory Protection Standard	9/29/98	OSHA
Small Entity Compliance Guide, App IV: Sample Repiratory Protection Program	9/30/98	OSHA
Questions and Answers on the Respiratory Protection Standard	8/17/98	OSHA
Exposure Management		
Ryan White Law and Rules (59 CFR 13418-28)	3/21/94	Fed Reg
Fact Sheet: "Reporting Exposure Incidents"	No Date	OSHA
Form: Needlestick and Sharp Ovject Injury Report	8/1/00	CDC
Form: Blood and Body Fluid Exposure Report	6/1/00	CDC
Form: Post Exposure Follow Up	10/1/00	CDC
Guideline for Infection Control in Health Care Personnel	6/1/98	CDC
Updated U.S. PHS Guidelines for the Mangement of Occupational Exposures to HBV,HCV, and HIV and Recommendations for PEP	6/29/01	MMWR
OSHA standard 1910.1020 (Access to Employee Exposure and Medical Records)	6/20/96	OSHA
Resources		
Useful Sources of Information	3/1/05	IDEMS
Reporting Numbers for District Health Departments	3/1/05	IDHW
Idaho Reportable Disease List	7/1/04	IDHW
Protocol for Reviewing and Responding to Applications for Significant Exposures	3/1/05	IDHW
Idaho Department of Health and Welfare Significant Exposure Information Request	2/1/05	IDHW
Idaho Hospital Infection Control Representative Contact Information	3/1/05	IDEMS
Sample job description: Designated Infection Control Officer	6/14/04	VTEMS
District Health Department Epidemilogy Program Roster	10/1/04	IDHW

Legend

CFR: Code of Federal Regulations
Fed Reg: Federal Register
IDEMS: Idaho Emergency Medical Services
IDHW: Idaho Department of Health and Welfare
MMWR: Morbiditiy and Mortality Weekly Report
NIOSH: National Institutes of Occupational Safety & Health
OSHA: Occupational Safety & Health Administration
VTEMS: Vermont Emergency Medical Services

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Overview of Infection Control in Idaho EMS

What's Spreading in Infection Control

How often and how well do you wash your hands while providing patient care? The answers for most health care providers are not very much and not very well. Health care workers have been the source of many documented infections that have prolonged patients' hospital stays and even resulted in death. That may change as a result of a recent report from experts in infection control. In October 2002 the Centers for Disease Control and Prevention (CDC) published "Guideline for Hand Hygiene in Health-Care Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force." The most noteworthy change in the report is the recommendation that health care workers use alcohol-based hand rubs instead of soap and water in most patient care circumstances.

Health care workers for years have learned they should wash their hands before patient contact. This teaching, however, has been honored more in the breach than the observance. It is well documented that health care workers, especially those in areas with seriously ill patients, often do not follow recommended hand hygiene practices. In response to such reports and other developments, CDC gathered representatives from major infection control organizations on a Hand Hygiene Task Force and published their report on October 25, 2002. The document contains a great deal of easily understood information on the physiology of the skin; effects of poor hand hygiene; comparative efficacy of plain soap, antibacterial soap and alcohols; hand hygiene practices; and recommendations [illegible] and hygiene, among other topics. [illegible] article presents the task force's recommendations as they apply to EMS and lists resources for further information.

The EMS Provider's Role

The report's recommendations fall into two major categories, those for an individual provider and those for a health care agency. The major suggestion for an individual to follow is to clean the hands frequently, especially before and after certain activities and exposures. A major distinction in hand hygiene technique rests on the difference between soiled and unsoiled hands. Hands are soiled if they are visibly dirty, contaminated with proteinaceous material, or soiled with blood or other body fluids. Hands that may have been exposed to the bacterium associated with anthrax are treated as though they were in this category. If none of these conditions apply, the hands are considered unsoiled.

The preferred agent to use for cleaning unsoiled hands is an alcohol-based hand rub. A number of such products have become available in the last few years. They can take the form of a gel, foam or rinse. To use an alcohol hand rub properly, the provider should apply the amount of the product the manufacturer recommends to the palm of one hand and rub the hands together, covering all surfaces of the hands and fingers, until the hands are dry.

> **It is well documented that health care workers, especially those in areas with seriously ill patients, often do not follow recommended hand hygiene practices.**

A typical alcohol-based hand rub contains between 60 percent and 95 percent ethanol with an emollient to prevent hand dryness and chapping. Alcohol at these concentrations effectively reduces hand levels of bacteria, including Mycobacterium tuberculosis and multidrug-resistant pathogens such as methicillin-resistant staph aureus (MRSA) and vancomycin-resistant enterococcus (VRE). Alcohol at these concentrations also denatures many viruses, including human immunodeficiency virus (HIV), influenza virus, respiratory syncytial virus, hepatitis B virus and hepatitis C virus. Hepatitis A virus may be inactivated by alcohol, but this depends on the alcohol concentration, length of time the hands are exposed to the alcohol and the variety of the particular virus. Alcohol is so effective in antisepsis that it is now an acceptable alternative to the scrubbing that surgical personnel have traditionally undergone before performing surgery.

Health care workers have had legitimate concerns about the effect of hand hygiene products on their skin. Dermatitis has been reported in health care workers who wash their hands frequently. Fortunately, alcohol-based products typically include emollients (softening and soothing agents) or humectants (moistening agents) or both. Use of hand lotions and creams can also decrease dryness and irritation. Allergic reactions have been reported very rarely as a result of exposure to an alcohol-based product; fortunately, the incidence seems to be much less than that seen with soaps.

The preferred agent to use for cleaning soiled hands is either plain (non-antimicrobial) soap and water or an antimicrobial soap and water. To use the soap properly, wet the hands first, apply the soap and rub the hands together vigorously for at least 15 seconds, covering all surfaces of the hands and fingers. Rinse the hands with water and dry them thoroughly with a disposable towel. Avoid reusable cloth towels. Use the towel to turn off the faucet. Hot water may increase the risk of dermatitis, so select a water temperature that is comfortable.

Non-antimicrobial soap works as a detergent, removing dirt, soil and various organic substances. Plain soap does not destroy microbes, but can remove many of them, especially when the provider washes for at least 30 seconds. Antimicrobial soaps can contain any of several different products, including chlorhexidine and iodophors. Different antiseptic agents show varying levels of effectiveness against different microbes. Chlorhexidine, for example, performs well against viruses and gram-negative and gram-positive bacteria, but not mycobacteria or fungi. Alcohols, on the other hand, perform better and faster than chlorhexidine, but their effects wear off sooner. There is no single agent that

is fast, effective against all microbes and persistent in its effects. The table summarizes the CDC's recommendations for good hand hygiene.

The EMS Agency's Role

For a hand hygiene program to work, the individual provider must have support from the EMS agency where he or she works: The organization needs to select an appropriate product or products, provide education and motivation, support the program administratively and monitor performance indicators. Selection of alcohol-based hand rubs and soaps should involve the people who will be using the products. Without acceptance by the end user, providers will not use hand rubs. Factors to consider include smell, consistency, color, efficacy, cost and means of dispensing.

A program of education and motivation should teach providers about the types of patient-care activities that can result in hand contamination and the advantages and disadvantages of various methods for cleaning hands. A number of factors can interfere with the success of such a program, so it must take into account: the belief that wearing gloves eliminates the need for hand hygiene; the lack of role models; provider skepticism toward the effectiveness of a hand-hygiene program; the traditional absence of hand-hygiene as an institutional priority; the lack of administrative sanctions for violators or rewards to those who comply and the lack of an institutional climate that supports safety.

An agency's administrative support of a hand hygiene program should include making improved hand hygiene an organizational priority, with the support and financial resources needed to support it. This includes making alcohol-based hand rubs easily available in numerous locations, e.g., on the wall in the ambulance patient compartment, in run kits, jump bags or other items frequently carried to patients and in providers' uniforms (pocket-sized containers are readily available). A hospital in Geneva, Switzerland, as part of its hand hygiene program, gave each employee a pocket-sized container of an alcohol-based hand rub. The institution's infection rate decreased steadily over time. Finally, an EMS agency should store supplies of alcohol-based hand rubs in cabinets or areas suitable for flammable materials. In Europe, where these products have been in use for some time, there have been rare reports of fires associated with alcohol-based hand rubs. Rubbing hands together until the alcohol is completely evaporated should prevent such incidents.

The effectiveness of a program of hand hygiene can be measured only if the organization evaluates its performance. This should take place through several different activities. The organization should periodically monitor frequency of compliance and keep records of those activities, measured as episodes of hand hygiene use/number of hand hygiene opportunities. HCWs should receive feedback on their performance. An indirect means of determining compliance is to monitor the volume of hand rub used. In hospitals, this amount is divided by the number of 1,000 patient-days. In EMS, a more appropriate denominator might be 100 or 1,000 patient transports. An easy item to monitor is compliance with policies regarding artificial nails.

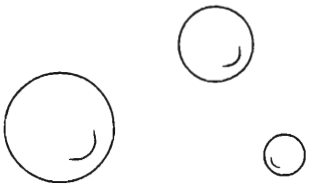
Resources

The CDC's report is available at *www.cdc.gov/handhygiene*. It has a wealth of easily accessible information on this often neglected topic. Other resources on hand hygiene CDC recommends include: *www.hopisafe.ch* (University of Geneva Hospitals, Geneva, Switzerland), *www.cdc.gov/ncidod/hip* (CDC, Atlanta, Georgia), *www.jr2.ox.ac.uk/bandolier/band88/b88-8.html* (Bandolier journal, United Kingdom) and *www.med.upenn.edu* (University of Pennsylvania, Philadelphia, Pennsylvania).

— Mike O'Keefe
State Training Coordinator

CDC Recommendations for Hand Hygiene

Some General Recommendations for Soiled or Unsoiled Hands:



- Wear gloves when contact with blood or other potentially infectious materials, mucous membranes, and nonintact skin could occur.
- Remove gloves after caring for a patient.
- Change gloves during patient care if moving from a contaminated body site to a clean body-site.
- Do not wear artificial nails or extenders when having direct contact with patients at high risk. Keep natural nail tips less than 1/4 inch long.

If your hands are **soiled,**
Before:
- eating

After:
- using a restroom
- suspected or proven exposure to Bacillus anthracis, the bacterium that causes anthrax (alcohols are ineffective against the spores):

- Wash with either a non-antimicrobial soap and water or an antimicrobial soap and water:
- Wet hands first, apply soap and rub hands together vigorously for at least 15 seconds, covering all surfaces of the hands and fingers. Rinse hands with water and dry thoroughly with a disposable towel. Use the towel to turn off the faucet. Avoid hot water because it may increase the risk of dermatitis.

If your hands are **unsoiled,**
Before:
- direct contact with patients
- inserting intravenous catheters
- eating

After:
- contact with a patient's intact skin (e.g., taking a pulse, checking a blood pressure or lifting a patient)
- contact with body fluids, excretions, mucous membranes, nonintact skin and wound dressings
- moving from a contaminated body site to a clean body-site
- contact with inanimate objects (including medical equipment) in the immediate vicinity of the patient
- removing gloves

- Use an alcohol-based hand rub.
- Apply the amount of the product the manufacturer recommends to the palm of one hand and rub hands together, covering all surfaces of hands and fingers, until hands are dry.

BOX 3. Hand-hygiene research agenda

Education and promotion

- Provide health-care workers (HCWs) with better education regarding the types of patient care activities that can result in hand contamination and cross-transmission of microorganisms.
- Develop and implement promotion hand-hygiene programs in pregraduate courses.
- Study the impact of population-based education on hand-hygiene behavior.
- Design and conduct studies to determine if frequent glove use should be encouraged or discouraged.
- Determine evidence-based indications for hand cleansing (considering that it might be unrealistic to expect HCWs to clean their hands after every contact with the patient).
- Assess the key determinants of hand-hygiene behavior and promotion among the different populations of HCWs.
- Develop methods to obtain management support.
- Implement and evaluate the impact of the different components of multimodal programs to promote hand hygiene.

Hand-hygiene agents and hand care

- Determine the most suitable formulations for hand-hygiene products.
- Determine if preparations with persistent antimicrobial activity reduce infection rates more effectively than do preparations whose activity is limited to an immediate effect.
- Study the systematic replacement of conventional handwashing by the use of hand disinfection.
- Develop devices to facilitate the use and optimal application of hand-hygiene agents.
- Develop hand-hygiene agents with low irritancy potential.
- Study the possible advantages and eventual interaction of hand-care lotions, creams, and other barriers to help minimize the potential irritation associated with hand-hygiene agents.

Laboratory-based and epidemiologic research and development

- Develop experimental models for the study of cross-contamination from patient to patient and from environment to patient.
- Develop new protocols for evaluating the in vivo efficacy of agents, considering in particular short application times and volumes that reflect actual use in health-care facilities.
- Monitor hand-hygiene adherence by using new devices or adequate surrogate markers, allowing frequent individual feedback on performance.
- Determine the percentage increase in hand-hygiene adherence required to achieve a predictable risk reduction in infection rates.
- Generate more definitive evidence for the impact on infection rates of improved adherence to recommended hand-hygiene practices.
- Provide cost-effectiveness evaluation of successful and unsuccessful promotion campaigns.

Part II. Recommendations

Categories

These recommendations are designed to improve hand-hygiene practices of HCWs and to reduce transmission of pathogenic microorganisms to patients and personnel in health-care settings. This guideline and its recommendations are not intended for use in food processing or food-service establishments, and are not meant to replace guidance provided by FDA's Model Food Code.

As in previous CDC/HICPAC guidelines, each recommendation is categorized on the basis of existing scientific data, theoretical rationale, applicability, and economic impact. The CDC/HICPAC system for categorizing recommendations is as follows:

Category IA. Strongly recommended for implementation and strongly supported by well-designed experimental, clinical, or epidemiologic studies.

Category IB. Strongly recommended for implementation and supported by certain experimental, clinical, or epidemiologic studies and a strong theoretical rationale.

Category IC. Required for implementation, as mandated by federal or state regulation or standard.

Category II. Suggested for implementation and supported by suggestive clinical or epidemiologic studies or a theoretical rationale.

No recommendation. Unresolved issue. Practices for which insufficient evidence or no consensus regarding efficacy exist.

Recommendations

1. Indications for handwashing and hand antisepsis
   A. When hands are visibly dirty or contaminated with proteinaceous material or are visibly soiled with blood or other body fluids, wash hands with either a non-antimicrobial soap and water or an antimicrobial soap and water (IA) (*66*).
   B. If hands are not visibly soiled, use an alcohol-based hand rub for routinely decontaminating hands in all other clinical situations described in items 1C–J (IA) (*74,93,166,169,283,294,312,398*). Alternatively, wash hands with an antimicrobial soap and water in all clinical situations described in items 1C–J (IB) (*69-71,74*).
   C. Decontaminate hands before having direct contact with patients (IB) (*68,400*).
   D. Decontaminate hands before donning sterile gloves when inserting a central intravascular catheter (IB) (*401,402*).
   E. Decontaminate hands before inserting indwelling urinary catheters, peripheral vascular catheters, or other invasive devices that do not require a surgical procedure (IB) (*25,403*).
   F. Decontaminate hands after contact with a patient's intact skin (e.g., when taking a pulse or blood pressure, and lifting a patient) (IB) (*25,45,48,68*).
   G. Decontaminate hands after contact with body fluids or excretions, mucous membranes, nonintact skin, and wound dressings if hands are not visibly soiled (IA) (*400*).
   H. Decontaminate hands if moving from a contaminated-body site to a clean-body site during patient care (II) (*25,53*).
   I. Decontaminate hands after contact with inanimate objects (including medical equipment) in the immediate vicinity of the patient (II) (*46,53,54*).
   J. Decontaminate hands after removing gloves (IB) (*50,58,321*).
   K. Before eating and after using a restroom, wash hands with a non-antimicrobial soap and water or with an antimicrobial soap and water (IB) (*404-409*).
   L. Antimicrobial-impregnated wipes (i.e., towelettes) may be considered as an alternative to washing hands with non-antimicrobial soap and water. Because they are not as effective as alcohol-based hand rubs or washing hands with an antimicrobial soap and water for reducing bacterial counts on the hands of HCWs, they are not a substitute for using an alcohol-based hand rub or antimicrobial soap (IB) (*160,161*).
   M. Wash hands with non-antimicrobial soap and water or with antimicrobial soap and water if exposure to *Bacillus anthracis* is suspected or proven. The physical action of washing and rinsing hands under such circumstances is recommended because alcohols, chlorhexidine, iodophors, and other antiseptic agents have poor activity against spores (II) (*120,172, 224,225*).
   N. No recommendation can be made regarding the routine use of nonalcohol-based hand rubs for hand hygiene in health-care settings. Unresolved issue.
2. Hand-hygiene technique
   A. When decontaminating hands with an alcohol-based hand rub, apply product to palm of one hand and rub hands together, covering all surfaces of hands and fingers, until hands are dry (IB) (*288,410*). Follow the manufacturer's recommendations regarding the volume of product to use.
   B. When washing hands with soap and water, wet hands first with water, apply an amount of product recommended by the manufacturer to hands, and rub hands together vigorously for at least 15 seconds, covering all surfaces of the hands and fingers. Rinse hands with water and dry thoroughly with a disposable towel. Use towel to turn off the faucet (IB) (*90-92,94,411*). Avoid using hot water, because repeated exposure to hot water may increase the risk of dermatitis (IB) (*254,255*).
   C. Liquid, bar, leaflet or powdered forms of plain soap are acceptable when washing hands with a non-antimicrobial soap and water. When bar soap is used, soap racks that facilitate drainage and small bars of soap should be used (II) (*412-415*).
   D. Multiple-use cloth towels of the hanging or roll type are not recommended for use in health-care settings (II) (*137,300*).
3. Surgical hand antisepsis
   A. Remove rings, watches, and bracelets before beginning the surgical hand scrub (II) (*375,378,416*).
   B. Remove debris from underneath fingernails using a nail cleaner under running water (II) (*14,417*).

C. Surgical hand antisepsis using either an antimicrobial soap or an alcohol-based hand rub with persistent activity is recommended before donning sterile gloves when performing surgical procedures (IB) (*115,159,232,234,237,418*).

D. When performing surgical hand antisepsis using an antimicrobial soap, scrub hands and forearms for the length of time recommended by the manufacturer, usually 2–6 minutes. Long scrub times (e.g., 10 minutes) are not necessary (IB) (*117,156,205, 207,238-241*).

E. When using an alcohol-based surgical hand-scrub product with persistent activity, follow the manufacturer's instructions. Before applying the alcohol solution, prewash hands and forearms with a non-antimicrobial soap and dry hands and forearms completely. After application of the alcohol-based product as recommended, allow hands and forearms to dry thoroughly before donning sterile gloves (IB) (*159,237*).

4. Selection of hand-hygiene agents

A. Provide personnel with efficacious hand-hygiene products that have low irritancy potential, particularly when these products are used multiple times per shift (IB) (*90,92,98,166,249*). This recommendation applies to products used for hand antisepsis before and after patient care in clinical areas and to products used for surgical hand antisepsis by surgical personnel.

B. To maximize acceptance of hand-hygiene products by HCWs, solicit input from these employees regarding the feel, fragrance, and skin tolerance of any products under consideration. The cost of hand-hygiene products should not be the primary factor influencing product selection (IB) (*92,93,166, 274,276-278*).

C. When selecting non-antimicrobial soaps, antimicrobial soaps, or alcohol-based hand rubs, solicit information from manufacturers regarding any known interactions between products used to clean hands, skin care products, and the types of gloves used in the institution (II) (*174,372*).

D. Before making purchasing decisions, evaluate the dispenser systems of various product manufacturers or distributors to ensure that dispensers function adequately and deliver an appropriate volume of product (II) (*286*).

E. Do not add soap to a partially empty soap dispenser. This practice of "topping off" dispensers can lead to bacterial contamination of soap (IA) (*187,419*).

5. Skin care

A. Provide HCWs with hand lotions or creams to minimize the occurrence of irritant contact dermatitis associated with hand antisepsis or handwashing (IA) (*272,273*).

B. Solicit information from manufacturers regarding any effects that hand lotions, creams, or alcohol-based hand antiseptics may have on the persistent effects of antimicrobial soaps being used in the institution (IB) (*174,420,421*).

6. Other Aspects of Hand Hygiene

A. Do not wear artificial fingernails or extenders when having direct contact with patients at high risk (e.g., those in intensive-care units or operating rooms) (IA) (*350–353*).

B. Keep natural nails tips less than 1/4-inch long (II) (*350*).

C. Wear gloves when contact with blood or other potentially infectious materials, mucous membranes, and nonintact skin could occur (IC) (*356*).

D. Remove gloves after caring for a patient. Do not wear the same pair of gloves for the care of more than one patient, and do not wash gloves between uses with different patients (IB) (*50,58,321,373*).

E. Change gloves during patient care if moving from a contaminated body site to a clean body site (II) (*50,51,58*).

F. No recommendation can be made regarding wearing rings in health-care settings. Unresolved issue.

7. Health-care worker educational and motivational programs

A. As part of an overall program to improve hand-hygiene practices of HCWs, educate personnel regarding the types of patient-care activities that can result in hand contamination and the advantages and disadvantages of various methods used to clean their hands (II) (*74,292,295,299*).

B. Monitor HCWs' adherence with recommended hand-hygiene practices and provide personnel with information regarding their performance (IA) (*74,276,292,295,299,306,310*).

C. Encourage patients and their families to remind HCWs to decontaminate their hands (II) (*394,422*).

8. Administrative measures

A. Make improved hand-hygiene adherence an institutional priority and provide appropriate

administrative support and financial resources (IB) (*74,75*).

B. Implement a multidisciplinary program designed to improve adherence of health personnel to recommended hand-hygiene practices (IB) (*74,75*).

C. As part of a multidisciplinary program to improve hand-hygiene adherence, provide HCWs with a readily accessible alcohol-based hand-rub product (IA) (*74,166,283,294,312*).

D. To improve hand-hygiene adherence among personnel who work in areas in which high workloads and high intensity of patient care are anticipated, make an alcohol-based hand rub available at the entrance to the patient's room or at the bedside, in other convenient locations, and in individual pocket-sized containers to be carried by HCWs (IA) (*11,74,166,283,284,312,318,423*).

E. Store supplies of alcohol-based hand rubs in cabinets or areas approved for flammable materials (IC).

Part III. Performance Indicators

1. The following performance indicators are recommended for measuring improvements in HCWs' hand-hygiene adherence:

   A. Periodically monitor and record adherence as the number of hand-hygiene episodes performed by personnel/number of hand-hygiene opportunities, by ward or by service. Provide feedback to personnel regarding their performance.

   B. Monitor the volume of alcohol-based hand rub (or detergent used for handwashing or hand antisepsis) used per 1,000 patient-days.

   C. Monitor adherence to policies dealing with wearing of artificial nails.

   D. When outbreaks of infection occur, assess the adequacy of health-care worker hand hygiene.

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Appendix

Antimicrobial Spectrum and Characteristics of Hand-Hygiene Antiseptic Agents*

Group	Gram-positive bacteria	Gram-negative bacteria	Mycobacteria	Fungi	Viruses	Speed of action	Comments
Alcohols	+++	+++	+++	+++	+++	Fast	Optimum concentration 60%–95%; no persistent activity
Chlorhexidine (2% and 4% aqueous)	+++	++	+	+	+++	Intermediate	Persistent activity; rare allergic reactions
Iodine compounds	+++	+++	+++	++	+++	Intermediate	Causes skin burns; usually too irritating for hand hygiene
Iodophors	+++	+++	+	++	++	Intermediate	Less irritating than iodine; acceptance varies
Phenol derivatives	+++	+	+	+	+	Intermediate	Activity neutralized by nonionic surfactants
Tricolsan	+++	++	+	—	+++	Intermediate	Acceptability on hands varies
Quaternary ammonium compounds	+	++	—	—	+	Slow	Used only in combination with alcohols; ecologic concerns

Note: +++ = excellent; ++ = good, but does not include the entire bacterial spectrum; + = fair; — = no activity or not sufficient.
* Hexachlorophene is not included because it is no longer an accepted ingredient of hand disinfectants.

TABLE 2. Immunizing agents and immunization schedules for health-care workers (HCWs)*

Generic name	Primary schedule and booster(s)	Indications	Major precautions and contraindications	Special considerations
IMMUNIZING AGENTS STRONGLY RECOMMENDED FOR HEALTH-CARE WORKERS				
Hepatitis B (HB) recombinant vaccine	Two doses IM 4 weeks apart; third dose 5 months after second; booster doses not necessary.	**Preexposure:** HCWs at risk for exposure to blood or body fluids. **Postexposure:** See Table 3.	On the basis of limited data, no risk of adverse effects to developing fetuses is apparent. Pregnancy should *not* be considered a contraindication to vaccination of women. Previous anaphylactic reaction to common baker's yeast is a contraindication to vaccination.	The vaccine produces neither therapeutic nor adverse effects on HBV-infected persons. Prevaccination serologic screening is not indicated for persons being vaccinated because of occupational risk. HCWs who have contact with patients or blood should be tested 1–2 months after vaccination to determine serologic response.
Hepatitis B immune globulin (HBIG)	0.06 mL/kg IM as soon as possible after exposure. A second dose of HBIG should be administered 1 month later if the HB vaccine series has not been started.	**Postexposure** prophylaxis (Table 3): For persons exposed to blood or body fluids containing HBsAg and who are not immune to HBV infection — 0.06 mL/kg IM as soon as possible (but no later than 7 days after exposure).		
Influenza vaccine (inactivated whole-virus and split-virus vaccines)	Annual vaccination with current vaccine. Administered IM.	HCWs who have contact with patients at high risk for influenza or its complications; HCWs who work in chronic care facilities; HCWs with high-risk medical conditions or who are aged ≥65 years.	History of anaphylactic hypersensitivity to egg ingestion.	No evidence exists of risk to mother or fetus when the vaccine is administered to a pregnant woman with an underlying high-risk condition. Influenza vaccination is recommended during second and third trimesters of pregnancy because of increased risk for hospitalization.

Measles live-virus vaccine	One dose SC; second dose at least 1 month later.	HCWs[†] born during or after 1957 who do not have documentation of having received 2 doses of live vaccine on of after the first birthday **or** a history of physician-diagnosed measles or serologic evidence of immunity. Vaccination should be considered for all HCWs who lack proof of immunity, including those born before 1957.	Pregnancy; immunocompromised persons[§], including HIV-infected persons who have evidence of severe immunosuppression; anaphylaxis after gelatin ingestion or administration of neomycin; recent administration of immune globulin.	MMR is the vaccine of choice if recipients are likely to be susceptible to rubella and/or mumps as well as to measles. Persons vaccinated during 1963–1967 with a killed measles vaccine alone, killed vaccine followed by live vaccine, or with a vaccine of unknown type should be revaccinated with 2 doses of live measles virus vaccine.
Mumps live-virus vaccine	One dose SC; no booster.	HCWs[†] believed to be susceptible can be vaccinated. Adults born before 1957 can be considered immune.	Pregnancy; immunocompromised persons[§]; history of anaphylactic reaction after gelatin ingestion or administration of neomycin.	MMR is the vaccine of choice if recipients are likely to be susceptible to measles and rubella as well as to mumps.

*Persons who provide health care to patients or work in institutions that provide patient care, e.g., physicians, nurses, emergency medical personnel, dental professionals and students, medical and nursing students, laboratory technicians, hospital volunteers, and administrative and support staff in health-care institutions

[†]All HCWs (i.e., medical or nonmedical, paid or volunteer, full time or part time, student or non-student, with or without patient-care responsibilities) who work in health-care institutions (e.g., inpatient and outpatient, public and private) should be immune to measles, rubella, and varicella.

[§]Persons immunocompromised because of immune deficiency diseases, HIV infection, leukemia, lymphoma or generalized malignancy or immunosuppressed as a result of therapy with corticosteroids, alkylating drugs, antimetabolites, or radiation.

Abbreviations: IM = intramuscular; HBV = hepatitis B virus; HBsAg = hepatitis B surface antigen; SC = subcutaneous; HIV = human immunodeficiency virus; MMR = measles, mumps, rubella vaccine.

TABLE 2. Immunizing agents and immunization schedules for health-care workers (HCWs)* — Continued

Generic name	Primary schedule and booster(s)	Indications	Major precautions and contraindications	Special considerations
Rubella live-virus vaccine	One dose SC; no booster	Indicated for HCWs[†], both men and women, who do not have documentation of having received live vaccine on or after their first birthday **or** laboratory evidence of immunity. Adults born before 1957, **except women who can become pregnant**, can be considered immune.	Pregnancy; immunocompromised persons[†]; history of anaphylactic reaction after administration of neomycin.	The risk for rubella vaccine-associated malformations in the offspring of women pregnant when vaccinated or who become pregnant within 3 months after vaccination is negligible. Such women should be counseled regarding the theoretical basis of concern for the fetus. MMR is the vaccine of choice if recipients are likely to be susceptible to measles or mumps, as well as to rubella.
Varicella zoster live-virus vaccine	Two 0.5 mL doses SC 4-8 weeks apart if ≥13 years of age.	Indicated for HCWs[†] who do not have either a reliable history of varicella or serologic evidence of immunity.	Pregnancy, immunocompromised persons[§], history of anaphylactic reaction following receipt of neomycin or gelatin. Avoid salicylate use for 6 weeks after vaccination.	Vaccine is available from the manufacturer for certain patients with acute lymphocytic leukemia (ALL) in remission. Because 71%-93% of persons without a history of varicella are immune, serologic testing before vaccination is likely to be cost-effective.
Varicella-zoster immune globulin (VZIG)	Persons <50 kg: 125 u/10 kg IM; persons ≥50 kg: 625 u[¶].	Persons known or likely to be susceptible (particularly those at high risk for complications, e.g., pregnant women) who have close and prolonged exposure to a contact case or to an infectious hospital staff worker or patient.		Serologic testing may help in assessing whether to administer VZIG. If use of VZIG prevents varicella disease, patient should be vaccinated subsequently.

BCG VACCINATION				
Bacille Calmette Guérin(BCG) Vaccine (Tuberculosis)	One percutaneous dose of 0.3 mL; no booster dose recommended.	Should be considered only for HCWs in areas where multi-drug tuberculosis is prevalent, a strong likelihood of infection exists, and where comprehensive infection control precautions have failed to prevent TB transmission to HCWs.	Should not be administered to immunocompromised persons,[§] pregnant women.	In the United States tuberculosis-control efforts are directed towards early identification, treatment of cases, and preventive therapy with isoniazid.

OTHER IMMUNOBIOLOGICS THAT ARE OR MAY BE INDICATED FOR HEALTH-CARE WORKERS

Generic name	Primary schedule and booster(s)	Indications	Major precautions and contraindications	Special considerations
Immune globulin (Hepatitis A)	**Postexposure**-One IM dose of 0.02 mL/kg administered ≤2 weeks after exposure.	Indicated for HCWs exposed to feces of infectious patients.	Contraindicated in persons with IgA deficiency; do not administer within 2 weeks after MMR vaccine, or 3 weeks after varicella vaccine. Delay administration of MMR vaccine for ≥3 months and varicella vaccine ≥5 months after administration of IG.	Administer in large muscle mass (deltoid, gluteal).

[*] Persons who provide health care to patients or work in institutions that provide patient care, e.g., physicians, nurses, emergency medical personnel, dental professionals and students, medical and nursing students, laboratory technicians, hospital volunteers, and administrative and support staff in health-care institutions.

[†] All HCWs (i.e., medical or nonmedical, paid or volunteer, full-time or part-time, student or nonstudent, with or without patient-care responsibilities) who work in health-care institutions (i.e., inpatient and outpatient, public and private) should be immune to measles, rubella, and varicella.

[§] Persons immunocompromised because of immune deficiency diseases, HIV infection (who should primarily not receive BCG, OPV, and yellow fever vaccines), leukemia, lymphoma or generalized malignancy or immunosuppressed as a result of therapy with corticosteroids, alkylating drugs, antimetabolites, or radiation.

[¶] Some experts recommend 125 u/10 kg regardless of total body weight.

Abbreviations: IM = intramuscular; HCW = health-care worker; TB = tuberculosis; MMR = measles, mumps, rubella vaccine; HAV = hepatitis A virus; SC = subcutaneous; IgA = immune globulin A.

TABLE 2. Immunizing agents and immunization schedules for health-care workers (HCWs)* — Continued

Generic name	Primary schedule and booster(s)	Indications	Major precautions and contraindications	Special considerations
Hepatitis A vaccine	Two doses of vaccine either 6-12 months apart (HAVRIX®), or 6 months apart (VAQTA®).	Not routinely indicated for HCWs in the United States. Persons who work with HAV-infected primates or with HAV in a research laboratory setting should be vaccinated.	History of anaphylactic hypersensitivity to alum or, for HAVRIX®, the preservative 2-phenoxyethanol. The safety of the vaccine in pregnant women has not been determined; the risk associated with vaccination should be weighed against the risk for hepatitis A in women who may be at high risk for exposure to HAV.	
Meningococcal polysaccharide vaccine (tetravalent A, C, W135, and Y)	One dose in volume and by route specified by manufacturer; need for boosters unknown.	Not routinely indicated for HCWs in the United States.	The safety of the vaccine in pregnant women has not been evaluated; it should not be administered during pregnancy unless the risk for infection is high.	
Typhoid vaccine, IM, SC, and oral	*IM vaccine:* One 0.5 mL dose, booster 0.5 mL every 2 years. *SC vaccine:* two 0.5 mL doses, ≥4 weeks apart, booster 0.5 mL SC or 0.1 ID every 3 years if exposure continues. *Oral vaccine:* Four doses on alternate days. The manufacturer recommends revaccination with the entire four-dose series every 5 years.	Workers in microbiology laboratories who frequently work with *Salmonella typhi.*	Severe local or systemic reaction to a previous dose. Ty21a (oral) vaccine should not be administered to immunocompromised persons† or to persons receiving antimicrobial agents.	Vaccination should not be considered an alternative to the use of proper procedures when handling specimens and cultures in the laboratory.

Vaccinia vaccine (smallpox)	One dose administered with a bifurcated needle; boosters administered every 10 years.	Laboratory workers who directly handle cultures with vaccinia, recombinant vaccinia viruses, or orthopox viruses that infect humans.	The vaccine is contraindicated in pregnancy, in persons with eczema or a history of eczema, and in immunocompromised persons[†] and their household contacts.	Vaccination may be considered for HCWs who have direct contact with contaminated dressings or other infectious material from volunteers in clinical studies involving recombinant vaccinia virus.
OTHER VACCINE-PREVENTABLE DISEASES				
Tetanus and diphtheria (toxoids [Td])	Two IM doses 4 weeks apart; third dose 6-12 months after second dose; booster every 10 years.	All adults.	Except in the first trimester, pregnancy is not a precaution. History of a neurologic reaction or immediate hypersensitivity reaction after a previous dose. History of severe local (Arthus-type) reaction after a previous dose. Such persons should not receive further routine or emergency doses of Td for 10 years.	Tetanus prophylaxis in wound management[§].
Pneumococcal polysaccharide vaccine (23 valent).	One dose, 0.5 mL, IM or SC; revaccination recommended for those at highest risk ≥5 years after the first dose.	Adults who are at increased risk of pneumococcal disease and its complications because of underlying health conditions; older adults, especially those age ≥65 who are healthy.	The safety of vaccine in pregnant women has not been evaluated; it should not be administered during pregnancy unless the risk for infection is high. Previous recipients of any type of pneumococcal polysaccharide vaccine who are at highest risk for fatal infection or antibody loss may be revaccinated ≥5 years after the first dose.	

[*] Persons who provide health care to patients or work in institutions that provide patient care, e.g., physicians, nurses, emergency medical personnel, dental professionals and students, medical and nursing students, laboratory technicians, hospital volunteers, and administrative and support staff in health-care institutions.

[†] Persons immunocompromised because of immune deficiency diseases, HIV infection, leukemia, lymphoma or generalized malignancy or immunosuppressed as a result of therapy with corticosteroids, alkylating drugs, antimetabolites, or radiation.

[§] See (15) CDC. Update on adult immunization: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 1991:40(No. RR-12):1–94.

Abbreviations: IM = intramuscular; ID = intradermal; SC = subcutaneous.

Examples of Recommended Personal Protection for Worker Protection Against HIV and HBV Transmission in Prehospital Settings

Task or Activity	Disposable Gloves	Gown	Mask	Protective Eyewear
Bleeding control with spurting blood	Yes	Yes	Yes	Yes
Bleeding control with minimal bleeding	Yes	No	No	No
Emergency childbirth	Yes	Yes	Yes, if splashing is likely	Yes, if splashing is likely
Blood drawing	At certain[1] times	No	No	No
Starting an intravenous (IV) line	Yes	No	No	No
Endotracheal intubation, esophageal obturator use	Yes	No	No, unless splashing is likely	No, unless splashing is likely
Oral/nasal suctioning, manually clearing airway	Yes[2]	No	No, unless splashing is likely	No, unless splashing is likely
Handling and cleaning instruments with microbial contamination	Yes	No, unless soiling is likely	No	No
Measuring blood pressure	No	No	No	No
Measuring temperature	No	No	No	No
Giving an injection	No	No	No	No

NOTE: The examples provided in this table are based on application of universal precautions. Universal precautions are intended to supplement rather than replace recommendations for routine infection control, such as handwashing and using gloves to prevent gross microbial contamination of hands (e.g., contact with urine or feces).

[1] Gloves should be worn for phlebotomy if cuts, scratches or other breaks in the skin are present on the worker's hands, if the worker is inexperienced, or the situation suggests a greater possibility of bleeding.

[2] While not clearly necessary to prevent HIV or HBV transmission unless blood is present, gloves are recommended to prevent transmission of other agents (e.g., Herpes simplex).

Centers for Disease Control, February 1989

Recommendations for Decontamination and Cleaning of Rescue Vehicles

Clean-Up Kit

Household utility gloves
Plastic spray bottle with cleaning agent
Plastic spray bottle with disinfectant solution or bottle with concentrated household bleach to be diluted with water (1:100 dilution approximates 1/4 cup bleach per gallon of water)
Disposable toweling
Plastic bags (hospital red bags, household plastic bags)
Basket/carrier to hold cleaning supplies

Clean-Up Procedure for After Each Call

1. **Prepare vehicle for cleaning/decontamination**

   a. Always wear utility gloves throughout clean-up procedure.

   b. Remove used or soiled linen and place in designated bag for laundering. Either leave laundry at the hospital or reprocess in the EMS laundry using warm water, detergent, and bleach as recommended on the product labels.

   c. Discard any soiled dressings, bloody materials, and other contaminated, non-sharps waste in a red bag and leave at the hospital.

   d. Place reusable equipment which needs reprocessing in plastic bag (any color other than red).

   e. Check the vehicle for any needles or other sharps which may have been left and carefully dispose in a sharps container.

2. **Check for areas soiled with blood and other visible body substances and remove.**

   a. Remove moist blood and other body substances with paper toweling and discard in a red bag.

   b. Spray cleaner on affected area and remove any remaining blood or body substance. Dispose of towels in red bag.

   c. Spray disinfectant on affected area, wipe over the surface, and allow to air dry. Dispose of towels in red bag.

3. **Spray cleaner on remaining surfaces with which the patient had contact as well as surfaces which were used in the course of providing prehospital care. Wipe the surface with toweling and allow to air dry.**

Periodic Cleaning of Rescue Vehicles

On a regular basis (e.g., weekly, monthly), as determined by the frequency of vehicle use and obvious need, the floors, walls, interior and exterior of cabinets and drawers, benches, and other surfaces, should be thoroughly cleaned.The same cleaning agent used between cases can be used for this more extensive cleaning. A supply kit should be kept in a central location for this purpose (e.g., pail, reusable cleaning cloths that are laundered after use, supply of cleaning agents). Wipe with toweling and allow to air dry.

Since carpeting and permeable seat cover in the patient compartment of ambulances are more difficult to clean than non-permeable surfaces, their use is not recommended.

NOTE: Bleach solution should be made up fresh at the time of use or daily.

Reprocessing Methods for Equipment used in the Prehospital Health-Care Setting

STERILIZATION

Destroys: All forms of microbial life including high numbers of bacterial spores

Methods: Steam under pressure (autoclave), gas (ethylene oxide), dry heat, or immersion in EPA-approved chemical "sterilant" for prolonged period of time, e.g., 6-10 hours or according to manufacturers' instructions. Note: liquid chemical "sterilants" should be used only on those instruments that are impossible to sterilize or disinfect with heat.

Use: For those instruments or devices that penetrate skin or contact normally sterile areas of the body, e.g., scalpels, needles, etc. Disposable invasive equipment eliminates the need to reprocess these types of items. When indicated, however, arrangements should be made with a health-care facility for reprocessing of reusable invasive instruments.

HIGH-LEVEL DISINFECTION

Destroys: All forms of microbial life except high numbers of bacterial spores.

Methods: Hot water pasteurization (80-100 C, 30 minutes) or exposure to an EPA-registered chemical "sterilant" as above, except for a short exposure time (10-45 minutes or as directed by the manufacturer).

Use: For reusable instruments or devices that come into contact with mucous membranes (e.g., laryngoscope blades, endotracheal tubes, etc.).

INTERMEDIATE-LEVEL DISINFECTION

Destroys: *Mycobacterium tuberculosis,* vegetative bacteria, most viruses, and most fungi, but does not kill bacterial spores.

Methods: EPA-registered "hospital disinfectant" chemical germicides that have a label claim for tuberculocidal activity; commercially available hard-surface germicides or solutions containing at least 500 ppm free available chlorine (a 1:100 dilution of common household bleach - approximately 1/4 cup bleach per gallon of tap water).

Use: For those surfaces that come into contact only with intact skin, e.g., stethoscopes, blood pressure cuffs, splints, etc., and have been visibly contaminated with blood or bloody body fluids. Surfaces must be precleaned of visible material before the germicidal chemical is applied for disinfection.

LOW-LEVEL DISINFECTION

Destroys: Most bacteria, some viruses, some fungi, but not *Mycobacterium tuberculosis* or bacterial spores.

Methods: EPA-registered "hospital disinfectants" (no label claim for tuberculocidal activity).

Use: These agents are excellent cleaners and can be used for routine housekeeping or removal of soiling in the **absence** of visible blood contamination.

Environmental Disinfection: Environmental surfaces which have become soiled should be cleaned and disinfected using any cleaner or disinfectant agent which is intended for environmental use. Such surfaces include floors, woodwork, ambulance seats,
countertops, etc.

IMPORTANT: To assure the effectiveness of any sterilization or disinfection process, equipment and instruments must first be thoroughly cleaned of all visible soil.

Centers for Disease Control, February 1989

Bloodborne Pathogens

Part Number:	1910
Part Title:	Occupational Safety and Health Standards
• **Subpart:**	Z
• **Subpart Title:**	Toxic and Hazardous Substances
• **Standard Number:**	1910.1030
• **Title:**	Bloodborne pathogens.

• **Appendix:** A

(a) Scope and Application. This section applies to all occupational exposure to blood or other potentially infectious materials as defined by paragraph (b) of this section.

(b) Definitions. For purposes of this section, the following shall apply:

Assistant Secretary means the Assistant Secretary of Labor for Occupational Safety and Health, or designated representative.

Blood means human blood, human blood components, and products made from human blood.

Bloodborne Pathogens means pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

Clinical Laboratory means a workplace where diagnostic or other screening procedures are performed on blood or other potentially infectious materials.

Contaminated means the presence or the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.

Contaminated Laundry means laundry which has been soiled with blood or other potentially infectious materials or may contain sharps.

Contaminated Sharps means any contaminated object that can penetrate the skin including, but not limited to, needles, scalpels, broken glass, broken capillary tubes, and exposed ends of dental wires.

Decontamination means the use of physical or chemical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal.

Director means the Director of the National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designated representative.

Engineering Controls means controls (e.g., sharps disposal containers, self-sheathing needles, safer medical devices, such as sharps with engineered sharps injury protections and needleless systems) that isolate or remove the bloodborne pathogens hazard from the workplace.

Exposure Incident means a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee's duties.

Handwashing Facilities means a facility providing an adequate supply of running potable water, soap and single use towels or hot air drying machines.

Licensed Healthcare Professional is a person whose legally permitted scope of practice allows him or her to independently perform the activities required by paragraph (f) Hepatitis B Vaccination and Post-exposure Evaluation and Follow-up.

HBV means hepatitis B virus.

HIV means human immunodeficiency virus.

Needleless systems means a device that does not use needles for:

The collection of bodily fluids or withdrawal of body fluids after initial venous or arterial access is established; (2) The administration of medication or fluids; or (3) Any other procedure involving the potential for occupational exposure to bloodborne pathogens due to percutaneous injuries from contaminated sharps.

Occupational Exposure means reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.

Other Potentially Infectious Materials means (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and (3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

Parenteral means piercing mucous membranes or the skin barrier through such events as needlesticks, human bites, cuts, and abrasions.

Personal Protective Equipment is specialized clothing or equipment worn by an employee for protection against a hazard. General work clothes (e.g., uniforms, pants, shirts or blouses) not intended to function as protection against a hazard are not considered to be personal protective equipment.

Production Facility means a facility engaged in industrial-scale, large-volume or high concentration production of HIV or HBV.

Regulated Waste means liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or other potentially infectious materials.

Research Laboratory means a laboratory producing or using research-laboratory-scale amounts of HIV or HBV. Research laboratories may produce high concentrations of HIV or HBV but not in the volume found in production facilities.

Sharps with engineered sharps injury protections means a nonneedle sharp or a needle device used for withdrawing body fluids, accessing a vein or artery, or administering medications or other fluids, with a built-in safety feature or mechanism that effectively reduces the risk of an exposure incident.

Source Individual means any individual, living or dead, whose blood or other potentially infectious materials may be a source of occupational exposure to the employee. Examples include, but are not limited to, hospital and clinic patients; clients in institutions for the developmentally disabled; trauma victims; clients of drug and alcohol treatment facilities; residents of hospices and nursing homes; human remains; and individuals who donate or sell blood or blood components.

Sterilize means the use of a physical or chemical procedure to destroy all microbial life including highly resistant bacterial endospores.
Universal Precautions is an approach to infection control. According to the concept of Universal Precautions, all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other bloodborne pathogens.
Work Practice Controls means controls that reduce the likelihood of exposure by altering the manner in which a task is performed (e.g., prohibiting recapping of needles by a two-handed technique).

(c) Exposure Control --
(1) Exposure Control Plan.

(i) Each employer having an employee(s) with occupational exposure as defined by paragraph (b) of this section shall establish a written Exposure Control Plan designed to eliminate or minimize employee exposure.

(ii) The Exposure Control Plan shall contain at least the following elements:

(A) The exposure determination required by paragraph (c)(2),

(B) The schedule and method of implementation for paragraphs (d) Methods of Compliance, (e) HIV and HBV Research Laboratories and Production Facilities, (f) Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-up, (g) Communication of Hazards to Employees, and (h) Recordkeeping, of this standard, and

(C) The procedure for the evaluation of circumstances surrounding exposure incidents as required by paragraph (f)(3)(i) of this standard.

(iii) Each employer shall ensure that a copy of the Exposure Control Plan is accessible to employees in accordance with 29 CFR 1910.1020(e).

(iv) The Exposure Control Plan shall be reviewed and updated at least annually and whenever necessary to reflect new or modified tasks and procedures which affect occupational exposure and to reflect new or revised employee positions with occupational exposure. The review and update of such plans shall also:

(A) Reflect changes in technology that eliminate or reduce exposure to bloodborne pathogens; and

(B) Document annually consideration and implementation of appropriate commercially available and effective safer medical devices designed to eliminate or minimize occupational exposure.

(v) An employer, who is required to establish an Exposure Control Plan shall solicit input from non-managerial employees responsible for direct patient care who are potentially exposed to injuries from contaminated sharps in the identification, evaluation, and selection of effective engineering and work practice controls and shall document the solicitation in the Exposure Control Plan.

The Exposure Control Plan shall be made available to the Assistant Secretary and the Director upon request for examination and copying.

(2) Exposure Determination.

(i) Each employer who has an employee(s) with occupational exposure as defined by paragraph (b) of this section shall prepare an exposure determination. This exposure determination shall contain the following:

(A) A list of all job classifications in which all employees in those job classifications have occupational exposure;
(B) A list of job classifications in which some employees have occupational exposure, and
(C) A list of all tasks and procedures or groups of closely related task and procedures in which occupational exposure occurs and that are performed by employees in job classifications listed in accordance with the provisions of paragraph (c)(2)(i)(B) of this standard.

(ii) This exposure determination shall be made without regard to the use of personal protective equipment.

(d) Methods of Compliance –

(1) General. Universal precautions shall be observed to prevent contact with blood or other potentially infectious materials. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids shall be considered potentially infectious materials.

(2) Engineering and Work Practice Controls.

(i) Engineering and work practice controls shall be used to eliminate or minimize employee exposure. Where occupational exposure remains after institution of these controls, personal protective equipment shall also be used.

(ii) Engineering controls shall be examined and maintained or replaced on a regular schedule to ensure their effectiveness.

(iii) Employers shall provide handwashing facilities which are readily accessible to employees.

(iv) When provision of handwashing facilities is not feasible, the employer shall provide either an appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. When antiseptic hand cleansers or towelettes are used, hands shall be washed with soap and running water as soon as feasible.

(v) Employers shall ensure that employees wash their hands immediately or as soon as feasible after removal of gloves or other personal protective equipment.

(vi) Employers shall ensure that employees wash hands and any other skin with soap and water, or flush mucous membranes with water immediately or as soon as feasible following contact of such body areas with blood or other potentially infectious materials.

(vii) Contaminated needles and other contaminated sharps shall not be bent, recapped, or removed except as noted in paragraphs (d)(2)(vii)(A) and (d)(2)(vii)(B) below. Shearing or breaking of contaminated needles is prohibited.

(A) Contaminated needles and other contaminated sharps shall not be bent, recapped or removed unless the employer can demonstrate that no alternative is feasible or that such action is required by a specific medical or dental procedure.

(B) Such bending, recapping or needle removal must be accomplished through the use of a mechanical device or a one-handed technique.

(viii) Immediately or as soon as possible after use, contaminated reusable sharps shall be placed in appropriate containers until properly reprocessed. These containers shall be:

(A) Puncture resistant;

(B) Labeled or color-coded in accordance with this standard;

(C) Leakproof on the sides and bottom; and

(D) In accordance with the requirements set forth in paragraph (d)(4)(ii)(E) for reusable sharps.

(ix) Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in work areas where there is a reasonable likelihood of occupational exposure.

(x) Food and drink shall not be kept in refrigerators, freezers, shelves, cabinets or on countertops or benchtops where blood or other potentially infectious materials are present.

(xi) All procedures involving blood or other potentially infectious materials shall be performed in such a manner as to minimize splashing, spraying, spattering, and generation of droplets of these substances.

(xii) Mouth pipetting/suctioning of blood or other potentially infectious materials is prohibited.

(xiii) Specimens of blood or other potentially infectious materials shall be placed in a container which prevents leakage during collection, handling, processing, storage, transport, or shipping.

(A) The container for storage, transport, or shipping shall be labeled or color-coded according to paragraph (g)(1)(i) and closed prior to being stored, transported, or shipped. When a facility utilizes Universal Precautions in the handling of all specimens, the labeling/color-coding of specimens is not necessary provided containers are recognizable as containing specimens. This exemption only applies while such specimens/containers remain within the facility. Labeling or color-coding in accordance with paragraph (g)(1)(i) is required when such specimens/containers leave the facility.

(B) If outside contamination of the primary container occurs, the primary container shall be placed within a second container which prevents leakage during handling, processing, storage, transport, or shipping and is labeled or color-coded according to the requirements of this standard.

(C) If the specimen could puncture the primary container, the primary container shall be placed within a secondary container which is puncture-resistant in addition to the above characteristics.

(xiv) Equipment which may become contaminated with blood or other potentially infectious materials shall be examined prior to servicing or shipping and shall be decontaminated as necessary, unless the employer can demonstrate that decontamination of such equipment or portions of such equipment is not feasible.

(A) A readily observable label in accordance with paragraph (g)(1)(i)(H) shall be attached to the equipment stating which portions remain contaminated.

(B) The employer shall ensure that this information is conveyed to all affected employees, the servicing representative, and/or the manufacturer, as appropriate, prior to handling, servicing, or shipping so that appropriate precautions will be taken.

(3) Personal Protective Equipment --

(i) Provision. When there is occupational exposure, the employer shall provide, at no cost to the employee, appropriate personal protective equipment such as, but not limited to, gloves, gowns, laboratory coats, face shields or masks and eye protection, and mouthpieces, resuscitation bags, pocket masks, or other ventilation devices. Personal protective equipment will be considered "appropriate" only if it does not permit blood or other potentially infectious materials to pass through to or reach the employee's work clothes, street clothes, undergarments, skin, eyes, mouth, or other mucous membranes under normal conditions of use and for the duration of time which the protective equipment will be used.

(ii) Use. The employer shall ensure that the employee uses appropriate personal protective equipment unless the employer shows that the employee temporarily and briefly declined to use personal protective equipment when, under rare and extraordinary circumstances, it was the employee's professional judgment that in the specific instance its use would have prevented the delivery of health care or public safety services or would have posed an increased hazard to the safety of the worker or co-worker. When the employee makes this judgement, the circumstances shall be investigated and documented in order to determine whether changes can be instituted to prevent such occurrences in the future.

(iii) Accessibility. The employer shall ensure that appropriate personal protective equipment in the appropriate sizes is readily accessible at the worksite or is issued to employees. Hypoallergenic gloves, glove liners, powderless gloves, or other similar alternatives shall be readily accessible to those employees who are allergic to the gloves normally provided.

(iv) Cleaning, Laundering, and Disposal. The employer shall clean, launder, and dispose of personal protective equipment required by paragraphs (d) and (e) of this standard, at no cost to the employee.

(v) Repair and Replacement. The employer shall repair or replace personal protective equipment as needed to maintain its effectiveness, at no cost to the employee.

(vi) If a garment(s) is penetrated by blood or other potentially infectious materials, the garment(s) shall be removed immediately or as soon as feasible.

(vii) All personal protective equipment shall be removed prior to leaving the work area.

(viii) When personal protective equipment is removed it shall be placed in an appropriately designated area or container for storage, washing, decontamination or disposal.

(ix) Gloves. Gloves shall be worn when it can be reasonably anticipated that the employee may have hand contact with blood, other potentially infectious materials, mucous membranes, and non-intact skin; when performing vascular

access procedures except as specified in paragraph (d)(3)(ix)(D); and when handling or touching contaminated items or surfaces.

(A) Disposable (single use) gloves such as surgical or examination gloves, shall be replaced as soon as practical when contaminated or as soon as feasible if they are torn, punctured, or when their ability to function as a barrier is compromised.

(B) Disposable (single use) gloves shall not be washed or decontaminated for re-use.

(C) Utility gloves may be decontaminated for re-use if the integrity of the glove is not compromised. However, they must be discarded if they are cracked, peeling, torn, punctured, or exhibit other signs of deterioration or when their ability to function as a barrier is compromised.

(D) If an employer in a volunteer blood donation center judges that routine gloving for all phlebotomies is not necessary then the employer shall:

(1) Periodically reevaluate this policy;

(2) Make gloves available to all employees who wish to use them for phlebotomy;

(3) Not discourage the use of gloves for phlebotomy; and

(4) Require that gloves be used for phlebotomy in the following circumstances:

(i) When the employee has cuts, scratches, or other breaks in his or her skin;

(ii) When the employee judges that hand contamination with blood may occur, for example, when performing phlebotomy on an uncooperative source individual; and

(iii) When the employee is receiving training in phlebotomy.

(x) Masks, Eye Protection, and Face Shields. Masks in combination with eye protection devices, such as goggles or glasses with solid side shields, or chin-length face shields, shall be worn whenever splashes, spray, spatter, or droplets of blood or other potentially infectious materials may be generated and eye, nose, or mouth contamination can be reasonably anticipated.

(xi) Gowns, Aprons, and Other Protective Body Clothing. Appropriate protective clothing such as, but not limited to, gowns, aprons, lab coats, clinic jackets, or similar outer garments shall be worn in occupational exposure situations. The type and characteristics will depend upon the task and degree of exposure anticipated.

(xii) Surgical caps or hoods and/or shoe covers or boots shall be worn in instances when gross contamination can reasonably be anticipated (e.g., autopsies, orthopaedic surgery).

(4) Housekeeping --

(i) General. Employers shall ensure that the worksite is maintained in a clean and sanitary condition. The employer shall determine and implement an appropriate written schedule for cleaning and method of decontamination based upon the location within the facility, type of surface to be cleaned, type of soil present, and tasks or procedures being performed in the area.

(ii) All equipment and environmental and working surfaces shall be cleaned and decontaminated after contact with blood or other potentially infectious materials.

(A) Contaminated work surfaces shall be decontaminated with an appropriate disinfectant after completion of procedures; immediately or as soon as feasible when surfaces are overtly contaminated or after any spill of blood or other potentially infectious materials; and at the end of the work shift if the surface may have become contaminated since the last cleaning.

(B) Protective coverings, such as plastic wrap, aluminum foil, or imperviously-backed absorbent paper used to cover equipment and environmental surfaces, shall be removed and replaced as soon as feasible when they become overtly contaminated or at the end of the workshift if they may have become contaminated during the shift.

(C) All bins, pails, cans, and similar receptacles intended for reuse which have a reasonable likelihood for becoming contaminated with blood or other potentially infectious materials shall be inspected and decontaminated on a regularly scheduled basis and cleaned and decontaminated immediately or as soon as feasible upon visible contamination.

(D) Broken glassware which may be contaminated shall not be picked up directly with the hands. It shall be cleaned up using mechanical means, such as a brush and dust pan, tongs, or forceps.

(E) Reusable sharps that are contaminated with blood or other potentially infectious materials shall not be stored or processed in a manner that requires employees to reach by hand into the containers where these sharps have been placed.

(iii) Regulated Waste --

(A) Contaminated Sharps Discarding and Containment.

(1) Contaminated sharps shall be discarded immediately or as soon as feasible in containers that are:

(i) Closable;

(ii) Puncture resistant;

(iii) Leakproof on sides and bottom; and

(iv) Labeled or color-coded in accordance with paragraph (g)(1)(i) of this standard.

(2) During use, containers for contaminated sharps shall be:

(i) Easily accessible to personnel and located as close as is feasible to the immediate area where sharps are used or can be reasonably anticipated to be found (e.g., laundries);

(ii) Maintained upright throughout use; and

(iii) Replaced routinely and not be allowed to overfill.

(3) When moving containers of contaminated sharps from the area of use, the containers shall be:

(i) Closed immediately prior to removal or replacement to prevent spillage or protrusion of contents during handling, storage, transport, or shipping;

(ii) Placed in a secondary container if leakage is possible. The second container shall be:

(A) Closable;

(B) Constructed to contain all contents and prevent leakage during handling, storage, transport, or shipping; and

(C) Labeled or color-coded according to paragraph (g)(1)(i) of this standard.

(4) Reusable containers shall not be opened, emptied, or cleaned manually or in any other manner which would expose employees to the risk of percutaneous injury.

(B) Other Regulated Waste Containment --

(1)Regulated waste shall be placed in containers which are:

(i) Closable;

(ii) Constructed to contain all contents and prevent leakage of fluids during handling, storage, transport or shipping;

(iii) Labeled or color-coded in accordance with paragraph (g)(1)(i) this standard; and

(iv) Closed prior to removal to prevent spillage or protrusion of contents during handling, storage, transport, or shipping.

(2) If outside contamination of the regulated waste container occurs, it shall be placed in a second container. The second container shall be:

(i) Closable;

(ii) Constructed to contain all contents and prevent leakage of fluids during handling, storage, transport or shipping;

(iii) Labeled or color-coded in accordance with paragraph (g)(1)(i) of this standard; and

(iv) Closed prior to removal to prevent spillage or protrusion of contents during handling, storage, transport, or shipping.

(C) Disposal of all regulated waste shall be in accordance with applicable regulations of the United States, States and Territories, and political subdivisions of States and Territories.

(iv) Laundry.

(A) Contaminated laundry shall be handled as little as possible with a minimum of agitation.

(1) Contaminated laundry shall be bagged or containerized at the location where it was used and shall not be sorted or rinsed in the location of use.

(2) Contaminated laundry shall be placed and transported in bags or containers labeled or color-coded in accordance with paragraph (g)(1)(i) of this standard. When a facility utilizes Universal Precautions in the handling of all soiled laundry, alternative labeling or color-coding is sufficient if it permits all employees to recognize the containers as requiring compliance with Universal Precautions.

(3) Whenever contaminated laundry is wet and presents a reasonable likelihood of soak-through of or leakage from the bag or container, the laundry shall be placed and transported in bags or containers which prevent soak-through and/or leakage of fluids to the exterior.

(B) The employer shall ensure that employees who have contact with contaminated laundry wear protective gloves and other appropriate personal protective equipment.
(C) When a facility ships contaminated laundry off-site to a second facility which does not utilize Universal Precautions in the handling of all laundry, the facility generating the contaminated laundry must place such laundry in bags or containers which are labeled or color-coded in accordance with paragraph (g)(1)(i).

(e) HIV and HBV Research Laboratories and Production Facilities.
(1) This paragraph applies to research laboratories and production facilities engaged in the culture, production, concentration, experimentation, and manipulation of HIV and HBV. It does not apply to clinical or diagnostic laboratories engaged solely in the analysis of blood, tissues, or organs. These requirements apply in addition to the other requirements of the standard.
(2) Research laboratories and production facilities shall meet the following criteria:
(i) Standard Microbiological Practices. All regulated waste shall either be incinerated or decontaminated by a method such as autoclaving known to effectively destroy bloodborne pathogens.
(ii) Special Practices.
(A) Laboratory doors shall be kept closed when work involving HIV or HBV is in progress.
(B) Contaminated materials that are to be decontaminated at a site away from the work area shall be placed in a durable, leakproof, labeled or color-coded container that is closed before being removed from the work area.
(C) Access to the work area shall be limited to authorized persons. Written policies and procedures shall be established whereby only persons who have been advised of the potential biohazard, who meet any specific entry requirements, and who comply with all entry and exit procedures shall be allowed to enter the work areas and animal rooms.
(D) When other potentially infectious materials or infected animals are present in the work area or containment module, a hazard warning sign incorporating the universal biohazard symbol shall be posted on all access doors. The hazard warning sign shall comply with paragraph (g)(1)(ii) of this standard.
(E) All activities involving other potentially infectious materials shall be conducted in biological safety cabinets or other physical-containment devices within the containment module. No work with these other potentially infectious materials shall be conducted on the open bench.
(F) Laboratory coats, gowns, smocks, uniforms, or other appropriate protective clothing shall be used in the work area and animal rooms. Protective clothing shall not be worn outside of the work area and shall be decontaminated before being laundered.
(G) Special care shall be taken to avoid skin contact with other potentially infectious materials. Gloves shall be worn when handling infected animals

and when making hand contact with other potentially infectious materials is unavoidable.

(H) Before disposal all waste from work areas and from animal rooms shall either be incinerated or decontaminated by a method such as autoclaving known to effectively destroy bloodborne pathogens.

(I) Vacuum lines shall be protected with liquid disinfectant traps and high-efficiency particulate air (HEPA) filters or filters of equivalent or superior efficiency and which are checked routinely and maintained or replaced as necessary.

(J) Hypodermic needles and syringes shall be used only for parenteral injection and aspiration of fluids from laboratory animals and diaphragm bottles. Only needle-locking syringes or disposable syringe-needle units (i.e., the needle is integral to the syringe) shall be used for the injection or aspiration of other potentially infectious materials. Extreme caution shall be used when handling needles and syringes. A needle shall not be bent, sheared, replaced in the sheath or guard, or removed from the syringe following use. The needle and syringe shall be promptly placed in a puncture-resistant container and autoclaved or decontaminated before reuse or disposal.

(K) All spills shall be immediately contained and cleaned up by appropriate professional staff or others properly trained and equipped to work with potentially concentrated infectious materials.

(L) A spill or accident that results in an exposure incident shall be immediately reported to the laboratory director or other responsible person.

(M) A biosafety manual shall be prepared or adopted and periodically reviewed and updated at least annually or more often if necessary. Personnel shall be advised of potential hazards, shall be required to read instructions on practices and procedures, and shall be required to follow them.

(ii) Containment Equipment.

(A) Certified biological safety cabinets (Class I, II, or III) or other appropriate combinations of personal protection or physical containment devices, such as special protective clothing, respirators, centrifuge safety cups, sealed centrifuge rotors, and containment caging for animals, shall be used for all activities with other potentially infectious materials that pose a threat of exposure to droplets, splashes, spills, or aerosols.

(B) Biological safety cabinets shall be certified when installed, whenever they are moved and at least annually.

(3) HIV and HBV research laboratories shall meet the following criteria:

(i) Each laboratory shall contain a facility for hand washing and an eye wash facility which is readily available within the work area.

(ii) An autoclave for decontamination of regulated waste shall be available.

(4) HIV and HBV production facilities shall meet the following criteria:

(i) The work areas shall be separated from areas that are open to unrestricted traffic flow within the building. Passage through two sets of doors shall be the

basic requirement for entry into the work area from access corridors or other contiguous areas. Physical separation of the high-containment work area from access corridors or other areas or activities may also be provided by a double-doored clothes-change room (showers may be included), airlock, or other access facility that requires passing through two sets of doors before entering the work area.

(ii) The surfaces of doors, walls, floors and ceilings in the work area shall be water resistant so that they can be easily cleaned. Penetrations in these surfaces shall be sealed or capable of being sealed to facilitate decontamination.

(iii) Each work area shall contain a sink for washing hands and a readily available eye wash facility. The sink shall be foot, elbow, or automatically operated and shall be located near the exit door of the work area.

(iv) Access doors to the work area or containment module shall be self-closing.

(v) An autoclave for decontamination of regulated waste shall be available within or as near as possible to the work area.

(vi) A ducted exhaust-air ventilation system shall be provided. This system shall create directional airflow that draws air into the work area through the entry area. The exhaust air shall not be recirculated to any other area of the building, shall be discharged to the outside, and shall be dispersed away from occupied areas and air intakes. The proper direction of the airflow shall be verified (i.e., into the work area).

(5) Training Requirements. Additional training requirements for employees in HIV and HBV research laboratories and HIV and HBV production facilities are specified in paragraph (g)(2)(ix).

(f) Hepatitis B Vaccination and Post-exposure Evaluation and Follow-up --

(1) General.

(i) The employer shall make available the hepatitis B vaccine and vaccination series to all employees who have occupational exposure, and post-exposure evaluation and follow-up to all employees who have had an exposure incident.

(ii) The employer shall ensure that all medical evaluations and procedures including the hepatitis B vaccine and vaccination series and post-exposure evaluation and follow-up, including prophylaxis, are:

(A) Made available at no cost to the employee;

(B) Made available to the employee at a reasonable time and place;

(C) Performed by or under the supervision of a licensed physician or by or under the supervision of another licensed healthcare professional; and

(D) Provided according to recommendations of the U.S. Public Health Service current at the time these evaluations and procedures take place, except as specified by this paragraph (f).

(iii) The employer shall ensure that all laboratory tests are conducted by an accredited laboratory at no cost to the employee.

(2) Hepatitis B Vaccination.

(i) Hepatitis B vaccination shall be made available after the employee has received the training required in paragraph (g)(2)(vii)(I) and within 10 working days of initial assignment to all employees who have occupational exposure

unless the employee has previously received the complete hepatitis B vaccination series, antibody testing has revealed that the employee is immune, or the vaccine is contraindicated for medical reasons.

(ii) The employer shall not make participation in a prescreening program a prerequisite for receiving hepatitis B vaccination.

(iii) If the employee initially declines hepatitis B vaccination but at a later date while still covered under the standard decides to accept the vaccination, the employer shall make available hepatitis B vaccination at that time.

(iv) The employer shall assure that employees who decline to accept hepatitis B vaccination offered by the employer sign the statement in Appendix A.

(v) If a routine booster dose(s) of hepatitis B vaccine is recommended by the U.S. Public Health Service at a future date, such booster dose(s) shall be made available in accordance with section (f)(1)(ii).

(3) Post-exposure Evaluation and Follow-up. Following a report of an exposure incident, the employer shall make immediately available to the exposed employee a confidential medical evaluation and follow-up, including at least the following elements:

(i) Documentation of the route(s) of exposure, and the circumstances under which the exposure incident occurred;

(ii) Identification and documentation of the source individual, unless the employer can establish that identification is infeasible or prohibited by state or local law;

(A) The source individual's blood shall be tested as soon as feasible and after consent is obtained in order to determine HBV and HIV infectivity. If consent is not obtained, the employer shall establish that legally required consent cannot be obtained. When the source individual's consent is not required by law, the source individual's blood, if available, shall be tested and the results documented.

(B) When the source individual is already known to be infected with HBV or HIV, testing for the source individual's known HBV or HIV status need not be repeated.

(C) Results of the source individual's testing shall be made available to the exposed employee, and the employee shall be informed of applicable laws and regulations concerning disclosure of the identity and infectious status of the source individual.

(iii) Collection and testing of blood for HBV and HIV serological status;

(A) The exposed employee's blood shall be collected as soon as feasible and tested after consent is obtained.

(B) If the employee consents to baseline blood collection, but does not give consent at that time for HIV serologic testing, the sample shall be preserved for at least 90 days. If, within 90 days of the exposure incident, the employee elects to have the baseline sample tested, such testing shall be done as soon as feasible.

(iv) Post-exposure prophylaxis, when medically indicated, as recommended by the U.S. Public Health Service;

(v) Counseling; and

(vi) Evaluation of reported illnesses.

(4) Information Provided to the Healthcare Professional.

(i) The employer shall ensure that the healthcare professional responsible for the employee's Hepatitis B vaccination is provided a copy of this regulation.
(ii) The employer shall ensure that the healthcare professional evaluating an employee after an exposure incident is provided the following information:
(A) A copy of this regulation;
(B) A description of the exposed employee's duties as they relate to the exposure incident;
(C) Documentation of the route(s) of exposure and circumstances under which exposure occurred;
(D) Results of the source individual's blood testing, if available; and
(E) All medical records relevant to the appropriate treatment of the employee including vaccination status which are the employer's responsibility to maintain.

(5) Healthcare Professional's Written Opinion. The employer shall obtain and provide the employee with a copy of the evaluating healthcare professional's written opinion within 15 days of the completion of the evaluation.
(i) The healthcare professional's written opinion for Hepatitis B vaccination shall be limited to whether Hepatitis B vaccination is indicated for an employee, and if the employee has received such vaccination.
(ii) The healthcare professional's written opinion for post-exposure evaluation and follow-up shall be limited to the following information:
(A) That the employee has been informed of the results of the evaluation; and
(B) That the employee has been told about any medical conditions resulting from exposure to blood or other potentially infectious materials which require further evaluation or treatment.
(iii) All other findings or diagnoses shall remain confidential and shall not be included in the written report.

(6) Medical Recordkeeping. Medical records required by this standard shall be maintained in accordance with paragraph (h)(1) of this section.

(g) Communication of Hazards to Employees --

(1) Labels and Signs --

(i) Labels.
(A) Warning labels shall be affixed to containers of regulated waste, refrigerators and freezers containing blood or other potentially infectious material; and other containers used to store, transport or ship blood or other potentially infectious materials, except as provided in paragraph (g)(1)(i)(E), (F) and (G).
(B) Labels required by this section shall include the following legend:

(C) These labels shall be fluorescent orange or orange-red or predominantly so, with lettering and symbols in a contrasting color.
(D) Labels shall be affixed as close as feasible to the container by string, wire, adhesive, or other method that prevents their loss or unintentional removal.
(E) Red bags or red containers may be substituted for labels.
(F) Containers of blood, blood components, or blood products that are labeled as to their contents and have been released for transfusion or other clinical use are exempted from the labeling requirements of paragraph (g).
(G) Individual containers of blood or other potentially infectious materials that are placed in a labeled container during storage, transport, shipment or disposal are exempted from the labeling requirement.
(H) Labels required for contaminated equipment shall be in accordance with this paragraph and shall also state which portions of the equipment remain contaminated.
(I) Regulated waste that has been decontaminated need not be labeled or color-coded.

(ii) Signs.

(A) The employer shall post signs at the entrance to work areas specified in paragraph (e), HIV and HBV Research Laboratory and Production Facilities, which shall bear the following legend:

(Name of the Infectious Agent)
(Special requirements for entering the area)
(Name, telephone number of the laboratory director or other responsible person.)

(B) These signs shall be fluorescent orange-red or predominantly so, with lettering and symbols in a contrasting color.

(2) Information and Training.

(i) Employers shall ensure that all employees with occupational exposure participate in a training program which must be provided at no cost to the employee and during working hours.

(ii) Training shall be provided as follows:

(A) At the time of initial assignment to tasks where occupational exposure may take place;

(B) Within 90 days after the effective date of the standard; and

(C) at least annually thereafter.

(iii) For employees who have received training on bloodborne pathogens in the year preceding the effective date of the standard, only training with respect to the provisions of the standard which were not included need be provided.

(iv) Annual training for all employees shall be provided within one year of their previous training.

(v) Employers shall provide additional training when changes such as modification of tasks or procedures or institution of new tasks or procedures affect the employee's occupational exposure. The additional training may be limited to addressing the new exposures created.

(vi) Material appropriate in content and vocabulary to educational level, literacy, and language of employees shall be used.

(vii) The training program shall contain at a minimum the following elements:

(A) An accessible copy of the regulatory text of this standard and an explanation of its contents;

(B) A general explanation of the epidemiology and symptoms of bloodborne diseases;

(C) An explanation of the modes of transmission of bloodborne pathogens;

(D) An explanation of the employer's exposure control plan and the means by which the employee can obtain a copy of the written plan;

(E) An explanation of the appropriate methods for recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials;

(F) An explanation of the use and limitations of methods that will prevent or reduce exposure including appropriate engineering controls, work practices, and personal protective equipment;

(G) Information on the types, proper use, location, removal, handling, decontamination and disposal of personal protective equipment;

(H) An explanation of the basis for selection of personal protective equipment;

(I) Information on the hepatitis B vaccine, including information on its efficacy, safety, method of administration, the benefits of being vaccinated, and that the vaccine and vaccination will be offered free of charge;

(J) Information on the appropriate actions to take and persons to contact in an emergency involving blood or other potentially infectious materials;

(K) An explanation of the procedure to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available;
(L) Information on the post-exposure evaluation and follow-up that the employer is required to provide for the employee following an exposure incident;
(M) An explanation of the signs and labels and/or color coding required by paragraph (g)(1); and
(N) An opportunity for interactive questions and answers with the person conducting the training session.

(viii) The person conducting the training shall be knowledgeable in the subject matter covered by the elements contained in the training program as it relates to the workplace that the training will address.

(ix) Additional Initial Training for Employees in HIV and HBV Laboratories and Production Facilities. Employees in HIV or HBV research laboratories and HIV or HBV production facilities shall receive the following initial training in addition to the above training requirements.

(A) The employer shall assure that employees demonstrate proficiency in standard microbiological practices and techniques and in the practices and operations specific to the facility before being allowed to work with HIV or HBV.
(B) The employer shall assure that employees have prior experience in the handling of human pathogens or tissue cultures before working with HIV or HBV.
(C) The employer shall provide a training program to employees who have no prior experience in handling human pathogens. Initial work activities shall not include the handling of infectious agents. A progression of work activities shall be assigned as techniques are learned and proficiency is developed. The employer shall assure that employees participate in work activities involving infectious agents only after proficiency has been demonstrated.

(h) Recordkeeping --

(1) Medical Records.

(i) The employer shall establish and maintain an accurate record for each employee with occupational exposure, in accordance with 29 CFR 1910.1020.

(ii) This record shall include:

(A) The name and social security number of the employee;
(B) A copy of the employee's hepatitis B vaccination status including the dates of all the hepatitis B vaccinations and any medical records relative to the employee's ability to receive vaccination as required by paragraph (f)(2);
(C) A copy of all results of examinations, medical testing, and follow-up procedures as required by paragraph (f)(3);
(D) The employer's copy of the healthcare professional's written opinion as required by paragraph (f)(5); and

(E) A copy of the information provided to the healthcare professional as required by paragraphs (f)(4)(ii)(B)(C) and (D).

(iii) Confidentiality. The employer shall ensure that employee medical records required by paragraph (h)(1) are:

(A) Kept confidential; and

(B) Not disclosed or reported without the employee's express written consent to any person within or outside the workplace except as required by this section or as may be required by law.

(iv) The employer shall maintain the records required by paragraph (h) for at least the duration of employment plus 30 years in accordance with 29 CFR 1910.1020.

(2) Training Records.

(i) Training records shall include the following information:

(A) The dates of the training sessions;

(B) The contents or a summary of the training sessions;

(C) The names and qualifications of persons conducting the training; and

(D) The names and job titles of all persons attending the training sessions.

(ii) Training records shall be maintained for 3 years from the date on which the training occurred.

(3) Availability.

(i) The employer shall ensure that all records required to be maintained by this section shall be made available upon request to the Assistant Secretary and the Director for examination and copying.

(ii) Employee training records required by this paragraph shall be provided upon request for examination and copying to employees, to employee representatives, to the Director, and to the Assistant Secretary.

(iii) Employee medical records required by this paragraph shall be provided upon request for examination and copying to the subject employee, to anyone having written consent of the subject employee, to the Director, and to the Assistant Secretary in accordance with 29 CFR 1910.1020.

(4) Transfer of Records.

(i) The employer shall comply with the requirements involving transfer of records set forth in 29 CFR 1910.1020(h).

(ii) If the employer ceases to do business and there is no successor employer to receive and retain the records for the prescribed period, the employer shall notify the Director, at least three months prior to their disposal and transmit them to the Director, if required by the Director to do so, within that three month period.

(5) Sharps injury log.

(i) The employer shall establish and maintain a sharps injury log for the recording of percutaneous injuries from contaminated sharps. The information in the sharps injury log shall be recorded and maintained in such manner as to protect the confidentiality of the injured employee. The sharps injury log shall contain, at a minimum:

(A) The type and brand of device involved in the incident,

(B) The department or work area where the exposure incident occurred, and

(C) An explanation of how the incident occurred.

(ii) The requirement to establish and maintain a sharps injury log shall apply to any employer who is required to maintain a log of occupational injuries and illnesses under 29 CFR 1904.

(iii) The sharps injury log shall be maintained for the period required by 29 CFR 1904.6.

(i) Dates --

(1) Effective Date. The standard shall become effective on March 6, 1992.

1910.1030(i)(2)

(2) The Exposure Control Plan required by paragraph (c) of this section shall be completed on or before May 5, 1992.

1910.1030(i)(3)

(3) Paragraph (g)(2) Information and Training and (h) Recordkeeping shall take effect on or before June 4, 1992.

1910.1030(i)(4)

(4) Paragraphs (d)(2) Engineering and Work Practice Controls, (d)(3) Personal Protective Equipment, (d)(4) Housekeeping, (e) HIV and HBV Research Laboratories and Production Facilities, (f) Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-up, and (g)(1) Labels and Signs, shall take effect July 6, 1992.

[56 FR 64004, Dec. 06, 1991, as amended at 57 FR 12717, April 13, 1992; 57 FR 29206, July 1, 1992; 61 FR 5507, Feb. 13, 1996; 66 FR 5325 Jan., 18, 2001]

Hepatitis B Vaccine Consent Form

I understand that, because of my occupational exposure to blood or other potentially infectious materials, I may be at risk of acquiring hepatitis B virus (HBV) infection. I have attended an educational session on hepatitis B. I have had the opportunity to ask questions and they have been answered to my satisfaction. I understand the risks and benefits of the hepatitis B vaccine and give my consent to receive it.

_____ _____

Signature of Member or Employee Date

_____

Name of Member or Employee (print or type)

* *

Hepatitis B Vaccine Declination Form

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.

_____ _____

Signature of Member or Employee Date

_____

Name of Member or Employee (print or type)

Occupational Exposure to Bloodborne Pathogens—Precautions for Emergency Responders

U.S. Department of Labor
Alexis M. Herman, Secretary

Occupational Safety and Health Administration
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Who is at Risk? 1

There are approximately 5.6 million workers in health care and other facilities who are at risk of exposure to bloodborne pathogens such as the human immunodeficiency virus (HIV) and the hepatitis B virus (HBV) and other potentially infectious materials. These workers include, but are not limited to, nurses, physicians, dentists and other dental workers, laboratory and blood bank technologists and technicians, medical examiners, morticians, phlebotomists, emergency room personnel, intensive care and operating room nurses and technicians, orderlies, housekeeping personnel, and laundry workers. Others also at risk include law enforcement personnel, firefighters, paramedics, emergency medical technicians, and anyone whose job might require providing first-response medical care in which there is a reasonable expectation of contact with blood or other potentially infectious materials.

The Occupational safety and Health Administration recognizes the need for a regulation that prescribes safeguards to protect workers against the health hazards from exposure to blood and certain body fluids containing bloodborne pathogens, and to reduce their risk to this exposure. This booklet will help employers and employees in emergency response settings understand and comply with OSHA's regulation on bloodborne pathogens, which was published on December 6, 1991, *Title 29 Code of Federal Regulations (CFR) Part 1910.1030.*

The following sections outline and summarize the requirements of the standard[1] and inform emergency responders and law enforcement and corrections employers and employees of the risks of occupational exposure to bloodborne pathogens and how to reduce these risks. Full implementation of the standard not only will prevent hepatitis B cases, but also will significantly reduce the risk of workers' contracting acquired immunodeficiency syndrome (AIDS) or other bloodborne diseases.

[1] The contents of this booklet are not a substitute for requirements of the standard. The complete regulatory text, appendix, and explanatory preamble of the Bloodborne Pathogens Standard, *Title 29 Code of Federal Regulations*, Part 1910.1030, was published in the *Federal Register* 56 (235): 64004-64182, December 6, 1991.

OSHA's bloodborne pathogens standard requires the employer to prepare a written exposure control program. The standard mandates that the program evaluate routine tasks and procedures in the workplaces that involve exposure to blood or other potentially infectious materials, identify workers performing such tasks, and use a variety of methods to reduce the risks.

OSHA requirements specify the need for engineering and work practice controls, personal protective equipment, housekeeping procedures, post-exposure evaluation and followup requirements, recordkeeping, and how to comply with the standard and communicate hazards to personnel.

The goal of the standard is to provide safe working conditions that protect employees from being unnecessarily exposed to health hazards. The following sections provide an overview of the standard on bloodborne pathogens and the ways emergency response and law enforcement employers and employees can reduce the risk of occupational exposure to blood and other potentially infectious materials.

OSHA's bloodborne pathogens standard applies to every employer with one or more employees who can reasonably be expected to come into contact with blood and other specified body fluids in carrying out or in performing their duties. The approximately 5.6 million workers covered by the rule include 4.4 million health care workers in facilities such as hospitals and physicians' and dentists' offices and 1.2 million non-health care workers in law enforcement, fire and rescue, correctional facilities, research laboratories, and the funeral industry.

Under the OSHA rule, blood means human blood, blood products, or blood components. Other potentially infectious materials include human body fluids such as saliva in dental procedures; semen; vaginal secretions; cerebrospinal, synovial, pleural, pericardial, peritoneal, and amniotic fluids; any body fluids visibly contaminated with blood; unfixed human tissues or organs; HIV-containing cell or tissue cultures; and HIV- or HBV-containing culture mediums or other solutions; and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.

Occupational exposure means a "reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of employees' duties." Determining occupational exposure and instituting control methods and work practices appropriate for specific job assignments are key requirements of the standard. The required written control plan and methods of compliance show how employee exposure can be minimized or eliminated.

In general, OSHA authority extends to all private sector employers with one or more employees, as well as to civilian employees in federal agencies. States administering their own occupational safety and health programs through plans approved under section 18(b) of the *Occupational Safety and Health (OSH) Act of 1970*, however, must adopt standards and enforce requirements that are at least as effective as federal requirements within 6 months of the issuance date of the bloodborne pathogens standard. Of the 25 current state plan states, 23 cover the private and public (i.e., state and local governments) sectors, and 2 cover the public sector only. Public sector employees in non-state plan states have neither federal nor state coverage under the rule.

Thus, many firefighters, hospital workers, and other emergency responders in states are not covered by the bloodborne pathogens standard.

4 Is a Plan Required?

A written exposure control plan is necessary for the safety and health of workers. Employers must develop a plan that identifies and documents the tasks, procedures, and job classifications covering instances where there is exposure to blood or other potentially infectious materials.

As required under the standard, a written exposure control plan is required that provides documentation of the following key elements:

- Identification of job classifications and, in some cases, tasks where there is exposure to blood and other potentially infectious materials;
- A schedule of how and when the provisions of the standard will be implemented, including schedules and methods for communication of hazards to employees, hepatitis B vaccination and post-exposure evaluation and followup, recordkeeping and implementation of the methods of compliance, such as

  — engineering and work practice controls,

  — personal protective equipment,

  — housekeeping, and

Procedures for evaluating the circumstances of an exposure incident.

The schedule of how and when the provisions of the standard will be implemented may be a calendar with brief notations describing the methods, or an annotated copy of the standard, or part of another document, such as the infection control plan.

The written exposure control plan must be accessible to employees and must be updated at least annually and when alterations in procedures create new occupational exposure. Planning begins with identifying employees who have occupational exposure.

For emergency responders such as firefighters, law enforcement agents, and other emergency response personnel, the potential sources of contamination from bloodborne pathogens are varied. Emergency responders assist at incidents frequently involving trauma, i.e., open wounds. Exposure and potential infection also can result from handling discarded emergency medical items such as needles, sharps, bandages, and gauze.

Today's firefighters and emergency responders play a greater role in emergency situations frequently as health care providers, often the first to arrive at the scene of an accident. For example, up to 80 percent of all field emergency medical care today is provided by fire service personnel.[2] As a result, fire and rescue personnel consistently are faced with the potential for exposure to blood, blood products, blood components, and body fluids.

Emergency responders frequently face unpredictable, uncontrollable, dangerous, and life-threatening circumstances. Anything can happen in an emergency, including exposure to blood and contaminated equipment. This is especially applicable to fire and rescue personnel and, in many instances, to law enforcement personnel who operate under hostile conditions. There is an extremely diverse range of potential situations that can put law enforcement officers at risk.

At crime scenes, when processing suspects, or as a result of fights and/or assaults, law enforcement officers may be at risk of exposure. The informed judgment and awareness of the individual officer are paramount when unusual circumstances or events arise that can jeopardize his/her safety or health. It is the responsibility of employers of emergency responders to ensure that their employees are properly informed and adequately protected at the work site and in emergency situations.

Exposure determination must be based on the definition of occupational exposure absent the use of personal protective clothing and equipment. The exposure determination is made by reviewing job classifications within the work setting and then making a list that may be divided into two groups. The first group includes job classifications

[2] Testimony of Clyde A. Bragdon Jr., September 14, 1989, before the Occupational Safety and Health Administration's hearings on the proposed bloodborne pathogens standard, Washington, D.C.

in which all of the employees have occupational exposure, such as pre-hospital care workers. This may include paramedics, emergency medical technicians, and advance life support personnel. Where all employees have occupational exposure, it is not necessary to list specific work tasks.

The second group includes those classifications in which some of the employees have occupational exposure. Where only some employees have exposure, specific tasks and procedures causing exposure must be listed. When employees with occupational exposure have been identified, the next step is to communicate the hazards to those employees.

All persons with a potential for exposure must be provided with adequate training and information including general explanations of the modes of transmission, symptoms, epidemiology, warning signs relating to possible exposure, and procedures to follow if exposure occurs. Training also must include appropriate methods for recognizing tasks that may involve exposure to blood or other potentially infectious materials and the use and limitations of methods that would reduce exposure. These include engineering controls, work practices, and personal protective equipment. There also must be information on the use, location, decontamination, and disposal of personal protective equipment and clothing, and information on what to do in an emergency.

Each occupationally exposed employee must be given free information and training at the time of initial assignment, during working hours, within 90 days after the effective date of the standard, and at least once a year thereafter. Additional training is needed when existing tasks are modified or new tasks are required which affect the employees' occupational exposure.

Training sessions must be comprehensive, including information on bloodborne pathogens as well as on OSHA's standard and the employer's exposure control plan. The person conducting the training must be knowledgeable in the subject matter, especially as it relates to emergency response personnel. An opportunity for a question and answer period must be part of the training session.

A training program shall consist, at a minimum, of the following elements:

- An accessible copy and explanation of the regulatory text;
- A general explanation of the epidemiology and symptoms of bloodborne diseases;
- An explanation of the modes of transmission of bloodborne pathogens;
- An explanation of the written exposure control plan and how to obtain a copy;
- An explanation of how to recognize events that may involve exposure to blood and other potentially infectious materials;
- An explanation of the basis for selecting personal protective equipment including information on the types,

selection, proper use, location, removal, handling, decontamination, and disposal of personal protective equipment;

- An explanation of the use and limitations of safe work practices, engineering controls, and personal protective equipment;
- Information on hepatitis B vaccination such as safety, benefits, efficacy, and availability;
- An explanation of the procedures to follow if an exposure occurs, including methods of reporting and the medical followup that will be made available;
- Information on the post-exposure evaluation and followup required in the event of an exposure incident and information on emergencies that relate to blood or other potentially infectious materials, followup procedures, and medical counseling;
- An explanation of information on warning signs, labels, and color-coding.

For employees who have received training on bloodborne pathogens in the year preceding the effective date of the standard, training need only be provided on provisions of the standard that were not included during the earlier training.

Hepatitis B Vaccination

Employers must make available, free of charge and at a reasonable time and place, the hepatitis B vaccine and vaccination series to all employees who are at risk of occupational exposure. Any booster doses recommended by the U.S. Public Health Service also must be provided.

Employers must offer free hepatitis B vaccine and vaccination series after initial training and within 10 working days of initial assignment to employees who have occupational exposure unless (1) the employee has previously received the complete hepatitis B vaccination series, (2) antibody testing reveals that the employee is immune or (3) medical reasons prevent the employee from being vaccinated.

The employee cannot be required to participate in an antibody pre-screening program to receive the hepatitis B vaccination series. All medical evaluations and procedures must be performed by or under the supervision of a licensed physician or an appropriately trained and licensed health care professional and administered according to current recommendations of the U.S. Public Health Service. Vaccinations also must be provided even if the employee initially declines but later decides to accept the vaccination while covered by the standard. Employees who decline the vaccination must sign a declination form (See Appendix in this booklet).

The employer also shall ensure that all laboratory tests are provided at no cost to the employee and are conducted by an accredited lab. The employer must obtain and provide employees with a copy of the health care professional's written opinion as to whether the need for hepatitis B vaccination is indicated and if the employee has received it.

Universal Precautions

Universal precautions is a method of infection control in which all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other bloodborne pathogens. Universal precautions are to be observed in all situations where there is a potential for contact with blood or other potentially infectious material. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids are to be considered potentially infectious.

10 What Are Some Methods of Control?

Engineering and Work Practice Controls

Engineering and work practice controls are the primary methods used to control the transmission of HBV and HIV. To the extent feasible, the employer must institute these controls to eliminate or minimize employee exposure to bloodborne diseases.

Engineering controls reduce employee exposure in the workplace by either removing the hazard or isolating the worker from exposure. Self-sheathing needles and special containers for contaminated sharp instruments are examples of engineering controls. Engineering controls must be examined and maintained, or replaced, on a scheduled basis. For example, disposable airway equipment or resuscitation bags and mechanical respiratory assist devices (e.g., oxygen demand valve resuscitators) should be available on all emergency vehicles and to all emergency response personnel who respond to medical emergencies or victim rescues. Pocket mouth-to-mouth resuscitation devices designed to isolate emergency response personnel from direct contact with fluids must be provided. Puncture-resistant sharps containers must be easily accessible and located in areas where needles, syringes, or other sharp instruments are commonly used.

Work practice controls alter the manner in which a task is performed. Correct work methods include properly handling and disposing of needles and sharps, used bandages and gauze, linens, and all other emergency items that come in contact with blood or other potentially infectious materials. All procedures involving blood or other potentially infectious materials must be performed in such a manner as to minimize spattering, generating droplets, splashing, and spraying. Shearing or breaking needles is prohibited. Needles must not be bent, removed, or recapped unless the employer can demonstrate that no alternative is feasible or that such action is required by a specific medical procedure. Any recapping or removing of needles must be accomplished through the use of a mechanical device or one-handed technique. Immediately, or as soon as possible after use, contaminated reusable sharps must be placed in puncture resistant, leak-proof containers, labeled as a biohazard or color-coded red until properly reprocessed. Specimens of blood or other potentially infectious materials must be placed in leak-proof containers. Bags or receptacles containing articles or disposable items contaminated with

body fluids must be labeled or color-coded according to the standard. Mouth pipetting/suctioning of blood or other potentially infectious materials is prohibited.

In work areas where there is a reasonable likelihood of occupational exposure, safe work practices include restricting eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses, and preventing the storage of food and/or drink in refrigerators or other locations where blood or potentially infectious materials are kept.

Employers must provide readily accessible hand washing facilities and ensure that personnel wash hands and any other exposed skin area with soap and water, and flush mucous membranes with water immediately or as soon as feasible following contact with blood or other potentially infectious materials or after removing personal protective equipment. If hand washing facilities are not available, personnel must be provided with antiseptic hand cleanser, clean cloth/paper towels or antiseptic towelettes and employees shall wash their hands with soap and running water as soon thereafter as feasible.

Equipment, such as defibrillation equipment, which during the course of operations could become contaminated with blood or other potentially infectious materials, shall be checked routinely and, prior to servicing or shipping, shall be decontaminated as necessary, unless the employer can demonstrate that decontamination of such equipment or portions of such equipment is not feasible.

For law enforcement officers, there is a potential for exposure during searches and evidence handling. In these instances, employees should use caution in searching clothing and in searching purses or other similar items. Where the contents cannot be determined easily, contents should be emptied by turning the bag upside down over a flat surface. Also, to avoid tearing gloves, one should use evidence tape instead of staples to seal evidence.

Personal Protective Equipment

In addition to instituting engineering and work practices controls, the standard requires that appropriate personal protective equipment also be used to reduce work risk of exposure. Personal protective

equipment is specialized clothing or equipment worn by employees for protection from exposure to blood or other potentially infectious materials. Employers must make readily available at no cost to employees appropriate personal protective equipment in the appropriate sizes to provide protection from blood or other potentially infectious materials. Personal protective equipment will be considered "appropriate" only if it does not permit blood or other potentially infectious substances and contaminated materials to pass through to or reach an employee's work clothes, street clothes, undergarments, skin, eyes, mouth, or other mucous membranes under normal conditions of use and for the duration of time the protective equipment is in use. Hypoallergenic alternatives (e.g., hypoallergenic or powderless gloves) must be available to employees who have an allergic sensitivity to protective equipment.

Personal protective equipment consists of, but is not limited to, gloves, face shields, masks, and eye protection, gowns, aprons, and similar items. Employers also must ensure that appropriate personal protective equipment is used and used correctly. Employers also must ensure that personal protective equipment is properly cleaned, laundered, repaired, replaced, or disposed of as needed, at no cost to the employee.

Disposable gloves should be a standard component of emergency-response equipment and should be donned by all personnel prior to initiating any emergency patient care tasks involving occupational exposure. Extra pairs should always be available. There is no single type or thickness of glove appropriate for all situations. Selection criteria should include dexterity, durability, fit, and the tasks that will be undertaken while the gloves are worn.

An employee may temporarily and briefly decline wearing personal protective equipment under rare and extraordinary circumstances and when, in the employee's professional judgment, it prevents the delivery of health care or public safety services or poses a greater hazard to workers. For example, in the case of emergency responders, this could occur when a firefighter rescues an individual who is not breathing from a burning building and discovers that the necessary resuscitation equipment is lost or damaged and the firefighter must administer cardiopulmonary resuscitation.

When the employee makes this judgment, the circumstances shall be investigated and documented to determine whether changes can be instituted to prevent such occurrences in the future. In general, appropriate personal protective equipment is to be used whenever occupational exposure may occur.

The employer also must ensure that employees observe the following precautions for handling and using personal protective equipment:

- Remove garments penetrated by blood or other infectious materials immediately, or as soon as feasible.
- Before leaving the work area contaminated protective equipment shall be placed in appropriately designated areas or containers for storing, washing, decontaminating or discarding.
- Wear appropriate gloves when there is a potential for hand contact with blood, other potentially infectious materials, mucous membranes, non-intact skin; when performing vascular access procedures;[3] and when handling or touching contaminated items or surfaces. Replace gloves if torn, punctured, contaminated, or if their ability to function as a barrier is compromised.
- Disposable (single use) gloves, such as surgical or examination gloves, shall be replaced as soon as practical when contaminated or as soon as feasible if they are torn, punctured, or when their ability to function as a barrier is compromised. They shall not be washed or decontaminated for re-use.
- Utility gloves may be decontaminated for re-use if the integrity of the glove is not compromised. However, they must be discarded if they are cracked, peeling, torn, punctured, or exhibit other signs of deterioration, or when their ability to function as a barrier is compromised.

[3] Except when an employee in a volunteer blood donation center judges that routine gloving for phlebotomies is not necessary. For specific requirements see Section (d)(3)(ix)(D) of the standard.

- Wear appropriate face and eye protection such as goggles, glasses with solid side shields or chin-length face shields when splashes, sprays, spatters, or droplets of infectious materials pose a hazard to the eyes, nose, or mouth. These should be available on all emergency vehicles. Masks in combination with eye protection devices—such as goggles or glasses with solid side shields or chin-length face shields—shall be worn whenever splashes, spray, spatter, or droplets of blood or other potentially infectious materials may be generated and eye, nose, or mouth contamination can be reasonably anticipated. These should be used in accordance with the level of exposure encountered. An extra change of work clothing should be available.

Housekeeping

Employers must ensure that emergency response vehicles and worksites are maintained in a clean and sanitary condition. Contaminated work surfaces must be decontaminated with a disinfectant upon completion of procedures or when contaminated by splashes, spills, or contact with blood or other potentially infectious materials. Employers shall determine and implement an appropriate written schedule for cleaning and methods of decontamination based upon the location within the facility, type of surface, types of contamination, if any, and tasks or procedures being performed.

All equipment and working surfaces that could have become contaminated shall be cleaned and checked routinely and shall be decontaminated as necessary. All coverings used for protecting working surfaces shall be removed and replaced as soon as possible after they have been contaminated.

All bins, pails, cans, and similar reusable receptacles must be decontaminated on a regularly scheduled basis and cleaned and decontaminated immediately or as soon as possible after visible contamination.

Broken glassware, which may be contaminated, must be picked up only by using mechanical means such as tongs, brush and dust pan, or forceps, and never with bare or gloved hands.

Contaminated reusable items, such as sharps, may not be stored or processed in a way that requires employees to reach into containers where the contents cannot be seen or safely handled.

Contaminated laundry shall be handled as little as possible with a minimum of agitation. Protective gloves and other appropriate personal protective equipment shall be used when handling contaminated laundry.

Contaminated laundry shall be bagged or containerized at the location where it was used and shall not be sorted or rinsed where it was used. Contaminated laundry shall be placed and transported in bags or containers and properly labeled in accordance with the labeling requirements of the standard (see labeling section). When a facility exercises universal precautions when handling soiled laundry, alternative labeling or color-coding is sufficient if it permits all employees to recognize the containers as requiring compliance with universal precautions.

Whenever contaminated laundry is wet and presents a reasonable likelihood of soak-through or of leakage from the bag or container, it shall be placed and transported in bags or containers that prevent soak-through and/or leakage. When contaminated laundry must be shipped offsite it must be placed in properly labeled (see labeling section), color-coded, leak-proof, and impervious bags.

Regulated waste must be placed in closeable, leak-proof containers built to contain all contents during handling, storing, transporting, or shipping and labeled appropriately (see labeling section). Regulated waste includes liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or other potentially infectious materials.

Labeling

Containers of regulated waste, refrigerators and freezers containing blood and other potentially infectious materials, and other containers used to store, transport, or ship blood or other potentially infectious materials must be labeled with fluorescent orange or orange-red biohazard warning labels (see Table 1). The warning label must contain the biohazard symbol and must have the word BIOHAZARD on it and be attached to each object by string, wire, adhesive, or another method to prevent loss or unintentional removal of the label.

Those labels are not required (1) when red bags or red containers are used; (2) on individual containers of blood, blood components, or blood products clearly marked as such and that have been released for transfusion or other clinical use; or (3) on individual containers of blood or other potentially infectious materials that are placed in a labeled container during storage, transport, shipment, or disposal.

Table 1—Labeling Requirements

Item	No Label Needed If Universal Precautions are Used and Specific Use of Container or Item is Known to All Employees		Biohazard Label		Red Container
Regulated waste container (e.g., contaminated sharps containers)			x	or	x
Reusable contaminated sharps containers (e.g., surgical instruments soaking in a tray)			x	or	x
Refrigerator/freezer holding blood or other potentially infectious material			x		
Containers used for storage, transport or shipping of blood			x	or	x
Blood/blood products for clinical use	**No labels required**				
Individual specimen containers of blood or other potentially infectious materials remaining in facility	x	or	x	or	x
Contaminated equipment needing service (e.g., dialysis equipment, suction apparatus)			x **plus a label specifying where the contamination exists**		
Specimens and regulated waste shipped from the primary facility to another facility for service or disposal			x	or	x
Contaminated laundry	*	or	x	or	x
Contaminated laundry sent to another facility that does not use universal precautions			x	or	x

*Alternative labeling or color coding is sufficient if it permits all employees to recognize the containers as requiring compliance with universal precautions.

An exposure incident is a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee's duties. An example of an exposure incident would be a puncture from a contaminated sharp.

Employees should immediately report exposure incidents. This allows for timely medical evaluations and followup by a health care professional as well as for timely tests of the source individual's blood for HIV and HBV. Reports must be treated by employers in the strictest confidence.

The employer is responsible for establishing the procedure for evaluating exposure incidents. When evaluating an exposure incident, thorough assessment and confidentiality are critical issues. Employees should immediately report exposure incidents to their employer to initiate a timely followup process by a health care professional. Such a report initiates the procedure for a prompt request for evaluation of the source individual's HBV and HIV status.

At the time of the exposure incident, the exposed employee must be directed to a health care professional as soon as possible after the exposure incident and preferably within 1 hour. This may require use of the nearest emergency room, depending on the time or location of the incident. It is useful to have available for telephone consultation a licensed physician experienced in the treatment of HIV and knowledgeable about the risks and benefits of post-exposure prophylaxis. The employer must provide the health care professional with a copy of the bloodborne pathogens standard, a description of the employee's job duties as they relate to the incident, a report of the specific exposure (incident report), including route of exposure, and relevant employee medical records, including hepatitis B vaccination status.

The medical evaluation and followup must at the very least:

- Document the routes of exposure and how exposure occurred
- Identify and document the source individual if feasible and not prohibited by law.

- Obtain consent and test source individual's blood as soon as possible to determine infectivity and document the source's blood test results.[4]
- If the source is known to be infectious for HBV or HIV, testing need not be repeated to determine the known infectivity.
- Provide the exposed employee with the test results and information about applicable disclosure laws and regulations concerning the source identity and infection status.
- Obtain consent, collect, and test exposed employee's blood as soon as possible after the exposure incident.
- If the exposed employee consents to baseline blood collection but does not consent to HIV serologic testing, the employee's blood samples must be preserved for at least 90 days. If, within 90 days of the exposure incident, the employee agrees to have the baseline sample tested, such testing shall be conducted as soon as feasible.
- Provide risk counseling and offer post-exposure prophylaxis, when medically indicated, according to the Centers for Disease Control recommendations.

Following the post-exposure evaluation, the health care professional will provide a written opinion to the employer. This opinion is limited to a statement that the employee has been informed of the results of the evaluation and told of the need, if any, for further evaluation or treatment. All other findings are confidential. The employer must provide a copy of the written opinion to the employee within 15 days of the evaluation.

[4] Testing cannot be done in most states without written consent. If consent is not obtained, the employer must show that legally required consent could not be obtained. Where consent is not required by law, the source individual's blood, if available, should be tested and the results documented.

20 What Type of Recordkeeping is Required?

There are two types of employee-related records required by the bloodborne pathogens standard: medical and training.

A confidential medical record for each employee with potential for exposure must be preserved and maintained by employers according to OSHA's rule governing access to employee exposure and medical records, Title 29 Part 1910.20(e).

In addition, under the bloodborne pathogens standard, medical records also must include the following information:

- Employee's name and social security number;
- Employee's hepatitis B vaccination status including dates of all hepatitis B vaccinations and any medical records related to the employee's ability to receive vaccinations;
- Results of examinations, medical testing, and post-exposure evaluation and followup procedures;
- The employer's copy of the health care professional's written opinion; and
- A copy of information provided to the health care professional.

Medical records must be kept confidential and maintained for at least the duration of employment plus 30 years. The bloodborne pathogens standard also requires employers to maintain and to keep accurate training records for 3 years and to include the following:

- Training dates,
- Content or a summary of the training,
- Names and qualifications of trainer(s), and
- Names and job titles of trainees.

Upon request, both medical and training records must be made available to the Director of the National Institute for Occupational Safety and Health (NIOSH) and to the Assistant Secretary of Labor for Occupational Safety and Health. Training records must be available to employees or employee representatives upon request. Medical records can be obtained by the employee or anyone having the employee's written consent. Also, if the employer ceases to do

business, medical and training records must be transferred to the successor employer. If there is no successor employer, the employer must notify the director of NIOSH for specific directions regarding disposition of the records at least 3 months prior to intended disposal.

Safety and Health Program Management Assistance

Effective management of worker safety and health protection is a decisive factor in reducing the extent and severity of work-related injuries and illnesses and their related costs. To assist employers and employees in developing effective safety and health programs, OSHA published recommended *Safety and Health Program Management Guidelines* (*Federal Register* 54(18):3908-3916, January 26, 1989). These voluntary guidelines apply to all places of employment covered by OSHA.

The guidelines identify four general elements that are critical to the development of a successful safety and health management program:

- management commitment and employee involvement,
- worksite analysis,
- hazard prevention and control, and
- safety and health training.

The guidelines recommend specific actions under each of these general elements to achieve an effective safety and health program. A single, free copy of the guidelines can be obtained from the U.S. Department of Labor, OSHA/OICA Publications, P.O. Box 37535, Washington DC 20013-7535, by sending a self-addressed mailing label with your request or by visiting OSHA's Web site at www.OSHA.gov.

State Programs

The *OSH Act* encourages states to develop and operate their own job safety and health plans. States administering occupational safety and health programs through plans approved under section 18(b) of the *Act,* must adopt standards and enforce requirements that are "at least as effective" as federal requirements. There are currently 25 state plan states: 23 cover the private and public sector (state and local governments) and 2 cover the public sector only. For more information on state plans, see the list of states with approved plans at the end of this publication.

Free Onsite Consultation

Consultation assistance is available on request to employers who want help in establishing and maintaining a safe and healthful workplace. Largely funded by OSHA, the service is provided at no cost to the employer. Primarily developed for small employers with more hazardous operations, the consultation service is delivered by state government agencies or universities employing professional safety consultants and health consultants. Comprehensive assistance includes an appraisal of all work practices and environmental hazards of the workplace and all aspects of the employer's present job safety and health program.

The program is separate from OSHA's inspection efforts. No penalties are proposed or citations issued for any safety or healthy problems identified by the consultant. The service is confidential

For more information concerning consultation assistance, see the list of consultation projects at the end of this publication and visit OSHA's Web site.

Voluntary Protection Programs (VPPs)

Voluntary protection programs and onsite consultation services, when coupled with an effective enforcement program, expand worker protection to help meet the goals of the *OSH Act*. The three VPPs—Star, Merit, and Demonstration—are designed to recognize outstanding achievement by companies that have successfully incorporated comprehensive safety and health programs into their total management system. They motivate others to achieve excellent safety and health results in the same outstanding way and they establish a cooperative relationship among employers, employees, and OSHA.

For additional information on VPPs and how to apply, contact the OSHA national, regional, or area offices listed at the end of this publication.

BIOHAZARD

WARNING

OSHA FACT

Bloodborne Pathogens

What are bloodborne pathogens?

Bloodborne pathogens are infectious materials in blood that can cause disease in humans, including hepatitis B and C and human immunodeficiency virus, or HIV. Workers exposed to these pathogens risk serious illness or death.

What protections does OSHA's Bloodborne Pathogen standard provide?

The full text of OSHA's Bloodborne Pathogens standard, published in *Title 29 of the Code of Federal Regulations* 1910.1030, details what employers must do to protect workers whose jobs put them at a reasonable risk of coming into contact with blood and other potentially infectious materials. The standard requires employers to do the following:

- Establish an exposure control plan. This is a written plan to eliminate or minimize employee exposures. Employers must update the plan annually to reflect technological changes that will help eliminate or reduce exposure to bloodborne pathogens. In the plan, employers must document annually that they have considered and implemented safer medical devices, if feasible, and that they have solicited input from frontline workers in identifying, evaluating, and selecting engineering controls.
- Use engineering controls. These are devices that isolate or remove the bloodborne pathogen hazard from the workplace. They include sharps disposal containers, self-sheathing needles, and safer medical devices such as sharps with engineered sharps-injury protection and needleless systems.
- Enforce work practice controls. These are practices that reduce the likelihood of exposure by changing the way a task is performed. They include appropriate procedures for hand washing, sharps disposing, lab specimen packaging, laundry handling, and contaminated material cleaning.
- Provide personal protective equipment such as gloves, gowns, and masks. Employers must clean, repair, and replace this equipment as needed.
- Make available Hepatitis B vaccinations to all employees with occupational exposure to bloodborne pathogens within 10 days of assignment.
- Provide post-exposure followup to any worker who experiences an exposure incident, at no cost to the worker. This includes conducting laboratory tests; providing confidential medical evaluation, identifying, and testing the source individual, if feasible; testing the exposed employee's blood, if the worker consents; performing post-exposure prophylaxis; offering counseling; and evaluating reported illnesses. All diagnoses must remain confidential.
- Use labels and signs to communicate hazards. The standard requires warning labels affixed to containers of regulated waste, refrigerators and freezers, and other containers used to store or transplant blood or other potentially infectious materials. Facilities may use red bags or containers instead of labels. Employers also must post signs to identify restricted areas.
- Provide information and training to employees. Employers must ensure that their workers receive regular training that covers the dangers of bloodborne pathogens, preventive practices, and post-exposure procedures. Employers must offer this training on initial assignment, then at least annually. In addition, laboratory and production facility workers must receive specialized initial training.
- Maintain employee medical and training records. The employer also must maintain a Sharps Injury Log unless classified as an exempt industry under OSHA's standard on Recording and Reporting Occupational Injuries and Illnesses.

How can I get more information?

OSHA's website provides more indepth information about bloodborne pathogens on the Bloodborne Pathogens webpage at www.osha.gov/SLTC/bloodbornepathogens and

on the Needlesticks webpages at www.osha.gov/needlesticks and www.osha.gov/SLTC/needlestick.

In addition, OSHA has various publications, standards, technical assistance, and compliance tools to help you, and offers extensive assistance through its many safety and health programs: workplace consultation, voluntary protection programs, grants, strategic partnerships, state plans, training, and education. Documents such as OSHA's *Safety and Health Management Guidelines* provide information about elements that are critical to the development of a successful safety and health management system. This and other information are available on OSHA's website.

- For one free copy of OSHA publications, send a self-addressed mailing label to this address: OSHA Publications Office, PO Box 37535, Washington, DC 20013-7535; or send a request to our fax at (202) 693-2498, or call (202) 693-1888.
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- To file a complaint online or obtain more information on OSHA federal and state programs, visit OSHA's website.

This is one of a series of informational fact sheets highlighting OSHA programs, policies, or standards. It does not impose any new compliance requirements or carry the force of legal opinion. For compliance requirements of OSHA standards or regulations, refer to *Title 29 of the Code of Federal Regulations*. This information will be made available to sensory-impaired individuals upon request. Voice phone: (202) 693-1999. See also OSHA's website at www.osha.gov.

U.S. Department of Labor
Occupational Safety and Health Administration
2002

Bloodborne facts

Hepatitis B Vaccination--Protection For You

U.S. Department of Labor
Occupational Safety and Health Administration

WHAT IS HBV?

Hepatitis B virus (HBV) is a potentially life-threatening bloodborne pathogen. Centers for Disease Control estimates there are approximately 280,000 HBV infections each year in the U.S.

Approximately 8,700 health care workers each year contract hepatitis B, and about 200 will die as a result. In addition, some who contract HBV will become carriers, passing the disease on to others. Carriers also face a significantly higher risk for other liver ailments which can be fatal, including cirrhosis of the liver and primary liver cancer.

HBV infection is transmitted through exposure to blood and other infectious body fluids and tissues. Anyone with occupational exposure to blood is at risk of contracting the infection.

Employers must provide engineering controls; workers must use work practices and protective clothing and equipment to prevent exposure to potentially infectious materials. However, the best defense against hepatitis B is vaccination.

WHO NEEDS VACCINATION?

The new OSHA standard covering bloodborne pathogens requires employers to offer the three-injection vaccination series free to all employees who are exposed to blood or other potentially infectious materials as part of their job duties. This includes health care workers, emergency responders, morticians, first-aid personnel, law enforcement officers, correctional facilities staff, launderers, as well as others.

The vaccination must be offered within 10 days of initial assignment to a job where exposure to blood or other potentially infectious materials can be "reasonably anticipated." The requirements for vaccinations of those already on the job take effect July 6, 1992.

WHAT DOES VACCINATION INVOLVE?

The hepatitis B vaccination is a noninfectious, yeast-based vaccine given in three injections in the arm. It is prepared from recombinant yeast cultures, rather than human blood or plasma. Thus, there is no risk of contamination from other bloodborne pathogens nor is there any chance of developing HBV from the vaccine

The second injection should be given one month after the first, and the third injection six months after the initial dose. More than 90 percent of those vaccinated will develop immunity to the hepatitis B virus. To ensure immunity, it is important for individuals to receive all three injections. At this point it is unclear how long the immunity lasts, so booster shots may be required at some point in the future.

The vaccine causes no harm to those who are already immune or to those who may be HBV carriers. Although employees may opt to have their blood tested for antibodies to determine need for the vaccine, employers may not make such screening a condition of receiving vaccination nor are employers required to provide prescreening.

Each employee should receive counseling from a health care professional when vaccination is offered. This discussion will help an employee determine whether inoculation is necessary.

WHAT IF I DECLINE VACCINATION?

Workers who decide to decline vaccination must complete a declination form. Employers must keep these forms on file so that they know the vaccination status of everyone who is exposed to blood. At any time after a worker initially declines to receive the vaccine, he or she may opt to take it.

WHAT IF I AM EXPOSED BUT HAVE NOT YET BEEN VACCINATED?

If a worker experiences an exposure incident, such as a needlestick or a blood splash in the eye, he or she must receive confidential medical evaluation from a licensed health care professional with appropriate follow-up. To the extent possible by law, the employer is to determine the source individual for HBV as well as human immunodeficiency virus (HIV) infectivity. The worker's blood will also be screened if he or she agrees.

The health care professional is to follow the guidelines of the U.S. Public Health Service in providing treatment. This would include hepatitis B vaccination. The health care professional must give a written opinion on whether or not vaccination is recommended and whether the employee received it. Only this information is reported to the employer. Employee medical records must remain confidential. HIV or HBV status must NOT be reported to the employer.

This is one of a series of fact sheets that discusses various requirements of the Occupational Safety and Health Administration's standard covering exposure to

Bloodborne facts

Protect Yourself When Handling Sharps

U.S. Department of Labor
Occupational Safety and Health Administration

A needlestick or a cut from a contaminated scapel can lead to infection from hepatitis B virus (HBV) or human immunodeficiency virus (HIV) which causes AIDS. Although few cases of AIDS have been documented from occupational exposure, approximately 8,700 health care workers each year contract hepatitis B. About 200 will die as a result. The new OSHA standard covering bloodborne pathogens specifies measures to reduce these risks of infection.

PROMPT DISPOSAL

The best way to prevent cuts and sticks is to minimize contact with sharps. That means disposing of them immediately after use. Puncture-resistant containers must be available nearby to hold contaminated sharps--either for disposal or, for reusable sharps, later decontamination for re-use. When reprocessing contaminated reusable sharps, employees must not reach by hand into the holding container. Contaminated sharps must never be sheared or broken.

Recapping, bending, or removing needles is permissible only if there is no feasible alternative or if required for a specific medical procedure such as blood gas analysis. If recapping, bending, or removal is necessary, workers must use either a mechanical device or a one-handed technique. If recapping is essential--for example, between multiple injections for the same patient--employees must avoid using both hands to recap. Employees might recap with a one-handed "scoop" technique, using the needle itself to pick up the cap, pushing cap and sharp together against a hard surface to ensure a tight fit. Or they might hold the cap with tongs or forceps to place it on the needle.

SHARPS CONTAINERS

Containers for used sharps must be puncture resistant. The sides and the bottom must be leakproof. They must be labeled or color coded red to ensure that everyone knows the contents are hazardous. Containers for disposable sharps must have a lid, and they must be maintained upright to keep liquids and the sharps inside

Employees must never reach by hand into containers of contaminated sharps. Containers for reusable sharps could be equipped with wire basket line for easy removal during reprocessing, or employees cou use tongs or forceps to withdraw the contents. Reusable sharps disposal containers may not be opened, emptied, or cleaned manually.

Containers need to be located as near to as feasible the area of use. In some cases, they may be placed on carts to prevent access to mentally disturbed pediatric patients. Containers also should be available wherever sharps may be found, such as in laundries. Th containers must be replaced routinely and not be overfilled, which can increase the risk of needlesticks or cuts.

HANDLING CONTAINERS

When employees are ready to discard containers they should first close the lids. If there is a chance of leakage from the primary container, the employees shou use a secondary container that is closable, labeled, or color coded and leak resistant.

Careful handling of sharps can prevent injury ar reduce the risk of infection. By following these work practices, employees can decrease their chances of contracting bloodborne illness.

This a one of a series of fact sheets that discusses various requirements of the Occupational Safety and Health Administration's standard covering exposure to bloodborne pathogens. *Single copies of fact sheets are available from OSHA Publications, Room N-3101, 200 Constitution Avenue, N.W., Washingtom DC 20210 and from OSHA regional offices.*

Bloodborne facts

Personal Protective Equipment Cuts Risk

U.S. Department of Labor
Occupational Safety and Health Administration

Wearing gloves, gowns, masks, and eye protection can significantly reduce health risks for workers exposed to blood and other potentially infectious materials. The new OSHA standard covering bloodborne disease requires employers to provide appropriate personal protective equipment (PPE) and clothing free of charge to employees.

Workers who have direct exposure to blood and other potentially infectious materials on their jobs run the risk of contracting bloodborne infections from hepatitis B virus (HBV), human immunodeficiency virus (HIV) which causes AIDS, and other pathogens. About 8,700 health care workers each year are infected with HBV, and 200 die from the infection. Although the risk of contracting AIDS through occupational exposure is much lower, wearing proper personal protective equipment can greatly reduce potential exposure to all bloodborne infections.

SELECTING PPE

Personal protective clothing and equipment must be suitable. This means the level of protection must fit the expected exposure. For example, gloves would be sufficient for a laboratory technician who is drawing blood, whereas a pathologist conducting an autopsy would need considerably more protective clothing.

PPE may include gloves, gowns, laboratory coats, face shields or masks, eye protection, pocket masks, and other protective gear. The gear must be readily accessible to employees and available in appropriate sizes.

If an employee is expected to have hand contact with blood or other potentially infectious materials or contaminated surfaces, he or she must wear gloves. Single use gloves cannot be washed or decontaminated for reuse. Utility gloves may be decontaminated if they are not compromised. They should be replaced when they show signs of cracking, peeling, tearing, puncturing, or deteriorating. If employees are allergic to standard gloves, the employer must provide hypoallergenic gloves or similar alternatives.

Routine gloving is not required for phlebotomy in voluntary blood donation centers, though it is necessary for all other phlebotomies. In any case, gloves must be available in voluntary blood donation centers for employees who want to use them. Workers in voluntary blood donation centers must use gloves (1) when they have cuts, scratches or other breaks in their skin, (2) while they are in training; and (3) when they believe contamination might occur.

Employees should wear eye and mouth protection such as goggles and masks, glasses with solid side shields, and masks or chin-length face shields when splashes, sprays, splatters, or droplets of potentially infectious materials pose a hazard through the eyes, nose or mouth. More extensive coverings such as gowns, aprons, surgical caps and hoods, and shoe covers or boots are needed when gross contamination is expected. This often occurs, for example, during orthopedic surgery or autopsies.

Employers must provide the PPE and ensure that their workers wear it. This means that if a lab coat is considered PPE, it must be supplied by the employer rather than the employee. The employer also must clean or launder clothing and equipment and repair or replace it as necessary.

Additional protective measures such as using PPE in animal rooms and decontaminating PPE before laundering are essential in facilities that conduct research on HIV or HBV.

EXCEPTION

There is one exception to the requirement for **protective gear.** An employee may choose, temporarily and briefly, **under rare and extraordinary circumstances,** to forego the equipment. It must be the employee's professional judgment that using the protective equipment would prevent the delivery of health care or public safety services or would pose an increased hazard to the safety of the worker or co-worker. When one of these excepted situations occurs, employers are to investigate and document the circumstances to determine if there are ways to avoid it in the future. For example, if a firefighter's resuscitation device is damaged, perhaps another type of device should be used or the device should be carried in a different manner. Exceptions must be limited–this is not a blanket exemption.

DECONTAMINATING AND DISPOSING OF PPE

Employees must remove personal protective clothing and equipment before leaving the work area or when the PPE becomes contaminated. If a garment is penetrated, workers must remove it immediately or as soon as feasible. Used protective clothing and equipment must be placed in designated containers for storage, decontamination, or disposal.

OTHER PROTECTIVE PRACTICES

If an employee's skin or mucous membranes come into contact with blood, he or she is to wash with soap and water and flush eyes with water as soon as feasible. In addition, workers must wash their hands immediately or as soon as feasible after removing protective equipment. If soap and water are not immediately available, employers may provide other handwashing measures such as moist **towelettes.** Employees still must wash with soap and water as soon as possible.

Employees must refrain from eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses in areas where they may be exposed to blood or other potentially infectious materials.

This is one of a series of fact sheets that discusses various requirements of the Occupational Safety and Health Administration's standard covering exposure to bloodborne pathogens. Single copies of fact sheets are available from OSHA Publications, Room N-3101, 200 Constitution Avenue, N. W, Washington DC 20210 and from OSHA regional offices.

Bloodborne facts

Holding the Line on Contamination

U.S. Department of Labor
Occupational Safety and Health Administration

Keeping work areas in a clean and sanitary condition reduces employees' risk of exposure to bloodborne pathogens. Each year about 8,700 health care workers are infected with hepatitis B virus, and 200 die from contracting hepatitis B through their work. The chance of contracting human immunodeficiency virus (HIV), the bloodborne pathogen which causes AIDS, from occupational exposure is small, yet a good housekeeping program can minimize this risk as well.

DECONTAMINATION

Every employer whose employees are exposed to blood or other potentially infectious materials must develop a written schedule for cleaning each area where exposures occur. The methods of decontaminating different surfaces must be specified, determined by the type of surface to be cleaned, the soil present and the tasks or procedures that occur in that area.

For example, different cleaning and decontamination measures would be used for a surgical operatory and a patient room. Similarly, hard surfaced flooring and carpeting require separate cleaning methods. More extensive efforts will be necessary for gross contamination than for minor spattering. Likewise, such varied tasks as laboratory analyses and normal patient care would require different techniques for clean-up.

Employees must decontaminate working surfaces and equipment with an appropriate disinfectant after completing procedures involving exposure to blood. Many laboratory procedures are performed on a continual basis throughout a shift. Except as discussed below, it is not necessary to clean and decontaminate between procedures. However, if the employee leaves the area for a period of time, for a break or lunch, then contaminated work surfaces must be cleaned.

Employees also must clean (1) when surfaces become obviously contaminated; (2) after any spill of blood or other potentially infectious materials; and (3) at the end of the work shift if contamination might have occurred. Thus, employees need not decontaminate the work area after each patient care procedure, but only after those that actually result in contamination.

If surfaces or equipment are draped with protective coverings such as plastic wrap or aluminum foil, these coverings should be removed or replaced if they become obviously contaminated. Reusable receptacles such as bins, pails and cans that are likely to become contaminated must be inspected and decontaminated on a regular basis. If contamination is visible, workers must clean and decontaminate the item immediately, or as soon as feasible.

Should glassware that may be potentially contaminated break, workers need to use mechanical means such as a brush and dustpan or tongs or forceps to pick up the broken glass--never by hand, even when wearing gloves.

Before any equipment is serviced or shipped for repairing or cleaning, it must be decontaminated to the extent possible. The equipment must be labeled, indicating which portions are still contaminated. This enables employees and those who service the equipment to take appropriate precautions to prevent exposure.

REGULATED WASTE

In addition to effective decontamination of work areas, proper handling c regulated waste is essential to prevent unnecessary exposure to blood anc other potentially infectious materials. Regulated waste must be handled with great care --i.e., liquid or semi liquid blood and other potentially infectious materials, items caked with these materials, items that would release blood or other potentially infected materials if compressed, pathological or microbiological wastes containing them and contaminate sharps.

Containers used to store regulated waste must be closable and suitable tc contain the contents and prevent leakage of fluids. Containers designed for sharps also must be puncture resistant. They must be labeled or color coded to ensure that employees are aware of the potential hazards. Such containers must be closed before removal to prevent the contents from spilling. If the outside of a container becomes contaminated, it must be placed within a second suitable container.

Regulated waste must be disposed of in accordance with applicable state and local laws.

LAUNDRY

Laundry workers must wear gloves and handle contaminated laundry as little as possible, with a minimum of agitation. Contaminated laundry should be bagged or placed in containers at the location where it is used, but not sorted or rinsed there.

Laundry must be transported within the establishment or to outside laundries in labeled or red color-coded bags. If the facility uses Universa Precautions for handling all soiled laundry, then alternate labeling or color coding that can be recognized by the employees may be used. If laundry is wet and it might soak through **laundry** bags, then workers must use bags that prevent leakage to transport it.

RESEARCH FACILITIES

More stringent decontamination requirements apply to research laboratories and production facilities that work with concentrated strains of HIV and HBV.

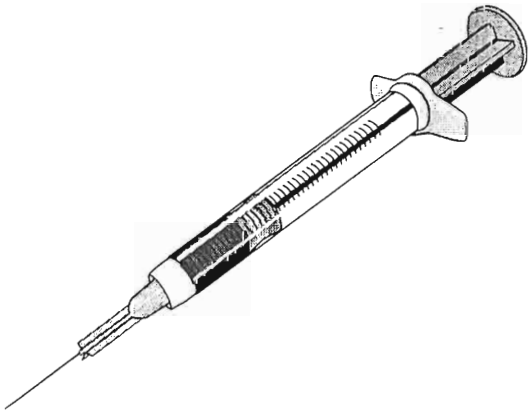
This is one of a series of fact sheets that discusses various requirements of the Occupational Safety and Health Administration's standard covering exposure to bloodborne pathogens. Single copies of fact sheets are available from OSHA Publications, Room N-3101, 20O Constitution Avenue,N.W., Washington, DC 20210 and

National Institute for Occupational Safety and Health

NIOSH

ALERT

Preventing Needlestick Injuries in Health Care Settings



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control and Prevention
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ORDERING INFORMATION

To receive documents or more information about occupational safety and health topics, contact the National Institute for Occupational Safety and Health (NIOSH) at

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DHHS (NIOSH) Publication No. 2000–108

November 1999

NIOSH ALERT

Preventing Needlestick Injuries in Health Care Settings

WARNING!

Health care workers who use or may be exposed to needles are at increased risk of needlestick injury. Such injuries can lead to serious or fatal infections with bloodborne pathogens such as hepatitis B virus, hepatitis C virus, or human immunodeficiency virus (HIV).

Employers of health care workers should implement the use of improved engineering controls to reduce needlestick injuries:

- Eliminate the use of needles where safe and effective alternatives are available.
- Implement the use of devices with safety features and evaluate their use to determine which are most effective and acceptable.

Needlestick injuries can best be reduced when the use of improved engineering controls is incorporated into a comprehensive program involving workers. Employers should implement the following program elements:

- Analyze needlestick and other sharps-related injuries in your workplace to identify hazards and injury trends.
- Set priorities and strategies for prevention by examining local and national information about risk factors for needlestick injuries and successful intervention efforts.
- Ensure that health care workers are properly trained in the safe use and disposal of needles.
- Modify work practices that pose a needlestick injury hazard to make them safer.
- Promote safety awareness in the work environment.
- Establish procedures for and encourage the reporting and timely followup of *all* needlestick and other sharps-related injuries.
- Evaluate the effectiveness of prevention efforts and provide feedback on performance.

Please tear out and post. Distribute copies to workers. See back of sheet to order complete Alert.

Health care workers should take the following steps to protect themselves and their fellow workers from needlestick injuries:

- Avoid the use of needles where safe and effective alternatives are available.
- Help your employer select and evaluate devices with safety features.
- Use devices with safety features provided by your employer.
- Avoid recapping needles.
- Plan for safe handling and disposal before beginning any procedure using needles.
- Dispose of used needles promptly in appropriate sharps disposal containers.
- Report all needlestick and other sharps-related injuries promptly to ensure that you receive appropriate followup care.
- Tell your employer about hazards from needles that you observe in your work environment.
- Participate in bloodborne pathogen training and follow recommended infection prevention practices, including hepatitis B vaccination.

For additional information, see ***NIOSH Alert: Preventing Needlestick Injuries in Health Care Settings*** [DHHS (NIOSH) Publication No. 2000–108]. Single copies of the Alert are available from the following:

NIOSH—Publications Dissemination
4676 Columbia Parkway
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U.S. Department of Health and Human Services
Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

NIOSH ALERT

Preventing Needlestick Injuries in Health Care Settings

WARNING!

Health care workers who use or may be exposed to needles are at increased risk of needlestick injury. Such injuries can lead to serious or fatal infections with bloodborne pathogens such as hepatitis B virus, hepatitis C virus, or human immunodeficiency virus (HIV).

The National Institute for Occupational Safety and Health (NIOSH) requests assistance in preventing needlestick injuries among health care workers.* These injuries are caused by needles such as hypodermic needles, blood collection needles, intravenous (IV) stylets, and needles used to connect parts of IV delivery systems. These injuries may cause a number of serious and potentially fatal infections with bloodborne pathogens such as hepatitis B virus (HBV), hepatitis C virus (HCV), or human immunodeficiency virus (HIV)—the virus that causes acquired immunodeficiency syndrome (AIDS).

These injuries can be avoided by eliminating the unnecessary use of needles, using devices with safety features, and promoting education and safe work practices for handling needles and related systems. These measures should be part of a comprehensive program to prevent the transmission of bloodborne pathogens.

This Alert provides current scientific information about the risk of needlestick injury and the transmission of bloodborne pathogens to health care workers. The document focuses on needlestick injuries as a key element in a broader effort to prevent all sharps-related injuries and associated bloodborne infections. The document describes five cases of health care workers with needlestick-related infections and presents intervention strategies for reducing these risks. Because many needleless devices and safer needle devices have been recently introduced and the field is rapidly evolving, the Alert briefly describes an approach for evaluating these devices.

*In this document, the term *health care worker* includes all workers in the health care setting who use or may be exposed to needles and other sharp devices that may contain blood or other potentially infectious materials. Health care workers include physicians, nurses, laboratory and dental personnel, pre-hospital care providers, and housekeeping, laundry, and maintenance workers.

NIOSH requests that workers, employers, manufacturers, editors of professional journals, safety and health officials, and labor unions implement the recommendations in this Alert and bring them to the attention of all health care workers who use or may be exposed to needles in the workplace.

BACKGROUND

More than 8 million health care workers in the United States work in hospitals and other health care settings. Precise national data are not available on the annual number of needlestick and other percutaneous injuries among health care workers; however, estimates indicate that 600,000 to 800,000 such injuries occur annually [Henry and Campbell 1995; EPINet 1999]. About half of these injuries go unreported [Roy and Robillard 1995; EPINet 1999; CDC 1997a; Osborn et al. 1999]. Data from the EPINet system suggest that at an average hospital, workers incur approximately 30 needlestick injuries per 100 beds per year [EPINet 1999].

Most reported needlestick injuries involve nursing staff; but laboratory staff, physicians, housekeepers, and other health care workers are also injured. Some of these injuries expose workers to bloodborne pathogens that can cause infection. The most important of these pathogens are HBV, HCV, and HIV. Infections with each of these pathogens are potentially life threatening—and preventable.

The emotional impact of a needlestick injury can be severe and long lasting, even when a serious infection is not transmitted. This impact is particularly severe when the injury involves exposure to HIV. In one study of 20 health care workers with an HIV exposure, 11 reported acute severe distress, 7 had persistent moderate distress, and 6 quit their jobs as a result of the exposure [Henry et al. 1990]. Other stress reactions requiring counseling have also been reported [Armstrong et al. 1995]. Not knowing the infection status of the source patient can accentuate the health care worker's stress. In addition to the exposed health care worker, colleagues and family members may suffer emotionally.

HIV

Between 1985 and June 1999, cumulative totals of 55 "documented"[†] cases and 136 "possible"[‡] cases of occupational HIV transmission to U.S. health care workers were reported to the Centers for Disease Control and Prevention (CDC) [CDC 1998a]. Most involved nurses and laboratory technicians. Percutaneous injury (e.g., needlestick) was associated with 49 (89%) of the documented transmissions. Of these, 44 involved hollow-bore needles, most of which were used for blood collection or insertion of an IV catheter.

HIV infection is a complex disease that can be associated with many symptoms. The virus attacks part of the body's immune system, eventually leading to severe infections and other complications—a condition known as AIDS. Despite current therapies

[†]Health care workers who had documented HIV after occupational exposure or had other laboratory evidence of occupational HIV infection.

[‡]Health care workers who were investigated and (1) had no identifiable behavioral or transfusion risks, (2) reported having had percutaneous or mucocutaneous occupational exposures to blood or body fluids or to laboratory solutions containing HIV, but (3) had no documented HIV seroconversion resulting from a specific occupational exposure.

that delay the progression of HIV disease, most health care workers who become infected with HIV are likely to eventually develop AIDS and die.

HBV

Information from national hepatitis surveillance is used to estimate the number of HBV infections in health care workers. In 1995, an estimated 800 health care workers became infected with HBV [CDC unpublished data]. This figure represented a 95% decline from the 17,000 new infections estimated in 1983. The decline was largely due to the widespread immunization of health care workers with the hepatitis B vaccine and the use of universal precautions and other measures required by the Occupational Safety and Health Administration (OSHA) bloodborne pathogens standard [29 CFR[§] 1910.1030].

About one-third to one-half of persons with acute HBV infection develop symptoms of hepatitis such as jaundice, fever, nausea, and abdominal pain. Most acute infections resolve, but 5% to 10% of patients develop chronic infection with HBV that carries an estimated 20% lifetime risk of dying from cirrhosis and 6% risk of dying from liver cancer [Shapiro 1995].

HCV

Hepatitis C virus infection is the most common chronic bloodborne infection in the United States, affecting approximately 4 million people [CDC 1998b]. Although the prevalence of HCV infection among health care workers is similar to that in the general population (1% to 2%) [CDC 1998b], health care workers clearly have an increased occupational risk for HCV infection. In a study that evaluated risk factors for infection, a history of unintentional needlestick injury was independently associated with HCV infection [Polish et al. 1993]. The number of health care workers who have acquired HCV occupationally is not known. However, of the total acute HCV infections that have occurred annually (ranging from 100,000 in 1991 to 36,000 in 1996), 2% to 4% have been in health care workers exposed to blood in the workplace [Alter 1995, 1997; CDC unpublished data].

HCV infection often occurs with no symptoms or only mild symptoms. But unlike HBV, chronic infection develops in 75% to 85% of patients, with active liver disease developing in 70%. Of the patients with active liver disease, 10% to 20% develop cirrhosis, and 1% to 5% develop liver cancer [CDC 1998b].

RISK OF INFECTION AFTER A NEEDLESTICK INJURY

After a needlestick exposure to an infected patient, a health care worker's risk of infection depends on the pathogen involved, the immune status of the worker, the severity of the needlestick injury, and the availability and use of appropriate post-exposure prophylaxis.

HIV

To estimate the rate of HIV transmission, data were combined from more than 20 worldwide prospective studies of health care workers exposed to HIV-infected blood through a percutanous injury. In all, 21 infections followed 6,498 exposures for an *average* transmission rate of 0.3% per

[§]*Code of Federal Regulations*. See CFR in references.

injury [Gerberding 1994; Ippolito et al. 1999]. A retrospective case-control study of health care workers who had percutaneous exposures to HIV found that the risk of HIV transmission was increased when the worker was exposed to a larger quantity of blood from the patient, as indicated by (1) a visibly bloody device, (2) a procedure that involved placing a needle in a patient's vein or artery, or (3) a deep injury [Cardo et al. 1997]. Preliminary data suggest that such high-risk needlestick injuries may have a substantially greater risk of disease transmission per injury [Bell 1997].

Post-exposure prophylaxis for HIV is recommended for health care workers occupationally exposed to HIV under certain circumstances [CDC 1998c]. Limited data suggest that such prophylaxis may considerably reduce the chance of becoming infected with HIV [Cardo et al. 1997]. However, the drugs used for HIV post-exposure prophylaxis have many adverse side effects [CDC 1998c]. Currently no vaccine exists to prevent HIV infection, and no treatment exists to cure it [CDC 1998d].

HBV

The rate of HBV transmission to susceptible health care workers ranges from 6% to 30% after a single needlestick exposure to an HBV-infected patient [CDC 1997b]. However, such exposures are a risk only for health care workers who are not immune to HBV. Health care workers who have antibodies to HBV either from pre-exposure vaccination or prior infection are not at risk. In addition, if a susceptible worker is exposed to HBV, post-exposure prophylaxis with hepatitis B immune globulin and initiation of hepatitis B vaccine is more than 90% effective in preventing HBV infection.

HCV

Prospective studies of health care workers exposed to HCV through a needlestick or other percutaneous injury have found that the incidence of anti-HCV seroconversion (indicating infection) averages 1.8% (range, 0% to 7%) per injury [Alter 1997; CDC 1998b]. Currently no vaccine exists to prevent HCV infection, and neither immunoglobulin nor antiviral therapy is recommended as post-exposure prophylaxis [CDC 1998b]. However, recommendations for treatment of early infections are rapidly evolving. Health care workers with known exposure should be monitored for seroconversion and referred for medical follow-up if seroconversion occurs.

Summary

Although exposure to HBV poses a high risk for infection, administration of pre-exposure vaccination or post-exposure prophylaxis to workers can dramatically reduce this risk. Such is not the case with HCV and HIV. Preventing the needlestick injury is the best approach to preventing these diseases in health care workers, and it is an important part of any bloodborne pathogen prevention program in the workplace.

HOW DO NEEDLESTICK INJURIES OCCUR?

Devices Associated with Needlestick Injuries

Health care workers use many types of needles and other sharp devices to

provide patient care. However, data from hospitals participating in the CDC National Surveillance System for Hospital Health Care Workers (NaSH) and from hospitals included in the EPINet research database show that only a few needles and other sharp devices are associated with the majority of injuries [International Health Care Worker Safety Center 1997; EPINet 1999; CDC unpublished data 1999]. Of nearly 5,000 percutaneous injuries reported by hospitals participating in NaSH between June 1995 and July 1999, 62% were associated with hollow-bore needles—primarily hypodermic needles attached to disposable syringes (29%) and winged-steel (butterfly-type) needles (13%). Figure 1 shows the extent to which these and other sharp devices contributed to the burden of percutaneous injuries in NaSH hospitals. Data from hospitals participating in EPINet show a similar distribution of injuries by device type [EPINet 1999].

Activities Associated with Needlestick Injuries

Whenever a needle or other sharp device is exposed, injuries can occur. Data from NaSH show that approximately 38% of percutaneous injuries occur during use and 42% occur after use and before disposal. Causes of percutaneous injuries with hollow-bore needles are shown in Figure 2.

The circumstances leading to a needlestick injury depend partly on the type and design of the device used. For example, needle devices that must be taken apart or manipulated after use (e.g., prefilled cartridge syringes and phlebotomy needle/vacuum tube assemblies) are an obvious hazard and have been associated with increased injury rates [Jagger et al. 1988]. In addition, needles attached to a length of flexible tubing (e.g., winged-steel needles and needles attached to IV tubing) are sometimes difficult to place in sharps containers and thus present another injury hazard. Injuries involving needles attached to IV tubing may occur when a health care worker inserts or withdraws a needle from an IV port or tries to temporarily remove the needlestick hazard by inserting the needle into a drip chamber, IV port or bag, or even bedding.

In addition to risks related to device characteristics, needlestick injuries have been related to certain work practices such as

- recapping,
- transferring a body fluid between containers, and
- failing to properly dispose of used needles in puncture-resistant sharps containers.

Past studies of needlestick injuries have shown that 10% to 25% occurred when recapping a used needle [Ruben et al. 1983; Krasinski et al. 1987; McCormick and Maki 1981; McCormick et al. 1991; Yassi and McGill 1991]. Although recapping by hand has been discouraged for some time and is prohibited under the OSHA bloodborne pathogens standard [29 CFR 1910.1030] unless no alternative exists, 5% of needlestick injuries in NaSH hospitals are still related to this practice (Figure 2). Injury may occur when a health care worker attempts to transfer blood or other body fluids from a syringe to a specimen container (such as a vacuum tube) and misses the target. Also, if used needles or other sharps are left in the work area or are discarded in a sharps container that is not puncture resistant, a needlestick injury may result.

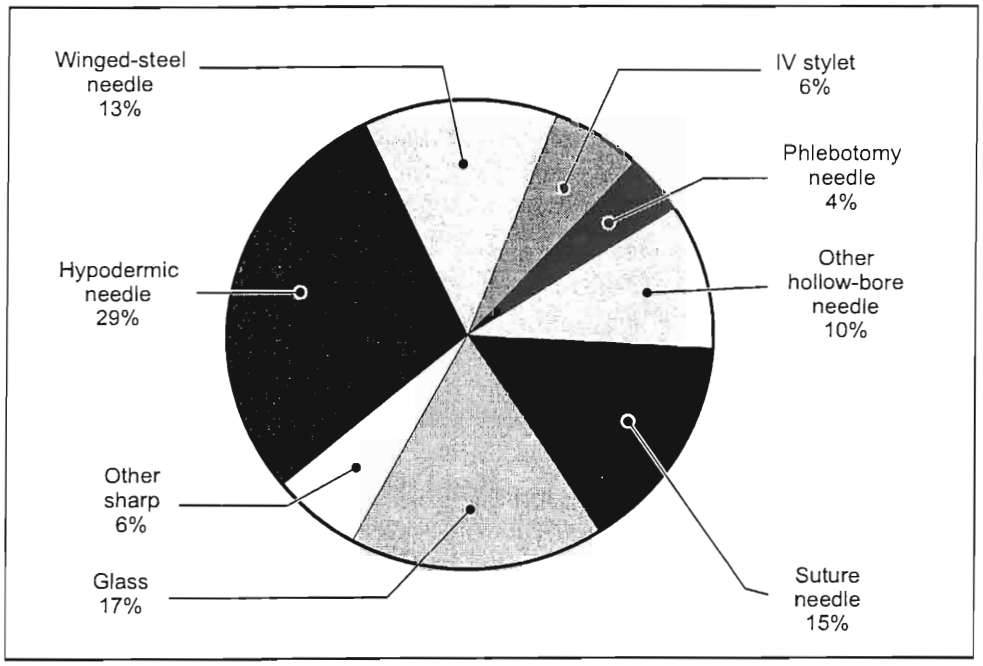

Figure 1. Hollow-bore needles and other devices associated with percutaneous injuries in NaSH hospitals, by % total percutaneous injuries (n=4,951), June 1995–July 1999. (Source: CDC [1999].)

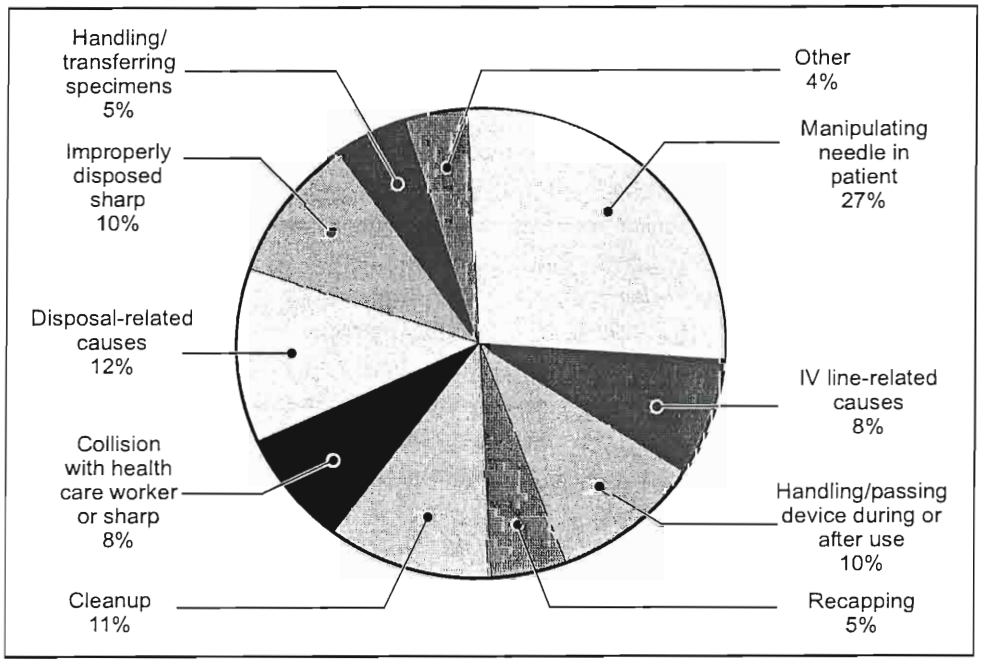

Figure 2. Causes of percutaneous injuries with hollow-bore needles in NaSH hospitals, by % total percutaneous injuries (n=3,057), June 1995–July 1999. (Source: CDC [1999].)

OSHA, FDA, AND STATE REGULATIONS**

OSHA

The current Federal standard for addressing needlestick injuries among health care workers is the OSHA bloodborne pathogens standard [29 CFR 1910.1030; 56 Fed. Reg.†† 64004 (1991)], which has been in effect since 1992. The standard applies to all occupational exposures to blood or other potentially infectious materials. Notable elements of this standard require the following:

- A written exposure control plan designed to eliminate or minimize worker exposure to bloodborne pathogens
- Compliance with universal precautions (an infection control principle that treats all human blood and other potentially infectious materials as infectious)
- Engineering controls and work practices to eliminate or minimize worker exposure
- Personal protective equipment (if engineering controls and work practices do not eliminate occupational exposures)
- Prohibition of bending, recapping, or removing contaminated needles and other sharps unless such an act is required by a specific procedure or has no feasible alternative
- Prohibition of shearing or breaking contaminated needles (OSHA defines *contaminated* as the presence or the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface)
- Free hepatitis B vaccinations offered to workers with occupational exposure to bloodborne pathogens
- Worker training in appropriate engineering controls and work practices
- Post-exposure evaluation and followup, including post-exposure prophylaxis when appropriate

OSHA also intends to act to reduce the number of injuries that health care workers receive from needles and other sharp medical objects [OSHA 1999a]. First, the agency has revised the compliance directive (guidance to be used in the field) accompanying its 1992 bloodborne pathogens standard [29 CFR 1910.1030] to reflect newer and safer technologies now available and to increase the employer's responsibility to evaluate and use effective, safer technologies [OSHA 1999b]. Second, the agency has proposed a requirement in the revised recordkeeping rule that all injuries resulting from contaminated needles and sharps be recorded on OSHA logs used by employers to record injuries and illnesses. Finally, OSHA will take steps to amend its bloodborne pathogens standard by placing needlestick and sharps injuries on its regulatory agenda.

FDA

Under the regulations of the Food and Drug Administration (FDA) application clearance process [FDA 1995], the manufacturers of

**Because of recent changes and pending legislation in the area of needlestick injury prevention, readers are urged to check with current Federal as well as State regulations.

††*Federal Register*. See Fed. Reg. in references.

medical devices (including needles used in patient care) must meet requirements for appropriate registration and for listing, labeling, and good manufacturing practices for design and production. The process for receiving clearance or approval to market a device requires device manufacturers to (1) demonstrate that a new device is substantially equivalent to a legally marketed device or (2) document the safety and effectiveness of the new device for patient care through a more involved premarket approval process. FDA has also released two advisories pertaining to sharps and the risk of bloodborne pathogen transmission in the health care setting [FDA 1992; FDA et al. 1999].

State Regulations

Currently, three States have adopted and more than two dozen are considering legislation to require additional regulatory actions addressing bloodborne pathogen exposures to health care workers. The recent California standard [State of California 1998] has several requirements that go beyond those currently required by OSHA. These requirements include stronger language for the use of needleless systems for certain procedures or (where needleless systems are not available) the use of needles with engineered sharps injury protection for certain procedures.

CASE REPORTS

The following case reports briefly describe the experiences of five health care workers who developed serious infections after occupational exposures to bloodborne pathogens. Their cases illustrate a number of the preventable hazardous conditions and practices that can lead to needlestick injuries.

Case 1

A hospitalized patient with AIDS became agitated and tried to remove the intravenous (IV) catheters in his arm. Several hospital staff members struggled to restrain the patient. During the struggle, an IV infusion line was pulled, exposing the connector needle that was inserted into the access port of the IV catheter. A nurse at the scene recovered the connector needle at the end of the IV line and was attempting to reinsert it when the patient kicked her arm, pushing the needle into the hand of a second nurse. The nurse who sustained the needlestick injury tested negative for HIV that day, but she tested HIV positive several months later [American Health Consultants 1992a].

Case 2

A physician was drawing blood from a patient in an examination room of an HIV clinic. Because the room had no sharps disposal container, she recapped the needle using the one-handed technique. While the physician was sorting waste materials from lab materials, the cap fell off the phlebotomy needle, which subsequently penetrated her right index finger. The physician's baseline HIV test was negative. She began post-exposure prophylaxis with zidovudine but discontinued it after 10 days because of adverse side effects. Approximately 2 weeks after the needlestick, the physician developed flu-like symptoms consistent with HIV infection. She was found to be seropositive for HIV when tested 3 months after the needlestick exposure [American Health Consultants 1992b].

Case 3

After performing phlebotomy on a patient with AIDS, a health care worker sustained a deep needlestick injury with the used phlebotomy needle. Blood from the collection tube also spilled into the space between the wrist and cuff of the health care worker's gloves, contaminating her chapped hands. The health care worker removed the gloves and washed her hands immediately. She had a negative baseline HIV test and refused zidovudine prophylaxis. Because her patient was not known to have HCV infection and did not have clinical evidence of liver disease, the health care worker did not receive baseline testing for exposure to HCV. Eight months after the incident, the health care worker was hospitalized with acute hepatitis. She was found to be seropositive for HIV 9 months after the incident. Sixteen months after the incident, she tested positive for anti-HCV antibodies and was diagnosed with chronic HCV infection. Her clinical condition continued to deteriorate, and she died 28 months after the needlestick injury [Ridzon et al. 1997].

Case 4

During bronchoscopy to determine the cause of shortness of breath in a patient infected with HBV, a health care worker sustained a percutaneous injury with a 25-gauge needle while extracting tissue from biopsy forceps. The worker did not receive post-exposure prophylaxis with hepatitis B immune globulin or hepatitis B vaccine. Approximately 15 weeks after the needlestick injury, the worker noted fatigue, malaise, and jaundice. Later, he was found to have abnormal liver enzymes and a positive test for hepatitis B surface antigen, consistent with acute hepatitis B infection. The patient who underwent bronchoscopy was diagnosed with *Pneumocystis carinii* pneumonia and died 8 months later after he was diagnosed with disseminated Kaposi's sarcoma and overwhelming opportunistic infection. The injured worker had an uncomplicated medical course, and his liver enzymes and his health eventually returned to normal. He later tested negative for hepatitis B surface antigen and positive for hepatitis B surface antibody, indicating recovery from his HBV infection. On followup 15 months after the needlestick injury, the worker also tested HIV negative; serum from the deceased patient was not available for antibody testing [Gerberding et al 1985].

Case 5

In 1972, a nurse sustained a needlestick injury to her finger while removing a hypodermic needle from a patient's arm. At the time of the injury, the source patient had apparent acute non-A, non-B hepatitis. The nurse developed hepatitis 6 weeks after the needlestick injury. Her liver enzymes remained elevated for nearly a year. Later examination of serum samples from the nurse and the source patient showed that both persons were infected with HCV. The initial serum sample from the nurse in 1972 was negative for anti-HCV antibody, but the sample obtained 6 weeks after the needlestick injury was seropositive. Although the nurse was clinically well at the time of the report, she remained seropositive for HCV [Seeff 1991].

USE OF IMPROVED ENGINEERING CONTROLS IN A PREVENTION STRATEGY

Comprehensive Programs to Prevent Needlestick Injuries

Safety and health issues can best be addressed in the setting of a comprehensive prevention program that considers all aspects of the work environment and that has employee involvement as well as management commitment. Implementing the use of improved engineering controls is one component of such a comprehensive program. Since many devices with needlestick prevention features are new, this section primarily addresses their use, including desirable characteristics, examples, and data supporting their effectiveness. However, other prevention strategy factors that must be addressed include modification of hazardous work practices, administrative changes to address needle hazards in the environment (e.g., prompt removal of filled sharps disposal boxes), safety education and awareness, feedback on safety improvements, and action taken on continuing problems. Several authors have noted the importance of a comprehensive approach [Krasinski et al. 1987; Hanrahan and Reutter 1997; DeJoy et al. 1995; Ramos-Gomez et al. 1997; Gershon et al. 1995]. The critical role of appropriate training has been emphasized by several recent reports of increased patient bloodstream infections associated with improper care of needleless IV systems, primarily in the home health care setting [Cookson et al. 1998; Danzig et al. 1995; Do et al. 1999; Kellerman et al. 1996]. These data emphasize the need for patient safety surveillance and thorough training as well as occupational injury surveillance when implementing the use of a new medical device.

Case Study of a Successful Comprehensive Prevention Program

The value of a comprehensive approach is illustrated by its success in a recent report by Dale et al. [1998]. Between 1993 and 1996, the phlebotomy service at a major institution decreased the needlestick injury rate among its 200 full-time phlebotomists from 1.5 to 0.2 per 10,000 venipunctures performed. In comparison, a national survey from 1990 to 1992 found a median needlestick injury rate of about 0.94 per 10,000 venipunctures [Howanitz and Schifman 1994]. A retrospective review of the events contributing to the success of the phlebotomy service included changes in worker education and work practices, the implementation of devices with safety features, and encouragement of injury reporting. These interventions as well as the implementation of CDC published guidelines and the OSHA bloodborne pathogens standard were associated with the observed steady decline in the injury rate. The authors noted that an important factor contributing to this success was a thorough understanding of the injuries that occurred among their staff.

Desirable Characteristics of Devices with Safety Features

Improved engineering controls are often among the most effective approaches to reducing occupational hazards and therefore are an important element of a needlestick prevention program. Such controls include eliminating the unnecessary use of needles and implementing devices with safety features. A number of sources have identified the desirable characteristics of safety devices [OSHA 1999c;

FDA 1992; Jagger et al. 1988; Chiarello 1995; Quebbeman and Short 1995; Pugliese 1998; Fisher 1999; ECRI 1999]. These characteristics include the following:

- The device is needleless.
- The safety feature is an integral part of the device.
- The device preferably works passively (i.e., it requires no activation by the user). If user activation is necessary, the safety feature can be engaged with a single-handed technique and allows the worker's hands to remain behind the exposed sharp.
- The user can easily tell whether the safety feature is activated.
- The safety feature cannot be deactivated and remains protective through disposal.
- The device performs reliably.
- The device is easy to use and practical.
- The device is safe and effective for patient care.

Although each of these characteristics is desirable, some are not feasible, applicable or available for certain health care situations. For example, needles will always be necessary where alternatives for skin penetration are not available. Also, a safety feature that requires activation by the user might be preferable to one that is passive in some cases. Each device must be considered on its own merit and ultimately on its ability to reduce workplace injuries. The desirable characteristics listed here should thus serve only as a guideline for device design and selection.

Examples of Safety Device Designs

Figure 3 shows examples of syringes with safety features. These and other examples of safety device designs are listed as follows:

- Needleless connectors for IV delivery systems (e.g., blunt cannula for use with prepierced ports and valved connectors that accept tapered or luer ends of IV tubing)
- Protected needle IV connectors (e.g., the IV connector needle is permanently recessed in a rigid plastic housing that fits over IV ports)
- Needles that retract into a syringe or vacuum tube holder
- Hinged or sliding shields attached to phlebotomy needles, winged-steel needles, and blood gas needles
- Protective encasements to receive an IV stylet as it is withdrawn from the catheter
- Sliding needle shields attached to disposable syringes and vacuum tube holders
- Self-blunting phlebotomy and winged-steel needles (a blunt cannula seated inside the phlebotomy needle is advanced beyond the needle tip before the needle is withdrawn from the vein—see Figure 3)
- Retractable finger/heel-stick lancets

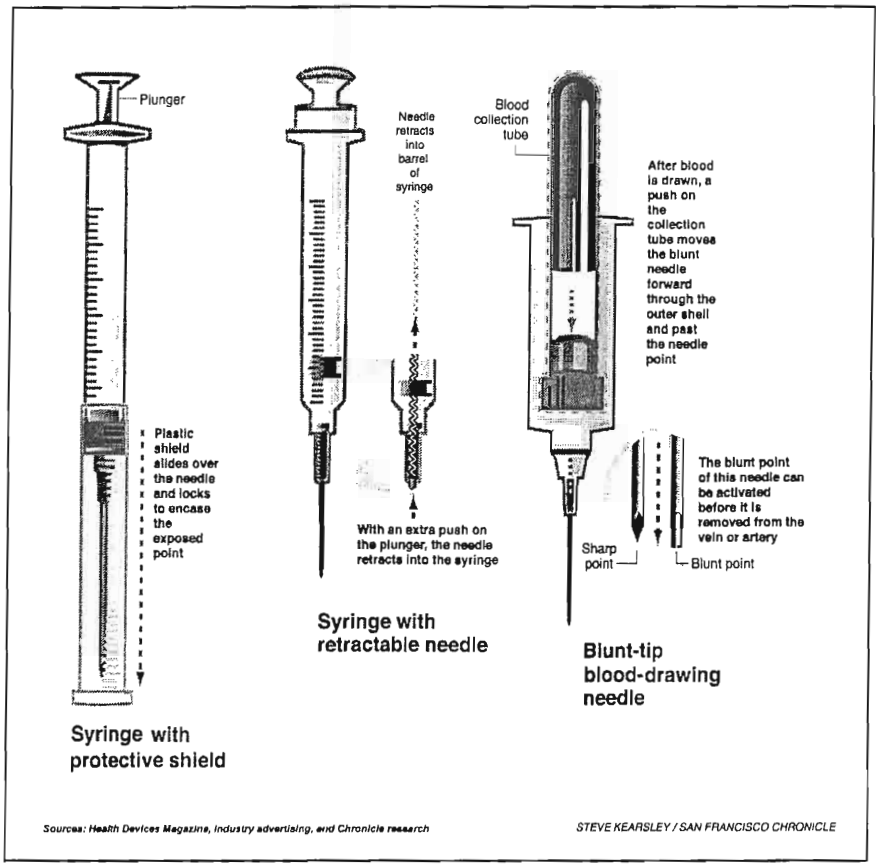

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Figure 3. Three examples of syringes with safety features. (These drawings are presented for educational purposes and do not imply endorsement of a particular product by NIOSH.)

Evidence of Effectiveness

Accumulating evidence indicates that devices with safety features reduce needlestick injuries:

- Needleless or protected-needle IV systems decreased needlestick injuries related to IV connectors by 62% to 88% [Gartner 1992; Yassi et al. 1995; Lawrence et al. 1997].
- Phlebotomy injuries were reduced by 76% with a self-blunting needle, 66% with a hinged needle shield, and 23% with a sliding-shield, winged-steel (butterfly-type) needle [CDC 1997a].
- Phlebotomy injuries were reduced by 82% with a needle shield, but a recapping device had minimal impact [Billiet et al. 1991].

- Safer IV catheters that encase the needle after use reduced needlestick injuries related to IV insertion by 83% in three hospitals [Jagger 1996].

Other studies also document substantial reductions in needlestick injuries with the proper use of needleless systems or newer safety needle devices used in a comprehensive program to prevent needlestick injuries [NCCC and DVA 1997; Zafar et al. 1997].

Although the focus in this section is on needle devices with safety features, sharps disposal containers are also important engineering controls to consider in a comprehensive needlestick injury prevention program. NIOSH [1998] recently reviewed the proper location, use, and benefits of sharps disposal containers.

As illustrated by the examples listed here, many devices with safety features decrease the frequency of needlestick injuries, but for many reasons they do not completely eliminate the risk. In some cases, the safety feature cannot be activated until after the needle is removed from the patient. Or the needle may be inadvertently dislodged during a procedure, thereby exposing the unprotected sharp. Some health care workers fail to activate the safety feature, or the safety feature may fail. With some devices, users can bypass safety features. For example, even with some needleless IV delivery systems, a needle can be used to connect parts of the system. Understanding the factors that influence the safety of a device and promoting practices that will maximize prevention effectiveness are therefore important components in prevention planning.

CONCLUSIONS

Needlestick injuries are an important and continuing cause of exposure to serious and fatal diseases among health care workers. Greater collaborative efforts by all stakeholders are needed to prevent needlestick injuries and the tragic consequences that can result. Such efforts are best accomplished through a comprehensive program that addresses institutional, behavioral, and device-related factors that contribute to the occurrence of needlestick injuries in health care workers. Critical to this effort are the elimination of needle-bearing devices where safe and effective alternatives are available and the development, evaluation, and use of needle devices with safety features.

RECOMMENDATIONS

Selecting and Evaluating Needle Devices with Safety Features

An increasing number and variety of needle devices with safety features are now available, but many of these devices have had only limited use in the workplace. Thus health care organizations and workers may find it difficult to select appropriate devices. Although these devices are designed to enhance the safety of health care workers, they should be evaluated to ensure that

— the safety feature works effectively and reliably,

— the device is acceptable to the health care worker, and

— the device does not adversely affect patient care.

As employers implement the use of needle devices with safety features, they can use several guidelines to select and evaluate these products. These guidelines are derived partly from publications and other resources offering plans, evaluation forms, and related information in this new area [Chiarello 1995; Fisher 1999; SEIU 1998; EPINet 1999; Pugliese and Salahuddin 1999]. While health care settings are implementing the use of needle devices with safety features, they should seek help from the appropriate professional organizations, trade groups, and manufacturers in obtaining information about devices and procedures suitable for specific settings (e.g. dental offices). Other information sources are listed in later sections of the Alert (see *References, Additional Information,* and *Suggested Readings*). In addition, OSHA received nearly 400 responses to its recent public request for information about preventing occupational exposure to bloodborne pathogens from percutaneous injuries [63 Fed. Reg. 48250 (1998); OSHA 1999c]. This information includes numerous reports about the successful implementation of needlestick injury prevention programs, and it may be useful to medical institutions as they establish injury tracking systems, prevention approaches, and the use of safer devices.

The major elements of a process for selecting and evaluating needle devices with safety features are listed here briefly:

1. Form a multidisciplinary team that includes workers to (1) develop, implement, and evaluate a plan to reduce needlestick injuries in the institution and (2) evaluate needle devices with safety features.

2. Identify priorities based on assessments of how needlestick injuries are occurring, patterns of device use in the institution, and local and national data on injury and disease transmission trends. Give the highest priority to needle devices with safety features that will have the greatest impact on preventing occupational infection (e.g., hollow-bore needles used in veins and arteries).

3. When selecting a safer device, identify its intended scope of use in the health care facility and any special technique or design factors that will influence its safety, efficiency, and user acceptability. Seek published, Internet, or other sources of data on the safety and overall performance of the device.

4. Conduct a product evaluation, making sure that the participants represent the scope of eventual product users. The following steps will contribute to a successful product evaluation:

   - Train health care workers in the correct use of the new device.

   - Establish clear criteria and measures to evaluate the device with regard to both health care worker safety and patient care. (Safety feature evaluation forms are available from the references cited earlier.)

   - Conduct onsite followup to obtain informal feedback, identify problems, and provide additional guidance.

5. Monitor the use of a new device after it is implemented to determine the need for additional training, solicit informal feedback on health care worker experience with the device (e.g., using a suggestion box), and identify possible adverse effects of the device on patient care.

Ongoing review of current devices and options will be necessary. As with any evolving technology, the process will be dynamic, and with experience, improved devices with safety features will emerge.

Recommendations for Employers

To protect health care workers from needlestick injuries, employers must provide a safe working environment that includes safer needle devices and effective safety programs. Many types of needle devices are associated with needlestick injuries, and these injuries can occur in many ways. Thus a combination of prevention strategies must be considered. Employers should take the following steps to implement a program for reducing needlestick injuries and to involve workers in this effort.

1. Employers of health care workers should implement the use of improved engineering controls to reduce needlestick injuries:

   - *Eliminate the use of needle devices where safe and effective alternatives are available.* The most obvious example of unnecessary needle use is the use of exposed needles to access or connect parts of an IV delivery system. For nearly a decade, needleless IV delivery systems and protected needles have been available to remove or isolate this hazard. Examine information about your own institution to identify other unnecessary needle use.

   - *Implement the use of needle devices with safety features and evaluate their use to determine which are most effective and acceptable.* Many devices are now available with safety features that isolate an exposed needle after use. An evaluation approach and references are provided in this document.

2. Needlestick injury reduction can best be accomplished when the use of improved engineering controls is incorporated into a comprehensive program involving workers:

   - *Analyze needlestick and other sharps-related injuries in your workplace to identify hazards and injury trends.* Data from injury reporting should be compiled and assessed to identify (1) where, how, with what devices, and when injuries are occurring and (2) the groups of health care workers being injured.

   - *Set priorities and prevention strategies by examining local and national information about risk factors for needlestick injuries and successful intervention efforts.* Procedures and devices that have contributed to disease transmission (e.g., devices used to access a vein or artery) should receive the highest priority for intervention. Look to local and national resources for information about the types of devices and work practices that have been successful in reducing injuries.

   - *Ensure that health care workers are properly trained in the safe use and disposal of needles.* Health care workers and students in the health professions should be trained to use needle devices properly and to maximize their personal protection throughout the handling of these

devices. As safer devices are introduced, worker training is essential to ensure proper use [Ihrig et al. 1997].

- *Modify work practices that pose a needlestick injury hazard to make them safer.* Hazards that can be eliminated by modifying work practices include injuries due to recapping, failing to dispose of a needle device properly, passing or transferring such a device, and transferring blood or body fluids from a device into a specimen container. Also, specimen collection can be coordinated to reduce the number of times needles are used on a patient, thereby reducing both worker risk and patient discomfort. In some cases, the use of devices with safety features will reduce or eliminate these risks. In all cases, involving health care workers will help identify and resolve safety issues. Employers should thus review current procedures for reporting and addressing hazards related to needles and other sharps.

- *Promote safety awareness in the work environment.* Many needlestick injuries result from unexpected circumstances such as sudden movement by a patient or collision with a coworker or needle device. Health care workers should be trained to be constantly alert to the injury potential when an exposed needle or other sharp device is being used. A number of job-related factors influence the adoption of safety behaviors by health care workers [Dejoy et al. 1995; Murphy et al. 1996; Gershon et al. 1995]. These workers often place patient needs before their personal safety. They are less likely to perform a safety measure they perceive to interfere with patient care or to require added steps. Therefore, employers must address both the hazards that contribute to needlestick injuries and the institutional barriers and attitudes that affect safe work practices [Hanrahan and Reutter 1997].

- *Establish procedures for and encourage the reporting and timely followup of **all** needlestick and other sharps-related injuries.* Reporting of needlestick injuries is essential to (1) ensure that all health care workers receive appropriate post-exposure medical management and (2) provide a record for assessing needlestick hazards in the work environment.

- *Evaluate the effectiveness of prevention efforts and provide feedback on performance.* Employers need to ensure that health care workers are adopting the recommended prevention strategies and that the changes they make have the desired effect. Thus they should provide a forum to assess worker perceptions, evaluate compliance, and identify problems.

Recommendations for Workers

To protect themselves and their coworkers, health care workers should be aware of the hazards posed by needlestick injuries and should use safety devices and improved work practices as follows:

1. Avoid the use of needles where safe and effective alternatives are available.

2. Help your employer select and evaluate devices with safety features.

3. Use devices with safety features provided by your employer.

4. Avoid recapping needles.

5. Plan safe handling and disposal before beginning any procedure using needles.

6. Dispose of used needle devices promptly in appropriate sharps disposal containers.

7. Report all needlestick and other sharps-related injuries promptly to ensure that you receive appropriate followup care.

8. Tell your employer about hazards from needles that you observe in your work environment.

9. Participate in bloodborne pathogen training and follow recommended infection prevention practices, including hepatitis B vaccination.

ADDITIONAL INFORMATION

For additional information about needlestick injuries, call 1–800–35–NIOSH (1–800–356–4674); or visit the NIOSH Web site at www.cdc.gov/niosh

The following Web sites provide additional information about needlestick injuries and safer needle devices:

- University of Virginia's International Health Care Workers Safety Center and its EPINet needlestick injury data collection system: www.med.virginia.edu/~epinet (or call 804–982–0702)
- San Francisco General Hospital's Trauma Foundation, Training for Development of Innovative Control Technology (TDICT) Project: www.tdict.org (or call 412–821–8209)
- OSHA Web page: www.osha.gov; for needlestick information, www.osha-slc.gov/SLTC/needlestick/index.html (or call the OSHA Publications Office at 202–693–1888)
- CDC Web page: www.cdc.gov; for hepatitis information, www.cdc.gov/ncidod/diseases/hepatitis/index.htm; for hospital infections, www.cdc.gov/ncidod/hip/default.htm; and for HIV information, www.cdc.gov/nchstp/hiv_aids/dhap.htm
- FDA medical device safety alerts: www.fda.gov/cdrh/safety.html

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Morgantown, WV 26505

Telephone, 304–285–5894; or call 1–800–35–NIOSH (1–800–356–4674).

We greatly appreciate your assistance in protecting the health of U.S. workers.

Linda Rosenstock, M.D., M.P.H.
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Centers for Disease Control and Prevention

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Airborne Pathogens

Part Number:	1910
• Part Title:	Occupational Safety and Health Standards
bpart:	I
• ubpart Title:	Personal Protective Equipment
• Standard Number:	1910.134
• Title:	Respiratory Protection.
• Appendix:	A , B-1 , B-2 , C , D

This section applies to General Industry (part 1910), Shipyards (part 1915), Marine Terminals (part 1917), Longshoring (part 1918), and Construction (part 1926).

1910.134(a)
Permissible practice.
1910.134(a)(1)
In the control of those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective shall be to prevent atmospheric contamination. This shall be accomplished as far as feasible by accepted engineering control measures (for example, enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials). When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used pursuant to this section.

1910.134(a)(2)
Respirators shall be provided by the employer when such equipment is necessary to protect the lth of the employee. The employer shall provide the respirators which are applicable and suitable the purpose intended. The employer shall be responsible for the establishment and maintenance of a respiratory protection program which shall include the requirements outlined in paragraph (c) of this section.

1910.134(b)
Definitions. The following definitions are important terms used in the respiratory protection standard in this section.

Air-purifying respirator means a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Assigned protection factor (APF) [Reserved]

Atmosphere-supplying respirator means a respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

Canister or cartridge means a container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.

Demand respirator means an atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

ergency situation means any occurrence such as, but not limited to, equipment failure, rupture of ntainers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

Employee exposure means exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection.

End-of-service-life indicator (ESLI) means a system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.

Escape-only respirator means a respirator intended to be used only for emergency exit.

Filter or air purifying element means a component used in respirators to remove solid or liquid aerosols from the inspired air.

Filtering facepiece (dust mask) means a negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

Fit factor means a quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

Fit test means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also Qualitative fit test QLFT and Quantitative fit test QNFT.)

Helmet means a rigid respiratory inlet covering that also provides head protection against impact and penetration.

High efficiency particulate air (HEPA) filter means a filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.

Hood means a respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.

Immediately dangerous to life or health (IDLH) means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Interior structural firefighting means the physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures which are involved in a fire situation beyond the incipient stage. (See 29 CFR 1910.155)

Loose-fitting facepiece means a respiratory inlet covering that is designed to form a partial seal with the face.

Maximum use concentration (MUC) [Reserved].

Negative pressure respirator (tight fitting) means a respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

Oxygen deficient atmosphere means an atmosphere with an oxygen content below 19.5% by volume.

Physician or other licensed health care professional (PLHCP) means an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide, or be delegated the responsibility to provide, some or all of the health care

services required by paragraph (e) of this section.

Positive pressure respirator means a respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

Powered air-purifying respirator (PAPR) means an air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

Pressure demand respirator means a positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

Qualitative fit test (QLFT) means a pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

Quantitative fit test (QNFT) means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Respiratory inlet covering means that portion of a respirator that forms the protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both. It may be a facepiece, helmet, hood, suit, or a mouthpiece respirator with nose clamp.

Self-contained breathing apparatus (SCBA) means an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

Service life means the period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer.

Supplied-air respirator (SAR) or airline respirator means an atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

This section means this respiratory protection standard.

Tight-fitting facepiece means a respiratory inlet covering that forms a complete seal with the face.

User seal check means an action conducted by the respirator user to determine if the respirator is properly seated to the face.

<u>1910.134(c)</u>

Respiratory protection program. This paragraph requires the employer to develop and implement a written respiratory protection program with required worksite-specific procedures and elements for required respirator use. The program must be administered by a suitably trained program administrator. In addition, certain program elements may be required for voluntary use to prevent potential hazards associated with the use of the respirator. The Small Entity Compliance Guide contains criteria for the selection of a program administrator and a sample program that meets the requirements of this paragraph. Copies of the Small Entity Compliance Guide will be available on or about April 8, 1998 from the Occupational Safety and Health Administration's Office of Publications, Room N 3101, 200 Constitution Avenue, NW, Washington, DC, 20210 (202-219-4667).

1910.134(c)(1)

In any workplace where respirators are necessary to protect the health of the employee or whenever respirators are required by the employer, the employer shall establish and implement a written respiratory protection program with worksite-specific procedures. The program shall be updated as necessary to reflect those changes in workplace conditions that affect respirator use. The employer shall include in the program the following provisions of this section, as applicable:

1910.134(c)(1)(i)
Procedures for selecting respirators for use in the workplace;
1910.134(c)(1)(ii)
Medical evaluations of employees required to use respirators;
1910.134(c)(1)(iii)
Fit testing procedures for tight-fitting respirators;
1910.134(c)(1)(iv)
Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations;
1910.134(c)(1)(v)
Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators;
1910.134(c)(1)(vi)
Procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators;
1910.134(c)(1)(vii)
Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations;
1910.134(c)(1)(viii)
Training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance; and
1910.134(c)(1)(ix)
Procedures for regularly evaluating the effectiveness of the program.

1910.134(c)(2)
Where respirator use is not required:
1910.134(c)(2)(i)
An employer may provide respirators at the request of employees or permit employees to use their own respirators, if the employer determines that such respirator use will not in itself create a hazard. If the employer determines that any voluntary respirator use is permissible, the employer shall provide the respirator users with the information contained in Appendix D to this section ("Information for Employees Using Respirators When Not Required Under the Standard"); and
1910.134(c)(2)(ii)
In addition, the employer must establish and implement those elements of a written respiratory protection program necessary to ensure that any employee using a respirator voluntarily is medically able to use that respirator, and that the respirator is cleaned, stored, and maintained so that its use does not present a health hazard to the user. Exception: Employers are not required to include in a written respiratory protection program those employees whose only use of respirators involves the voluntary use of filtering facepieces (dust masks).
1910.134(c)(3)
The employer shall designate a program administrator who is qualified by appropriate training or experience that is commensurate with the complexity of the program to administer or oversee the respiratory protection program and conduct the required evaluations of program effectiveness.

1910.134(c)(4)
The employer shall provide respirators, training, and medical evaluations at no cost to the employee.

1910.134(d)
Selection of respirators. This paragraph requires the employer to evaluate respiratory hazard(s) in the workplace, identify relevant workplace and user factors, and base respirator selection on these factors. The paragraph also specifies appropriately protective respirators for use in IDLH atmospheres, and limits the selection and use of air-purifying respirators.
1910.134(d)(1)
General requirements.
1910.134(d)(1)(i)

The employer shall select and provide an appropriate respirator based on the respiratory hazard(s) to which the worker is exposed and workplace and user factors that affect respirator performance and reliability.

1910.134(d)(1)(ii)

The employer shall select a NIOSH-certified respirator. The respirator shall be used in compliance with the conditions of its certification.

1910.134(d)(1)(iii)

The employer shall identify and evaluate the respiratory hazard(s) in the workplace; this evaluation shall include a reasonable estimate of employee exposures to respiratory hazard(s) and an identification of the contaminant's chemical state and physical form. Where the employer cannot identify or reasonably estimate the employee exposure, the employer shall consider the atmosphere to be IDLH.

1910.134(d)(1)(iv)

The employer shall select respirators from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

1910.134(d)(2)

Respirators for IDLH atmospheres.

1910.134(d)(2)(i)

The employer shall provide the following respirators for employee use in IDLH atmospheres:

1910.134(d)(2)(i)(A)

A full facepiece pressure demand SCBA certified by NIOSH for a minimum service life of thirty minutes, or

1910.134(d)(2)(i)(B)

A combination full facepiece pressure demand supplied-air respirator (SAR) with auxiliary self-contained air supply.

1910.134(d)(2)(ii)

Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

1910.134(d)(2)(iii)

All oxygen-deficient atmospheres shall be considered IDLH. Exception: If the employer demonstrates that, under all foreseeable conditions, the oxygen concentration can be maintained within the ranges specified in Table II of this section (i.e., for the altitudes set out in the table), then any atmosphere-supplying respirator may be used.

1910.134(d)(3)

Respirators for atmospheres that are not IDLH.

1910.134(d)(3)(i)

The employer shall provide a respirator that is adequate to protect the health of the employee and ensure compliance with all other OSHA statutory and regulatory requirements, under routine and reasonably foreseeable emergency situations.

1910.134(d)(3)(i)(A)

Assigned Protection Factors (APFs) [Reserved]

1910.134(d)(3)(i)(B)

Maximum Use Concentration (MUC) [Reserved]

1910.134(d)(3)(ii)

The respirator selected shall be appropriate for the chemical state and physical form of the contaminant.

1910.134(d)(3)(iii)

For protection against gases and vapors, the employer shall provide:

1910.134(d)(3)(iii)(A)

An atmosphere-supplying respirator, or

1910.134(d)(3)(iii)(B)

An air-purifying respirator, provided that:

1910.134(d)(3)(iii)(B)(1)

The respirator is equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant; or

1910.134(d)(3)(iii)(B)(2)

If there is no ESLI appropriate for conditions in the employer's workplace, the employer implements a change schedule for canisters and cartridges that is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. The employer shall describe in the respirator program the information and data relied upon and the basis for the canister and cartridge change schedule and the basis for reliance on the data.

1910.134(d)(3)(iv)

For protection against particulates, the employer shall provide:

1910.134(d)(3)(iv)(A)

An atmosphere-supplying respirator; or

1910.134(d)(3)(iv)(B)

An air-purifying respirator equipped with a filter certified by NIOSH under 30 CFR part 11 as a high efficiency particulate air (HEPA) filter, or an air-purifying respirator equipped with a filter certified for particulates by NIOSH under 42 CFR part 84; or

1910.134(d)(3)(iv)(C)

For contaminants consisting primarily of particles with mass median aerodynamic diameters (MMAD) of at least 2 micrometers, an air-purifying respirator equipped with any filter certified for particulates by NIOSH.

TABLE I. -- ASSIGNED PROTECTION FACTORS

[RESERVED]

TABLE II

Altitude (ft.)	Oxygen deficient Atmospheres (% O_2) for which the employer atmosphere-may rely on supplying respirators
Less than 3,001	16.0-19.5
3,001-4,000	16.4-19.5
4,001-5,000	17.1-19.5
5,001-6,000	17.8-19.5
6,001-7,000	18.5-19.5
7,001-8,000[1]	19.3-19.5.

[1]Above 8,000 feet the exception does not apply. Oxygen-enriched breathing air must be supplied above 14,000 feet.

1910.134(e)

Medical evaluation. Using a respirator may place a physiological burden on employees that varies with the type of respirator worn, the job and workplace conditions in which the respirator is used, and the medical status of the employee. Accordingly, this paragraph specifies the minimum requirements for medical evaluation that employers must implement to determine the employee's ability to use a respirator.

1910.134(e)(1)

General. The employer shall provide a medical evaluation to determine the employee's ability to use a respirator, before the employee is fit tested or required to use the respirator in the workplace. The employer may discontinue an employee's medical evaluations when the employee is no longer required to use a respirator.

1910.134(e)(2)

Medical evaluation procedures.

910.134(e)(2)(i)

The employer shall identify a physician or other licensed health care professional (PLHCP) to perform medical evaluations using a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire.

1910.134(e)(2)(ii)

The medical evaluation shall obtain the information requested by the questionnaire in Sections 1 and 2, Part A of Appendix C of this section.

1910.134(e)(3)

Follow-up medical examination.

1910.134(e)(3)(i)

The employer shall ensure that a follow-up medical examination is provided for an employee who gives a positive response to any question among questions 1 through 8 in Section 2, Part A of Appendix C or whose initial medical examination demonstrates the need for a follow-up medical examination.

1910.134(e)(3)(ii)

The follow-up medical examination shall include any medical tests, consultations, or diagnostic procedures that the PLHCP deems necessary to make a final determination.

1910.134(e)(4)

Administration of the medical questionnaire and examinations.

1910.134(e)(4)(i)

The medical questionnaire and examinations shall be administered confidentially during the employee's normal working hours or at a time and place convenient to the employee. The medical questionnaire shall be administered in a manner that ensures that the employee understands its content.

'910.134(e)(4)(ii)

The employer shall provide the employee with an opportunity to discuss the questionnaire and examination results with the PLHCP.

1910.134(e)(5)

Supplemental information for the PLHCP.

1910.134(e)(5)(i)

The following information must be provided to the PLHCP before the PLHCP makes a recommendation concerning an employee's ability to use a respirator:

1910.134(e)(5)(i)(A)

(A) The type and weight of the respirator to be used by the employee;

1910.134(e)(5)(i)(B)

The duration and frequency of respirator use (including use for rescue and escape);

1910.134(e)(5)(i)(C)

The expected physical work effort;

1910.134(e)(5)(i)(D)

Additional protective clothing and equipment to be worn; and

1910.134(e)(5)(i)(E)

Temperature and humidity extremes that may be encountered.

1910.134(e)(5)(ii)

Any supplemental information provided previously to the PLHCP regarding an employee need not be provided for a subsequent medical evaluation if the information and the PLHCP remain the same.

1910.134(e)(5)(iii)

The employer shall provide the PLHCP with a copy of the written respiratory protection program and a copy of this section.

Note to Paragraph (e)(5)(iii): When the employer replaces a PLHCP, the employer must ensure that the new PLHCP obtains this information, either by providing the documents directly to the PLHCP or having the documents transferred from the former PLHCP to the new PLHCP. However, OSHA does

not expect employers to have employees medically reevaluated solely because a new PLHCP has been selected.
1910.134(e)(6)
Medical determination. In determining the employee's ability to use a respirator, the employer shall:
1910.134(e)(6)(i)
Obtain a written recommendation regarding the employee's ability to use the respirator from the PLHCP. The recommendation shall provide only the following information:
1910.134(e)(6)(i)(A)
Any limitations on respirator use related to the medical condition of the employee, or relating to the workplace conditions in which the respirator will be used, including whether or not the employee is medically able to use the respirator;
1910.134(e)(6)(i)(B)
The need, if any, for follow-up medical evaluations; and
1910.134(e)(6)(i)(C)
A statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation.
1910.134(e)(6)(ii)
If the respirator is a negative pressure respirator and the PLHCP finds a medical condition that may place the employee's health at increased risk if the respirator is used, the employer shall provide a PAPR if the PLHCP's medical evaluation finds that the employee can use such a respirator; if a subsequent medical evaluation finds that the employee is medically able to use a negative pressure respirator, then the employer is no longer required to provide a PAPR.
1910.134(e)(7)
Additional medical evaluations. At a minimum, the employer shall provide additional medical evaluations that comply with the requirements of this section if:
1910.134(e)(7)(i)
An employee reports medical signs or symptoms that are related to ability to use a respirator;
1910.134(e)(7)(ii)
A PLHCP, supervisor, or the respirator program administrator informs the employer that an employee needs to be reevaluated;
1910.134(e)(7)(iii)
Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or
1910.134(e)(7)(iv)
A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

1910.134(f)
Fit testing. This paragraph requires that, before an employee may be required to use any respirator with a negative or positive pressure tight-fitting facepiece, the employee must be fit tested with the same make, model, style, and size of respirator that will be used. This paragraph specifies the kinds of fit tests allowed, the procedures for conducting them, and how the results of the fit tests must be used.
1910.134(f)(1)
The employer shall ensure that employees using a tight-fitting facepiece respirator pass an appropriate qualitative fit test (QLFT) or quantitative fit test (QNFT) as stated in this paragraph.
1910.134(f)(2)
The employer shall ensure that an employee using a tight-fitting facepiece respirator is fit tested prior to initial use of the respirator, whenever a different respirator facepiece (size, style, model or make) is used, and at least annually thereafter.
1910.134(f)(3)
The employer shall conduct an additional fit test whenever the employee reports, or the employer, PLHCP, supervisor, or program administrator makes visual observations of, changes in the

employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.

910.134(f)(4)

If after passing a QLFT or QNFT, the employee subsequently notifies the employer, program administrator, supervisor, or PLHCP that the fit of the respirator is unacceptable, the employee shall be given a reasonable opportunity to select a different respirator facepiece and to be retested.

1910.134(f)(5)

The fit test shall be administered using an OSHA-accepted QLFT or QNFT protocol. The OSHA-accepted QLFT and QNFT protocols and procedures are contained in Appendix A of this section.

1910.134(f)(6)

QLFT may only be used to fit test negative pressure air-purifying respirators that must achieve a fit factor of 100 or less.

1910.134(f)(7)

If the fit factor, as determined through an OSHA-accepted QNFT protocol, is equal to or greater than 100 for tight-fitting half facepieces, or equal to or greater than 500 for tight-fitting full facepieces, the QNFT has been passed with that respirator.

1910.134(f)(8)

Fit testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators shall be accomplished by performing quantitative or qualitative fit testing in the negative pressure mode, regardless of the mode of operation (negative or positive pressure) that is used for respiratory protection.

1910.134(f)(8)(i)

Qualitative fit testing of these respirators shall be accomplished by temporarily converting the respirator user's actual facepiece into a negative pressure respirator with appropriate filters, or by using an identical negative pressure air-purifying respirator facepiece with the same sealing surfaces as a surrogate for the atmosphere-supplying or powered air-purifying respirator facepiece.

910.134(f)(8)(ii)

Quantitative fit testing of these respirators shall be accomplished by modifying the facepiece to allow sampling inside the facepiece in the breathing zone of the user, midway between the nose and mouth. This requirement shall be accomplished by installing a permanent sampling probe onto a surrogate facepiece, or by using a sampling adapter designed to temporarily provide a means of sampling air from inside the facepiece.

1910.134(f)(8)(iii)

Any modifications to the respirator facepiece for fit testing shall be completely removed, and the facepiece restored to NIOSH-approved configuration, before that facepiece can be used in the workplace.

1910.134(g)

Use of respirators. This paragraph requires employers to establish and implement procedures for the proper use of respirators. These requirements include prohibiting conditions that may result in facepiece seal leakage, preventing employees from removing respirators in hazardous environments, taking actions to ensure continued effective respirator operation throughout the work shift, and establishing procedures for the use of respirators in IDLH atmospheres or in interior structural firefighting situations.

1910.134(g)(1)

Facepiece seal protection.

1910.134(g)(1)(i)

The employer shall not permit respirators with tight-fitting facepieces to be worn by employees who have:

1910.134(g)(1)(i)(A)

Facial hair that comes between the sealing surface of the facepiece and the face or that interferes with valve function; or

1910.134(g)(1)(i)(B)

Any condition that interferes with the face-to-facepiece seal or valve function.

1910.134(g)(1)(ii)
If an employee wears corrective glasses or goggles or other personal protective equipment, the employer shall ensure that such equipment is worn in a manner that does not interfere with the seal of the facepiece to the face of the user.
1910.134(g)(1)(iii)
For all tight-fitting respirators, the employer shall ensure that employees perform a user seal check each time they put on the respirator using the procedures in Appendix B-1 or procedures recommended by the respirator manufacturer that the employer demonstrates are as effective as those in Appendix B-1 of this section.
1910.134(g)(2)
Continuing respirator effectiveness.
1910.134(g)(2)(i)
Appropriate surveillance shall be maintained of work area conditions and degree of employee exposure or stress. When there is a change in work area conditions or degree of employee exposure or stress that may affect respirator effectiveness, the employer shall reevaluate the continued effectiveness of the respirator.
1910.134(g)(2)(ii)
The employer shall ensure that employees leave the respirator use area:
1910.134(g)(2)(ii)(A)
To wash their faces and respirator facepieces as necessary to prevent eye or skin irritation associated with respirator use; or
1910.134(g)(2)(ii)(B)
If they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece; or
1910.134(g)(2)(ii)(C)
To replace the respirator or the filter, cartridge, or canister elements.
1910.134(g)(2)(iii)
If the employee detects vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece, the employer must replace or repair the respirator before allowing the employee to return to the work area.
1910.134(g)(3)
Procedures for IDLH atmospheres. For all IDLH atmospheres, the employer shall ensure that:
1910.134(g)(3)(i)
One employee or, when needed, more than one employee is located outside the IDLH atmosphere;
1910.134(g)(3)(ii)
Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere;
1910.134(g)(3)(iii)
The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue;
1910.134(g)(3)(iv)
The employer or designee is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue;
1910.134(g)(3)(v)
The employer or designee authorized to do so by the employer, once notified, provides necessary assistance appropriate to the situation;
1910.134(g)(3)(vi)
Employee(s) located outside the IDLH atmospheres are equipped with:
1910.134(g)(3)(vi)(A)
Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either
1910.134(g)(3)(vi)(B)

Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would increase the overall risk resulting from entry; or

1910.134(g)(3)(vi)(C)

Equivalent means for rescue where retrieval equipment is not required under paragraph (g)(3)(vi)(B).

1910.134(g)(4)

Procedures for interior structural firefighting. In addition to the requirements set forth under paragraph (g)(3), in interior structural fires, the employer shall ensure that:

1910.134(g)(4)(i)

At least two employees enter the IDLH atmosphere and remain in visual or voice contact with one another at all times;

1910.134(g)(4)(ii)

At least two employees are located outside the IDLH atmosphere; and

1910.134(g)(4)(iii)

All employees engaged in interior structural firefighting use SCBAs.

Note 1 to paragraph (g): One of the two individuals located outside the IDLH atmosphere may be assigned to an additional role, such as incident commander in charge of the emergency or safety officer, so long as this individual is able to perform assistance or rescue activities without jeopardizing the safety or health of any firefighter working at the incident.

Note 2 to paragraph (g): Nothing in this section is meant to preclude firefighters from performing emergency rescue activities before an entire team has assembled.

1910.134(h)

Maintenance and care of respirators. This paragraph requires the employer to provide for the cleaning and disinfecting, storage, inspection, and repair of respirators used by employees.

1910.134(h)(1)

Cleaning and disinfecting. The employer shall provide each respirator user with a respirator that is clean, sanitary, and in good working order. The employer shall ensure that respirators are cleaned and disinfected using the procedures in Appendix B-2 of this section, or procedures recommended by the respirator manufacturer, provided that such procedures are of equivalent effectiveness. The respirators shall be cleaned and disinfected at the following intervals:

1910.134(h)(1)(i)

Respirators issued for the exclusive use of an employee shall be cleaned and disinfected as often as necessary to be maintained in a sanitary condition;

1910.134(h)(1)(ii)

Respirators issued to more than one employee shall be cleaned and disinfected before being worn by different individuals;

1910.134(h)(1)(iii)

Respirators maintained for emergency use shall be cleaned and disinfected after each use; and

1910.134(h)(1)(iv)

Respirators used in fit testing and training shall be cleaned and disinfected after each use.

1910.134(h)(2)

Storage. The employer shall ensure that respirators are stored as follows:

1910.134(h)(2)(i)

All respirators shall be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals, and they shall be packed or stored to prevent deformation of the facepiece and exhalation valve.

1910.134(h)(2)(ii)

In addition to the requirements of paragraph (h)(2)(i) of this section, emergency respirators shall be:

1910.134(h)(2)(ii)(A)

Kept accessible to the work area;

1910.134(h)(2)(ii)(B)

Stored in compartments or in covers that are clearly marked as containing emergency respirators; and
1910.134(h)(2)(ii)(C)
Stored in accordance with any applicable manufacturer instructions.
1910.134(h)(3)
Inspection.
1910.134(h)(3)(i)
The employer shall ensure that respirators are inspected as follows:
1910.134(h)(3)(i)(A)
All respirators used in routine situations shall be inspected before each use and during cleaning;
1910.134(h)(3)(i)(B)
All respirators maintained for use in emergency situations shall be inspected at least monthly and in accordance with the manufacturer's recommendations, and shall be checked for proper function before and after each use; and
1910.134(h)(3)(i)(C)
Emergency escape-only respirators shall be inspected before being carried into the workplace for use.
1910.134(h)(3)(ii)
The employer shall ensure that respirator inspections include the following:
1910.134(h)(3)(ii)(A)
A check of respirator function, tightness of connections, and the condition of the various parts including, but not limited to, the facepiece, head straps, valves, connecting tube, and cartridges, canisters or filters; and
1910.134(h)(3)(ii)(B)
A check of elastomeric parts for pliability and signs of deterioration.
1910.134(h)(3)(iii)
In addition to the requirements of paragraphs (h)(3)(i) and (ii) of this section, self-contained breathing apparatus shall be inspected monthly. Air and oxygen cylinders shall be maintained in a fully charged state and shall be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level. The employer shall determine that the regulator and warning devices function properly.
1910.134(h)(3)(iv)
For respirators maintained for emergency use, the employer shall:
1910.134(h)(3)(iv)(A)
Certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator; and
1910.134(h)(3)(iv)(B)
Provide this information on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in inspection reports stored as paper or electronic files. This information shall be maintained until replaced following a subsequent certification.
1910.134(h)(4)
Repairs. The employer shall ensure that respirators that fail an inspection or are otherwise found to be defective are removed from service, and are discarded or repaired or adjusted in accordance with the following procedures:
1910.134(h)(4)(i)
Repairs or adjustments to respirators are to be made only by persons appropriately trained to perform such operations and shall use only the respirator manufacturer's NIOSH-approved parts designed for the respirator;
1910.134(h)(4)(ii)
Repairs shall be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed; and
1910.134(h)(4)(iii)
Reducing and admission valves, regulators, and alarms shall be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

1910.134(i)

Breathing air quality and use. This paragraph requires the employer to provide employees using mosphere-supplying respirators (supplied-air and SCBA) with breathing gases of high purity.

1910.134(i)(1)

The employer shall ensure that compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration accords with the following specifications:

1910.134(i)(1)(i)

Compressed and liquid oxygen shall meet the United States Pharmacopoeia requirements for medical or breathing oxygen; and

1910.134(i)(1)(ii)

Compressed breathing air shall meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989, to include:

1910.134(i)(1)(ii)(A)

Oxygen content (v/v) of 19.5-23.5%;

1910.134(i)(1)(ii)(B)

Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;

1910.134(i)(1)(ii)(C)

Carbon monoxide (CO) content of 10 ppm or less;

1910.134(i)(1)(ii)(D)

Carbon dioxide content of 1,000 ppm or less; and

1910.134(i)(1)(ii)(E)

Lack of noticeable odor.

1910.134(i)(2)

The employer shall ensure that compressed oxygen is not used in atmosphere-supplying respirators that have previously used compressed air.

1910.134(i)(3)

The employer shall ensure that oxygen concentrations greater than 23.5% are used only in equipment designed for oxygen service or distribution.

1910.134(i)(4)

The employer shall ensure that cylinders used to supply breathing air to respirators meet the following requirements:

1910.134(i)(4)(i)

Cylinders are tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR part 173 and part 178);

1910.134(i)(4)(ii)

Cylinders of purchased breathing air have a certificate of analysis from the supplier that the breathing air meets the requirements for Grade D breathing air; and

1910.134(i)(4)(iii)

The moisture content in the cylinder does not exceed a dew point of -50 deg.F (-45.6 deg.C) at 1 atmosphere pressure.

1910.134(i)(5)

The employer shall ensure that compressors used to supply breathing air to respirators are constructed and situated so as to:

1910.134(i)(5)(i)

Prevent entry of contaminated air into the air-supply system;

1910.134(i)(5)(ii)

Minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F (5.56 deg.C) below the ambient temperature;

1910.134(i)(5)(iii)

Have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters shall be maintained and replaced or refurbished periodically following the manufacturer's instructions.

1910.134(i)(5)(iv)

Have a tag containing the most recent change date and the signature of the person authorized by the employer to perform the change. The tag shall be maintained at the compressor.

1910.134(i)(6)

For compressors that are not oil-lubricated, the employer shall ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm.

1910.134(i)(7)

For oil-lubricated compressors, the employer shall use a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.

1910.134(i)(8)

The employer shall ensure that breathing air couplings are incompatible with outlets for nonrespirable worksite air or other gas systems. No asphyxiating substance shall be introduced into breathing air lines.

1910.134(i)(9)

The employer shall use breathing gas containers marked in accordance with the NIOSH respirator certification standard, 42 CFR part 84.

1910.134(j)

Identification of filters, cartridges, and canisters. The employer shall ensure that all filters, cartridges and canisters used in the workplace are labeled and color coded with the NIOSH approval label and that the label is not removed and remains legible.

1910.134(k)

Training and information. This paragraph requires the employer to provide effective training to employees who are required to use respirators. The training must be comprehensive, understandable, and recur annually, and more often if necessary. This paragraph also requires the employer to provide the basic information on respirators in Appendix D of this section to employees who wear respirators when not required by this section or by the employer to do so.

1910.134(k)(1)

The employer shall ensure that each employee can demonstrate knowledge of at least the following:

1910.134(k)(1)(i)

Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator;

1910.134(k)(1)(ii)

What the limitations and capabilities of the respirator are;

1910.134(k)(1)(iii)

How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions;

1910.134(k)(1)(iv)

How to inspect, put on and remove, use, and check the seals of the respirator;

1910.134(k)(1)(v)

What the procedures are for maintenance and storage of the respirator;

1910.134(k)(1)(vi)

How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators; and

1910.134(k)(1)(vii)

The general requirements of this section.

1910.134(k)(2)

The training shall be conducted in a manner that is understandable to the employee.

1910.134(k)(3)

The employer shall provide the training prior to requiring the employee to use a respirator in the workplace.

1910.134(k)(4)

An employer who is able to demonstrate that a new employee has received training within the last 12 months that addresses the elements specified in paragraph (k)(1)(i) through (vii) is not required to repeat such training provided that, as required by paragraph (k)(1), the employee can demonstrate knowledge of those element(s). Previous training not repeated initially by the employer must be provided no later than 12 months from the date of the previous training.

1910.134(k)(5)

Retraining shall be administered annually, and when the following situations occur:

1910.134(k)(5)(i)

Changes in the workplace or the type of respirator render previous training obsolete;

1910.134(k)(5)(ii)

Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill; or

1910.134(k)(5)(iii)

Any other situation arises in which retraining appears necessary to ensure safe respirator use.

1910.134(k)(6)

The basic advisory information on respirators, as presented in Appendix D of this section, shall be provided by the employer in any written or oral format, to employees who wear respirators when such use is not required by this section or by the employer.

1910.134(l)

Program evaluation. This section requires the employer to conduct evaluations of the workplace to ensure that the written respiratory protection program is being properly implemented, and to consult employees to ensure that they are using the respirators properly.

1910.134(l)(1)

The employer shall conduct evaluations of the workplace as necessary to ensure that the provisions of the current written program are being effectively implemented and that it continues to be effective.

1910.134(l)(2)

The employer shall regularly consult employees required to use respirators to assess the employees' views on program effectiveness and to identify any problems. Any problems that are identified during this assessment shall be corrected. Factors to be assessed include, but are not limited to:

1910.134(l)(2)(i)

Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);

1910.134(l)(2)(ii)

Appropriate respirator selection for the hazards to which the employee is exposed;

1910.134(l)(2)(iii)

Proper respirator use under the workplace conditions the employee encounters; and

1910.134(l)(2)(iv)

Proper respirator maintenance.

1910.134(m)

Recordkeeping. This section requires the employer to establish and retain written information regarding medical evaluations, fit testing, and the respirator program. This information will facilitate employee involvement in the respirator program, assist the employer in auditing the adequacy of the program, and provide a record for compliance determinations by OSHA.

1910.134(m)(1)

Medical evaluation. Records of medical evaluations required by this section must be retained and made available in accordance with 29 CFR 1910.1020.

1910.134(m)(2)

Fit testing.

1910.134(m)(2)(i)

The employer shall establish a record of the qualitative and quantitative fit tests administered to an employee including:

1910.134(m)(2)(i)(A)

The name or identification of the employee tested;
1910.134(m)(2)(i)(B)
Type of fit test performed;
1910.134(m)(2)(i)(C)
Specific make, model, style, and size of respirator tested;
1910.134(m)(2)(i)(D)
Date of test; and
1910.134(m)(2)(i)(E)
The pass/fail results for QLFTs or the fit factor and strip chart recording or other recording of the test results for QNFTs.
1910.134(m)(2)(ii)
Fit test records shall be retained for respirator users until the next fit test is administered.
1910.134(m)(3)
A written copy of the current respirator program shall be retained by the employer.
1910.134(m)(4)
Written materials required to be retained under this paragraph shall be made available upon request to affected employees and to the Assistant Secretary or designee for examination and copying.

1910.134(n)
Dates.
1910.134(n)(1)
Effective date. This section is effective April 8, 1998. The obligations imposed by this section commence on the effective date unless otherwise noted in this paragraph. Compliance with obligations that do not commence on the effective date shall occur no later than the applicable start-up date.
1910.134(n)(2)
Compliance dates. All obligations of this section commence on the effective date except as follows:
1910.134(n)(2)(i)
The determination that respirator use is required (paragraph (a)) shall be completed no later than September 8, 1998.
1910.134(n)(2)(ii)
Compliance with provisions of this section for all other provisions shall be completed no later than October 5, 1998.
1910.134(n)(3)
The provisions of 29 CFR 1910.134 and 29 CFR 1926.103, contained in the 29 CFR parts 1900 to 1910.99 and the 29 CFR part 1926 editions, revised as of July 1, 1997, are in effect and enforceable until October 5, 1998, or during any administrative or judicial stay of the provisions of this section.
1910.134(n)(4)
Existing Respiratory Protection Programs. If, in the 12 month period preceding April 8, 1998, the employer has conducted annual respirator training, fit testing, respirator program evaluation, or medical evaluations, the employer may use the results of those activities to comply with the corresponding provisions of this section, providing that these activities were conducted in a manner that meets the requirements of this section.

1910.134(o)
Appendices.
1910.134(o)(1)
Compliance with Appendix A, Appendix B-1, Appendix B-2, and Appendix C of this section is mandatory.
1910.134(o)(2)
Appendix D of this section is non-mandatory and is not intended to create any additional obligations not otherwise imposed or to detract from any existing obligations.

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Part Number:	1910
• Part Title:	Occupational Safety and Health Standards
Subpart:	I
Subpart Title:	Personal Protective Equipment
• Standard Number:	1910.134 App A
• Title:	Fit Testing Procedures (Mandatory).

Appendix A to § 1910.134: Fit Testing Procedures (Mandatory)

Part I. OSHA-Accepted Fit Test Protocols

A. Fit Testing Procedures -- General Requirements

The employer shall conduct fit testing using the following procedures. The requirements in this appendix apply to all OSHA-accepted fit test methods, both QLFT and QNFT.

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.

The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.

4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.

5. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:

(a) Position of the mask on the nose

(b) Room for eye protection

(c) Room to talk

(d) Position of mask on face and cheeks

The following criteria shall be used to help determine the adequacy of the respirator fit:

(a) Chin properly placed;

(b) Adequate strap tension, not overly tightened;

(c) Fit across nose bridge;

(d) Respirator of proper size to span distance from nose to chin;

(e) Tendency of respirator to slip;

(f) Self-observation in mirror to evaluate fit and respirator position.

8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described in Appendix B-1 of this section or those recommended by the respirator manufacturer which provide equivalent protection to the procedures in Appendix B-1. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.

9. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.

10. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties.

11. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.

12. Exercise regimen. Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

13. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which could interfere with respirator fit.

14. Test Exercises. (a) The following test exercises are to be performed for all fit testing methods prescribed in this appendix, except for the CNP method. A separate fit testing exercise regimen is contained in the CNP protocol. The test subject shall perform exercises, in the test environment, in the following manner:

(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.

(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.

(3) Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.

(4) Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).

(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test

conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

(6) Grimace. The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT)

(7) Bending over. The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist. (8) Normal breathing. Same as exercise (1).

(b) Each test exercise shall be performed for one minute except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

B. Qualitative Fit Test (QLFT) Protocols

General

(a) The employer shall ensure that persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

2. Isoamyl Acetate Protocol

Note: This protocol is not appropriate to use for the fit testing of particulate respirators. If used to fit test particulate respirators, the respirator must be equipped with an organic vapor filter.

(a) Odor Threshold Screening

Odor threshold screening, performed without wearing a respirator, is intended to determine if the individual tested can detect the odor of isoamyl acetate at low levels.

(1) Three 1 liter glass jars with metal lids are required.

(2) Odor-free water (e.g., distilled or spring water) at approximately 25 deg. C (77 deg. F) shall be used for the solutions.

(3) The isoamyl acetate (IAA) (also known at isopentyl acetate) stock solution is prepared by adding 1 ml of pure IAA to 800 ml of odor-free water in a 1 liter jar, closing the lid and shaking for 30 seconds. A new solution shall be prepared at least weekly.

(4) The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well-ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.

(5) The odor test solution is prepared in a second jar by placing 0.4 ml of the stock solution into 500 ml of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only one day.

(6) A test blank shall be prepared in a third jar by adding 500 cc of odor-free water.

(7) The odor test and test blank jar lids shall be labeled (e.g., 1 and 2) for jar identification. Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.

(8) The following instruction shall be typed on a card and placed on the table in front of the two test jars (i.e., 1 and 2): "The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil."

(9) The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.

(10) If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.

(11) If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.

(b) Isoamyl Acetate Fit Test

(1) The fit test chamber shall be a clear 55-gallon drum liner suspended inverted over a 2-foot diameter frame so that the top of the chamber is about 6 inches above the test subject's head. If no drum liner is available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.

(2) Each respirator used for the fitting and fit testing shall be equipped with organic vapor cartridges or offer protection against organic vapors.

(3) After selecting, donning, and properly adjusting a respirator, the test subject shall wear it to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well-ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.

(4) A copy of the test exercises and any prepared text from which the subject is to read shall be taped to the inside of the test chamber.

(5) Upon entering the test chamber, the test subject shall be given a 6-inch by 5-inch piece of paper towel, or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 ml of pure IAA. The test subject shall hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampule may be substituted for the IAA wetted paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that

generated by the paper towel method.

Allow two minutes for the IAA test concentration to stabilize before starting the fit test exercises. This would be an appropriate time to talk with the test subject; to explain the fit test, the importance of his/her cooperation, and the purpose for the test exercises; or to demonstrate some of the exercises.

(7) If at any time during the test, the subject detects the banana-like odor of IAA, the test is failed. The subject shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.

(8) If the test is failed, the subject shall return to the selection room and remove the respirator. The test subject shall repeat the odor sensitivity test, select and put on another respirator, return to the test area and again begin the fit test procedure described in (b) (1) through (7) above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the subject shall wait at least 5 minutes before retesting. Odor sensitivity will usually have returned by this time.

(9) If the subject passes the test, the efficiency of the test procedure shall be demonstrated by having the subject break the respirator face seal and take a breath before exiting the chamber.

(10) When the test subject leaves the chamber, the subject shall remove the saturated towel and return it to the person conducting the test, so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealing plastic bag to keep the test area from being contaminated.

3. Saccharin Solution Aerosol Protocol

The entire screening and testing procedure shall be explained to the test subject prior to the conduct of screening test.

(a) Taste threshold screening. The saccharin taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of saccharin.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches in diameter by 14 inches tall with at least the front portion clear and that allows free movements of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a 3/4-inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his/her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a sweet taste.

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. The nozzle is directed away from the nose and mouth of the person. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The threshold check solution is prepared by dissolving 0.83 gram of sodium saccharin USP in 100 ml of warm water. It can be prepared by putting 1 ml of the fit test solution (see (b)(5) below) in 100 ml of distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then released and allowed to fully expand.

(7) Ten squeezes are repeated rapidly and then the test subject is asked whether the saccharin can be tasted. If the test subject reports tasting the sweet taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the saccharin is not tasted after 30 squeezes (step 10), the test subject is unable to taste saccharin and may not perform the saccharin fit test.

Note to paragraph 3. (a): If the test subject eats or drinks something sweet before the screening test, he/she may be unable to taste the weak saccharin solution.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Saccharin solution aerosol fit test procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure described in 3. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected in section I. A. of this appendix. The respirator shall be properly adjusted and equipped with a particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 83 grams of sodium saccharin to 100 ml of warm water.

(6) As before, the test subject shall breathe through the slightly open mouth with tongue extended, and report if he/she tastes the sweet taste of saccharin.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of saccharin fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during

the screening test. A minimum of 10 squeezes is required.

After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the original number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of saccharin is detected. If the test subject does not report tasting the saccharin, the test is passed.

(11) If the taste of saccharin is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

(12) Since the nebulizer has a tendency to clog during use, the test operator must make periodic checks of the nebulizer to ensure that it is not clogged. If clogging is found at the end of the test session, the test is invalid.

4. Bitrex™ (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol

The Bitrex™ (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. Bitrex is routinely used as a taste aversion agent in household liquids which children should not be drinking and is endorsed by the American Medical Association, the National Safety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the eening test.

(a) Taste Threshold Screening.

The Bitrex taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of Bitrex.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches (30.5 cm) in diameter by 14 inches (35.6 cm) tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a \3/4\ inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a bitter taste

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the Threshold Check Solution into the enclosure. This Nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

) The Threshold Check Solution is prepared by adding 13.5 milligrams of Bitrex to 100 ml of 5% salt (NaCl) solution in distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely,

and is then released and allowed to fully expand.

(7) An initial ten squeezes are repeated rapidly and then the test subject is asked whether the Bitrex can be tasted. If the test subject reports tasting the bitter taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the Bitrex is not tasted after 30 squeezes (step 10), the test subject is unable to taste Bitrex and may not perform the Bitrex fit test.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Bitrex Solution Aerosol Fit Test Procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure as that described in 4. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected according to section I. A. of this appendix. The respirator shall be properly adjusted and equipped with any type particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 337.5 mg of Bitrex to 200 ml of a 5% salt (NaCl) solution in warm water.

(6) As before, the test subject shall breathe through his or her slightly open mouth with tongue extended, and be instructed to report if he/she tastes the bitter taste of Bitrex.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the

screening test.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of Bitrex is detected. If the test subject does not report tasting the Bitrex, the test is passed.

(11) If the taste of Bitrex is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

5. Irritant Smoke (Stannic Chloride) Protocol

This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

(a) General Requirements and Precautions

(1) The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).

(2) Only stannic chloride smoke tubes shall be used for this protocol.

(3) No form of test enclosure or hood for the test subject shall be used.

(4) The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

(5) The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

(b) Sensitivity Screening Check

The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

(1) The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

(2) The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.

(3) The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect

the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.

(c) Irritant Smoke Fit Test Procedure

(1) The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).

(2) The test subject shall be instructed to keep his/her eyes closed.

(3) The test operator shall direct the stream of irritant smoke from the smoke tube toward the faceseal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.

(4) If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.

(5) The exercises identified in section I.A. 14. of this appendix shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

(6) If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

(7) Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.

(8) If a response is produced during this second sensitivity check, then the fit test is passed.

C. Quantitative Fit Test (QNFT) Protocols

The following quantitative fit testing procedures have been demonstrated to be acceptable: Quantitative fit testing using a non-hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; Quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; Quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

1. General

(a) The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

2. Generated Aerosol Quantitative Fit Testing Protocol

(a) Apparatus.

Instrumentation. Aerosol generation, dilution, and measurement systems using particulates (corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS] or sodium chloride) as test aerosols shall be used for quantitative fit testing.

(2) Test chamber. The test chamber shall be large enough to permit all test subjects to perform freely all required exercises without disturbing the test agent concentration or the measurement apparatus. The test chamber shall be equipped and constructed so that the test agent is effectively isolated from the ambient air, yet uniform in concentration throughout the chamber.

(3) When testing air-purifying respirators, the normal filter or cartridge element shall be replaced with a high efficiency particulate air (HEPA) or P100 series filter supplied by the same manufacturer.

(4) The sampling instrument shall be selected so that a computer record or strip chart record may be made of the test showing the rise and fall of the test agent concentration with each inspiration and expiration at fit factors of at least 2,000. Integrators or computers that integrate the amount of test agent penetration leakage into the respirator for each exercise may be used provided a record of the readings is made.

(5) The combination of substitute air-purifying elements, test agent and test agent concentration shall be such that the test subject is not exposed in excess of an established exposure limit for the test agent at any time during the testing process, based upon the length of the exposure and the exposure limit duration.

(6) The sampling port on the test specimen respirator shall be placed and constructed so that no leakage occurs around the port (e.g., where the respirator is probed), a free air flow is allowed into the sampling line at all times, and there is no interference with the fit or performance of the respirator. The in-mask sampling device (probe) shall be designed and used so that the air sample is drawn from the breathing zone of the test subject, midway between the nose and mouth and with the probe extending into the facepiece cavity at least 1/4 inch.

(7) The test setup shall permit the person administering the test to observe the test subject inside the chamber during the test.

(8) The equipment generating the test atmosphere shall maintain the concentration of test agent constant to within a 10 percent variation for the duration of the test.

(9) The time lag (interval between an event and the recording of the event on the strip chart or computer or integrator) shall be kept to a minimum. There shall be a clear association between the occurrence of an event and its being recorded.

(10) The sampling line tubing for the test chamber atmosphere and for the respirator sampling port shall be of equal diameter and of the same material. The length of the two lines shall be equal.

(11) The exhaust flow from the test chamber shall pass through an appropriate filter (i.e., high efficiency particulate filter) before release.

(12) When sodium chloride aerosol is used, the relative humidity inside the test chamber shall not exceed 50 percent.

(13) The limitations of instrument detection shall be taken into account when determining the fit factor.

(14) Test respirators shall be maintained in proper working order and be inspected regularly for deficiencies such as cracks or missing valves and gaskets.

(b) Procedural Requirements.

(1) When performing the initial user seal check using a positive or negative pressure check, the sampling line shall be crimped closed in order to avoid air pressure leakage during either of these pressure checks.

(2) The use of an abbreviated screening QLFT test is optional. Such a test may be utilized in order to quickly identify poor fitting respirators that passed the positive and/or negative pressure test and reduce the amount of QNFT time. The use of the CNC QNFT instrument in the count mode is another optional method to obtain a quick estimate of fit and eliminate poor fitting respirators before going on to perform a full QNFT.

(3) A reasonably stable test agent concentration shall be measured in the test chamber prior to testing. For canopy or shower curtain types of test units, the determination of the test agent's stability may be established after the test subject has entered the test environment.

(4) Immediately after the subject enters the test chamber, the test agent concentration inside the respirator shall be measured to ensure that the peak penetration does not exceed 5 percent for a half mask or 1 percent for a full facepiece respirator.

(5) A stable test agent concentration shall be obtained prior to the actual start of testing.

(6) Respirator restraining straps shall not be over-tightened for testing. The straps shall be adjusted by the wearer without assistance from other persons to give a reasonably comfortable fit typical of normal use. The respirator shall not be adjusted once the fit test exercises begin.

(7) The test shall be terminated whenever any single peak penetration exceeds 5 percent for half masks and 1 percent for full facepiece respirators. The test subject shall be refitted and retested.

(8) Calculation of fit factors.

(i) The fit factor shall be determined for the quantitative fit test by taking the ratio of the average chamber concentration to the concentration measured inside the respirator for each test exercise except the grimace exercise.

(ii) The average test chamber concentration shall be calculated as the arithmetic average of the concentration measured before and after each test (i.e., 7 exercises) or the arithmetic average of the concentration measured before and after each exercise or the true average measured continuously during the respirator sample.

(iii) The concentration of the challenge agent inside the respirator shall be determined by one of the following methods:

(A) Average peak penetration method means the method of determining test agent penetration into the respirator utilizing a strip chart recorder, integrator, or computer. The agent penetration is determined by an average of the peak heights on the graph or by computer integration, for each exercise except the grimace exercise. Integrators or computers that calculate the actual test agent penetration into the respirator for each exercise will also be considered to meet the requirements of the average peak penetration method.

(B) Maximum peak penetration method means the method of determining test agent penetration in the

respirator as determined by strip chart recordings of the test. The highest peak penetration for a given exercise is taken to be representative of average penetration into the respirator for that exercise.

(C) Integration by calculation of the area under the individual peak for each exercise except the grimace exercise. This includes computerized integration.

(D) The calculation of the overall fit factor using individual exercise fit factors involves first converting the exercise fit factors to penetration values, determining the average, and then converting that result back to a fit factor. This procedure is described in the following equation:

$$\text{Overall Fit Factor} = \frac{\text{Number of exercises}}{1/ff_1 + 1/ff_2 + 1/ff_3 + 1/ff_4 + 1/ff_5 + 1/ff_6 + 1/ff_7 + 1/ff_8}$$

Where ff_1, ff_2, ff_3, etc. are the fit factors for exercises 1, 2, 3, etc.

(9) The test subject shall not be permitted to wear a half mask or quarter facepiece respirator unless a minimum fit factor of 100 is obtained, or a full facepiece respirator unless a minimum fit factor of 500 is obtained.

(10) Filters used for quantitative fit testing shall be replaced whenever increased breathing resistance is encountered, or when the test agent has altered the integrity of the filter media.

3. Ambient aerosol condensation nuclei counter (CNC) quantitative fit testing protocol.

The ambient aerosol condensation nuclei counter (CNC) quantitative fit testing (Portacount ™) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator, that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Portacount Fit Test Requirements.

(1) Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 series 100, series 99, or series 95 particulate filter) per manufacturer's instruction.

(2) Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.

(3) Check the following conditions for the adequacy of the respirator fit: Chin properly placed; Adequate strap tension, not overly tightened; Fit across nose bridge; Respirator of proper size to span distance from nose to chin; Tendency of the respirator to slip; Self-observation in a mirror to evaluate fit and

respirator position.

(4) Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting facepiece, try another size of the same model respirator, or another model of respirator.

(5) Follow the manufacturer's instructions for operating the Portacount and proceed with the test.

(6) The test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(7) After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

(b) Portacount Test Instrument.

(1) The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.

(2) Since the pass or fail criterion of the Portacount is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance in this Appendix.

(3) A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

4. Controlled negative pressure (CNP) quantitative fit testing protocol.

The CNP protocol provides an alternative to aerosol fit test methods. The CNP fit test method technology is based on exhausting air from a temporarily sealed respirator facepiece to generate and then maintain a constant negative pressure inside the facepiece. The rate of air exhaust is controlled so that a constant negative pressure is maintained in the respirator during the fit test. The level of pressure is selected to replicate the mean inspiratory pressure that causes leakage into the respirator under normal use conditions. With pressure held constant, air flow out of the respirator is equal to air flow into the respirator. Therefore, measurement of the exhaust stream that is required to hold the pressure in the temporarily sealed respirator constant yields a direct measure of leakage air flow into the respirator. The CNP fit test method measures leak rates through the facepiece as a method for determining the facepiece fit for negative pressure respirators. The CNP instrument manufacturer Dynatech Nevada also provides attachments (sampling manifolds) that replace the filter cartridges to permit fit testing in an employee's own respirator. To perform the test, the test subject closes his or her mouth and holds his/her breath, after which an air pump removes air from the respirator facepiece at a pre-selected constant pressure. The facepiece fit is expressed as the leak rate through the facepiece, expressed as milliliters per minute. The quality and validity of the CNP fit tests are determined by the degree to which the in-mask pressure tracks the test pressure during the system measurement time of approximately five seconds. Instantaneous feedback in the form of a real-time pressure trace of the in-mask pressure is provided and used to determine test validity and quality. A minimum fit factor pass level of 100 is necessary for a half-mask respirator and a minimum fit factor of at least 500 is required for a full facepiece respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) CNP Fit Test Requirements.

(1) The instrument shall have a non-adjustable test pressure of 15.0 mm water pressure.

The CNP system defaults selected for test pressure shall be set at -- 15 mm of water (-0.58 inches of water) and the modeled inspiratory flow rate shall be 53.8 liters per minute for performing fit tests.

(**Note:** CNP systems have built-in capability to conduct fit testing that is specific to unique work rate, mask, and gender situations that might apply in a specific workplace. Use of system default values, which were selected to represent respirator wear with medium cartridge resistance at a low-moderate work rate, will allow inter-test comparison of the respirator fit.)

(3) The individual who conducts the CNP fit testing shall be thoroughly trained to perform the test.

(4) The respirator filter or cartridge needs to be replaced with the CNP test manifold. The inhalation valve downstream from the manifold either needs to be temporarily removed or propped open.

(5) The test subject shall be trained to hold his or her breath for at least 20 seconds.

(6) The test subject shall don the test respirator without any assistance from the individual who conducts the CNP fit test.

(7) The QNFT protocol shall be followed according to section I.

C. 1. of this appendix with an exception for the CNP test exercises.

(b) CNP Test Exercises.

) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject needs to hold head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply for 1 minute, being careful not to hyperventilate. After the deep breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during test measurement.

(3) Turning head side to side. Standing in place, the subject shall slowly turn his or her head from side to side between the extreme positions on each side for 1 minute. The head shall be held at each extreme momentarily so the subject can inhale at each side. After the turning head side to side exercise, the subject needs to hold head full left and hold his or her breath for 10 seconds during test measurement. Next, the subject needs to hold head full right and hold his or her breath for 10 seconds during test measurement.

(4) Moving head up and down. Standing in place, the subject shall slowly move his or her head up and down for 1 minute. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling). After the moving head up and down exercise, the subject shall hold his or her head full up and hold his or her breath for 10 seconds during test measurement. Next, the subject shall hold his or her head full down and hold his or her breath for 10 seconds during test measurement.

(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song for 1 minute. After the talking exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(6) Grimace. The test subject shall grimace by smiling or frowning for 15 seconds.

(7) Bending Over. The test subject shall bend at the waist as if he or she were to touch his or her toes for 1 minute. Jogging in place shall be substituted for this exercise in those test environments such as shroud-type QNFT units that prohibit bending at the waist. After the bending over exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(8) Normal Breathing. The test subject shall remove and re-don the respirator within a one-minute period. Then, in a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of a respirator shall be tried.

(c) CNP Test Instrument.

(1) The test instrument shall have an effective audio warning device when the test subject fails to hold his or her breath during the test. The test shall be terminated whenever the test subject failed to hold his or her breath. The test subject may be refitted and retested.

(2) A record of the test shall be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style and size of respirator used; and date tested.

Part II. New Fit Test Protocols

A. Any person may submit to OSHA an application for approval of a new fit test protocol. If the application meets the following criteria, OSHA will initiate a rulemaking proceeding under section 6(b)(7) of the OSH Act to determine whether to list the new protocol as an approved protocol in this Appendix A.

B. The application must include a detailed description of the proposed new fit test protocol. This application must be supported by either:

1. A test report prepared by an independent government research laboratory (e.g., Lawrence Livermore National Laboratory, Los Alamos National Laboratory, the National Institute for Standards and Technology) stating that the laboratory has tested the protocol and had found it to be accurate and reliable; or

2. An article that has been published in a peer-reviewed industrial hygiene journal describing the protocol and explaining how test data support the protocol's accuracy and reliability.

C. If OSHA determines that additional information is required before the Agency commences a rulemaking proceeding under this section, OSHA will so notify the applicant and afford the applicant the opportunity to submit the supplemental information. Initiation of a rulemaking proceeding will be deferred until OSHA has received and evaluated the supplemental information.

[63 FR 20098, April 23, 1998]

Part Number:	1910
• Part Title:	Occupational Safety and Health Standards
• Subpart:	I
• Subpart Title:	Personal Protective Equipment
• Standard Number:	1910.134 App B-1
• Title:	User Seal Check Procedures (Mandatory).

Appendix B-1 to § 1910.134: User Seal Check Procedures (Mandatory)

The individual who uses a tight-fitting respirator is to perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed in this appendix, or the respirator manufacturer's recommended user seal check method shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

I. Facepiece Positive and/or Negative Pressure Checks

A. *Positive pressure check.* Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

B. *Negative pressure check.* Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

II. Manufacturer's Recommended User Seal Check Procedures

The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures provided that the employer demonstrates that the manufacturer's procedures are equally effective.

[63 FR 1152, Jan. 8, 1998]

Part Number:	1910
• Part Title:	Occupational Safety and Health Standards
• Subpart:	I
• Subpart Title:	Personal Protective Equipment
• Standard Number:	1910.134 App B-2
• Title:	Respirator Cleaning Procedures (Mandatory).

Appendix B-2 to § 1910.134: Respirator Cleaning Procedures (Mandatory)

These procedures are provided for employer use when cleaning respirators. They are general in nature, and the employer as an alternative may use the cleaning recommendations provided by the manufacturer of the respirators used by their employees, provided such procedures are as effective as those listed here in Appendix B- 2. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth in Appendix B-2, i.e., must ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

I. Procedures for Cleaning Respirators

A. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure- demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.

B. Wash components in warm (43 deg. C [110 deg. F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

C. Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain.

D. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:
1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43 deg. C (110 deg. F); or,
2. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43 deg. C (110 deg. F); or,
3. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

E. Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

F. Components should be hand-dried with a clean lint-free cloth or air-dried.

G. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.

H. Test the respirator to ensure that all components work properly.

[63 FR 1152, Jan. 8, 1998]

Part Number:	1910
• Part Title:	Occupational Safety and Health Standards
Subpart:	I
• Subpart Title:	Personal Protective Equipment
• Standard Number:	1910.134 App C
• Title:	OSHA Respirator Medical Evaluation Questionnaire (Mandatory).

Appendix C to Sec. 1910.134: OSHA Respirator Medical Evaluation Questionnaire (Mandatory)

To the employer: Answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination.

To the employee:

Can you read (circle one): Yes/No

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

Part A. Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

. Today's date:_____

2. Your name:_____

3. Your age (to nearest year):_____

4. Sex (circle one): Male/Female

5. Your height: _____ ft. _____ in.

6. Your weight: _____ lbs.

7. Your job title:_____

8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code): _____

9. The best time to phone you at this number: _____

10. Has your employer told you how to contact the health care professional who will review this questionnaire (circle one): Yes/No

1. Check the type of respirator you will use (you can check more than one category):
.. _____ N, R, or P disposable respirator (filter-mask, non- cartridge type only).
b. _____ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

12. Have you worn a respirator (circle one): Yes/No

If "yes," what type(s):_____

_____

Part A. Section 2. (Mandatory) Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator (please circle "yes" or "no").

1. Do you **currently** smoke tobacco, or have you smoked tobacco in the last month: Yes/No

2. Have you **ever had** any of the following conditions?

   a. Seizures (fits): Yes/No
   b. Diabetes (sugar disease): Yes/No
   c. Allergic reactions that interfere with your breathing: Yes/No
   d. Claustrophobia (fear of closed-in places): Yes/No
   e. Trouble smelling odors: Yes/No

3. Have you **ever had** any of the following pulmonary or lung problems?

   a. Asbestosis: Yes/No
   b. Asthma: Yes/No
   c. Chronic bronchitis: Yes/No
   d. Emphysema: Yes/No
   e. Pneumonia: Yes/No
   f. Tuberculosis: Yes/No
   g. Silicosis: Yes/No
   h. Pneumothorax (collapsed lung): Yes/No
   i. Lung cancer: Yes/No
   j. Broken ribs: Yes/No
   k. Any chest injuries or surgeries: Yes/No
   l. Any other lung problem that you've been told about: Yes/No

4. Do you **currently** have any of the following symptoms of pulmonary or lung illness?

   a. Shortness of breath: Yes/No
   b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline: Yes/No
   c. Shortness of breath when walking with other people at an ordinary pace on level ground: Yes/No
   d. Have to stop for breath when walking at your own pace on level ground: Yes/No
   e. Shortness of breath when washing or dressing yourself: Yes/No
   f. Shortness of breath that interferes with your job: Yes/No
   g. Coughing that produces phlegm (thick sputum): Yes/No
   h. Coughing that wakes you early in the morning: Yes/No
   i. Coughing that occurs mostly when you are lying down: Yes/No
   j. Coughing up blood in the last month: Yes/No
   k. Wheezing: Yes/No
   l. Wheezing that interferes with your job: Yes/No
   m. Chest pain when you breathe deeply: Yes/No
   n. Any other symptoms that you think may be related to lung problems: Yes/No

5. Have you **ever had** any of the following cardiovascular or heart problems?

a. Heart attack: Yes/No
b. Stroke: Yes/No
c. Angina: Yes/No
d. Heart failure: Yes/No
e. Swelling in your legs or feet (not caused by walking): Yes/No
f. Heart arrhythmia (heart beating irregularly): Yes/No
g. High blood pressure: Yes/No
h. Any other heart problem that you've been told about: Yes/No

6. Have you **ever had** any of the following cardiovascular or heart symptoms?

a. Frequent pain or tightness in your chest: Yes/No
b. Pain or tightness in your chest during physical activity: Yes/No
c. Pain or tightness in your chest that interferes with your job: Yes/No
d. In the past two years, have you noticed your heart skipping or missing a beat: Yes/No
e. Heartburn or indigestion that is not related to eating: Yes/ No
f. Any other symptoms that you think may be related to heart or circulation problems: Yes/No

7. Do you **currently** take medication for any of the following problems?

a. Breathing or lung problems: Yes/No
b. Heart trouble: Yes/No
c. Blood pressure: Yes/No
d. Seizures (fits): Yes/No

8. If you've used a respirator, have you **ever had** any of the following problems? (If you've never used a respirator, check the following space and go to question 9:)

a. Eye irritation: Yes/No
b. Skin allergies or rashes: Yes/No
c. Anxiety: Yes/No
d. General weakness or fatigue: Yes/No
e. Any other problem that interferes with your use of a respirator: Yes/No

9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire: Yes/No

Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-facepiece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.

10. Have you **ever lost** vision in either eye (temporarily or permanently): Yes/No

11. Do you **currently** have any of the following vision problems?

a. Wear contact lenses: Yes/No
b. Wear glasses: Yes/No
c. Color blind: Yes/No
d. Any other eye or vision problem: Yes/No

12. Have you **ever had** an injury to your ears, including a broken ear drum: Yes/No

13. Do you **currently** have any of the following hearing problems?

a. Difficulty hearing: Yes/No
b. Wear a hearing aid: Yes/No
c. Any other hearing or ear problem: Yes/No

14. Have you **ever had** a back injury: Yes/No

15. Do you **currently** have any of the following musculoskeletal problems?

a. Weakness in any of your arms, hands, legs, or feet: Yes/No
b. Back pain: Yes/No
c. Difficulty fully moving your arms and legs: Yes/No
d. Pain or stiffness when you lean forward or backward at the waist: Yes/No
e. Difficulty fully moving your head up or down: Yes/No
f. Difficulty fully moving your head side to side: Yes/No
g. Difficulty bending at your knees: Yes/No
h. Difficulty squatting to the ground: Yes/No
i. Climbing a flight of stairs or a ladder carrying more than 25 lbs: Yes/No
j. Any other muscle or skeletal problem that interferes with using a respirator: Yes/No

Part B Any of the following questions, and other questions not listed, may be added to the questionnaire at the discretion of the health care professional who will review the questionnaire.

1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower than normal amounts of oxygen: Yes/No

If "yes," do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you're working under these conditions: Yes/No

2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals: Yes/No

If "yes," name the chemicals if you know them:_____
_____
_____

3. Have you ever worked with any of the materials, or under any of the conditions, listed below:

a. Asbestos: Yes/No
b. Silica (**e.g.**, in sandblasting): Yes/No
c. Tungsten/cobalt (e.g., grinding or welding this material): Yes/No
d. Beryllium: Yes/No
e. Aluminum: Yes/No
f. Coal (for example, mining): Yes/No
g. Iron: Yes/No
h. Tin: Yes/No
i. Dusty environments: Yes/No
j. Any other hazardous exposures: Yes/No
k.

If "yes," describe these exposures:_____
_____
_____

4. List any second jobs or side businesses you have:_____
_____

5. List your previous occupations:_____
_____

6. List your current and previous hobbies:_____
_____

7. Have you been in the military services? Yes/No

If "yes," were you exposed to biological or chemical agents (either in training or combat): Yes/No

8. Have you ever worked on a HAZMAT team? Yes/No

9. Other than medications for breathing and lung problems, heart trouble, blood pressure, and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications): Yes/No

If "yes," name the medications if you know them:_____

. Will you be using any of the following items with your respirator(s)?

a. HEPA Filters: Yes/No
b. Canisters (for example, gas masks): Yes/No
c. Cartridges: Yes/No

11. How often are you expected to use the respirator(s) (circle "yes" or "no" for all answers that apply to you)?:

a. Escape only (no rescue): Yes/No
b. Emergency rescue only: Yes/No
c. Less than 5 hours **per week:** Yes/No
d. Less than 2 hours **per day:** Yes/No
e. 2 to 4 hours per day: Yes/No
f. Over 4 hours per day: Yes/No

12. During the period you are using the respirator(s), is your work effort:

a. **Light** (less than 200 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift:_____hrs._____mins.

Examples of a light work effort are **sitting** while writing, typing, drafting, or performing light assembly ·ork; or **standing** while operating a drill press (1-3 lbs.) or controlling machines.

b. **Moderate** (200 to 350 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift:_____hrs._____mins.

Examples of moderate work effort are **sitting** while nailing or filing; **driving** a truck or bus in urban traffic; **standing** while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 lbs.) at trunk level; **walking** on a level surface about 2 mph or down a 5-degree grade about 3 mph; or **pushing** a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.

c. **Heavy** (above 350 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift:_____hrs._____mins.

Examples of heavy work are **lifting** a heavy load (about 50 lbs.) from the floor to your waist or shoulder; working on a loading dock; **shoveling; standing** while bricklaying or chipping castings; **walking** up an 8-degree grade about 2 mph; climbing stairs with a heavy load (about 50 lbs.).

13. Will you be wearing protective clothing and/or equipment (other than the respirator) when you're using your respirator: Yes/No

If "yes," describe this protective clothing and/or equipment:_____
_____

14. Will you be working under hot conditions (temperature exceeding 77 deg. F): Yes/No

15. Will you be working under humid conditions: Yes/No

16. Describe the work you'll be doing while you're using your respirator(s):
_____
_____

17. Describe any special or hazardous conditions you might encounter when you're using your respirator(s) (for example, confined spaces, life-threatening gases):
_____
_____

18. Provide the following information, if you know it, for each toxic substance that you'll be exposed to when you're using your respirator(s):

Name of the first toxic substance:_____
Estimated maximum exposure level per shift:_____
Duration of exposure per shift:_____
Name of the second toxic substance:_____
Estimated maximum exposure level per shift:_____
Duration of exposure per shift:_____
Name of the third toxic substance:_____
Estimated maximum exposure level per shift:_____
Duration of exposure per shift:_____
The name of any other toxic substances that you'll be exposed to while using your respirator:
_____
_____
_____

19. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of others (for example, rescue, security):

_____

[63 FR 1152, Jan. 8, 1998; 63 FR 20098, April 23, 1998]

I. SUMMARY FOR RESPIRATOR USERS

This summary presents a brief overview of what the respirator user needs to know about the new categories of particulate respirators certified by the National Institute for Occupational Safety and Health (NIOSH).

NIOSH has developed a new set of regulations in 42 CFR* 84 (also referred to as "Part 84") for testing and certifying nonpowered, air-purifying, particulate-filter respirators. The new Part 84 respirators have passed a more demanding certification test than the old respirators (e.g., dust and mist [DM], dust, fume and mist [DFM], spray paint, pesticide, etc.) certified under 30 CFR 11 (also referred to as "Part 11").

Changes in the new regulations involve only nonpowered, air-purifying, particulate-filter respirators. Certification requirements for all other classes of respirators (e.g., chemical cartridges, self-contained breathing apparatus [SCBA], airlines, gas masks without a particulate filter, powered air-purifying respirators [PAPRs] equipped with high-efficiency particulate air [HEPA] filters, etc.) have been transferred to Part 84 without change. Until further notice, the Occupational Safety and Health Administration (OSHA) is allowing the continued use of Part 11 particulate-filter respirators. Under Part 84, NIOSH is allowing manufacturers to continue selling and shipping Part 11 particulate filters as NIOSH-certified until July 10, 1998.

The new Part 84 regulation provides for nine classes of filters (three levels of filter efficiency,‡ each with three categories of resistance to filter efficiency degradation‡). The three levels of filter efficiency are 95%, 99%, and 99.97%. The three categories of resistance to filter efficiency degradation are labeled N, R, and P. The class of filter will be clearly marked on the filter, filter package, or respirator box. For example, a filter marked N95 would mean an N-series filter that is at least 95% efficient. Chemical cartridges that include particulate filter elements will carry a similar marking that pertains only to the particulate filter element.

The new classes of nonpowered particulate respirators require new decision logic for selection of the proper respirator. The selection process for using the new particulate classification is discussed fully in Section II (Detailed Guidelines for Use) and outlined as follows:

1. The selection of N-, R-, and P-series filters depends on the presence or absence of oil particles, as follows:

- If no oil particles are present in the work environment, use a filter of any series (i.e., N-, R-, or P-series).
- If oil particles (e.g., lubricants, cutting fluids, glycerine, etc.) are present, use an R- or P-series filter. ***Note:*** N-series filters cannot be used if oil particles are present.
- If oil particles are present and the filter is to be used for more than one work shift, use only a P-series filter.

Note: To help you remember the filter series, use the following guide:

N for *Not* resistant to oil,
R for ***Resistant*** to oil

P for oil ***Proof***

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2. Selection of filter efficiency (i.e., 95%, 99%, or 99.97%) depends on how much filter leakage can be accepted. Higher filter efficiency means lower filter leakage.

3. The choice of facepiece depends on the level of protection needed--that is, the assigned protection factor (APF) needed.

**Code of Federal Regulations. See CFR in references.*

†Filter efficiency is the stated percentage of particles removed from the air.

‡Filter efficiency degradation is defined as a lowering of filter efficiency or a reduction in the ability of the filter to remove particles as a result of workplace exposure.

Return to CONTENTS

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GUIDELINES AND RECOMMENDATIONS

Guidance on Air Medical Transport for SARS Patients

This updated guidance is intended to assist air medical transport (AMT) service providers in using specialized and/or specially equipped aircraft to transport SARS patients while ensuring the safety of patients and transport personnel. It should not be generalized to commercial passenger aircraft. The recommendations are based on standard infection control practices, AMT standards, and epidemiologic information from investigations of SARS, including experience from air transport of patients during the 2003 outbreak.

Currently recommended infection control measures for hospitalized patients with SARS http://www.cdc.gov/ncidod/sars/guidance/I/index.htm include Standard Precautions (with eye protection to prevent droplet exposure) plus Contact and Airborne Isolation Precautions. Respiratory protection using respirators providing at least 95% filtering efficiency (e.g., NIOSH-certified N-95 or higher-level filtering facepiece respirator) with appropriate fit-testing (www.osha.gov/SLTC/etools/respiratory/oshafiles/fittesting1.html) is recommended.

A. Air Transport of SARS Patients: General Considerations

- SARS patients should be transported on a dedicated AMT mission with the minimum number of crew members. **Whenever possible, no passengers or patients who do not have SARS should be on board.** If a parent is accompanying a sick child, the parent should use personal protective equipment (PPE) during transport as described in "Infection Control," below.

- If possible, a primary caregiver should be assigned to the SARS patient.

- The number of caregivers should be limited to those required to provide essential care during the trip.

- Infection control measures should focus on:

  - Source control (i.e., confining the spread of respiratory secretions at the patient level)
  - Engineering controls to limit airborne dissemination of the virus
  - Containment of the area of contamination (i.e., designating "clean" and "dirty" areas on the aircraft)
  - Use of PPE
  - Use of safe work practices to prevent exposure

  The size and type of aircraft will influence the extent to which these measures can be implemented. When available, use of a portable isolation unit may be considered.

- Consideration must be given to the need for "PPE breaks" during long trips. Personnel will need to use the lavatory and have meals; removal of respiratory protection is unavoidable. An area at the front of the plane (or "upwind" from the patient, depending on cabin air flow), as far as possible from the patient, should be designated for this purpose.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION
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- All SARS patient transport involving U.S. citizens should be coordinated with CDC Quarantine Station staff http://www.cdc.gov/ncidod/dq/quarantine_stations.htm and other appropriate state and federal health authorities, including CDC (24-hour response number: 770-488-7100) and the Department of State http://contact-us.state.gov/ before movement begins. International movement of SARS patients might require special approvals by aircraft-servicing locations, patient rest-stop hospitals, countries that will be over-flown, and/or final destinations.

B. Airframe Selection and Cabin Airflow

Cabin airflow characteristics may reduce exposure of occupants to airborne infectious particles. Whenever possible, aircraft used to medically evacuate patients with SARS should have separate air-handling systems for the cockpit and cabin, with cockpit air at positive pressure relative to the cabin.

1. Fixed-wing pressurized aircraft

- AMT service providers should consult the manufacturer(s) of their aircraft to identify cabin airflow characteristics, including: HEPA filtration and directional airflow capabilities, air outlet location, presence or absence of air mixing between cockpit and patient-care cabin during flight, and time and aircraft configuration required to perform a post-mission airing-out of the aircraft.
- Aircraft with forward-to-aft cabin air flow and a separate cockpit cabin are strongly preferred for transport of SARS patients. Aft-to-forward cabin air flow may increase the risk of airborne exposure of cabin and flight deck personnel. Aircraft that re-circulate cabin and flight-deck air without HEPA filtration should not be selected for SARS patient transport.
- Aircraft ventilation should remain on at all times during transport of SARS patients, including during ground delays.
- Aircraft that provide space for crew members to perform necessary personal activities (e.g., eating, drinking) in an area that does not share air with the patient-care cabin should be selected for flights likely to exceed 4 hours.

2. Rotor-wing and non-pressurized aircraft

- In aircraft with uncontrolled interior air flow, such as rotor-wing and small, non-pressurized fixed-wing aircraft, all personnel should wear disposable N-95 or higher-level respirators during transport of SARS patients. For cockpit crews, aircraft aviator tight-fitting face pieces capable of delivering oxygen that has not mixed with cabin air may be used in lieu of a disposable N-95 respirator.

C. Patient Placement

The airflow of each aircraft should form the basis for litter and seat assignments. In general:

- SARS patients should be positioned as far downwind with regard to cabin air flow as possible.
- A bathroom for use by the patient(s) with SARS should be close by.
- In AMT aircraft with vertical litter tiers and top-to-bottom air flow, SARS litter patients should be placed in the lowest position in the tier.
- Ambulatory SARS patients should be seated next to the cabin sidewall.
- Patients should wear a surgical mask, if tolerated, to reduce droplet production.

- If transport of a non-SARS patient simultaneously with SARS patient(s) cannot be avoided, the non-SARS patient should wear an N-95 or higher-level respirator during transport and should be positioned upwind and as far as possible from the SARS patient.
- If several SARS patients are transported, they may be moved as a group (cohorted) in an aircraft that provides appropriate airflow characteristics as described above.

D. Infection Control

1. Designation of an "isolation area"

- Where space permits, a perimeter should be established for designating "clean" and "dirty" areas for the purpose of defining where gowns and gloves must be donned and removed. The distance will depend on the area required for patient care support; a minimum distance of 6 feet from the patient is recommended. A bathroom for use by the patient should be within the isolation area.
- Materials required for patient care, including PPE, should be organized outside the isolation area. Receptacles for soiled linen, waste, and reusable equipment should be placed inside the isolation area.
- Patient movement should be restricted to the designated isolation area.
- Personnel who are within the isolation area must wear full PPE.

2. Source control

- If the patient is able, s/he should be instructed to wear a surgical mask

3. Personal protective equipment and procedures

- The following PPE should be available for use by direct care providers:
  - Non-sterile patient-care gloves
  - Disposable isolation gowns
  - Goggles or face shield (Corrective eyeglasses alone are not appropriate protection.)
  - Fit-tested, disposable respirators (Disposable N-95 respirators are approved for in-flight use.)
  - Hand hygiene product (e.g., alcohol-based hand rub)

- Disposable non-sterile gloves, gown, and eye and respiratory protection must be worn for all patient contact.
- Eye protection, gown, and gloves should be removed and discarded in designated receptacles after patient care is completed (e.g., between patients) or when soiled or damaged. The respirator should remain on until the wearer is in the area designated as safe for respirator removal.
- Hands must be washed with soap and water or a waterless, alcohol-based hand rub immediately after removal of PPE.
- Oxygen delivery with simple and non-rebreather face masks may be used for patient oxygen support during flight.
- Manually assisted ventilation should be performed using a resuscitation bag-valve mask. If available, units equipped for HEPA or equivalent filtration of expired air should be used.
- Cough-generating procedures (e.g., nebulizer treatments) should be avoided during transport.

E. Patients Requiring Mechanical Ventilation

- Mechanical ventilators for SARS patients should provide HEPA or equivalent filtration of airflow exhaust.
- AMT services should consult their ventilator equipment manufacturer to confirm appropriate filtration capability and the effect of filtration on positive-pressure ventilation.

F. Management of Clinical Specimens

- Standard Precautions should be used when collecting and transporting clinical specimens.
- Specimens should be stored only in designated coolers or refrigerators.
- Clinical specimens should be labeled with appropriate patient information and placed in a clean, self-sealing bag for storage and transport.

G. Waste Disposal

- Dry solid waste (e.g., used gloves, dressings), should be collected in biohazard bags for disposal as regulated medical waste in accordance with local requirements at the destination medical facility.
- Waste that is saturated with blood or body fluids should be collected in leak-proof biohazard bags or containers for disposal as regulated medical waste in accordance with local requirements at the destination medical facility.
- Sharp items such as used needles or scalpel blades should be collected in puncture-resistant sharps containers for disposal as regulated medical waste in accordance with local requirements at the destination medical facility.
- Suctioned fluids and secretions should be stored in sealed containers for disposal as regulated medical waste in accordance with local requirements at the destination medical facility. Handling that might create splashes or aerosols during flight should be avoided.
- Suction device exhaust should not be vented into the cabin without HEPA or equivalent filtration. Portable suction devices should be fitted with in-line HEPA or equivalent filters. Externally vented suction should not be used during ground operation.
- Excretions (feces, urine) may be carefully poured down the aircraft toilet.

H. Cleaning and Disinfection

- After transporting a SARS patient, exits and doors should be closed and aircraft air conditioning turned on at maximum capacity for several minutes in accordance with the airing time specified by aircraft manufacturers to provide at least one complete air exchange. Non-pressurized aircraft should be aired out, with exits and doors open long enough to ensure a complete air exchange. Blowers and high-powered fans that might re-aerosolize infectious material should not be used for airing out aircraft.
- Cleaning should be postponed until airing out is complete.
- Compressed air that might re-aerosolize infectious material should not be used for cleaning the aircraft.
- Non-patient-care areas of the aircraft should be cleaned and maintained according to manufacturers' recommendations.
- Cleaning personnel should wear non-sterile gloves and disposable isolation gown or coveralls over their usual cleaning uniform. Eye protection to prevent contact with germicides should be worn according to existing organization procedures for environmental cleaning and disinfection while cleaning patient-care areas.

- Patient-care areas (including stretchers, railings, medical equipment control panels, and adjacent flooring, walls and work surfaces likely to be directly contaminated during care) should be cleaned and disinfected in accordance with manufacturer's recommendations.
- Spills of body fluids during transport should be cleaned by placing absorbent material over the spill and collecting the used cleaning material in a biohazard bag. The area of the spill should be cleaned using an EPA-registered hospital disinfectant. Ground service personnel should be notified of the spill location and initial clean-up performed.
- Contaminated web seats or seat cushions should be placed in a biohazard bag and labeled with the location and type of contamination for later disposal or cleaning.
- Contaminated reusable patient care equipment should be placed in biohazard bags and labeled for cleaning and disinfection at the AMT service medical equipment section.
- Reusable equipment should be cleaned and disinfected according to manufacturer's instructions.
- Following completion of cleaning tasks, including cleaning and disinfection of reusable equipment, cleaning personnel should carefully remove and dispose of personal protective gear and wash hands thoroughly with soap and water or an alcohol-based hand rub http://www.cdc.gov/handhygiene/.

I. Logistical Planning and Post-Mission Follow-Up

- Sufficient infection control supplies should be on board to support the expected duration of the mission plus additional time in the event that the aircraft experiences maintenance delays or weather diversions.
- Flight planning should identify emergency or unexpected diversion airfields and coordinate with authorities in advance.
- Upon termination of the mission, the AMT team should provide the following information to their medical director: mission number/date; address of the team/aircraft basing; duration of patient transport; names, contact information, and crew positions (including estimated duration of direct patient care provided) of mission personnel; and description of any recognized breach(es) in infection control precautions.
- AMT services should designate persons responsible for performing post-mission monitoring of mission personnel and reporting results to the AMT service medical director.
- Mission personnel should be monitored (directly or by telephone) at least once daily for 10 days for evidence of fever or respiratory symptoms that would require evaluation and follow-up (www.cdc.gov/ncidod/sars/exposuremanagement.htm).

J. Ground/In-Flight Emergency Procedures

AMT service providers should have a written plan addressing patient handling during in-flight and/or ground emergency situations. Activities such as donning life vests and litter-patient emergency egress may create special exposure risks. Use of respirators must be weighed against time constraints and on-board emergency conditions (e.g., smoke in the cabin, sudden cabin decompression). Gowns and latex gloves represent a fire/flash hazard and should not be worn during ground or in-flight emergency situations.

For more information, visit www.cdc.gov/sars or call the CDC public response hotline at (888) 246-2675 (English), (888) 246-2857 (Español), or (866) 874-2646 (TTY)

Supplement I: Infection Control in Healthcare, Home, and Community Settings

IV. Infection Control for Prehospital Emergency Medical Services (EMS)

Effective communication among clinicians requesting emergency transport of a patient with possible or known SARS-CoV disease, EMS personnel, and receiving facilities is necessary to ensure the appropriate protection of healthcare workers. Prehospital care personnel should follow the updated Standard Precautions recommendations to prevent the spread of respiratory infections described in III.B above. These include promoting respiratory hygiene/cough etiquette (www.cdc.gov/flu/professionals/infectioncontrol/resphygiene.htm) and using Droplet Precautions (www.cdc.gov/ncidod/hip/ISOLAT/Isolat.htm), in addition to Standard Precautions, for all patients with symptoms of a respiratory infection. When SARS is suspected in a patient needing emergency transport, ***prehospital care providers and healthcare facilities should be notified in advance that they may be transporting or receiving a patient who may have SARS-CoV disease.***

A. Patient Transport

Objective: Safely transport patients with known or possible SARS-CoV disease.

Activities

Patients who may have SARS-CoV disease may be safely transported in any emergency vehicle with the proper precautions.

- Involve the fewest EMS personnel required to minimize possible exposures.
- Family members and other contacts of SARS patients should not ride in the ambulance if possible. If necessary, they should be evaluated for fever and lower respiratory symptoms and, if either is present, asked to wear a surgical or procedure mask when riding in the vehicle.
- When possible, use vehicles that have separate driver and patient compartments that can provide separate ventilation to each area. Close the door/window between these compartments before bringing the patient on board. Set the vehicle's ventilation system to the non-recirculating mode to maximize the volume of outside air brought into the vehicle. If the vehicle has a rear exhaust fan, use it to draw air away from the cab, toward the patient-care area, and out the back end of the vehicle. Some vehicles are equipped with a supplemental recirculating ventilation unit that passes air through HEPA filters before returning it to the vehicle. Such a unit can be used to increase the number of ACH (NIOSH HETA report 95-0031-2601 [www.cdc.gov/niosh/hhe/reports/pdfs/1995-0031-2601.pdf]).
- If a vehicle without separate compartments and ventilation must be used, open the outside air vents in the driver area and turn on the rear exhaust ventilation fans to the highest setting. This will create a negative pressure gradient in the patient area.

(continued from previous page)

- If possible, place a surgical mask on the patient to contain droplets expelled during coughing. If this is not possible (i.e., would further compromise respiratory status, difficult for the patient to wear), have the patient cover the mouth/nose with tissue when coughing.

- Oxygen delivery with a non-rebreather face mask may be used to provide oxygen support during transport. If needed, positive-pressure ventilation should be performed using a resuscitation bag-valve mask, preferably one equipped to provide HEPA or equivalent filtration of expired air.

- If a patient has been mechanically ventilated before transport, HEPA or equivalent filtration of airflow exhaust should be available. (EMS organizations should consult their ventilator equipment manufacturer to confirm appropriate filtration capability and the effect of filtration on positive-pressure ventilation.)

- Cough-generating procedures (e.g., mechanical ventilation, nebulizer treatment) should be avoided during prehospital care.

B. Personal Protective Equipment

Objective: Ensure the safety of prehospital care providers who transport patients with known or possible SARS-CoV disease.

Activities

- Prehospital care providers who directly handle a patient with SARS-CoV disease or who are in the compartment with the patient should wear PPE as recommended for Standard, Contact, and AII Precautions. These include the following:
    - Disposable isolation gown, pair of disposable patient examination gloves, eye protection (i.e., goggles or face shield).
    - Respiratory protection (i.e., N-95 or higher-level respirator)

- Personnel in the driver's compartment who will have no direct patient contact should wear an N-95 or higher-level respirator during transport. Drivers who also provide direct patient care (e.g., moving patients on stretchers) should wear the recommended PPE for patient contact. This PPE, with the exception of the respirator, should be removed and hand hygiene performed after completing patient care and before entering driver's compartment to avoid contaminating the compartment. Instructions on how to safely don, use, and remove PPE is being developed and will be provided when available on CDC's SARS website: www.cdc.gov/ncidod/sars/.

C. Safe Work Practices

Objective: Ensure safe work practices among EMS personnel to prevent transmission of SARS-CoV.

Activities

- Avoid touching one's face with contaminated gloves.
- Avoid unnecessary touching of surfaces in the ambulance vehicle.
- Arrange for the receiving facility staff to meet the patient at the ambulance door to limit the need for EMS personnel to enter the emergency department in contaminated PPE. (It may not be practical to change PPE before patient transfer into the facility.) Remove and discard PPE

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after transferring the patient at the receiving facility and perform hand hygiene. Treat used disposable PPE as medical waste.

D. Clinical Specimens

Objective: Safely collect clinical specimens from SARS patients during transport.

Activities

- Handle clinical specimens that must be collected during transport (e.g., blood gas) in accordance with standard operating procedures.

E. Post-Transport Management of the Contaminated Vehicle

Objective: Safely clean vehicles used for transport of SARS patients to prevent SARS-CoV transmission.

Activities

- Follow standard operating procedures for the containment and disposal of regulated medical waste.
- Follow standard operating procedures for containing and reprocessing used linen. Wear appropriate PPE when removing soiled linen from the vehicle. Avoid shaking the linen.
- Clean and disinfect the vehicle in accordance with standard operating procedures. Personnel performing the cleaning should wear a disposable gown and gloves (a respirator should not be needed) during the clean-up process; the PPE should be discarded after use. All surfaces that may have come in contact with the patient or materials contaminated during patient care (e.g., stretcher, rails, control panels, floors, walls, work surfaces) should be thoroughly cleaned and disinfected using an EPA-registered hospital disinfectant in accordance with manufacturer's recommendations.
- Clean and disinfect reusable patient-care equipment according to manufacturer's instructions.

F. Follow-up of EMS Personnel

Objective: Ensure appropriate follow-up and care of EMS personnel who transport SARS patients.

Activities

- Manage EMS personnel who transport SARS patients as recommended for hospital personnel (see Section IX).

SMALL ENTITY COMPLIANCE GUIDE
FOR THE
REVISED RESPIRATORY PROTECTION STANDARD

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CONTENTS

INTRODUCTION i
Who should read this guide? i
How do I use this guide? ii
What is a respirator? ii
What is a respiratory protection program? iii
When am I required to establish a respiratory protection program? iii
What is OSHA's Respiratory Protection standard? iv
How does the new standard differ from the old standard that it replaces? v
How does the new Respiratory Protection standard recognize the needs of small businesses? v
Whom can I contact if I have additional questions about the Respiratory Protection standard that are not answered in the Small Entity Compliance Guide? vi

Section (a): PERMISSIBLE PRACTICE a-1
ENGINEERING CONTROLS a-1
PROVIDING YOUR EMPLOYEES WITH RESPIRATORS a-2

Section (b): DEFINITIONS b-1

Section (c): RESPIRATORY PROTECTION PROGRAM c-1
PROGRAM DEVELOPMENT AND IMPLEMENTATION c-1
VOLUNTARY RESPIRATOR USE c-3
PROGRAM ADMINISTRATOR c-5
EMPLOYER-PROVIDED RESPIRATORS c-7
CHECKLIST FOR RESPIRATORY PROTECTION PROGRAMS c-8

Section (d): RESPIRATOR SELECTION d-1
GENERAL GUIDELINES FOR SELECTION d-1
RESPIRATORS FOR IDLH ATMOSPHERES d-5
RESPIRATORS FOR NON-IDLH ATMOSPHERES d-7
CHECKLIST FOR RESPIRATOR SELECTION d-14

Section (e): MEDICAL EVALUATION e-1
EMPLOYER-PROVIDED MEDICAL EVALUATIONS e-1
MEDICAL EVALUATION PROCEDURES e-2
FOLLOW-UP MEDICAL EXAMINATIONS e-4
ADMINISTRATION OF QUESTIONNAIRES AND EXAMINATIONS e-4
SUPPLEMENTAL INFORMATION FOR THE PLHCP e-5
MEDICAL DETERMINATION e-7
ADDITIONAL MEDICAL EVALUATIONS e-9
CHECKLIST FOR MEDICAL EVALUATION e-10

CONTENTS (continued)

Section (f): FIT TESTING f-1
INTRODUCTORY CONCEPTS f-1
RESPIRATORS THAT REQUIRE FIT TESTING f-4
WHEN FIT TESTING MUST BE CONDUCTED: GENERAL REQUIREMENTS . f-5
WHEN FIT TESTING MUST BE CONDUCTED: CHANGES IN THE RESPIRATOR WEARER'S PHYSICAL CONDITION f-5
WHEN FIT TESTING MUST BE CONDUCTED: UNACCEPTABLE FIT AS DETERMINED BY AN EMPLOYEE AFTER FIT TESTING f-6
FIT TESTING PROCEDURES: GENERAL REQUIREMENTS f-6
LIMITATION ON USE OF QUALITATIVE FIT TESTING f-6
USE OF QUANTITATIVE FIT TESTING f-7
FIT TESTING FOR ATMOSPHERE-SUPPLYING AND POWERED AIR-PURIFYING RESPIRATORS f-7
CHECKLIST FOR FIT TESTING f-10

Section (g): USE OF RESPIRATORS g-1
PREVENTING LEAKS IN THE FACEPIECE SEAL g-1
CONTINUING RESPIRATOR EFFECTIVENESS g-4
PROCEDURES FOR IMMEDIATELY DANGEROUS TO LIFE OR HEALTH ATMOSPHERES (IDLH) AND FOR INTERIOR STRUCTURAL FIREFIGHTING g-6
PROCEDURES FOR INTERIOR STRUCTURAL FIREFIGHTING g-10
CHECKLIST FOR PROPER USE OF RESPIRATORS g-12

Section (h): MAINTENANCE AND CARE OF RESPIRATORS h-1
CLEANING AND DISINFECTING h-1
STORAGE h-3
INSPECTION h-3
REPAIRS h-4
CHECKLIST FOR RESPIRATOR MAINTENANCE AND CARE h-5

Section (i): BREATHING AIR QUALITY AND USE i-1
ATMOSPHERE-SUPPLYING RESPIRATORS i-2
SPECIFICATIONS FOR BREATHING AIR i-2
OXYGEN USE i-4
CYLINDER USE i-4
COMPRESSOR USE i-5
PRECAUTIONS REGARDING COUPLINGS i-7
LABELING OF BREATHING GAS CONTAINERS i-8
CHECKLIST FOR BREATHING AIR QUALITY AND USE i-9

Section(j): IDENTIFICATION OF FILTERS, CARTRIDGES AND CANISTERS j-1

CONTENTS (continued)

Section (k): TRAINING AND INFORMATION k-1
CONTENT OF TRAINING k-1
COMPREHENSION OF TRAINING k-3
TIMING OF TRAINING k-3
PORTABILITY OF TRAINING k-3
RETRAINING k-3
INFORMATION FOR VOLUNTARY RESPIRATOR USERS k-4
TRAINING AND INFORMATION CHECKLIST k-4

Section (l): PROGRAM EVALUATION l-1
CONDUCTING PROGRAM EVALUATIONS l-1
CONSULTING WITH EMPLOYEES l-1
PROGRAM EVALUATION CHECKLIST l-2

Section (m): RECORDKEEPING m-1
MEDICAL EVALUATION RECORDS m-1
RESPIRATOR FIT TESTING RECORDS m-1
WRITTEN RESPIRATORY PROTECTION PROGRAM m-2
ACCESS TO RECORDS m-2
RECORDKEEPING CHECKLIST m-2

Section (n): DATES n-1
EFFECTIVE DATE n-1
EXISTING RESPIRATORY PROTECTION PROGRAMS n-1

APPENDIX I **Respiratory Protection standard (29 CFR 1910.134)**

APPENDIX II **OSHA Area and Regional Offices;**
States With Consultation Programs and Approved Plans

APPENDIX III **Questions and Answers on the Respiratory Protection standard**

APPENDIX IV **Sample Respiratory Protection Program**

APPENDIX V **References**

Small Entity Compliance Guide

INTRODUCTION

This guide is intended to help small businesses comply with the Respiratory Protection standard. It provides guidance only, and does not alter or determine compliance responsibilities, which are set forth in Occupational Safety and Health Administration (OSHA) standards and the Occupational Safety and Health Act. The guide does not replace the official Respiratory Protection standard (29 CFR 1910.134), which is contained in Appendix I of this document. The reader must refer to the standard to ensure compliance. Moreover, because interpretations and enforcement policy may change over time, for additional guidance on OSHA compliance requirements, the reader should consult current administrative interpretations and decisions by the Occupational Safety and Health Review Commission and the courts.

The Respiratory Protection standard will protect an estimated 5 million respirator wearers working in 1.3 million workplaces. OSHA estimates that compliance with the standard will prevent hundreds of deaths and thousands of illnesses in U.S. workplaces each year.

The Respiratory Protection standard specifies only the minimum requirements for an effective respiratory protection program. You are encouraged to exceed these minimum criteria if doing so enhances the safety and health of your employees.

In 21 states and two territories, occupational respiratory requirements are enforced by the state agency responsible for the OSHA-approved state plan. These states are: Alaska, Arizona, California, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Virgin Islands, Washington and Wyoming. New York and Connecticut also operate OSHA-approved state plans limited in scope to state and local government employees.

State plans are required to adopt and enforce respiratory protection standards that are either identical to or at least as effective as the federal standard. These states are also required to extend the coverage of their respiratory protection standard to state and local government employees, including paid, and in some states, volunteer, firefighters, who are otherwise not covered by the federal standard. The information in this guide should be equally applicable to you if you are located in a state plan state, although you should check to see if there are any unique or additional requirements that may apply. (A list of phone numbers and addresses for the state programs is included in Appendix II.)

Who should read this guide?

You should read this guide if it is likely that you will need to establish and implement a respiratory protection program for your business. Under the Respiratory Protection standard, OSHA may require you to establish a respiratory protection program when exposure to an airborne contaminant or to low oxygen levels can cause illness or injury to

a worker's health, and when these health effects can be prevented by the appropriate selection and use of a respirator.

How do I use this guide?

The guide is divided into chapters that correspond to the major provisions, or paragraphs, of the Respiratory Protection standard (e.g. respirator selection—paragraph (d), fit testing—paragraph (f)). Each chapter follows the same organization as the corresponding paragraph of the standard, providing more detail than the standard itself to help you better understand the requirements. Standard citations (e.g. (d)(3)(ii)are provided in the margins to enable you to refer from the explanations provided in this guide to the original standard, which is included in Appendix I. Checklists are provided at the end of each chapter.

In addition, Appendix III of this document contains *Questions and Answers on the Respiratory Protection standard (Q&A)*. If you do not find the answers to your particular questions in this document, check the *Q&A*.

Appendix IV of this guide contains a sample respiratory protection program. This sample program was written for a hypothetical company to provide an example of how the requirements of the Respiratory Protection standard may be appropriately implemented. Keep in mind that there is often more than one way to implement certain requirements of the standard in a particular workplace setting.

What is a respirator?

Respirators are devices that protect workers from inhaling harmful substances. These substances can be in the form of airborne vapors, gases, dust, fogs, fumes, mists, smokes, or sprays. Some respirators also ensure that workers do not breathe air that contains dangerously low levels of oxygen.

There are two major types of respirators:

1. Air-purifying respirators, which remove contaminants from the air.

2. Atmosphere-supplying respirators, which provide clean air from an uncontaminated source.

Respirators provide protection from respiratory hazards only when they are used properly.

Atmosphere supplying respirator

Air-purifying respirator

What is a respiratory protection program?

A respiratory protection program is a cohesive collection of worksite-specific procedures and policies that addresses all respiratory protection elements required by the standard. For example, a respiratory protection program must contain specific procedures describing how respirators will be selected, fitted, used, maintained and inspected in a particular workplace. Chapter (c) of this guide contains more information on respiratory protection programs.

When am I required to establish a respiratory protection program?

Generally, whenever you or OSHA requires your employees to wear respirators. For example, you may need to establish a respiratory protection program:

- If your employees work in situations where the level of oxygen is insufficient, or potentially insufficient.
- If your employees are potentially exposed to harmful levels of hazardous gases or vapors.
- If your employees are exposed to other potential respiratory hazards, such as dust, mists, fumes, sprays, and other airborne particles.

You need to supply workers with respirators when all preferred methods of protecting them from breathing contaminated air have been determined to be insufficient to reduce the contamination to nonhazardous levels. You must consider the potential for emergencies when making this determination. These preferred methods include:

- Engineering controls, such as ventilation.
- Substituting non-hazardous materials for the materials that pose respiratory hazards.
- Administrative controls, such as scheduling major maintenance for weekends or times when few workers are present.

If you have any questions about when to supply your employees with respirators, refer to the standard in Appendix I.

What is OSHA's Respiratory Protection standard?

The Respiratory Protection standard requires employers to establish and maintain a respiratory protection program to protect their respirator-wearing workers. OSHA has issued a revised standard, which became effective on October 5, 1998. It updates and replaces a standard that OSHA adopted in 1971. (The complete text of the revised standard is included in Appendix I.)

The revised standard incorporates new scientific principles and technologies that have emerged since 1971. Because of advances in technology, many areas covered by the previous standard had become outdated.

The new standard is intended to:

- Enhance the protection of worker health.
- Promote more effective use of respirators.
- Make it easier for you to comply with its provisions.
- Make it easier to understand the policy and procedures you must follow when implementing a respiratory protection program.

How does the new standard differ from the old standard that it replaces?

The new standard:

- Contains new provisions that recognize the needs of small businesses.
- Requires written respiratory protection programs to include work-site specific procedures. (*See Section (c) of this guide.*)
- Requires that a qualified "program administrator" oversee the respiratory protection program. (*See page c-5 of this guide.*)
- Provides:
  - Definitions that will eliminate confusion about terminology and how these terms apply to respirators and their use. (*See Section (b) of the standard in Appendix I.*)
  - Criteria for selecting respirators. (*See Section (d) of this guide.*)
  - Clear language on the requirement for medical examinations of workers and the use of medical questionnaires. (*See Section (e) of this guide.*)
- Requires employers to perform a hazard determination to identify respiratory hazards and work conditions. (*See pages d-1 through d-4 of this guide.*)
- Requires annual fit testing for all tight-fitting respirators, and it includes protocols for fit testing. (*See Section (f) of this guide and Appendix B of the standard in Appendix I of this guide.*)
- Addresses the use of respirators in situations that OSHA characterizes as Immediately Dangerous to Life or Health (IDLH). (*See page g-6 of this guide.*)

How does the new Respiratory Protection standard recognize the needs of small businesses?

Among other things, the revised Respiratory Protection standard:

- Allows the use of a medical questionnaire to screen for employee health conditions which could affect most workers ability to use a respirator. The questionnaire must be administered by a physician or other licensed health care professional. (*See page e-2 of this guide.*)

- Allows medical evaluations to be conducted either by a physician or by another licensed health care professional. (*See page e-2 of this guide.*)

- Requires medical evaluations after the initial evaluation to be conducted only when specific conditions indicate a need for a reevaluation. (*See page e-3 of this guide.*)

- Minimizes the amount of paperwork required in connection with medical evaluations. (*See pages e-5 through e-7 of this guide.*)

- Establishes flexible requirements for cleaning and disinfecting respirators issued to individual employees "as necessary to be maintained in a sanitary condition." (*See page h-1 of this guide.*)

- Allows tags be used to document respirator inspections rather than written records. (*See page h-3 of this guide.*)

- Allows you to obtain a certificate of breathing gas analysis from the supplier instead of requiring you to conduct your own gas analysis. (*See page i-2 of this guide.*)

Whom can I contact if I have additional questions about the Respiratory Protection standard that are not answered in the Small Entity Compliance Guide?

For additional assistance in establishing and implementing a respiratory protection program, contact the OSHA Area Office nearest you. If you are unable to contact your local OSHA Area Office, you can contact the appropriate OSHA Regional Office for information or assistance. A list of OSHA Area and Regional Offices is included as Appendix II.

The OSHA Consultation Service is an excellent resource for additional assistance. This free program helps employers find out about potential hazards and improve their occupational safety and health management systems. It is separate from the OSHA inspection effort. State OSHA Consultation programs are listed in Appendix II.

If you are located in a state that operates an OSHA-approved State Plan, you should contact the responsible state agency listed in Appendix II for information and assistance.

Section (a): PERMISSIBLE PRACTICE

(a)(1) ENGINEERING CONTROLS

To prevent illness or diseases caused by breathing hazardous air in the workplace, you must use engineering controls to the extent feasible to prevent contamination of the workplace atmosphere. When engineering controls are not feasible, or while engineering controls are being put in place, appropriate respirators must be used.

How do I know if the atmosphere in my workplace is hazardous?

An atmosphere is hazardous if it does not contain sufficient oxygen, or if it contains chemical, biological, or radiological contaminants in sufficient quantity to harm the health of employees. Section (d) of this guide contains information on how to identify and evaluate respiratory hazards in your workplace.

What are engineering controls?

Engineering controls physically change the work environment to reduce employee exposure to air contaminants. Such controls may include:

- Change of the work process
- Substitution of less hazardous substances for harmful materials
- Isolation or enclosure of the work process or of employees
- Local exhaust or general dilution ventilation

Where can I find guidance on the type of engineering controls I may need to put in place?

Potential sources for this type of information include:

- Trade associations.
- Manufacturers or suppliers of materials or equipment associated with the creation of air contaminants.

- Your insurance carrier.
- Government agencies (see Appendix II of this guide for a list of OSHA offices in your area).
- OSHA Consultation Program (see Appendix II of this guide for the list of States with consultation programs).
- Industrial hygiene consultants.

(a)(2) PROVIDING YOUR EMPLOYEES WITH RESPIRATORS

You must provide respirators when such equipment is necessary to protect the health of employees. The respirator provided must be suitable for its intended purpose. When you are required to provide respirators, you must establish and maintain a respiratory protection program. The requirements for a respiratory protection program are described in Section (c) of this guide.

How do I know if the engineering controls I install are sufficient to protect employee health?

The vendor who supplies your engineering controls may be able to help you determine whether the controls will adequately protect your employees from respiratory hazards. You can also evaluate the level of contamination in your workplace after the engineering controls are installed, as explained in Section (d) of this document.

How do I know what type of respirator is suitable for protecting the health of my employees?

Section (d) of this guide will answer your questions about selecting a suitable respirator.

Is worker rotation acceptable as an interim control while engineering control measures are being developed and implemented?

Rotation is an acceptable practice for less-toxic contaminants. It is never permitted for protection against cancer-causing substances. In addition, many of OSHA's substance-specific health standards contain ceiling limits that do not allow the use of worker rotation. If respirators are also necessary to protect the health of the employee while engineering controls are being developed, they must be provided.

Section (b): DEFINITIONS

This section of the Respiratory Protection standard contains definitions of important terms used in the text of the standard. The definitions are intended to clarify the requirements of the standard. They are contained in Paragraph (b) of the standard, which is included as Appendix I of this guide.

Section (c): RESPIRATORY PROTECTION PROGRAM

Whenever respirator use is required by you or by OSHA, this section of the Respiratory Protection standard dictates that you:

- Develop a written respiratory protection program with procedures that are specific to your worksite.
- Implement the program and update it as necessary.
- Assign a qualified program administrator to run and evaluate the program.

Additionally, you are required to ensure that certain aspects of the respiratory protection program are followed by employees who wear a respirator voluntarily (that is, they wear respirators even though respirator use is not required by either you or OSHA).

(c)(1) PROGRAM DEVELOPMENT AND IMPLEMENTATION

You are required to develop and implement a written respiratory protection program and to update it as necessary.

Program Development

You must develop a written respiratory protection program that includes procedures for the use of respirators in any work areas where protection from respiratory hazards is required. The procedures in your program must be specific to your particular workplace.

All required elements of the respiratory protection program must be in writing unless a particular element does not apply to your workplace. For example, if you do not use atmosphere-supplying respirators, then you do not need to develop procedures for that type of respirator.

Why a written program?

A written program is needed because health and safety programs can be more effectively implemented and evaluated if the procedures are available in a written form for study and review.

Also, a written respiratory protection program is the best way to ensure that the unique characteristics of the worksite are taken into account. Developing the written program encourages you to thoroughly assess and document information pertaining to respiratory hazards posed to your employees—both during normal operating conditions and during reasonably foreseeable emergencies.

Program Content

You are required to include the following elements (as applicable) in your respiratory protection program:

- Procedures for
  - Selecting appropriate respirators for use in the workplace.
  - Fit testing tight-fitting respirators.
  - Using respirators properly in routine situations as well as in reasonably foreseeable emergencies.
  - Cleaning, disinfecting, storing, inspecting, repairing, removing from service or discarding, and otherwise maintaining respirators. Also, you must establish schedules for these elements.
  - Ensuring adequate air supply, quantity, and flow of breathing air for atmosphere-supplying respirators.
  - Regularly evaluating the effectiveness of the program.
- Provisions for medical evaluation of employees who must use respirators.
- Training employees in the proper use of respirators (including putting them on and removing them), the limitations on their use, and their maintenance.

Appendix III, Sample Respiratory Protection Program, provides additional guidance on the required content of the respiratory protection program.

Program Implementation and Updating

Once you have established a written program covering all the required elements that apply to your workplace, you then must ensure that the program is appropriately implemented. Implementation of the program must be administered and overseen by your program administrator (see section (c)(3)).

Once your program has been implemented you must ensure that it is updated *as necessary* to reflect relevant changes in the workplace. That is, you need to revise only the elements of the program that have been affected by changes that relate to respiratory hazards in work areas. For example, you would need to revise the appropriate sections of your written program if new processes or new chemicals were introduced into the workplace that will impact respirator usage. In addition, if you make any changes in the types of respirators used or in any of the other elements of the respiratory protection program, you must make appropriate revisions to the written program.

)(2) **VOLUNTARY RESPIRATOR USE**

You are required to ensure that all employees who use a respirator voluntarily are provided with certain basic information on proper use. Additionally, you must ensure that certain of these workers are included in your program's provisions for medical evaluations, and for cleaning, storage, and maintenance of respirators.

What is meant by "voluntary" use of respirator equipment?

Voluntary use is when an employee chooses to wear a respirator, even though the use of a respirator is not required by either you or by any OSHA standard.

Providing Basic Information to Voluntary Respirator Users

You may allow an employee to use a respirator voluntarily, if you determine that the respirator itself will not present a hazard to the employee due to misuse, other hazards or conditions in the workplace, or employee medical conditions. In such cases, you may provide employees with respirators or allow them to use their own respiratory protection.

If you allow such use of a respirator, you must provide the voluntary respirator user with the advisory information in Appendix D of the standard (see Appendix I in this document). This appendix provides basic information on the proper use of respirators for employees who are voluntary users of the equipment and thus are not required to undergo training. These precautions can be presented to the employee either verbally or in a written form. (See also Section (k) of this guide on Training and Information.)

Applicable Components of the Respiratory Protection Program

You must ensure that certain aspects of your respiratory protection program are implemented for voluntary respirator users. This requirement, however, does not apply for employees who voluntarily wear dust masks (filtering facepieces).

Filtering facepieces

Elements of the program that apply to voluntary users (except those using filtering facepieces (dust masks) voluntarily) involve:

- Provisions for medical evaluation of employees who use elastomeric respirators.
- Procedures for cleaning, disinfecting, storing, inspecting, repairing, removing from service or discarding, and otherwise maintaining respirators. Also, you must establish schedules for these program elements.

Implementing these aspects of the program for a voluntary respirator user will ensure that the respirator is used properly and does not create a hazard to the user. If these provisions are not implemented, potential hazards or problems could result:

- A respirator wearer's health could be jeopardized due to an undetected medical condition (e.g., asthma, heart condition).
- A dirty respirator could cause dermatitis.
- A dirty or poorly disinfected respirator could cause an ingestion hazard.

What types of respirators do the voluntary use requirements apply to?

This requirement applies primarily to tight-fitting negative pressure APRs, and it would also apply to powered APRs if an employee elected to voluntarily use this type of respirator. It does not apply to dust masks (filtering facepieces).

Do I need to have a written respiratory protection program if only voluntary users wear respirators at my facility?

No, if the only respirators being worn voluntarily are filtering facepieces (dust masks). Yes, if APRs or powered APRs are being used voluntarily. But when this is the case, your written program needs to include only the elements that pertain to voluntary users: a section on medical evaluations, and one on inspection, care, and maintenance.

(c)(3) PROGRAM ADMINISTRATOR

You must designate a program administrator to run the program and evaluate its effectiveness. An individual is qualified to be a program administrator if he or she has appropriate training or experience in accord with the program's level of complexity.

This training or experience is appropriate if it enables the program administrator to fulfill the minimum standard requirements of recognizing, evaluating, and controlling the hazards in your workplace. For example, if your program requires air-supplying respirators for use in immediately dangerous to life or health (IDLH) environments, your program administrator must

have training and experience pertaining to the use of this type of equipment. Similarly, if you don't use air-supplying respirators and don't have significant respiratory hazards at your workplace, someone with less sophisticated experience or training might be able to effectively serve in this position.

Ultimately, the appropriate qualifications for your program administrator must be determined based on the particular respiratory hazards that exist, or that are reasonably anticipated, at your workplace.

How do I, or a designated employee, become a qualified program administrator?

If your workers are exposed only to nuisance dusts and relatively low-toxicity materials, and they use only a few types of relatively simple respirators, knowledge of this guide and materials supplied by the manufacturer may be sufficient for you, or a designated employee, to serve as the program administrator.

If more dangerous chemicals are present, if the potential for high exposures exists, or if sophisticated respirators are used, the program administrator must have more extensive experience and/or training. In these circumstances, you may need to seek out the expertise needed or obtain appropriate training.

Is there a list of approved training courses I can send my program administrator to?

No. OSHA does not provide a training course specifically to train respiratory protection program administrators, nor does OSHA require program administrators to attend a specified course. OSHA only requires the program administrator to have an adequate level of training or experience to deal with the complexity of the respiratory protection program at the worksite.

You may want to check with trade associations or adult education programs run by universities or technical and vocational schools in your area. The OSHA Consultation Program can help you identify appropriate training courses, or, if you hire a consultant to help you with aspects of your respiratory protection program, he or she may be able to help you with this.

How will OSHA determine that a person is experienced and/or trained to be a respiratory protection program administrator?

Usually, the OSHA compliance officer will review the written program and interview the respiratory protection program administrator. Questions asked during the interview are likely to focus on determining how familiar the program administrator is with the OSHA Respiratory Protection standard and the use and application of the respirators at the particular workplace. Significant deficiencies in the written program also could indicate a lack of training and understanding of the standard.

Only one person can fulfill the primary responsibilities of running the program, unless your company has more than one worksite. Under that circumstance, you may have a program administrator for each site. Ordinarily, however, you cannot divide the responsibilities among several employees. Requiring an administrator with sole responsibility helps ensure the integrity of the program by maintaining continuous oversight from one person. Nonetheless, the administrator may rely on other employees to help run parts of the respiratory protection program (e.g., fit testing, medical evaluations).

One of the program administrator's primary responsibilities is to evaluate the program. Although OSHA recognizes the value of an objective assessment, the Agency did not want to burden small businesses with the cost of arranging for an outside party to conduct the evaluations, and the standard therefore allows program administrators to perform the program evaluations required under the standard.

(c)(4) EMPLOYER-PROVIDED RESPIRATORS

You must provide respirators, training, and medical evaluations at no cost to employees who are required to wear a respirator for protection from respiratory hazards at your workplace. This requirement reflects the philosophy that employers are obligated to provide and pay for necessary personal protective equipment (such as respirators) used by employees on the job.

Do I also have to pay for respirators for voluntary users?

No. You do not have to pay for respirators for voluntary respirator users. In such cases, you still must pay for required medical evaluations for voluntary users and provide voluntary users with appropriate facilities and time to clean, disinfect, maintain, and store respirators.

CHECKLIST FOR RESPIRATORY PROTECTION PROGRAMS

Check to ensure that your facility has:

- ☐ A written respiratory protection program that is specific to your workplace and covers the following:
  - ☐ Procedures for selecting respirators.
  - ☐ Medical evaluations of employees required to wear respirators.
  - ☐ Fit testing procedures.
  - ☐ Routine use procedures and emergency respirator use procedures.
  - ☐ Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and maintaining respirators.
  - ☐ Procedures for ensuring adequate air quality for supplied air respirators.
  - ☐ Training in respiratory hazards.
  - ☐ Training in proper use and maintenance of respirators.
  - ☐ Program evaluation procedures.
  - ☐ Procedures for ensuring that workers who voluntarily wear respirators (excluding filtering facepieces) comply with the medical evaluation, and cleaning, storing and maintenance requirements of the standard.
- ☐ A designated program administrator who is qualified to administer the program.
- ☐ Updated the written program as necessary to account for changes in the workplace affecting respirator use.
- ☐ Provided equipment, training, and medical evaluations at no cost to employees.

Section (d): RESPIRATOR SELECTION

(d)(1) GENERAL GUIDELINES FOR SELECTION

You must base selections of respirators on the hazards to which your employees are exposed and must consider how workplace and user factors affect respirator performance and reliability.

What are workplace and user factors?

Some examples include the following:

- The size and configuration of the workspace—Are workers equipped with air supplied respirators able to fit into any tight space in your workplace?
- Ease of worker communication—Are your employees wearing respirators able to communicate with one another and warn one another of hazards?
- Ease or difficulty of the work or rate of activity—Are your employees doing heavy lifting that may deplete the air supply of a self-contained breathing apparatus (SCBA)? Would a fast work pace lead to discomfort, causing the employee to move the respirator and, thus, affect the fit?
- Workplace conditions such as temperature and humidity or the location and movement of other personnel and equipment—Would the temperature and humidity affect the effectiveness of filters, cartridges, and other respirator parts as well as the comfort of the wearer? Would the mobility of your employees or the presence of moving machinery entangle the airlines of atmosphere-supplying respirators?

(d)(1)(iii) You need to Identify and Evaluate Worksite Hazards

- Identify the chemicals to which your employees are exposed and evaluate the hazards of those chemicals.
- Determine the state and physical form of the chemical. Are they solids, liquids, or gases? Do the liquids and solids give off vapors or do they form dusts or mists?
- Estimate or measure employee exposures to the hazards.

Respiratory hazards may be present in the workplace in the following physical forms:

Dusts and fibers are solid particles that are formed or generated from solid materials through mechanical processes such as crushing, grinding, drilling, abrading or blasting. Examples are lead, silica, and asbestos.

Fumes are solid particles that are formed when a metal or other solid vaporizes and the molecules condense (or solidify) in cool air. Examples are metal fumes from smelting or welding. Fumes also may be formed from processes such as plastic injection or extrusion molding.

Mists are tiny droplets of liquid suspended in the air. Examples are oil mist produced from lubricants used in metal cutting operations, acid mists from electroplating, and paint spray mist from spraying operations.

Gases are materials that exist as individual molecules in the air at room temperature. Examples are welding gases, such as acetylene and nitrogen, and carbon monoxide produced from internal combustion engines.

Vapors are the gaseous form of substances that are normally in the solid or liquid state at room temperature and pressure. They are formed by evaporation. Most solvents produce vapors. Examples include toluene and methylene chloride.

Biological hazards include bacteria, viruses, fungi, and other living organisms that can cause acute and chronic infections if breathed in. Examples include Legionnaire's Disease, flour, and animal products (dander, excreta).

Some Suggestions for Measuring or Making "Reasonable" Estimates of Worker Exposures

- Personal monitoring is the most accurate way of obtaining worker exposure information. Sampling equipment and analytical methods are available for the vast majority of substances regulated by OSHA's Air Contaminants standard (29 CFR 1910.1000 and 29 CFR 1926.55). OSHA has specific monitoring requirements for its substance-specific standards (i.e., benzene or asbestos). See Subpart Z of *Title 29 Code of Federal Regulations,* parts 1910 and 1926, for OSHA's substance-specific standards.

- You can also estimate exposures by monitoring fixed locations or by sampling for short time durations. If you do this, you should measure under worst case conditions to be sure you are providing adequate protection for your employees. For example, if you select a respirator based on a reading obtained from a fixed sample collected close to the source of emission, the respirator may provide adequate worker protection because workers generally move about and do not spend their workshift near the source of emissions. Similarly, a respirator selected on the basis of the reading obtained from a spot sample taken when the process is operating at peak conditions may provide adequate protection because process emissions under non-peak conditions are less than at peak conditions.

- Data may be available to you from previous exposure measurements. For example, studies may have been conducted in your industry. Your trade association may have data, or, manufacturers of products or materials used in your workplace may have conducted laboratory tests that provide worker exposure data. To generalize from data obtained from these sources or an industry-wide survey, however, you must show that the conditions that existed in the survey, such as the processes, types of materials, control methods, work practices, and environmental conditions, are similar to those in your own workplace.

- You should be aware that exposures can be quite variable from day to day and from worker to worker. It is therefore important always to err on the side of over- rather than underprotection.

- You may wish to consult with health and safety professionals in evaluating exposures. However, consultation is not mandatory. The respiratory protection program administrator should have the necessary qualifications. You can probably obtain consultants through the organizations listed in the sources of help at the end of this chapter. The OSHA Consultation Program (see Appendix II for a list of programs by state) and your insurance carrier are other potential sources of assistance.

What if I am unable to determine my employees' exposure?

You must consider the worksite atmosphere IDLH, Immediately Dangerous to Life or Health and select respirators on that basis. IDLH means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere (29 CFR 1910.134 paragraph (b)). However, you may be able to demonstrate, through information on processes and reasonable assumptions about potential maximum concentrations, that IDLH conditions would not occur.

(d)(1)(ii) **You Must Select a Respirator Certified by the National Institute for Occupational Safety**

and Health (NIOSH). The respirator must be used in compliance with the conditions of its certification. See the sources of help at the end of this chapter for addresses and telephone numbers of NIOSH.

(d)(2) RESPIRATORS FOR IDLH ATMOSPHERES

(d)(2)(i) Types of respirators

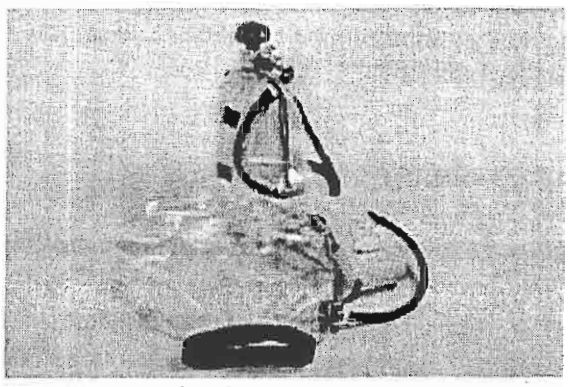
IDLH environments require the highest level of respiratory protection and reliability. You must provide either of the following for use in IDLH environments:

- Full-facepiece pressure-demand SCBAs that are certified by NIOSH for a minimum service life of 30 minutes.

Full facepiece SCBA

- Combination full-facepiece pressure-demand supplied-air respirators with auxiliary self-contained air supply.

(d)(2)(ii) Respirators for escape from IDLH atmospheres **must be NIOSH certified for escape from the atmosphere in which they will be used.** For example, for formaldehyde exposures, escape respirators may be a full facepiece with chin style, front, or back-mounted industrial canister approved against formaldehyde (29 CFR 1910.1048).



Emergency escape breathing apparatus

(d)(2)(iii) **You must consider all oxygen-deficient atmospheres to be IDLH**. Atmosphere-supplying respirators must be used in oxygen-deficient atmospheres (where oxygen is less than 19.5%). You may use any atmosphere-supplying respirator if you can demonstrate that, under all reasonable foreseeable conditions, the oxygen concentration in the work area can be maintained within the ranges specified in the following table (Table II of 29 CFR 1910.134). Otherwise, you must provide employees with full facepiece pressure demand SCBAs or combination full facepiece pressure demand supplied-air respirators with auxiliary self-contained air supply.

TABLE 1

Altitude	**Oxygen deficient atmospheres (% O_2) for which the employer may rely on any atmosphere supplying respirator.**
Less than 3001	16.0-19.5
3001-4000	16.4-19.5
4001-5000	17.1-19.5
5001-6000	17.8-19.5
6001-7000	18.5-19.5
7001-8000	19.3-19.5

Above 8000 feet the exception does not apply. Oxygen-enriched breathing air must be supplied above 14,000 feet.

Table 1 specifies, by altitude, the oxygen concentrations in which any type of atmosphere-

supplying respirators may be used. For example, if your workplace is located at sea level and you can demonstrate that the oxygen content in the oxygen deficient environment will be maintained between 17 and 19%, then you may use any atmosphere-supplying respirator.

Work operations being conducted in well-controlled atmospheres where oxygen levels are deficient (below 19.5 percent) are typically permit-required confined spaces (see OSHA's Permit-Required Confined Space standard, 29 CFR 1910.146).

(d)(3) **RESPIRATORS FOR NON-IDLH ATMOSPHERES**

(d)(3)(i) **You must provide respirators that are adequate to protect employee health and ensure compliance with all other OSHA requirements under routine and reasonably foreseeable emergency situations.** Other OSHA regulations include the Air Contaminants standard, 29 CFR 1910.1000, the substance-specific standards, appropriate safety regulations such as the Hazardous Waste Operations and Emergency Response standard, 29 CFR 1910.120 paragraph (g)(2), and many construction and maritime standards.

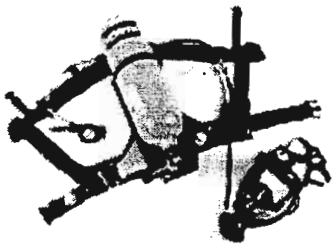
Also, the General Duty Clause of the Occupational Safety and Health Act requires you to protect your employees from substances not regulated by OSHA, but which are known to be hazardous at levels encountered in the workplace. Consult the Material Safety Data Sheet (MSDS) sent by your chemical supplier if you have questions about the toxicity of a particular substance. For further assistance in ascertaining whether substances used in your workplace that are not regulated by OSHA are hazardous, see the sources of help (at the end of this chapter) and the list of OSHA Area Offices (Appendix II).

(d)(3)(ii) **You must select respirators that are appropriate for the chemical state and physical form of the contaminant.** See the section discussing the identification of worksite hazards. You need different types of filters, cartridges, and canisters depending on whether dusts, fumes, mists, vapors, and gases are present in your workplace and depending on the kinds and concentrations of substances present. Refer to NIOSH and the other sources of help listed at the end of this chapter.

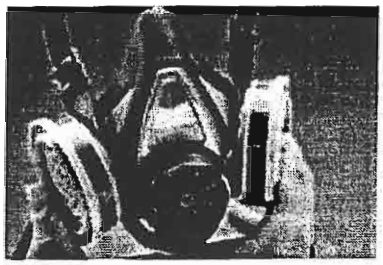
(d)(3)(iii) Respiratory protection for gases and vapors

For protection against gases and vapors, you can select either atmosphere-supplying respirators or air-purifying respirators.

Half-facepiece SAR



Full-facepiece SCBA



Half-facepiece APR

Full facepiece PAPR

You must meet the following conditions if your employees use air-purifying respirators.

- The respirator must be equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant; or

- If there is no appropriate ESLI, you must implement a change schedule for canisters and cartridges based on objective information that will ensure that canisters and cartridges are changed before the end of their service life.

You do not want to have situations where the canisters or cartridges become saturated and the gases or vapors break through the canisters or cartridges, allowing the contaminants to get inside the mask and into your employees' breathing zones.

Why not just rely on the employee's ability to detect the odor of the substance when the gas or vapor breaks through?

You may not rely on the detection of odor as protection against respiratory hazards posed by gases and vapors because:

- Most toxic substances do not have appropriate sensory (odor or irritant) warning properties.
- Some chemicals have odors that are only detectable above their established exposure limits, meaning the employees will smell the chemical only after they have already been exposed to unsafe levels of the contaminant.
- Individuals' abilities to perceive particular odors may differ quite markedly from the population average due to any of a variety of innate, chronic, or acute physiological conditions. For example, about 10 percent of people have a markedly impaired sense of smell.
- There is no good screening mechanism to identify persons with sensory receptor problems.
- Continuing exposure to the odor usually results in diminution or even disappearance of the smell sensation. This phenomenon is known as olfactory fatigue. When this happens, the worker unknowingly gets used to the contaminant breaking through the cartridge/canister and loses the ability to detect its smell.

What is an end of service life indicator (ESLI)?

An ESLI is a mechanism for warning the user that a respirator is approaching the end of its ability to provide protection. The warning appears on the cartridge itself. For example, after a period of use, an indicator on a cartridge with sorbent material will signal that protection against organic vapors is approaching saturation or is no longer effective.

So far, NIOSH has approved ESLIs for only four cartridges or canisters (mercury vapor, carbon monoxide, ethylene oxide and hydrogen sulfide). Thus, you most likely will have to establish change schedules to ensure that cartridges and canisters are changed before their end-of-service-life.

What must be considered when developing change schedules?

You must develop cartridge change schedules based on available data or information that can be relied upon to ensure that cartridges are changed before the end of their useful service life.

You need to consider the following factors in determining change schedules:

- The contaminants the respirator is to protect against.
- The concentrations of contaminants in the work area.
- Frequency of use—(e.g., is the respirator used continuously or intermittently throughout the shift?)
- Temperature, humidity and air flow through the cartridge or canister.
- Employees' work rates.
- The presence of other potentially interfering chemicals.

You should assume worst case conditions to avoid breakthrough earlier than anticipated. You should document the information relied upon and the basis for the change schedules you use in your written respiratory protection program.

Where can I get help on developing change schedules?

You must consult with your respirator supplier or manufacturer for guidance on developing change schedules specific to your work conditions. Some suppliers have prepared materials that may assist you with developing change schedules for your worksite. Other possible sources of help include your trade association, and/or the resources listed at the end of this chapter.

Further information to help you develop change schedules is forthcoming. Several trade associations are currently gathering published information, such as breakthrough test data (i.e., how long it takes a substance to break through the cartridge or canister and get into the facepiece), and plan to produce a guidance document to help employers develop change schedules. OSHA is also developing instructional materials on change schedules, which will be a useful tool for employers

(d)(3)(iv) Respiratory protection for particulates

What are my options for protection against particulates?

You have three options:

- Atmosphere-supplying respirators.
- Air-purifying respirators (including filtering facepieces) with filters certified by NIOSH under 30 CFR part 11 as high efficiency particulate (HEPA) filters, or filters certified by NIOSH under 42 part 84.
- Air-purifying respirators with any filter certified for particulates by NIOSH for protection against contaminants consisting primarily of particles with mass median aerodynamic diameters (MMAD) of at least two micrometers.

Particulate APR, N95

See the sources of help section at the end of this chapter for advice and information in determining whether or not contaminants in your workplace consist primarily of particles of two micrometers or more.

What types of particulate filters are available for air-purifying respirators (APRs)?

Particulate-removing cartridges contain filters that reduce inhaled concentrations of toxic dusts and fiber, such as lead and asbestos, fumes, mists, and radioactive and biological materials (such as grain dusts). Powered and non-powered APRs require different particulate filters. Only HEPA filters are appropriate for protection against particulates for powered APRs.

The nine filter types for use with non-powered APRs are based on three levels of filter

efficiency and three levels of resistance to degradation by oil. The three levels of filter efficiency are 95, 99, and 99.97 percent. These are referred to as 95, 99 and 100 filters, respectively. The three levels of oil resistance are N (non oil resistant), R (oil resistant) and P (oil proof). The most common commercially available cartridges are the "N95"(not oil resistant and 95 percent efficient) and "P100" (oil proof and 99.97 percent efficient). The P100 is comparable to the HEPA filter that is used with PAPRs.

Do I need to use particulate filters with ESLI?

ESLIs are not needed with particulate-removing filters. The employee should be trained to change the filter when he or she has difficulty breathing due to a lack of air being drawn through the filter. This is an indication that the filter has become loaded with particulate.

Where can I go for help?

Sources of help include:

- *NIOSH Respirator Decision Logic*. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health. Request DHHS (NIOSH) Publication No. 87-108. NIOSH also has a help line. The telephone number is 1-800-35 NIOSH.

- American National Standard for Respiratory Protection (ANSI Z88.2). American National Standards Institute, 11 West 42nd Street, New York, New York, 10036.

- Respirator manufacturers provide advice through product literature, sales staff, and telephone help lines. The Industrial Safety Equipment Association (ISEA) has contact information. ISEA can be reached at: 1901 N. Moore Street, Suite 808, Arlington VA. 22209, or (703) 525-1695, or www.safetycentral.org/isea.

- Chemical manufacturers may provide information on the nature and properties of substances to which your employees may be exposed. You should be able to obtain information from the Material Safety Data Sheets (MSDSs) provided by the supplier of the chemical.

- You can contact the American Conference of Governmental Industrial Hygienists (ACGIH), 6500 Glenway Ave., Bldg. D-7, Cincinnati, Ohio, 45211-4438 for advice and information on exposure measurement and estimation and other related industrial hygiene subjects. ACGIH has published the ACGIH Ventilation

Manual, which contains calculations applied to certain situations to estimate worker exposures.

- You can also contact the American Industrial Hygiene Association (AIHA), 2700 Prosperity Ave., Suite 250, Fairfax, Virginia, 22031 for advice and information on exposure measurement and estimation. Members of AIHA's Exposure Assessment Strategy's Committee are knowledgeable in worker exposure measurement and estimation.

- The National Library of Medicine provides free online help about chemical hazards. Through TOXNET, located at http://toxnet.nlm.nih.gov/servlets/simple-search, you can search a number of databases on toxicology, hazardous chemicals and other related subjects for information on respiratory hazards.

CHECKLIST FOR RESPIRATOR SELECTION

Check that at your facility:

- ☐ Respiratory hazards in your workplace have been identified and evaluated.
- ☐ Employee exposures that have not been, or cannot be, evaluated are considered IDLH.
- ☐ Respirators are NIOSH certified, and used under the conditions of certification.
- ☐ Respirators are selected based on the workplace hazards evaluated and workplace and user factors affecting respirator performance and reliability.
- ☐ A sufficient number of respirator sizes and models are provided to be acceptable and correctly fit the users.
- ☐ For IDLH atmospheres:
  - ☐ Full facepiece pressure demand SARs with auxiliary SCBA unit or full facepiece pressure demand SCBAs, with a minimum service life of 30 minutes, are provided.
  - ☐ Respirators used for escape only are NIOSH certified for the atmosphere in which they will be used.
  - ☐ Oxygen deficient atmospheres are considered IDLH.
- ☐ For Non-IDLH atmospheres:
  - ☐ Respirators selected are appropriate for the chemical state and physical form of the contaminant.
  - ☐ Air-purifying respirators used for protection against gases and vapors are equipped with ESLIs or a change schedule has been implemented.
  - ☐ Air-purifying respirators used for protection against particulates are equipped with NIOSH-certified HEPA filters or other filters certified by NIOSH for particulates under 42 CFR part 84.

Section (e): MEDICAL EVALUATION

This section of the Respiratory Protection standard requires employers to implement medical evaluations to determine a worker's ability to use a respirator.

This requirement is necessary because using a respirator may place a burden on a worker's health. This burden varies according to a number of factors, such as the weight and breathing resistance of the respirator and the workplace conditions under which the respirator is worn. Specific medical conditions that may place an employee at increased risk of illness, injury, or death include:

- Cardiovascular and respiratory disease, such as high blood pressure, angina, asthma, chronic bronchitis, or emphysema.
- Cardiovascular damage caused by heart attack or stroke.
- Reduced lung function caused by factors such as smoking or prior exposure to respiratory hazards.
- Neurological disorders, such as epilepsy.
- Musculoskeletal disorders, such as lower back pain.
- Psychological conditions, such as claustrophobia and severe anxiety.

(e)(1) EMPLOYER-PROVIDED MEDICAL EVALUATIONS

You must provide an employee with a medical evaluation to determine his or her ability to use a respirator. If a worker refuses to be medically evaluated for the use of a respirator, he or she cannot perform a job that requires a respirator.

When do I need to provide an employee with a medical evaluation?

The medical evaluation must be provided ***before*** the employee is fit tested and uses the respirator in your workplace for the first time.

You may stop providing a worker with medical evaluations when the worker is no longer required to use a respirator.

Are medical evaluations required for all types of respirators?

Medical evaluations are required for both positive pressure and negative pressure respirators (except for filtering facepieces (dust masks)used on a voluntary basis).

When elastomeric or supplied-air respirators are worn voluntarily by workers (not required by you or OSHA), you must ensure that the workers are medically able to wear the respirators and that they are provided with the information in Appendix D to the standard. The procedures for making this medical determination must be part of a written respiratory protection program. When your employees wear dust masks (filtering facepiece respirators), however, no written medical-determination procedures are required.

Do I need to provide medical evaluations for seasonal and temporary workers?

You must provide seasonal and temporary workers with medical evaluations. The frequency or length of a worker's term of employment does not affect the requirement for medical evaluations.

(e)(2) **MEDICAL EVALUATION PROCEDURES**

This portion of the standard specifies that the medical evaluation can be performed by using a medical questionnaire or by an initial medical examination that obtains the same information as the medical questionnaire.

Identification of a Medical Professional

Employers must identify a physician or another licensed health care professional (PLHCP) to perform the medical evaluations.

Who can perform a medical evaluation?

Physicians are not the only health care professionals allowed to perform medical evaluations for respirator use. The Respiratory Protection standard allows any PLHCP to administer the medical questionnaire (described below) or to conduct the medical examination if doing so is within the scope of the PLHCP's license. You must check with PLHCPs in your local area to see if performing the medical evaluation is within the scope of their professional license. Or you may check with your state licensing board. Appendix IV, Questions and Answers on the Respiratory Protection standard, lists state

licensing boards.

Can a nurse perform a medical evaluation?

Any health care professional, including a nurse, who qualifies as a PLHCP can perform a medical evaluation. If a nurse does not qualify as a PLHCP, he or she may still be able to perform a medical evaluation if he or she is doing so under the supervision of a physician, and the physician performs the final review of the assessment.

Can an employee request to see his or her own physician for a medical evaluation?

Yes, but you may find this arrangement difficult to administer. If employees select their own physicians, you will need to maintain contact with each physician, and you will need to send each physician the supplemental information described in paragraph (e)(5) of the standard. You must allow the employee to be evaluated during the employee's normal working hours or at a time that is convenient to the employee, and you also are responsible for paying for this service (even if the employee has coverage under an insurance plan).

The Medical Questionnaire: The medical questionnaire is designed to identify general medical conditions that place employees who use respirators at risk of serious medical consequences.

If you choose to use the medical questionnaire to conduct the medical evaluation, you must use the questionnaire contained in the Respiratory Protection standard (Appendix C of the standard, Sections 1 and 2). The language in Appendix C of the standard is mandatory and cannot be altered. The PLHCP determines whether or not Part B of the questionnaire needs to be administered, and the PLHCP can alter the questions in Part B in any manner he or she thinks is appropriate.

You may choose to use medical examinations in place of the questionnaire, but you are not required to do so. Although the questionnaire does not have to be administered during the medical examination, the PLHCP must obtain the same information from the worker that is contained in the questionnaire.

(e)(3) FOLLOW-UP MEDICAL EXAMINATIONS

You must provide follow-up examinations for employees who give positive answers to any of the questions numbered 1 through 8 in Section 2, Part A. You must also provide follow-up exams to employees who will be using SCBAs or full-face respirators who respond positively to questions 10 through 15. See Appendix C of the standard (Appendix I of this document). Also, you must provide a follow-up examination if the questionnaire or initial medical examination indicates that one is necessary.

As part of the follow-up examination, the PLHCP may include any tests, consultations, or diagnostic procedures that are needed to make a final determination about an employee's ability to use a respirator. In some cases, all that might be needed is a phone call to the employee from the PLHCP to clarify an issue from the questionnaire.

A PLHCP may investigate a medical condition that is not addressed in the questionnaire if the PLHCP has reason to believe that the condition could affect the employee's ability to wear a respirator.

If the PLHCP is not a physician, some medical issues may arise during the follow-up examination that may be outside the scope of the PLHCP's license. In such cases, a physician must be involved.

(e)(4) ADMINISTRATION OF QUESTIONNAIRES AND EXAMINATIONS

Procedures for Administering the Medical Evaluation: When you provide a medical evaluation program:

- You must protect the confidentiality of the employee who is being evaluated.
- The questionnaire or medical examination must be given during an employee's normal work hours or at a time and place convenient to the employee.
- The employee must understand the questions on the medical questionnaire.

Who pays for the medical evaluation?

You must pay for the medical evaluation and any related expenses—including travel costs—incurred by your employee during the evaluation.

How can I ensure that an employee's medical evaluation remains confidential?

You must provide your employees with instructions on how to deliver or send the completed questionnaire to the PLHCP who will review it. This can be done, for example, by supplying them with stamped, pre-addressed envelopes for mailing their completed questionnaires to the PLHCP.

If an employee does not speak English or cannot read, how can I make sure that he or she understands the questions on the medical questionnaire?

You can send the employee directly to a PLHCP who is able to help the employee fill out the questionnaire. For non-English speakers, you may want to consider supplying an interpreter to help the PLHCP interpret the questionnaire for your employee. The standard does not require you to hire a professional interpreter; instead, you may use an English-speaking family member or friend of the employee, or another employee who speaks both English and the employee's language, who can help the employee fill out the questionnaire.

Employee's Right to Contact the PLHCP

The standard requires you to inform employees that a PLHCP is available to discuss the medical questionnaire with them, and to allow employees to discuss the results of their questionnaire with the PLHCP. This discussion will enable employees and PLHCPs to clarify questions that were asked on the questionnaire, and for employees to explain answers that they provided.

How can I notify employees about how to contact the PLHCP?

You could post the PLHCP's name and telephone number in a location that is easily accessible to all workers (such as a lunch room or break area). You could also include the information in a separate sheet with the medical questionnaire.

(e)(5) SUPPLEMENTAL INFORMATION FOR THE PLHCP

This portion of the Respiratory Protection standard requires you to provide the PLHCP with specific information to be used to make the determination about an employee's ability to use a respirator. This information includes:

- The type and weight of the respirator to be worn by the employee.

- The duration and frequency of respirator use (including use for rescue and escape).
- The level of physical effort that the employee would be expending while wearing a respirator.
- Additional personal protective clothing and equipment that the employee would wear.
- The temperature and humidity extremes that may be encountered in the work environment where respirator use is required.

In addition, you must provide the PLHCP with the following:

- A copy of your written respiratory protection program.
- A copy of the Respiratory Protection standard.

Why do I need to provide the PLHCP with a copy of the written respiratory protection program and the Respiratory Protection standard?

This requirement helps ensure that PLHCPs have a thorough understanding of their duties and responsibilities in the medical evaluation process. Your written respiratory protection program will provide the PLHCP with critical information about the working conditions that could increase the burden placed on the employee's health during respirator use.

Does the PLHCP need to visit the worksite to perform a medical evaluation?

No, the supplemental information required in this portion of the standard is sufficient for the PLHCP to make a valid recommendation on the employee's ability to wear a respirator. OSHA, however, encourages PLHCPs to visit the worksite if they believe the information obtained there would be useful to them.

If I select a new PLHCP, do I need to have my employees reevaluated?

No, but you must make sure that the new PLHCP has the information required in this section. You must either provide the information directly to the new PLHCP, or you must make sure that the information is transferred from the former PLHCP to the new PLHCP.

How often do I need to provide the PLHCP with supplemental information?

You need to supply the information to the PLHCP only when the conditions of respirator usage change.

(e)(6) MEDICAL DETERMINATION

This portion of the standard requires you to obtain a recommendation from the PLHCP about the employee's ability to use a respirator. The PLHCP's recommendation must be in writing, and it must include the following information:

- A determination of whether or not the employee is medically able to use a respirator.
- Any limitations on respirator use related to the medical condition of the employee or to the workplace conditions in which the respirator will be used.
- The need, if any, for follow-up medical evaluations.
- A statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation.

Note that you are required to have the PLHCP provide a copy of the written recommendation to each employee.

Who is responsible for making the final decision about an employee's ability to wear a respirator?

You are responsible for making the final determination. The PLHCP's opinion is an important factor that you must consider in making this determination.

Is the information from the medical evaluation confidential, or can the PLHCP share this information with me?

The PLHCP must keep strictly confidential any information revealed during the medical evaluation; your access is limited to the information contained in the PLHCP's written recommendation.

Can I receive a copy of the employee's completed medical questionnaire?

No, you must only maintain a copy of the PLHCP's written recommendation in a confidential file.

Negative Pressure Respirators: If the PLHCP determines that an employee is unable to wear a negative pressure respirator, perhaps because of a breathing problem such as asthma or bronchitis, but would be able to wear a powered air-purifying respirator (PAPR), you must provide the employee with a PAPR. If, however, the PLHCP determines in a subsequent medical evaluation that the worker can wear a negative pressure respirator, you no longer need to provide the worker with a PAPR.

PAPR

(e)(7) ADDITIONAL MEDICAL EVALUATIONS

This portion of the standard requires you to provide an employee with additional medical evaluations whenever the following events occur:

- The employee reports symptoms related to his or her ability to use a respirator.
- The PLHCP, respiratory protection program administrator, or supervisor determines that a medical reevaluation is necessary.
- Information from the respiratory protection program suggests a need for reevaluation.
- Workplace conditions (such as protective clothing, temperature, or level of work effort) have changed so that an increased burden is placed on the employee's health.

Do I need to provide my employees with a medical reevaluation annually or according to some other fixed schedule?

Yes, you must provide medical reevaluations in accordance with the PLHCP's recommendation.

Do I need to provide an employee who is unable to use a respirator with an alternative job at no loss of pay and other benefits?

Although the standard does not require that employees receive such benefits, other OSHA substance-specific standards may contain this requirement.

CHECKLIST FOR MEDICAL EVALUATION

Check that at your facility:

- ☐ All employees have been evaluated to determine their ability to wear a respirator prior to being fit tested for or wearing a respirator for the first time in your workplace.
- ☐ A physician or other licensed health care professional (PLHCP) has been identified to perform the medical evaluations.
- ☐ The medical evaluations obtain the information requested in Sections 1 and 2, Part A of Appendix C of the standard, 29 CFR 1910.134.
- ☐ Employees are provided follow-up medical exams if they answer positively to any of questions 1 through 8 in Section 2, Part A of Appendix C, or if their initial medical evaluation reveals that a follow-up exam is needed.
- ☐ Medical evaluations are administered confidentially during normal work hours, and in a manner that is understandable to employees.
- ☐ Employees are provided the opportunity to discuss the medical evaluation results with the PLHCP.
- ☐ The following supplemental information is provided to the PLHCP before he or she makes a decision about respirator use:
  - ☐ Type and weight of the respirator.
  - ☐ Duration and frequency of respirator use.
  - ☐ Expected physical work effort.
  - ☐ Additional protective clothing to be worn.
  - ☐ Potential temperature and humidity extremes.
  - ☐ Written copies of the respiratory protection program and the Respiratory Protection standard.

CHECKLIST FOR MEDICAL EVALUATION (cont.)

- ☐ Written recommendations are obtained from the PLHCP regarding each employee's ability to wear a respirator, and that the PLHCP has given the employee a copy of these recommendations.

- ☐ Employees who are medically unable to wear a negative pressure respirator are provided with a powered air-purifying respirator (PAPR) if they are found by the PLHCP to be medically able to use a PAPR.

- ☐ Employees are given additional medical evaluations when:
  - ☐ The employee reports symptoms related to his or her ability to use a respirator.
  - ☐ The PLHCP, respiratory protection program administrator, or supervisor determines that a medical reevaluation is necessary.
  - ☐ Information from the respiratory protection program suggests a need for reevaluation.
  - ☐ Workplace conditions have changed in a way that could potentially place an increased burden on the employee's health.

Section (f): FIT TESTING

This section of the Respiratory Protection standard requires you to conduct fit testing on all employees who are required to wear a respirator that includes a tight-fitting facepiece.

Fit testing is a procedure used to determine how well a respirator "fits"—that is, whether the respirator forms a seal on the user's face. If a good facepiece-to-face seal is not achieved, the respirator will provide a lower level of protection than it was designed to provide. For example, without a good seal, the respirator can allow contaminants to leak into the user's breathing air.

This section also describes:

- What types of respirators must be fit tested
- How often fit testing must be conducted
- What procedures must be used
- How the results of fit testing should be used to guide respirator selection

INTRODUCTORY CONCEPTS

As a general introduction to the topic of fit testing, several fundamental concepts are defined below. These definitions expand on those provided with the actual standard (see Appendix I of this guide).

As described below, there are two types of fit testing: quantitative and qualitative.

What is quantitative fit testing (QNFT)?

Quantitative fit testing is a method of measuring the amount of leakage into a respirator. It is a numeric assessment of how well a respirator fits a particular individual.

To quantitatively fit test a respirator, sampling probes or other measuring device must be placed to measure aerosol concentrations both outside and on the inside of the respirator facepiece. The respirator wearer then performs the user seal checks followed by.the selected QNFT.

- For the generated aerosol QNFT, he or she stands inside a "test chamber" (booth

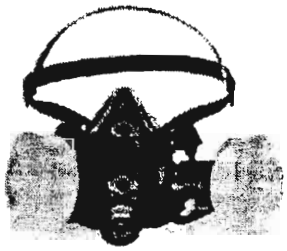
or hood), where a nontoxic aerosol is introduced into the air. Measurements are then taken of the aerosol concentration both inside the test chamber and inside the respirator. An assessment of the quantitative fit is made based on the ratio of the aerosol concentration inside the test chamber to the concentration inside the facepiece.

- For the condensation nuclei counter QNFT, ambient air particles are used as the test aerosol with measurements made of their concentration outside and inside the facepiece, and an assessment is made of the quantitative fit of the facepiece.

- The controlled negative pressure QNFT method uses a fit test instrument to exhaust air from inside the respirator facepiece to maintain a constant negative pressure. The measurement of the exhaust stream required to maintain a constant negative pressure yields a measure of the leakage into the facepiece.

Detailed protocols for quantitative fit testing are provided as part of the standard (see Appendix A of the standard in Appendix I of this document).

Fit test adapter



Facepiece with fit test adapter inserted

What is qualitative fit testing (QLFT)?

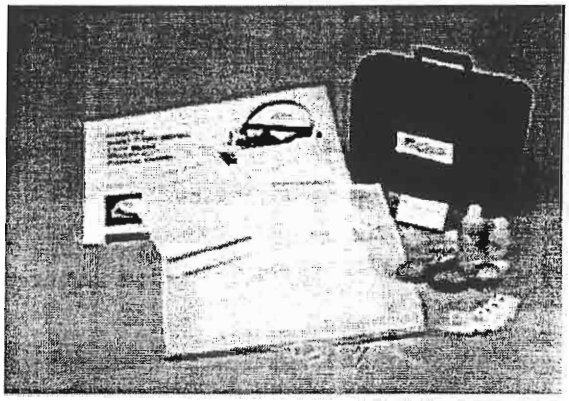
Qualitative fit testing is a non-numeric pass/fail test that relies on the respirator wearer's response to a substance ("test agent") used in the test to determine respirator fit.

In qualitative fit testing, after performing user seal checks, the respirator wearer stands in an enclosure and a test agent is introduced, such as:

- Banana oil (isoamyl acetate)
- Saccharin
- Bitrex
- Irritant smoke (without a test enclosure)

If the individual can smell the test agent (or is irritated by the smoke), this indicates that the agent leaked into the facepiece and that the respirator has failed the test because a good facepiece-to-face seal has not been achieved. If the employee cannot successfully complete the qualitative test with a particular respirator, the employee must then be tested with another make, size, or brand of respirator.

Detailed protocols for qualitative fit testing are provided as part of the standard (see Appendix B of the standard in Appendix I of this document).



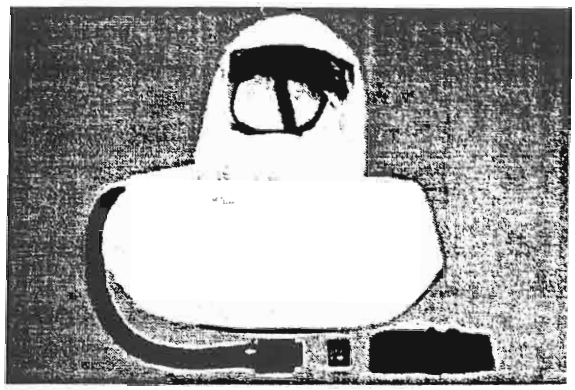
Bitrex QLFT kit

What is a tight-fitting facepiece?

A tight-fitting facepiece is intended to form a complete seal with the respirator wearer's face. This seal must be sufficiently tight to prevent any contaminants in the work environment from leaking around the edges of the facepiece into the user's breathing air.

In contrast, a loose-fitting facepiece is specifically designed to form a partial seal with the user's face. Such a facepiece typically covers at least the head and includes a system through which clean air is distributed into the breathing zone. For example, hoods, suits, and helmets are all loose-fitting facepieces. Such equipment does not rely on a tight facepiece-to-face seal to protect the worker, and is useful for workers with facial hair or other physical characteristics that make it difficult to wear a tight-fitting facepiece.

Tight-fitting facepiece



Loose-fitting hood

What are positive pressure and negative pressure respirators?

Positive pressure respirators maintain positive air pressure inside the facepiece throughout the user's breathing cycle. That is, the air pressure inside the facepiece remains greater than the air pressure outside the facepiece. Thus, any leakage around the facepiece seal should result in air escaping from inside the facepiece to the outside environment rather than worksite contaminants leaking into the facepiece and breathing air.

In contrast, a negative pressure respirator will have a lower air pressure inside the facepiece than outside during inhalation. If the facepiece-to-face seal leaks on these types of respirators, air contaminants will be drawn into the breathing air.

What is the fit factor?

The fit factor is a quantitative measure of how well a particular respirator fits (or provides protection to) an individual. It is the ratio of the concentration of a contaminant in the environment to the concentration inside the mask.

Fit factors are obtained from quantitative fit testing. For example, if an employee was in a test chamber that contained 300 ppm of aerosol and 3 ppm of the test agent was found inside the mask, the fit factor would be equal to 100.

(f)(1) RESPIRATORS THAT REQUIRE FIT TESTING

You must ensure that quantitative or qualitative fit testing is conducted for all employees required to wear either positive or negative pressure tight-fitting facepiece respirators. This

includes both air-purifying and atmosphere-supplying respirators operating in either a positive or negative pressure mode, but does not include any loose-fitting facepieces.

Must I perform fit testing for employees who voluntarily wear tight-fitting facepiece respirators ?

No. If an employee chooses to wear a tight-fitting facepiece respirator (including a negative pressure air-purifying respirator or a filtering facepiece (dust mask)) in a worksite environment where such equipment is not necessary, you are not required to conduct fit testing.

(f)(2) WHEN FIT TESTING MUST BE CONDUCTED: GENERAL REQUIREMENTS

You must ensure that fit testing is conducted for all employees required to wear tight-fitting facepiece respirators as follows:

- Prior to initial use.
- Whenever an employee switches to a different tight-fitting facepiece respirator (for example, a different size, make, model, or type).
- At least annually.

(f)(3) WHEN FIT TESTING MUST BE CONDUCTED: CHANGES IN THE RESPIRATOR WEARER'S PHYSICAL CONDITION

You must ensure that an additional fit test is conducted if an employee experiences a change in physical condition that could affect the seal on the tight-fitting facepiece respirator. This requirement is triggered by a physical change:

- Reported by the respirator user.
- Observed by you, a physician or other licensed health care professional, the supervisor, or the program administrator.

Physical changes in the employee that might affect the facepiece-to-face seal could include, for example, an obvious change in body weight, facial scarring, extensive dental work, or cosmetic surgery.

(f)(4) WHEN FIT TESTING MUST BE CONDUCTED: UNACCEPTABLE FIT AS DETERMINED BY AN EMPLOYEE AFTER FIT TESTING

If, after fit testing, an employee reports that his or her respirator does not fit properly, you must allow the employee a reasonable opportunity to select a different tight-fitting facepiece respirator. After another respirator is selected, you must conduct a new fit test on the employee's replacement equipment.

An employee might determine that the facepiece does not establish an effective facepiece-to-face seal, for example, upon smelling a worksite contaminant while wearing the respirator with new cartridges. Or an employee might hear or feel air leaking around the facepiece-to-face seal. The employee's determination also can be based on factors unrelated to the particular worksite. For example, the employee might find that he or she can't wear the respirator for extended periods without experiencing irritation or pain.

(f)(5) FIT TESTING PROCEDURES: GENERAL REQUIREMENTS

You must ensure that all fit testing conducted for employees required to wear tight-fitting facepiece respirators follows the OSHA approved protocols.

Detailed protocols for qualitative and quantitative fit testing are provided as part of the standard (see Appendices A and B of the standard in Appendix I of this document). These protocols specify that you must have on hand during fit testing all types and sizes of respirators that are available for use at the worksite. This allows you to ensure that each employee is tested with the same type of respirator (make, model, style, and size) that he or she will wear at the worksite.

(f)(6) LIMITATION ON USE OF QUALITATIVE FIT TESTING

The table at the end of this chapter summarizes acceptable means of fit testing (QLFT versus QNFT) for different types of respirators. For more information, consult OSHA's web site at www@OSHA.gov.

Qualitative fit-testing may be used to fit test all positive pressure respirators (air-supplying and PAPRs). Your use of qualitative fit testing on negative pressure air-purifying respirators is limited to those that must achieve a fit factor of 100 or less. Dividing the fit factor of 100 by a standard safety factor of 10 indicates that the negative pressure air-purifying respirators that have successfully completed a qualitative fit test can be relied on to reduce a worker's exposure by a protection factor of 10. The safety factor of 10 is used because protection factors that workers achieve at work sites tend to be much lower than the fit factors achieved during fit testing.

In practice, this means that any negative pressure air-purifying respirator (APR) may be qualitatively fit tested if the APR is to be used in workplace atmospheres where the level of the hazardous contaminant is 10 times or less than the permissible exposure limit (PEL) and lower than the level that is immediately dangerous to life or health (IDLH). For example, if the PEL for a specific workplace contaminant is 5 ppm, you could use a qualitative fit test to fit test a negative pressure APR to be used in the workplace at exposure levels up to 50 ppm (ten times the PEL or less). If the workplace exposure level is greater than 50 ppm, however, you must use quantitative fit testing.

Both half-facepiece APRs and full-facepiece APRs may be qualitatively fit tested if they are to be worn in work areas where the concentration of contaminant is no more than ten times the PEL.

What is a PEL?

OSHA PELs (permissible exposure limits) establish the maximum level of a specific contaminant that a worker can be exposed to, averaged over an 8-hour work day (8-hour time-weighted average, or TWA) or over a specified portion of a work day (for example, a 15 minute short-term exposure limit, or STEL). (PELs are listed in 29 CFR 1910.1000, and 1926.55. Also see the substance-specific standards for general industry and construction.)

(f)(7) USE OF QUANTITATIVE FIT TESTING

If quantitative testing is used to fit test a tight-fitting facepiece respirator, respirator fit is not acceptable unless:

- For a half or quarter facepiece: The fit factor achieved in the test is greater than or equal to 100
- For a full facepiece: The fit factor achieved in the test is greater than or equal to 500

(f)(8) FIT TESTING FOR ATMOSPHERE-SUPPLYING AND POWERED AIR-PURIFYING RESPIRATORS

You must ensure that all fit testing conducted for employees issued tight-fitting atmosphere-supplying respirators and powered air-purifying respirators is conducted in the negative pressure mode, even if the respirator is to be worn with positive pressure.

This is because it is difficult outside of a laboratory test situation to accurately perform fit testing on positive pressure respirators.

In what circumstances might an atmosphere-supplying or powered air-purifying respirator perform like a negative pressure respirator?

For example, if the blower component of a powered air-purifying respirator loses power because it is turned off or the batteries run out, the respirator will become a negative pressure respirator. Similarly, atmosphere-supplying respirators can shift momentarily to negative pressure respirators if the air supply is restricted or the system fails.

Also, powered air-purifying respirators and self-contained breathing apparatus units can perform like negative pressure respirators as the user increases his or her inhalation rate during heavy work. The increased inhalation rate can result in negative pressure spikes inside the facepiece that are greater than the positive pressure of the air being supplied. This is called overbreathing the respirator. Therefore, positive air flow alone cannot be counted on to prevent the leakage that can occur with a poorly fitting facepiece.

You can conduct qualitative or quantitative fit testing of tight-fitting atmosphere-supplying respirators and powered air-purifying respirators according to the following requirements.

Qualitative fit testing. To conduct qualitative fit testing on an atmosphere-supplying respirator, you must do one of the following:

- Temporarily convert the user's actual facepiece into a negative pressure respirator by installing the appropriate filters. If you are not sure how to do this, check with the respirator manufacturer or your supplier.

- Use an identical negative pressure facepiece (size, make, model).

You can conduct qualitative fit testing on a powered air-purifying respirator by simply turning off the blower.

Quantitative fit testing. To conduct quantitative fit testing on an atmosphere-supplying respirator, you must temporarily or permanently install a sampling probe or adaptor inside the facepiece.

In preparation for testing, you should contact the respirator manufacturer or supplier for information on whether a sampling adapter can be temporarily installed in the facepiece. Any modifications made to a respirator for testing purposes must be removed before use.

If temporary modifications cannot be made, you will need to permanently convert the facepiece to allow for testing. If you permanently convert the facepiece—for example, by drilling a hole in the respirator facepiece to insert the probe—you cannot repair the hole and put the respirator back in service. Once a hole is drilled in the facepiece, the respirator can only be used for fit testing purposes. It is no longer approved for workplace use.

TABLE 2

Acceptable Fit-testing Methods		
Respirator	**QLFT**	**QNFT**
Half-Face, Negative Pressure, APR (<100 fit factor)	Yes	Yes
Full-Face, Negative Pressure, APR (<100 fit factor) used in atmospheres up to 10 times the PEL	Yes	Yes
Full-Face, Negative Pressure, APR (>100 fit factor)	No	Yes
PAPR	Yes	Yes
Supplied-Air Respirators (SAR), or SCBA used in Negative Pressure (Demand Mode) (>100 fit factor)	No	Yes
Supplied-Air Respirators (SAR), or SCBA used in Positive Pressure (Pressure Demand Mode)	Yes	Yes
SCBA - Structural Fire Fighting, Positive Pressure	Yes	Yes
SCBA/SAR - IDLH, Positive Pressure	Yes	Yes
Mouthbit Respirators	Fit-testing Not Required	
Loose-fitting Respirators (e.g., hoods, helmets)		

CHECKLIST FOR FIT TESTING

Check that at your facility:

- ☐ Employees who are using tight fitting respirator facepieces have passed an appropriate fit test prior to being required to use a respirator.
- ☐ Fit testing is conducted with the same make, model, and size that the employee will be expected to use at the worksite.
- ☐ Fit tests are conducted annually and when different respirator facepieces are to be used.
- ☐ Provisions are made to conduct additional fit tests in the event of physical changes in the employee that may affect respirator fit.
- ☐ Employees are given the opportunity to select a different respirator facepiece, and be retested, if their respirator fit is unacceptable to them.
- ☐ Fit tests are administered using OSHA-accepted QNFT or QLFT protocols.
- ☐ QLFT is only used to fit test either PAPRs, SCBAs, or negative pressure APRs that must achieve a fit factor of 100 or less.
- ☐ QNFT is used in all situations where a negative pressure respirator is intended to protect workers from contaminant concentrations greater than 10 times the PEL.
- ☐ When QNFT is used to fit negative pressure respirators, a minimum fit factor of 100 is achieved for tight-fitting half-facepieces and 500 for full-facepieces.

CHECKLIST FOR FIT TESTING (cont.)

- ☐ For tight-fitting atmosphere-supplying respirators and powered air-purifying respirators:
  - ☐ Fit tests are conducted in the negative pressure mode.
  - ☐ QLFT is achieved by temporarily converting the facepiece into a negative pressure respirator with appropriate filters, or by using an identical negative pressure APR
  - ☐ QNFT is achieved by modifying the facepiece to allow for sampling inside the mask midway between the nose and mouth. The facepiece is restored to its NIOSH approved configuration before being used in the workplace.

Section (g): USE OF RESPIRATORS

As part of your written program, you must establish and implement procedures for the proper use of respirators in both routine jobs and emergencies. Specific use procedures are required to:

- Prevent leaks in the respirator facepiece seal.
- Prevent employees from removing respirators in hazardous environments.
- Ensure that respirators operate effectively throughout the work shift.
- Protect employees entering IDLH atmospheres and interior structural firefighting situations.

(g)(1) PREVENTING LEAKS IN THE FACEPIECE SEAL

Facepiece seals and valves are important in tight-fitting respirators. Tight-fitting respirators have a complete seal to the face. If there is a leak in the seal of a tight-fitting respirator or valve, then the respirator cannot reduce the wearer's exposures to respiratory hazards. You must be sure that nothing interferes with the seal of the respirator to the worker's face or with the valves.

Conditions that can interfere with the seal or valve are specified in the standard and include:

- Facial hair,
- Facial scars,
- Jewelry or headgear that projects under the facepiece seal,
- Missing dentures, and
- Corrective glasses or goggles or other personal protective equipment:
  - Face shields
  - Protective clothing
  - Helmets
  - Eyeglass insert or spectacle kits

Workers may use this equipment with tight-fitting respirators if you ensure that the equipment is worn in a way that:

- Does not interfere with the face-to-facepiece seal.
- Does not distort the worker's vision.
- Does not cause physical harm to the worker (e.g., if the eyeglass insert did not fit properly so that the tight fit of the respirator caused the insert to press against his or her forehead, eyes, or temples).

You must make sure that the respirator does not interfere with the worker's eyewear or force the worker to remove the eyewear altogether.

What if a worker has a condition that does not interfere with the face-to-facepiece seal?

As long as the condition does not interfere with the function of the respirator valves, then the worker can wear a tight-fitting respirator, provided that the worker has no other conditions that interfere with the face-to-facepiece seal or valve. For example, a mustache may not interfere with the facepiece seal but may interfere with the valve function.

Do these restrictions apply to all types of respirators?

The restrictions for facial hair and other conditions apply ONLY to tight-fitting respirators. Several respiratory protection alternatives, such as loose-fitting hoods or helmets, are available to accommodate workers with facial hair or with other conditions that might interfere with the seal of the facepiece to the face of the user.

Can employees wear contact lenses?

Contact lenses can be safely worn with respirators.

You must be sure that workers perform user seal checks each time they put on a tight-fitting respirator. User seal checks are a quick and easy way for workers to verify that they have put on their respirators correctly and that the respirators are working properly.

To conduct a user seal check, the worker must follow either the procedures for a user seal check that are contained in Appendix B-1 of the Respiratory Protection standard or equally effective procedures that the respirator manufacturer recommends for conducting a user seal check.

How are user seal checks conducted?

To conduct a user seal check, the worker performs a negative **or** positive pressure fit check.

- For the negative pressure check, the worker:
  - — covers the respirator inlets (cartridges, canisters, or seals)
  - — gently inhales, and
  - — holds breath for 10 seconds.

  The facepiece should collapse on the worker's face and remain collapsed.

- For the positive pressure check, the worker:
  - — covers the respirator exhalation valve(s); and
  - — exhales.

  The facepiece should hold the positive pressure for a few seconds. During this time, the worker should not hear or feel the air leaking out of the face-to-facepiece seal.

Appendix B-1 of the Respiratory Protection standard provides detailed instructions on how to conduct the user seal check.

The manufacturer's recommended procedures for checking the facepiece seal may be used if the employer demonstrates that the manufacturer's procedures are as effective as those described in Appendix B-1 of the Respiratory Protection standard, e.g., these procedures are effective in identifying respirators that fit poorly when put on or adjusted.

Can a user seal check be used as a substitute for a qualitative fit test?

A user seal check is ***not*** a substitute for a qualitative fit test. Fit testing is a more rigorous procedure that is used to determine whether the respirator fits the face of the worker. Section (f) of this Compliance Guide contains a complete discussion on respirator fit testing.

How can employers ensure that workers perform user seal checks?

The intent of the standard is that you make sure that the fit and performance of the respirator is not compromised. You must take actions that will result in safe work practices. Examples of these actions include:

- Providing training to workers
- Routinely observing work practices
- Routinely monitoring site conditions
- Consulting employees

(g)(2) CONTINUING RESPIRATOR EFFECTIVENESS

You must be aware of conditions in work areas where employees are using respirators. You must also allow employees to leave the respirator use area to perform any activity that involves removing or adjusting a respirator facepiece, or if there is any indication that a respirator may not be fully effective. If there is any indication that they are not functioning properly, you must replace, repair, or discard respirators, before allowing employees to return to an area in which respirator use in required.

How can I conduct appropriate surveillance?

"Appropriate surveillance"means that you must routinely look for any changes that may affect the effectiveness of a respirator. You must look for changes in the work area, such as changes in work tasks or processes, that can result in changes in the hazard or the time period of exposure, or that put the employee in closer proximity to the hazard. Another change might be the addition of new machinery that would cause an employee to exert more energy and breathe harder.

By "appropriate surveillance" OSHA means that you must routinely observe employees as they work while wearing respirators. By observing respirator use under actual workplace conditions, you can determine:

- Whether other protective equipment is interfering with respirator use.
- Whether a change in working conditions may result in exposure to new contaminants.

- Whether workers are experiencing discomfort, such as skin irritation or break-through of contaminants through cartridges and canisters.

If any of these conditions exist, you must make adjustments—such as providing a more protective respirator or a different size or style of respirator, or altering work practices to reduce the stress on workers—to ensure that workers continue to receive adequate respiratory protection.

When must I allow workers to leave the respirator use area?

To maintain their respirators, workers may, from time to time, need to leave the area where respirator use is required and go to a safe area free of respiratory hazards and contaminants.

Workers must leave the respirator use area:

- If the worker needs to wash his or her face or the respirator facepiece to prevent eye or skin irritation associated with respirator use.
- If the worker detects vapor or gas breakthrough (that is, the cartridge or canister is saturated with contaminant and needs to be changed).
- If the worker notices that the facepiece is leaking.
- If the worker observes a change in breathing resistance (that is, the filter is full of dust or other particles and needs to be changed).
- If the respirator or parts of the respirator, such as valves or straps, are not working properly and need to be replaced.

Workers need a "safe area" in the workplace where they can safely remove their respirators to wash or conduct the maintenance necessary to ensure the respirator's adequate operation.

Where does the safe area need to be located?

The safe area must be located in a place that is free of respiratory hazards or contamination. As long as these conditions are met, the safe area can be in a location that minimizes interruptions to work flow.

When must I replace or repair respirators?

You must replace or repair respirators that are not working properly. Respirators should not be used if they are defective in any way. You must replace or repair a defective respirator whenever the worker detects vapor or gas breakthrough, changes in breathing resistance, or facepiece leakage, before allowing the worker to return to the work area where respirator use is required.

How often do respirators need to be replaced or repaired?

There is no required replacement schedule for respirators in general. However, damaged respirators cannot properly protect employees. Respirators need to be replaced or repaired when one or more of their components is missing, damaged, or visibly deteriorated.

(g)(3) PROCEDURES FOR IMMEDIATELY DANGEROUS TO LIFE OR HEALTH ATMOSPHERES (IDLH) AND FOR INTERIOR STRUCTURAL FIREFIGHTING

This section of the Respiratory Protection standard contains requirements for respirator use in IDLH environments. The standard defines IDLH as "an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere." Section d of this Compliance Guide (Selection of Respirators) contains additional information about IDLH environments.

The provisions of paragraph (g)(3) of the Respiratory Protection standard are requirements for respirator use in all IDLH atmospheres. Paragraph (g)(4) contains additional requirements applicable only to the extra-hazardous environments encountered during interior structural fire fighting (two-in/two-out; use SCBAs only). OSHA considers interior structural firefighting environments to be IDLH environments. These two paragraphs ((g)(3) and (g)(4)) deal with requirements for standby personnel and the respirator users inside the IDLH atmosphere. The standard requires standby personnel when workers use respirators in IDLH environments. These two provisions are intended to ensure that adequate rescue capability exists in case of respirator failure or some other emergency inside the IDLH environment.

Who are standby persons?

Standby personnel remain outside the IDLH atmosphere. They must be available, trained, and equipped to assist respirator users inside the IDLH atmosphere, and to provide effective emergency rescue, when needed.

You must be sure that standby personnel maintain visual, voice, or signal line communication with the workers in the IDLH environment. Standby personnel may use radios to communicate with workers inside the IDLH environment. You must be sure that standby personnel notify you

or your designated representative before entering the IDLH atmosphere. Once notified, you must provide necessary assistance appropriate to the situation.

When do I need to have more than one standby person located outside the IDLH environment?

A single standby person is adequate if an IDLH environment is well-characterized and controlled and if one person can easily maintain communication with all workers in the IDLH environment. Two stand-by personnel are required for interior structural firefighting. An IDLH atmosphere is "well-characterized" if it has been monitored and the results of the monitoring have been analyzed, or if it has been through a process hazard analysis. (Chemical plants conduct comprehensive process hazard analyses as required by OSHA's Process Safety Management standard [29 CFR 1910.119] to determine which process units pose IDLH hazards.)

Often, only one respirator user at a time is exposed to an IDLH atmosphere, and a single standby person can easily monitor that worker's status. Even in situations where more than one respirator user is inside an IDLH environment, a single standby person can often provide adequate communication and support. For example, one standby person can easily communicate with more than one employee working inside a small pump room or shed.

More than one standby person may be required for other situations. For example, to clean and paint the inside of a multi-level, multi-portal water tower, a process that often generates a deadly atmosphere as a result of cleaning solution and paint solvent vapors, employees often enter the tower through different portals to work on different levels. In such a situation, there will be a need for good communication at each entry portal, and more than one standby person would be needed to maintain adequate communication and accessibility (See also 29 CFR 1910.146, Confined Spaces).

For interior structural firefighting, you must have two employees enter the IDLH atmosphere and remain in visual or voice contact with one another at all times. You must also have two standby personnel located outside the IDLH atmosphere; all employees engaged in interior structural fire fighting must use SCBAs.

When must standby personnel maintain communication with workers in the IDLH atmosphere?

At all times. Voice and visual or hand signal line communication must be maintained between the employee(s) in the IDLH environment and the standby person. Because IDLH conditions present the potential for serious injury or death, there is little margin for error in an IDLH environment. Equipment malfunction in an IDLH environment can

swiftly disable workers, prevent them from leaving the environment, and lead to severe injury or death. For this reason, close communication between standby personnel and respirator users in the IDLH environment is critical.

When is radio communication acceptable?

Standby personnel may communicate by radio with workers inside the IDLH environment. Although workers inside the IDLH atmosphere may also communicate by radio, these workers must remain in visual contact.

Is voice communication the only acceptable method for workers in the IDLH environment and standby personnel to communicate with one another?

No. Communication can be in the form of hand signals if the workers in the IDLH atmosphere and the standby personnel remain in view of one another. Signal lines may also be used. It is also advisable to have several means of communication systems on hand, in the event that one form of communication fails.

What is appropriate training and equipment for the standby personnel?

You must train the standby personnel to:

- Provide effective emergency rescue; **and**
- Notify you or your designated representative before the standby personnel enter the IDLH atmosphere to provide emergency rescue.

You must equip your standby personnel with the following:

- Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; **and**
- Either appropriate retrieval equipment for removing the workers inside the IDLH atmosphere where retrieval equipment would contribute to the rescue of the workers inside the IDLH atmosphere and would not increase the overall risk resulting from entry; **or**
- Equivalent means for rescue where retrieval equipment could increase the overall risk resulting from entry.

For workers involved in interior structural firefighting, standby personnel must be equipped with SCBAs.

Rescue personnel must be properly trained and protected before they enter the IDLH environment. The Hazardous Waste Operations and Emergency Response standard (29 CFR 1910.120) and the Permit-Required Confined Spaces standard (29 CFR 1910.146) provide guidance on the training and protective equipment that is required. Situations exist in which retrieval lines (harnesses, wristlets, anklets) may pose an entanglement problem, especially in areas in which air lines or electrical cords are present in the work areas in which the IDLH atmosphere occurs. Most of the time, however, rescue with retrieval equipment is effective, and much safer for the rescuers, because the standby personnel do not have to enter the IDLH atmosphere.

If there is an emergency can the standby provide immediate rescue assistance?

Your standby personnel must inform either you or your designated representative before attempting emergency rescue within an IDLH environment. Your designated representative may be a properly trained employee or response team or local firefighting and emergency rescue personnel. In any case, proper arrangements and procedures must be in place before you can allow your workers to enter an IDLH environment. Once notified, you must provide necessary assistance appropriate to the situation.

This provision of the standard is intended to ensure that you know when an emergency has occurred so that you or your designated representative can send in immediate additional assistance to help in the rescue.

When should standby personnel enter the IDLH environment?

Under most circumstances, standby personnel should not enter the IDLH environment until you or your designated representative has responded to the notification acknowledging that an emergency exists, that rescue personnel are entering the IDLH environment, and that emergency response units are on their way to provide additional assistance. You must provide standby personnel (rescuers) with proper respiratory equipment, and you must train and prepare your standby personnel to facilitate rescue attempts.

This notification provision is not intended to suggest that standby employees should wait indefinitely for you or your authorized designee to respond to notification before entering the IDLH atmosphere when your workers inside are in danger and standby personnel are appropriately trained and equipped to provide assistance. In the majority of cases, however, rescuers should not enter the IDLH environment until receiving some response from you (i.e., you or your designated representative should know that the rescuers are entering and emergency response units should be on their way to the incident).

How must I provide appropriate assistance in emergencies?

Once you or your designated representative has been notified, you or your representative must provide the necessary assistance appropriate for the situation. You must make sure that:

- Rescue operations are carried out appropriately
- Rescuers are provided with proper respiratory equipment
- Designated employees are adequately prepared to conduct rescue attempts

You may not always need to send standby personnel into the hazardous atmosphere. In some cases, the worker within the IDLH environment will be able to get out on his or her own, or retrieval equipment may enable rescuers to retrieve the worker without entering the hazardous atmosphere. In these instances, you will need to provide workers inside IDLH atmospheres and standby personnel employees with emergency medical treatment. If standby employees do need to enter the hazardous environment to perform rescue operations, however, you must make sure that those rescuers are fully protected.

You should consult OSHA's rules on confined spaces (29 CFR 1910.146) and on hazardous waste operations and emergency response (29 CFR 1910.120) for other provisions that may apply to IDLH environments.

(g)(4) PROCEDURES FOR INTERIOR STRUCTURAL FIREFIGHTING

This portion of the standard applies to workers engaged in interior structural firefighting only.

What is interior structural firefighting?

Firefighting to control or extinguish a fire in an advanced stage of burning inside a building. Because the fire is producing large amounts of smoke, heat, and toxic products of combustion, exposure to firefighters is extremely hazardous and the environment is considered IDLH.

Are all firefighters engaged in interior structural firefighting covered by the standard?

The Respiratory Protection standard applies directly to private sector workers engaged in firefighting, including those working in industrial fire brigades and private incorporated fire companies, and to federal employees covered under Section 19 of the Occupational Safety and Health Act.

Federal OSHA's jurisdiction does not extend to employees of state and local governments; therefore, public sector firefighters are covered only in the 25 states which

operate their own OSHA-approved occupational safety and health state programs and are required to extend the provisions of their state standards to these workers. These states and territories are: Alaska, Arizona, California, Connecticut, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, New York, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Virgin Islands, Washington, and Wyoming.

Coverage of volunteers varies by state and depends on state law. State and local government employees in states that do not operate OSHA-approved state plans are not covered by these requirements, unless the requirements are voluntarily adopted for local applicability.

What additional requirements apply to interior structural firefighting?

In addition to the requirements for all IDLH atmospheres, if your workers are involved in interior structural firefighting, you must be certain that:

- At least two employees enter the IDLH atmosphere and remain in visual or voice contact with one another at all times.
- At least two employees are located outside the IDLH atmosphere.
- All employees engaged in interior structural firefighting use SCBAs.

Although two individuals must always be located outside the IDLH atmosphere, one may be assigned to an additional role, such as incident command, pump operations, or operator of the fire apparatus—so long as this individual is able to perform assistance or rescue activities without jeopardizing the safety or health of any firefighter working at the incident. Any assignment of additional duties to the second firefighter must be weighed against the potential for the additional duties to interfere with assistance or rescue activities.

Must firefighters wait until four workers are assembled before attempting to rescue victims inside the burning structure?

No. There is an explicit exemption in the Respiratory Protection standard that states that, if life is in jeopardy, the "two-in, two-out" requirement is waived. The incident commander and the firefighters at the scene must decide whether the risks posed by entering the interior structural fire before at least four firefighters have assembled is outweighed by the need to rescue a victim who life may be at risk.

CHECKLIST FOR PROPER USE OF RESPIRATORS

Check your facility to be certain that:

- ☐ Workers using tight-fitting respirators have no conditions, such as facial hair, that would interfere with a face-to-facepiece seal or valve function.
- ☐ Workers wear corrective glasses, goggles, or other protective equipment in a manner that does not interfere with the face-to-facepiece seal or valve function.
- ☐ Workers perform user seal checks prior to each use of a tight-fitting respirator.
- ☐ There are procedures for conducting ongoing surveillance of the work area for conditions that affect respirator effectiveness, and that, when such conditions exist, you take steps to address those situations.
- ☐ Employees are permitted to leave their work area to conduct respirator maintenance, such as washing the facepiece, or to replace respirator parts.
- ☐ Employees do not return to their work area until their respirator has been repaired or replaced in the event of breakthrough, a leak in the facepiece, or a change in breathing resistance.
- ☐ There are procedures for respirator use in IDLH atmospheres and during interior structural firefighting to ensure that: the appropriate number of standby personnel are deployed; standby personnel and employees in the IDLH environment maintain communication; standby personnel are properly trained, equipped, and prepared; you will be notified when standby personnel enter an IDLH atmosphere; and you will respond to this notification.
- ☐ Standby personnel are equipped with a pressure demand or other positive pressure SCBA, or a positive pressure supplied air respirator with an escape SCBA, and appropriate retrieval equipment or other means for rescue.
- ☐ Procedures for interior structural firefighting require that: at least two employees enter the IDLH atmosphere and remain in contact with one another at all times; at least two standby personnel are used; and all firefighting employees use SCBAs.

Section (h): MAINTENANCE AND CARE OF RESPIRATORS

You must provide respirator users with equipment that is clean, sanitary, and in good working order. To accomplish this you must have a system of respirator care and maintenance as a component of your respiratory protection program. Regular care and maintenance is important to ensure that the equipment functions as designed and protects the user from the threat of illness or death.

Your system of respirator care and maintenance must provide for:

- cleaning and disinfection procedures
- proper storage
- regular inspections
- repair methods

(h)(1) CLEANING AND DISINFECTING

Respirator equipment must be regularly cleaned and disinfected according to specified procedures (see Appendix B-2 of the standard in Appendix I of this document) or according to manufacturer specifications that are of equivalent effectiveness.

Cleaning and disinfection procedures are divided into the following:

- Disassembly of components
- Cleaning and disinfecting
- Rinsing, drying, and reassembly
- Testing

How often must respirators be cleaned and disinfected?

The frequency of cleaning and disinfecting or sanitizing respirators will depend in part on whether your employees share the equipment or are issued respirators for their exclusive use. Worksite conditions also will dictate cleaning frequency, e.g., working in a dirty

environment will require that the respirator facepiece, in particular, be cleaned more frequently.

Respirator wipes are useful for cleaning

At a minimum:

If a respirator is...	Then...
issued for the exclusive use of an individual employee	the equipment must be cleaned and disinfected as often as necessary to be maintained in clean and sanitary condition.
used by more than one employee	the equipment must be cleaned and disinfected *before* being used by different individuals.
maintained for use in emergencies, testing, and training exercises	the equipment must be cleaned and disinfected *after* each use.

Who is responsible for cleaning and disinfecting respirators?

You may choose the program that best meets the needs of your workplace. For example, you may use a centralized operation where employees receive respirators that have been cleaned, disinfected and repaired by workers assigned to this task. You also may require that each respirator wearer be responsible for cleaning and maintaining his or her equipment. In either case, you must provide appropriate training, on-the-job-time, and the necessary equipment and supplies.

In addition, if individual employees are required to clean their own respirators, you must allow time during work hours for users to perform this function.

h(2) STORAGE

What are the proper storage procedures for respirators?

You must store respirators in a manner that:

- Protects them from contamination, dust, sunlight, extreme temperatures, excessive moisture, damaging chemicals, or other destructive conditions.
- Prevents the facepiece or valves from becoming deformed.
- Follows all storage precautions issued by the respirator manufacturer.

In addition, if a respirator is intended for emergency use, it must be:

- Kept accessible to the work area, but not in an area that may itself become involved in an emergency and become contaminated or inaccessible.
- Stored in a compartment or cover (e.g., on a fire truck) that is clearly identified as containing emergency equipment.

h(3) INSPECTION

How often must respirators be inspected, and what procedures do I follow?

The frequency of and procedures for inspections depend on whether the respirator is intended for non-emergency, emergency, or escape-only use.

All respirator inspections must include:

- A check of respirator function, i.e., visual inspection to identify any parts that may be missing, distorted, blocked, loose, deteriorated, or otherwise interfere with proper performance.
- A check of elastomeric (rubber) parts for pliability and deterioration.

In addition, inspect:

- **Non-emergency use equipment.** *Before* each use and *during* cleaning and disinfection.

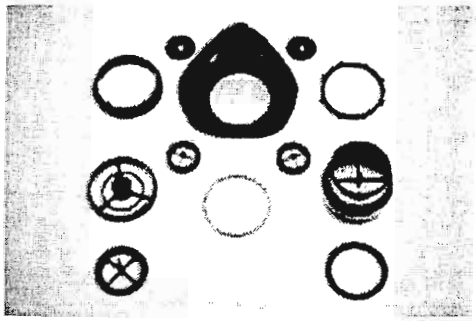
- **Self-contained breathing apparatus (SCBA).** *Monthly,* making sure the air and oxygen cylinders that are available for immediate use are maintained in a fully charged state (i.e., pressure is not below 90% of manufacturer's recommended level). You must also activate the regulator and low pressure warning devices to ensure that they function properly.

- **Emergency use respirators.** *At least monthly*, checking for proper functioning *before and after each use*. When inspecting these types of respirators you must:

  1. Document the date of inspection, name or signature of inspector, inspection findings, any remedial action required, and serial number or other identification of the respirator.

  2. Retain this information with the respirator, storage compartment, or inspection report until next certification. You may use tags to document the inspections.

- **Emergency escape-only equipment.** *Before* being carried into the workplace for use.



Inspection of SCBA nosecup

h(4) REPAIRS

What do I do if a respirator fails to pass inspection?

If a respirator does not pass inspection, you must remove the respirator from service and discard, repair, or adjust it. Tagging out of service respirators is a good means for ensuring that defective respirators are not inadvertently used.

Who performs the repair work?

Respirators may be repaired only by an appropriately trained person, who must use NIOSH-approved parts that are designed for the particular respirator being repaired.

Valves, regulators, and alarms must be adjusted and repaired only by the manufacturer or a technician trained by the manufacturer.

What are some examples of when a respirator should be removed from service?

- A cartridge has become saturated or a contaminant has broken through the cartridge and must be replaced.
- An alarm system is not functioning on an SCBA.
- A respirator strap, buckle, or connection is damaged or missing.
- The mask portion of a respirator is misshapen or degraded and can no longer form a good seal around the user's face.

CHECKLIST FOR RESPIRATOR MAINTENANCE AND CARE

Check to make sure that your facility has met the following requirements:

Cleaning and Disinfecting

- ☐ Respirators are provided that are clean, sanitary, and in good working order.
- ☐ Respirators are cleaned and disinfected using the procedures specified in Appendix B-2 of the standard.
- ☐ Respirators are cleaned and disinfected:
  - ☐ As often as necessary when issued for the exclusive use of one employee.
  - ☐ Before being worn by different individuals.
  - ☐ After each use for emergency use respirators.
  - ☐ After each use for respirators used for fit testing and training.

Storage

- ☐ Respirators are stored to protect them from damage from the elements, and from becoming deformed.
- ☐ Emergency respirators are stored:
  - ☐ To be accessible to the work area.
  - ☐ In compartments marked as such.
  - ☐ In accordance with manufacturer's recommendations.

Inspections

- ☐ Routine-use respirators are inspected before each use and during cleaning.
- ☐ SCBAs and emergency respirators are inspected monthly and checked for proper function before and after each use.
- ☐ Emergency escape-only respirators are inspected before being carried into the workplace for use.

CHECKLIST FOR RESPIRATOR MAINTENANCE AND CARE (cont.)

- ☐ Inspections include:
  - ☐ Check of respirator function
  - ☐ Tightness of connections
  - ☐ Condition of the facepiece, head straps, valves, and cartridges.
  - ☐ Condition of elastomeric parts.

- ☐ For SCBAs, inspection includes checking that cylinders are fully charged, and that regulators and warning devices function properly.

- ☐ Emergency use respirators are certified by documenting the inspection, and by tagging the information either to the respirator or its compartment, or storing it with inspection reports.

Repairs

- ☐ Respirators that have failed inspection are taken out of service .

- ☐ Repairs are made only by trained personnel.

- ☐ Only NIOSH-approved parts are used.

- ☐ Reducing and admission valves, regulators and alarms are adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

Section (i): BREATHING AIR QUALITY AND USE

This section of the Respiratory Protection standard requires you to provide workers who are wearing atmosphere-supplying respirators with breathing air of high purity. Respirators that supply breathing air are generally used in highly hazardous work environments. It is critical that such respirator systems provide breathing air of optimal quality and that the equipment operates reliably.

More broadly, you are required to establish or continue a respiratory protection program that follows performance standards for the operation and maintenance of breathing air compressors, methods for ensuring breathing air quality, and requirements for the quality of purchased breathing air.

The requirements detailed in this section are critical for ensuring the integrity of high purity breathing air for use with respirators, whether the air is delivered in tanks by a supplier or produced on site using a compressor. Also, it is your responsibility to ensure that practices are in place for protecting the quality of breathing air while stored in containers and when being used by employees. These requirements are essential for protecting respirator-wearing workers from the threat of illness or death.

As detailed below, when using atmosphere-supplying respirators you must:

- Provide breathing air that meets certain specifications.
- Develop procedures to ensure the proper use of compressed gas cylinders and air compressors.
- Implement certain precautions to avoid improper use of couplings on airline systems and confusion about breathing air containers.
- Implement certain precautions to prevent exposure to carbon monoxide when using air compressors.

ATMOSPHERE-SUPPLYING RESPIRATORS

Atmosphere-supplying respirators are used to provide breathing air from a source independent of the ambient atmosphere. The two types of such equipment are:

- Self-contained breathing apparatus (SCBA) units, for which air is supplied from a tank (a cylinder of compressed air or oxygen). For this type of respirator, the source of the breathing air is designed to be transported by or with the equipment user.

- Supplied-air respirators (SARs) (also known as airline respirators), which receive air from a connecting hose. The source of air is either a pressurized cylinder or an air compressor. Because the employee does not carry the air on his or her back when using a SAR, breathing air can be provided over a longer time than is the case with a SCBA.

How is breathing air delivered to the respirator user?

Air compressors capture air from the surrounding environment, filter it, remove oil (if necessary), compress it to increase its density, and deliver the air through a system of regulators that brings the air back down to a breathable pressure for the respirator user.

With SCBA units, the pressurized breathing air is transferred from the tank to the respirator user through regulators that decrease the pressure to a level that a human can breathe. Because there is a fixed amount of air in the tank, the user can only rely on it for a given period of time. That time varies based on the size of the tank, the amount of pressure in the tank, and the physical effort required by the respirator user. Use times range from 20 minutes for low pressure tanks (2,500 psi) to 45 minutes for high pressure tanks (4,500 psi).

The air delivered by both types of system is at slightly greater than atmospheric pressure, which assists in preventing contaminated air from seeping through gaps in the facepiece or other areas.

(i)(1) SPECIFICATIONS FOR BREATHING AIR

You must ensure that compressed air, compressed oxygen, liquid air, and liquid oxygen meet certain specifications as outlined below for breathing by employees wearing atmosphere-supplying respirators. Unless you produce your own breathing air from a compressor, you can rely on certificates of analysis from air suppliers to ensure that breathing air meets the required

specifications.

Types of Breathing Air

Compressed air is the most common type of breathing air system used in worksite applications because it is the most convenient and least expensive. Compressed air is provided either through compressed air cylinders or air compressors at relatively high pressures. Regulators are used to ensure that breathing air supplied to respirators is provided at pressures that are safe for workers to breathe.

Other types of breathing air systems include liquid air, compressed oxygen, and liquid oxygen. Liquid air is air that exists in a liquid state, which is achieved by compressing purified air and chilling it to a temperature below the boiling point of its principal components (i.e., nitrogen and oxygen). Compressed oxygen systems are used in limited applications because they present a significant fire hazard. Liquid oxygen is quite expensive and also presents a significant fire hazard. It is generally used only in very specialized applications.

Specifications

)(1)(i) **Compressed and liquid oxygen.** Such forms of oxygen must meet the U.S. Pharmacopoeia requirements for medical or breathing oxygen.

(i)(1)(ii) **Compressed breathing air.** Any compressed breathing air must meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air (G-7.1-1989). This specification requires that:

(A) ■ Oxygen content in compressed breathing air must be 19.5 to 23.5 percent of the total volume of air.

(B) ■ Condensed hydrocarbon content in compressed breathing air must be 5 milligrams (mg) per each cubic meter (m^3) of air or less.

(C) ■ Carbon monoxide content in compressed breathing air must be 10 parts per million (ppm) or less.

(D) ■ Carbon dioxide content in compressed breathing air must be 1,000 ppm or less.

(E) ■ There must be a lack of any noticeable odor from the compressed breathing air.

(i)(2)&(3) OXYGEN USE

Explosion/fire hazard from compressor oil and grease. You must prohibit employees from using compressed oxygen in respirators that have previously been used with compressed air. The reason for this prohibition is that oil and grease can be introduced into respirator airlines used for compressed air, posing a danger of fire or explosion from the high pressure oxygen coming in contact with the oil or grease. Airline systems contain inline filters for capturing impurities so that the respirator user will not inhale the oil or grease.

Explosion/fire hazard from high concentration oxygen. You must ensure that employees use oxygen concentrations greater than 23.5 percent only with equipment designed specifically for oxygen service and distribution. Such equipment is specifically designed to minimize the risk of fire or explosion posed by the high concentration of oxygen.

(i)(4) CYLINDER USE

You must ensure that cylinders used with atmosphere-supplying respirators meet the following requirements:

- Cylinders of breathing air must be tested and maintained according to Department of Transportation (DOT) Shipping Container Specification Regulations (49 CFR Parts 173 and 178), which include provisions for the construction, testing, and maintenance of cylinders. These steps are necessary to prevent explosions that can result from a rupture in a breathing air cylinder under high pressure. (Additional guidance is available in OSHA 29 CFR 1910.101(b), which includes provisions for in-plant handling and storage of compressed gas cylinders.)

- Cylinders of purchased breathing air must be accompanied by a certificate from the supplier indicating that the contents of each cylinder have been tested and found to meet the criteria for Grade D breathing air. This certification will provide you with a reasonable assurance that the breathing air supplied to your employees is safe.

- Cylinder contents must have a moisture level that does not exceed a dew point of minus 50°Fahrenheit (F) (minus 45.6°Celsius [C]) at 1 atmosphere pressure. (Dew point refers to the temperature at which the air is saturated with moisture.) This requirement is intended to prevent respirator valves from freezing when excess moisture accumulates on the valves, which can cause blockages in the flow of breathing air. You should verify with the supplier that the breathing air meets this requirement.

(i)(5)-(7) **COMPRESSOR USE**

General Requirements

You must ensure that compressors used with atmosphere-supplying respirators provide breathing air according to the following requirements:

(i)(5)(i) **Location of compressor during use.** The location of an air compressor during use is very important to maintain the purity of the supplied breathing air. For this reason, an air compressor in use must be located so that the air intake component is not drawing from areas that contain:

- Combustion exhaust from vehicles or the compressor itself.
- Plant process exhaust, which should be exhausted to the outside by the facility's ventilation system.
- Contaminated air from hazardous work areas.

(i)(5)(ii) **Low moisture content of ambient air.** The moisture content of compressed air must be kept to a minimum to prevent freezing of respirator valves at cold temperatures, which can cause blockages in the flow of breathing air. To ensure a low moisture content, the dew point at one atmosphere must be 10° F (5.56° C) below the ambient temperature (in plant).

> ***Are there any systems for keeping moisture from getting into a compressor?***
>
> Water traps or desiccators can keep moisture out of a compressor. These systems remove the water from the air as it is run through the compressor, ensuring a certain level of dryness when it comes out. Such systems, like all other parts of a compressor, must be maintained in accordance with the manufacturer's instructions to properly remove the moisture.

(i)(5)(iii) **Inline air purification.** Suitable air-purifying beds and filters must be used in the supply lines to ensure delivery of a continuous flow of Grade D breathing air to the respirator user. (A sorbent bed is a filter designed to capture impurities in the air.) You must maintain, refurbish, or replace inline sorbent beds and filters as specified by the equipment manufacturer.

(i)(5)(iv) **Tracking of bed and filter changes.** You must ensure that a tag is maintained at/on the compressor with a note indicating when the sorbent beds and filters were last changed. The notation must include the signature of the person you have authorized to perform the bed and filter maintenance. Only a tag indicating the *most recent* filter and bed changes needs to be retained at/on the compressor.

Requirements Regarding Carbon Monoxide

You must take certain precautions in regard to carbon monoxide when using compressors with atmosphere-supplying respirators. These precautions are required because:

- Exposure to carbon monoxide above certain levels can be fatal.
- Sources of this potentially lethal gas are fairly common in many worksites. (In fact, one source of carbon monoxide is the exhaust from the compressor itself.)
- You will not be able to detect the presence of carbon monoxide because it is an odorless gas.

The types of precautions you will need to take depend on the type of compressor you use.

(i)(6) **Compressors that are not oil lubricated.** With this type of compressor, you must ensure that carbon monoxide in the breathing air is less than or equal to 10 ppm. This can be achieved by:

- Locating the compressor's air intake component in an area free of contaminants
- Conducting continuous or frequent monitoring of the breathing air supply
- Using inline carbon monoxide filters
- Using high-temperature alarms or shut-off devices

Must each of these methods be used for compressors that are not oil lubricated?

No. You must use whichever of the above methods are necessary to ensure that carbon monoxide does not contaminate the breathing air. In some cases, one method may be all that is needed. In other cases, you may be required to use more than one of these methods. You must evaluate your own worksite conditions to determine which measures are needed to prevent carbon monoxide from contaminating breathing air.

(i)(7) **Compressors that are oil lubricated.** With this type of compressor, carbon monoxide can be generated when oil enters the combustion chamber and is partially combusted. Therefore, you must ensure that the compressor operates with a carbon monoxide alarm or a high-temperature alarm.

Carbon monoxide alarms provide better protection than high-temperature alarms because the high-temperature alarms only detect carbon monoxide generated in the combustion chamber, and

not carbon monoxide resulting from a poorly located compressor intake. Furthermore, high-temperature alarms are installed more for the purpose of protecting the compressor from damage than guarding employees from exposure to carbon monoxide. Because of this, the alarm component of the system is often located with the alarm sensor, where it may not be heard by the respirator users. Consequently, if the compressor has only a high-temperature alarm, you must ensure that air quality is frequently monitored to confirm that carbon monoxide levels stay below 10 ppm.

How often should I check on carbon monoxide levels?

Periodic monitoring for carbon monoxide is acceptable when using newer, well-maintained compressors. Continuous monitoring, however, is recommended for older compressors. In older equipment, oil may enter the air supply more readily due to piston ring or cylinder wear. Continuous monitoring also should be conducted for rented or second-hand compressors because the maintenance history is likely to be unknown or uncertain.

How do I check carbon monoxide levels?

Carbon monoxide levels can be tested with two general types of devices:

- Direct reading instruments that use electrochemical sensors
- Chemical detector tubes

Although the electrochemical devices tend to be more expensive, they are also more accurate (i.e., they have a 5 percent error rate). Also, such devices must be calibrated periodically (usually monthly) to achieve accurate readings. Chemical detector tubes have a higher error rate of 10 to 15 percent. Carbon monoxide filters (i.e., filters that convert carbon monoxide to carbon dioxide) with color-change indicators may not be used as carbon monoxide monitors because the color change indicates the presence of moisture, not carbon monoxide.

(i)(8) PRECAUTIONS REGARDING COUPLINGS

You must ensure that couplings used on airlines for atmosphere-supplying respirators are *incompatible* with outlets for nonbreathable worksite air or other gas systems. This precaution

must be taken to avoid the chance of inadvertently connecting a respirator to a source other than the breathing air. Such a mistake could result in serious illness or death.

Also, you must ensure that at no time is an asphyxiating substance introduced into a respirator's airlines. For example, an inert gas such as nitrogen must not be used to purge or clean breathing airlines.

(i)(9) LABELING OF BREATHING GAS CONTAINERS

You must ensure that breathing air containers are labeled in keeping with the NIOSH respirator certification standard (42 CFR 84). The NIOSH standard incorporates ANSI's Method of Marking Portable Compressed Gas Containers to Identify Material Contained (Z48.1-1971). Proper labeling of containers will avoid the possibility of confusion when connecting the breathing air source to the respirator.

CHECKLIST FOR BREATHING AIR QUALITY AND USE

Check that at your facility:

General

- ☐ Compressed breathing air meets the requirements for Grade D breathing air.
- ☐ Compressed oxygen is not used in respirators that have previously used compressed air.
- ☐ Oxygen concentrations greater that 23.5 percent are used only in equipment designed for oxygen service or distribution.
- ☐ Breathing air couplings are incompatible with outlets for other gas systems.
- ☐ Breathing gas containers are marked with appropriate NIOSH certification.

Breathing Air Cylinders

- ☐ Cylinders are tested and maintained according to DOT 49 CFR Part 173 and 178.
- ☐ A certificate of analysis for breathing air has been obtained from the supplier.
- ☐ Moisture content in the cylinder does not exceed a dew point of -50° F at 1 atmosphere pressure.

CHECKLIST FOR BREATHING AIR QUALITY AND USE (cont.)

Compressors

- ☐ Are constructed and situated to prevent contaminated air from getting into the system.
- ☐ Are set up to minimize the moisture content.
- ☐ Are equipped with in-line air-purifying sorbent beds and/or filters that are maintained or replaced following manufacturer's instructions.
- ☐ Are tagged with information on the most recent change date of the filter and an authorizing signature.
- ☐ Carbon monoxide does not exceed 10 ppm in the breathing air from compressors that are not oil-lubricated.
- ☐ High-temperature and carbon monoxide alarms are used on oil-lubricated compressors, or that the air is monitored often enough to ensure that carbon monoxide does not exceed 10 ppm if only a high-temperature alarm is used.

Section(j): IDENTIFICATION OF FILTERS, CARTRIDGES AND CANISTERS

This section of the standard requires you to ensure that all filters, cartridges and canisters used are labeled and color coded with the NIOSH approval label. You must also ensure that the label is not removed and remains legible.

To fulfill these requirements, you should adopt appropriate procedures for ensuring that:

- Only NIOSH-approved filters, cartridges, and canisters are used
- Labels are not removed, defaced, or obscured during respirator usage

These procedures may be included in your written respiratory protection program.

What is included on the NIOSH label?

The label clearly states the class of contaminants for which the filter, cartridge, or canister may be used (e.g., permissible particulate respirator filter for dusts, fumes and mists, including asbestos containing dusts and mists and radionuclides). The NIOSH approval number, and any limitations or precautions are also included on the label.

What is the purpose of the label?

The NIOSH label serves several purposes. It ensures selection of the appropriate cartridge/canister for the contaminants found in the workplace. Also, it permits the employee using the respirator to check and confirm that the respirator has the appropriate filters before the respirator is used. Further, the color coding scheme allows fellow employees, supervisors, and the respiratory protection program administrator to readily determine that the employee is using the appropriate filter.

Can I write the date of initial use on the label?

Yes. Marking the initial use date on the label can be done in a way that does not obscure the information on the label.

Section (k): TRAINING AND INFORMATION

Employee training is a critical part of a successful respiratory protection program and is essential for correct respirator use. You must provide training to your employees who are required to wear respirators.

(k)(1) CONTENT OF TRAINING

You must ensure that each employee can demonstrate knowledge of at least the following:

- **Why the respirator is necessary and how improper fit, usage, and maintenance can make the respirator ineffective.**

  Training must address the identification of hazards, the extent of employee exposure to those hazards, and the potential health effects of exposure. The training that is required under the Hazard Communication standard (29 CFR 1910.1200) can satisfy this requirement for chemical hazards. Employees must understand that proper fit, usage, and maintenance of respirators is critical to ensure that they can perform their protective function.

- **What the limitations and capabilities of the selected respirator are.**

  Training must cover how the respirator operates. Included must be an explanation of how the respirator provides protection by filtering the air, absorbing the gas or vapor, or by supplying a clean source of air. Limitations on the use of the equipment, such as prohibitions against using an air-purifying respirator in an IDLH atmosphere, and why not, must also be explained.

- **How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.**

  Training must address the possibility of respirator malfunction and the development of emergency situations specific to the worksite. Employees must understand what procedures are to be followed in such circumstances, and which procedures require use of a different respirator.

- **How to inspect, put on and remove, and check the seals of the respirator.**

  You must train employees how to recognize problems that may decrease the effectiveness of the respirator and what steps to follow if a problem is detected, such as the person to whom problems should be reported and where replacement equipment can be obtained if

needed. If specialized personnel conduct inspections, individual respirator wearers only need to be taught about the portions of the inspection process that are their responsibility. You must also cover how to properly put on and remove the respirator to ensure that respirator fit in the workplace is as close as possible to the fit obtained during fit testing. Employees must be trained to perform user seal checks (see Appendix B-1 of the standard in Appendix I of this document).

- **What the respirator maintenance and storage procedures are.**

  The extent of training required may vary according to workplace conditions. If employees are individually responsible for storing and maintaining respirators, detailed training may be necessary. If specialized personnel perform these functions, employees only need to be informed of the maintenance and storage procedures.

- **How to recognize medical signs and symptoms that may limit or prevent effective use of the respirator.**

  You must instruct employees to recognize medical signs and symptoms, such as shortness of breath or dizziness, that may limit or prevent effective use of respirators. Examples of medical conditions and signs and symptoms that may affect an employee's ability to use a respirator are described in Appendix C of the standard in Appendix I of this document.

- **The general requirements of the Respiratory Protection standard.**

  You must ensure that employees are aware, in general, of your obligations under the standard. This discussion need not focus on the standard's provisions but could, for example, simply inform employees that employers are obligated to develop a written program, properly select respirators, evaluate respirator use, correct deficiencies in respirator use, conduct medical evaluations, provide for the maintenance, storage and cleaning of respirators, and retain and provide access to specific records.

Do I Need to Follow a Particular Format?

No. As long as the required topics are addressed, you can use whatever training method is effective. Prepared materials, such as audiovisual and slide presentations, formal classroom instruction, informal discussions during safety meetings, training programs developed or conducted by unions or respirator manufacturers, or a combination of these methods may be used.

In what sense are employees expected to be able to "demonstrate knowledge" of proper respirator use based on the training?

You must ensure that, before an employee is required to use a respirator in the workplace, he or she understands the information provided and can use the respirator properly. This can be done by reviewing the training with the employee either orally or in writing, and by reviewing the employee's hands-on use of respirators.

(k)(2) COMPREHENSION OF TRAINING

Training must be conducted in a manner that is understandable to your employees. This means that your program should be tailored to your employees' education level and language background.

(k)(3) TIMING OF TRAINING

You must provide the required training prior to requiring an employee to use a respirator in the workplace.

(k)(4) PORTABILITY OF TRAINING

If you can demonstrate that a new employee has received training within the last 12 months and can demonstrate the necessary knowledge, you are not required to repeat this training. In cases where training in some elements is lacking or inadequate, you are required to provide training in those elements. Previous training not repeated initially must be provided no later than 12 months from the date of the previous training.

(k)(5) RETRAINING

You must retrain employees in the proper use of respirators annually. You must also retrain employees when:

- Changes in the workplace or the type of respirator make previous training obsolete.
- The knowledge and skill necessary to use the respirator properly has not been retained by the employee.
- Any other situation arises in which retraining appears necessary to ensure safe respirator

use.

(k)(6) INFORMATION FOR VOLUNTARY RESPIRATOR USERS

For employees who choose to wear a respirator but are not required to do so, you are only required to provide the advisory information in Appendix D of the standard. This basic information on the proper use of respirators can be presented to the employee either verbally or in written form. Training is not required for employees who are not required to wear respirators, i.e., for employees who are wearing respirators voluntarily.

TRAINING AND INFORMATION CHECKLIST

Check that at your facility:

- ☐ Employees can demonstrate knowledge of:
  - ☐ Why the respirator is necessary and the consequences of improper fit, use, or maintenance.
  - ☐ Limitations and capabilities of the respirator.
  - ☐ How to effectively use the respirator in emergency situations.
  - ☐ How to inspect, put on, remove, use, and check the seals of the respirator.
  - ☐ Maintenance and storage procedures.
  - The general requirements of the respirator standard.
- ☐ Training is understandable to employees.
- ☐ Training is provided prior to employee use of a respirator.
- ☐ Retraining is provided:
  - ☐ Annually.
  - ☐ Upon changes in workplace conditions that affect respirator use.
  - ☐ Whenever retraining appears necessary to ensure safe respirator use.
- ☐ Appendix D of the standard is provided to voluntary users.

Section (l): PROGRAM EVALUATION

(l)(1) CONDUCTING PROGRAM EVALUATIONS

You must perform evaluations of the workplace as necessary to make sure that your written respiratory protection program is working effectively.

How often do I need to evaluate my written respiratory protection program?

You do not need to review your respiratory protection program according to any fixed schedule. The frequency with which you need to evaluate your respiratory protection program will depend on the complexity and/or variability of the program and factors such as:

- The type and extent of hazards in your workplace.
- The types of respirators used by your employees.
- The number of your employees who use respirators.
- The amount of experience your respirator-wearing employees have in using respirators.

You must evaluate respirator use with sufficient frequency to ensure that all elements of the respiratory protection program are being effectively implemented.

(l)(2) CONSULTING WITH EMPLOYEES

You must regularly consult with employees required to wear respirators to assess their views on the effectiveness of the respiratory protection program and to identify any problems that they may be encountering with the use of respirators. You must correct any problems that are identified. At a minimum, you must assess:

- Whether proper fit of respirators is being achieved, and whether respirator use is interfering with effective work performance.
- Whether appropriate respirators have been selected.
- Whether respirators are being properly used.

- Whether respirators are being properly maintained.

When I consult with my employees, what should I ask them?

You may want to ask your employees questions such as:

- Does your respirator interfere with your hearing or vision?
- Do you experience fatigue or have difficulty breathing during respirator use?
- Does your respirator restrict your movements or interfere with your job performance in any way?
- Is your respirator uncomfortable?
- Are you confident that you are using your respirator correctly?
- Are you confident that your respirator is performing adequately?

PROGRAM EVALUATION CHECKLIST

Check that at your facility:

- ☐ Workplace evaluations are being conducted as necessary to ensure that the written respiratory protection program is being effectively implemented.
- ☐ Employees required to wear respirators are being regularly consulted to asses the employees' views and to identify problems with respirator fit, selection, use and maintenance.
- ☐ Any problems identified during assessments are corrected.

Section (m): RECORDKEEPING

To assist you in auditing the adequacy of your respiratory protection program, to facilitate employee involvement, and to provide a record for compliance determinations by OSHA, you must retain certain records.

(m)(1) MEDICAL EVALUATION RECORDS

Records of medical evaluations required by the standard and described in section (e) of this guide must be retained and made available to the affected employees in accordance with OSHA's Access to Employee Exposure and Medical Records standard (29 CFR 1910.1020).

(m)(2) RESPIRATOR FIT TESTING RECORDS

You are required to retain written records of the qualitative and quantitative fit tests administered to your employees. These records need to include:

- The name or identification of the employee tested.
- The type of fit test performed.
- The make, model, and size of the respirator tested.
- The date of the fit test.
- Pass/fail results if a qualitative fit test (QLFT) is used, or the fit factor and strip chart recording or other record of the test results if a quantitative fit test (QNFT) is used.

How long do I need to retain fit test records?

Fit test records must be retained for respirator users until the next fit test is administered.

Do I need to retain records of fit tests for employees who are no longer using respirators?

No. Fit test records do not need to be retained for these employees.

(m)(3) WRITTEN RESPIRATORY PROTECTION PROGRAM

You must retain a written copy of your current respiratory protection program.

(m)(4) ACCESS TO RECORDS

Written materials required to be retained must be made available upon request to the affected employees, their designated representatives, and to OSHA. See 29 CFR 1910.1020 for more information.

Do I need to allow employees and OSHA to make copies of these materials?

Yes. You need to make these materials available for inspection and for copying.

Must employees be allowed access to the records of other employees?

No. Each affected employee can have access to his or her records only.

RECORDKEEPING CHECKLIST

Check that at your facility:

- ☐ Records of medical evaluations have been retained.
- ☐ Fit testing records have been retained.
- ☐ A copy of the current respiratory protection program has been retained.
- ☐ Access to these records is provided to affected employees.

Section (n): DATES

This portion of the Respiratory Protection standard sets forth the dates by which you must meet the requirements of the revised Respiratory Protection standard.

(n)(1) EFFECTIVE DATE

The revised Respiratory Protection standard became effective on October 5, 1998.

(n)(4) EXISTING RESPIRATORY PROTECTION PROGRAMS

You may use the results of training, fit testing, or program or medical evaluations conducted within twelve months prior to April 8, 1998 to comply with the revised Respiratory Protection standard, if the results meet the requirements of the standard.

TABLE OF CONTENTS

Small Entity Compliance Guide: Sample Respiratory Protection Program

1.0	**Purpose**	**APP IV-4**
2.0	**Scope and Application**	**APP IV-4**
3.0	**Responsibilities**	**APP IV-5**
	Program Administrator	**APP IV-5**
	Supervisors	**APP IV-6**
	Employees	**APP IV-6**
4.0	**Program Elements**	**APP IV-7**
	Selection Procedures	**APP IV-7**
	Medical Evaluation	**APP IV-9**
	Fit Testing	**APP IV-11**
	Respirator Use	**APP IV-12**
	Air Quality	**APP IV-14**
	Cleaning, Maintenance, Change Schedules and Storage	**APP IV-15**
	Training	**APP IV-17**
5.0	**Program Evaluation**	**APP IV-18**
6.0	**Documentation and Recordkeeping**	**APP IV-18**

This Sample Respiratory Protection Program is for demonstration purposes only. XYZ Seating is not intended to represent an actual company. XYZ is a hypothetical company that has chosen to interpret certain provisions of 29 CFR 1910.134 in ways that could be different from the way another company might choose to implement it.

1.0 Purpose

XYZ Seating has determined that employees in the Prep, Coating, Assembly, and Maintenance departments are exposed to respiratory hazards during routine operations. These hazards include wood dust, particulates, and vapors, and in some cases represent Immediately Dangerous to Life or Health (IDLH) conditions. The purpose of this program is to ensure that all XYZ Seating employees are protected from exposure to these respiratory hazards.

Engineering controls, such as ventilation and substitution of less toxic materials, are the first line of defense at XYZ Seating; however, engineering controls have not always been feasible for some of our operations, or have not always completely controlled the identified hazards. In these situations, respirators and other protective equipment must be used. Respirators are also needed to protect employees' health during emergencies. The work processes requiring respirator use at XYZ Seating are outlined in Table 1 in the Scope and Application section of this program.

In addition, some employees have expressed a desire to wear respirators during certain operations that do not require respiratory protection. As a general policy XYZ Seating will review each of these requests on a case-by-case basis. If the use of respiratory protection in a specific case will not jeopardize the health or safety of the worker(s), XYZ Seating will provide respirators for voluntary use. As outlined in the Scope and Application section of this program, voluntary respirator use is subject to certain requirements of this program.

2.0 Scope and Application

This program applies to all employees who are required to wear respirators during normal work operations, and during some non-routine or emergency operations such as a spill of a hazardous substance. This includes employees in the Prep, Coating (Spray Booth), Assembly, and Maintenance departments. All employees working in these areas and engaged in certain processes or tasks (as outlined in the table below) must be enrolled in the company's respiratory protection program.

In addition, any employee who voluntarily wears a respirator when a respirator is not required (i.e., in certain maintenance and coating operations) is subject to the medical evaluation, cleaning, maintenance, and storage elements of this program, and must be provided with certain information specified in this section of the program.[1]

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[1] Employees who voluntarily wear filtering facepieces (dust masks) are not subject to the medical evaluation, cleaning, storage, and maintenance provisions of this program.

Employees participating in the respiratory protection program do so at no cost to them. The expense associated with training, medical evaluations and respiratory protection equipment will be borne by the company.

TABLE 1: VOLUNTARY AND REQUIRED RESPIRATOR USE AT XYZ SEATING	
Respirator	**Department/Process**
Filtering facepiece (dust mask)	Voluntary use for warehouse workers
Half-facepiece APR or PAPR with P100 filter	Prep and Assembly Voluntary use for maintenance workers when cleaning spray booth walls or changing spray booth filter
SAR, pressure demand, with auxiliary SCBA	Maintenance - dip coat tank cleaning
Continuous flow SAR with hood	Spray booth operations Prep (cleaning)*
Half-facepiece APR with organic vapor cartridge	Voluntary use for Dip Coat Tenders, Spray Booth Operators (gun cleaning), and Maintenance workers (loading coating agents into supply systems)
Escape SCBA	Dip Coat, Coatings Storage Area, Spray Booth Cleaning Area

* until ventilation is installed.

3.0 Responsibilities

Program Administrator

The Program Administrator is responsible for administering the respiratory protection program. Duties of the program administrator include:

- Identifying work areas, processes or tasks that require workers to wear respirators, and evaluating hazards.
- Selection of respiratory protection options.
- Monitoring respirator use to ensure that respirators are used in accordance with their certifications.
- Arranging for and/or conducting training.
- Ensuring proper storage and maintenance of respiratory protection equipment.

- Conducting qualitative fit testing with Bitrex.
- Administering the medical surveillance program.
- Maintaining records required by the program.
- Evaluating the program.
- Updating written program, as needed.

The Program Administrator for Company XYZ Seating is _____.

Supervisors

Supervisors are responsible for ensuring that the respiratory protection program is implemented in their particular areas. In addition to being knowledgeable about the program requirements for their own protection, supervisors must also ensure that the program is understood and followed by the employees under their charge. Duties of the supervisor include:

- Ensuring that employees under their supervision (including new hires) have received appropriate training, fit testing, and annual medical evaluation.
- Ensuring the availability of appropriate respirators and accessories.
- Being aware of tasks requiring the use of respiratory protection.
- Enforcing the proper use of respiratory protection when necessary.
- Ensuring that respirators are properly cleaned, maintained, and stored according to the respiratory protection plan.
- Ensuring that respirators fit well and do not cause discomfort.
- Continually monitoring work areas and operations to identify respiratory hazards.
- Coordinating with the Program Administrator on how to address respiratory hazards or other concerns regarding the program.

Employees

Each employee has the responsibility to wear his or her respirator when and where required and in the manner in which they were trained. Employees must also:

- Care for and maintain their respirators as instructed, and store them in a clean sanitary location.
- Inform their supervisor if the respirator no longer fits well, and request a new one that fits properly.
- Inform their supervisor or the Program Administrator of any respiratory hazards that they feel are not adequately addressed in the workplace and of any other concerns that they have regarding the program.

4.0 Program Elements

Selection Procedures

The Program Administrator will select respirators to be used on site, based on the hazards to which workers are exposed and in accordance with all OSHA standards. The Program Administrator will conduct a hazard evaluation for each operation, process, or work area where airborne contaminants may be present in routine operations or during an emergency. The hazard evaluation will include:

1) Identification and development of a list of hazardous substances used in the workplace, by department, or work process.

2) Review of work processes to determine where potential exposures to these hazardous substances may occur. This review shall be conducted by surveying the workplace, reviewing process records, and talking with employees and supervisors.

3) Exposure monitoring to quantify potential hazardous exposures. Monitoring will be contracted out. XYZ Seating currently has a contract with ABC Industrial Hygiene Services to provide monitoring when needed.

The results of the current hazard evaluation are the following:
(Table 3 at the end of this program contains the sampling data that this section was based on.)

Prep-sanding: Ventilation controls on some sanders are in place, but employees continue to be exposed to respirable wood dust at 2.5 - 7.0 mg/m^3 (8 hour time-weighted-average, or TWA). Half-facepiece APRs with P100 filters and goggles are required for employees sanding wood pieces. PAPRs will be available for employees who are unable to wear an APR.

Prep-cleaning: Average methylene chloride exposures measured at 70 ppm based on 8 hr. TWA exposure results for workers cleaning/stripping furniture pieces. Ventilation controls are planned, but will not be implemented until designs are completed and a contract has been let for installation of the controls. In the meantime, employees must wear supplied air hoods with continuous air flow, as required by the Methylene Chloride standard 1910.1052.

Coating-spray booth: XYZ Seating has decided to take a conservative approach and require all employees to wear supplied air respirators when working inside the spray booth. Based on exposure data in published reports on the same type of spray booth operations, the Program Administrator has determined that an SAR in the continuous flow mode will provide sufficient protection. Spray booth employees may opt to wear half-facepiece APRs with organic vapor cartridges when cleaning spray guns.

Coating-dip coat, and drying: Exposures are kept within PELs by ventilation, and employees generally enter the dip coat area for short time periods (up to one hour). Vapors could leak into the dip coat and drying areas if the ventilation system is not running at peak efficiency. Odors in this area are often unpleasant even at the levels maintained by the ventilation system. While XYZ Seating notes that respiratory protection is not required in this area, the company recognizes employee concern about breathing vapors and about having to work in an unpleasant environment. Accordingly, employees may voluntarily choose to wear a half-facepiece APR with organic vapor cartridges when working in this area.

Assembly: Ventilation controls on sanders are in place, but employees continue to be exposed to respirable wood dust at 2.5 - 6.0 mg/m^3 (8 hour TWA); half-facepiece APRs with P100 filters and goggles are required for employees sanding wood pieces in the assembly department. PAPRs will be available for employees who are unable to wear an APR. The substitution for aqueous-based glues will eliminate exposures to formaldehyde, methylene chloride, and epoxy resins.

Maintenance: Because of potential IDLH conditions, employees cleaning dip coat tanks must wear a pressure demand SAR during the performance of this task.

Employees may voluntarily wear half-facepiece APRs with P100 cartridges when cleaning spray booth walls or changing booth filters and half-facepiece APRs with organic vapor cartridges when loading coating agents into supply systems. Although exposure monitoring has shown that exposures are kept within PELs during these procedures, XYZ Seating will provide respirators to workers who are concerned about potential exposures.

Updating the Hazard Assessment

The Program Administrator must revise and update the hazard assessment as needed (i.e., any time work process changes may potentially affect exposure). If an employee feels that respiratory protection is needed during a particular activity, he/she is to contact his or her supervisor or the Program Administrator. The Program Administrator will evaluate the potential hazard, arranging for outside assistance as necessary. The Program Administrator will then communicate the results of that assessment back to the employees. If it is determined that respiratory protection is necessary, all other elements of this program will be in effect for those tasks and this program will be updated accordingly.

NIOSH Certification

All respirators must be certified by the National Institute for Occupational Safety and Health (NIOSH) and shall be used in accordance with the terms of that certification. Also, all filters, cartridges, and canisters must be labeled with the appropriate NIOSH approval label. The label must not be removed or defaced while it is in use.

Voluntary Respirator Use

XYZ Seating will provide respirators at no charge to employees for voluntary use for the following work processes:

- Employees may wear half-facepiece APRs with organic vapor cartridges while working in the dip coat area.
- Warehouse workers may wear filtering facepieces.
- Spray Booth Operators may wear half-facepiece APRs with organic vapor cartridges while cleaning spray guns.
- Maintenance personnel may wear half-facepiece APRs with P100 cartridges while cleaning spray booth walls, and organic vapor cartridges while loading spray guns.

The Program Administrator will provide all employees who voluntarily choose to wear either of the above respirators with a copy of Appendix D of the standard. (Appendix D details the requirements for voluntary use of respirators by employees.) Employees choosing to wear a half facepiece APR must comply with the procedures for Medical Evaluation, Respirator Use, and Cleaning, Maintenance and Storage.

The Program Administrator shall authorize voluntary use of respiratory protective equipment as requested by all other workers on a case-by-case basis, depending on specific workplace conditions and the results of the medical evaluations.

Medical Evaluation

Employees who are either required to wear respirators, or who choose to wear an APR voluntarily, must pass a medical exam before being permitted to wear a respirator on the job. Employees are not permitted to wear respirators until a physician has determined that they are medically able to do so. Any employee refusing the medical evaluation will not be allowed to work in an area requiring respirator use.

A licensed physician at ABC medical clinic, where all company medical services are provided, will provide the medical evaluations. Medical evaluation procedures are as follows:

- The medical evaluation will be conducted using the questionnaire provided in Appendix C of the respiratory protection standard. The Program Administrator will provide a copy of this questionnaire to all employees requiring medical evaluations.

- To the extent feasible, the company will assist employees who are unable to read the questionnaire (by providing help in reading the questionnaire). When this is not possible, the employee will be sent directly to the physician for medical evaluation.

- All affected employees will be given a copy of the medical questionnaire to fill out, along with a stamped and addressed envelope for mailing the questionnaire to the company physician. Employees will be permitted to fill out the questionnaire on company time.

- Follow-up medical exams will be granted to employees as required by the standard, and/or as deemed necessary by the ABC medical clinic physician.

- All employees will be granted the opportunity to speak with the physician about their medical evaluation, if they so request.

- The Program Administrator has provided the ABC medical clinic physician with a copy of this program, a copy of the Respiratory Protection standard, the list of hazardous substances by work area, and for each employee requiring evaluation: his or her work area or job title, proposed respirator type and weight, length of time required to wear respirator, expected physical work load (light, moderate, or heavy), potential temperature and humidity extremes, and any additional protective clothing required.

- Any employee required for medical reasons to wear a positive pressure air purifying respirator will be provided with a powered air purifying respirator.

- After an employee has received clearance and begun to wear his or her respirator, additional medical evaluations will be provided under the following circumstances:

    - Employee reports signs and/or symptoms related to their ability to use a respirator, such as shortness of breath, dizziness, chest pains, or wheezing.
    - The ABC medical clinic physician or supervisor informs the Program Administrator that the employee needs to be reevaluated;
    - Information from this program, including observations made during fit testing and program evaluation, indicates a need for reevaluation;
    - A change occurs in workplace conditions that may result in an increased physiological burden on the employee.

A list of XYZ Seating employees currently included in medical surveillance is provided in Table 2 of this program.

All examinations and questionnaires are to remain confidential between the employee and the physician.

Fit Testing

Fit testing is required for employees wearing half-facepiece APRs for exposure to wood dust in Prep and Assembly, and maintenance workers who wear a tight-fitting SAR for dip tank cleaning. Employees voluntarily wearing half-facepiece APRs may also be fit tested upon request.

Employees who are required to wear half-facepiece APRs will be fit tested:

- Prior to being allowed to wear any respirator with a tight fitting facepiece.
- Annually.
- When there are changes in the employee's physical condition that could affect respiratory fit (e.g., obvious change in body weight, facial scarring, etc.).

Employees will be fit tested with the make, model, and size of respirator that they will actually wear. Employees will be provided with several models and sizes of respirators so that they may find an optimal fit. Fit testing of PAPRs is to be conducted in the negative pressure mode.

The Program Administrator will conduct fit tests following the OSHA approved Bitrex Solution Aerosol QLFT Protocol in Appendix B (B4) of the Respiratory Protection standard.

The Program Administrator has determined that QNFT is not required for the respirators used under current conditions at XYZ Seating. If conditions affecting respirator use change, the Program Administrator will evaluate on a case-by-case basis whether QNFT is required.

Respirator Use

Respiratory protection is required for the following personnel:

TABLE 2: XYZ Seating Personnel in Respiratory Protection Program			
Name	**Department**	**Job Description/ Work Procedure**	**Respirator**
Joe Apple	Prep	Operator	Half mask APR P100 filter when sanding/ SAR continuous flow hood for cleaning
Ron Carey	Maintenance	Dip tank cleaning	SAR, pressure demand with auxiliary SCBA
Lisa Jones	Coating	Spray Booth Operator	SAR, continuous flow hood
. . .			

General Use Procedures:

- Employees will use their respirators under conditions specified by this program, and in accordance with the training they receive on the use of each particular model. In addition, the respirator shall not be used in a manner for which it is not certified by NIOSH or by its manufacturer.

- All employees shall conduct user seal checks each time that they wear their respirator. Employees shall use either the positive or negative pressure check (depending on which test works best for them) specified in Appendix B-1 of the Respiratory Protection Standard.

- All employees shall be permitted to leave the work area to go to the locker room to maintain their respirator for the following reasons: to clean their respirator if the respirator is impeding their ability to work, change filters or cartridges, replace parts, or to inspect respirator if it stops functioning as intended. Employees should notify their supervisor before leaving the area.

- Employees are not permitted to wear tight-fitting respirators if they have any condition, such as facial scars, facial hair, or missing dentures, that prevents them from achieving a good seal. Employees are not permitted to wear headphones, jewelry, or other articles that may interfere with the facepiece-to-face seal.

Emergency Procedures:

The following work areas have been identified as having foreseeable emergencies:

Spray Booth Cleaning Area - spill of hazardous waste
Dip Coat Area - malfunction of ventilation system, leak in supply system
Coatings Storage Area - spill or leak of hazardous substances

When the alarm sounds, employees in the affected department must immediately don their emergency escape respirator, shut down their process equipment, and exit the work area. All other employees must immediately evacuate the building. XYZ Seating's Emergency Action Plan describes these procedures (including proper evacuation routes and rally points) in greater detail.

Emergency escape respirators are located:

Locker #1 in the Spray Booth Area
Storage cabinet #3 in Dip Coat/Drying Area
Locker #4 in the Coatings Storage Area

Respiratory protection in these instances is for escape purposes only. XYZ Seating employees are not trained as emergency responders, and are not authorized to act in such a manner.

Respirator Malfunction

1. APR Respirator Malfunction:

For any malfunction of an APR (e.g., such as breakthrough, facepiece leakage, or improperly working valve), the respirator wearer should inform his or her supervisor that the respirator no longer functions as intended, and go to the designated safe area to maintain the respirator. The supervisor must ensure that the employee receives the needed parts to repair the respirator, or is provided with a new respirator.

2. Atmosphere-supplying Respirator Malfunction:

All workers wearing atmosphere-supplying respirators will work with a buddy. Buddies shall assist workers who experience an SAR malfunction as follows:

If a worker in the spray booth experiences a malfunction of an SAR, he or she should signal to the buddy that he or she has had a respirator malfunction. The buddy shall don an emergency escape respirator and aid the worker in immediately exiting the spray booth.

Workers cleaning wood pieces or assembled furniture in the Prep department will work with a buddy. If one of the workers experiences a respirator malfunction, he/she shall signal this to their buddy. The buddy must immediately stop what he or she is doing to escort the employee to the Prep staging area where the employee can safely remove the SAR.

IDLH Procedures

The Program Administrator has identified the following area as presenting the potential for IDLH conditions:

Dip Coat Tank Cleaning:
Maintenance workers will be periodically required to enter the dip tank to perform scheduled or unscheduled maintenance. In such cases, workers will follow the permit required confined space entry procedures specified in the XYZ Seating Confined Space Program. As specified in these procedures, the Program Administrator has determined that workers entering this area shall wear a pressure demand SAR. In addition, an appropriately trained and equipped standby person shall remain outside the dip tank and maintain constant voice and visual communication with the worker. In the event of an emergency requiring the standby person to enter the IDLH environment, the standby person shall immediately notify the Program Administrator and will proceed with rescue operations in accordance with rescue procedures outlined in the XYZ Seating Confined Space Program.

Air Quality

For supplied-air respirators, only Grade D breathing air shall be used in the cylinders. The Program Administrator will coordinate deliveries of compressed air with the company's vendor, Compressed Air Inc., and require Compressed Air Inc. to certify that the air in the cylinders meets the specifications of Grade D breathing air.

The Program Administrator will maintain a minimum air supply of one fully charged replacement cylinder for each SAR unit. In addition, cylinders may be recharged as necessary from the breathing air cascade system located near the respirator storage area. The air for this

system is provided by XYZ Seating's supplier, and deliveries of new air are coordinated by the Program Administrator.

Cleaning, Maintenance, Change Schedules and Storage

Cleaning

Respirators are to be regularly cleaned and disinfected at the designated respirator cleaning station located in the employee locker room.

Respirators issued for the exclusive use of an employee shall be cleaned as often as necessary, but at least once a day for workers in the Prep and Assembly departments.

Atmosphere supplying and emergency use respirators are to be cleaned and disinfected after each use.

The following procedure is to be used when cleaning and disinfecting respirators:

- Disassemble respirator, removing any filters, canisters, or cartridges.
- Wash the facepiece and associated parts in a mild detergent with warm water. Do not use organic solvents.
- Rinse completely in clean warm water.
- Wipe the respirator with disinfectant wipes (70% Isopropyl Alcohol) to kill germs.
- Air dry in a clean area.
- Reassemble the respirator and replace any defective parts.
- Place in a clean, dry plastic bag or other air tight container.

Note: The Program Administrator will ensure an adequate supply of appropriate cleaning and disinfection material at the cleaning station. If supplies are low, employees should contact their supervisor, who will inform the Program Administrator.

Maintenance

Respirators are to be properly maintained at all times in order to ensure that they function properly and adequately protect the employee. Maintenance involves a thorough visual inspection for cleanliness and defects. Worn or deteriorated parts will be replaced prior to use. No components will be replaced or repairs made beyond those recommended by the manufacturer. Repairs to regulators or alarms of atmosphere-supplying respirators will be conducted by the manufacturer.

The following checklist will be used when inspecting respirators:

- Facepiece:
  - cracks, tears, or holes
  - facemask distortion
  - cracked or loose lenses/faceshield

- Headstraps:
  - breaks or tears
  - broken buckles

- Valves:
  - residue or dirt
  - cracks or tears in valve material

- Filters/Cartridges:
  - approval designation
  - gaskets
  - cracks or dents in housing
  - proper cartridge for hazard

- Air Supply Systems:
  - breathing air quality/grade
  - condition of supply hoses
  - hose connections
  - settings on regulators and valves

Employees are permitted to leave their work area to perform limited maintenance on their respirator in a designated area that is free of respiratory hazards. Situations when this is permitted include to wash their face and respirator facepiece to prevent any eye or skin irritation, to replace the filter, cartridge or canister, and if they detect vapor or gas breakthrough or leakage in the facepiece or if they detect any other damage to the respirator or its components.

Change Schedules

Employees wearing APRs or PAPRs with P100 filters for protection against wood dust and other particulates shall change the cartridges on their respirators when they first begin to experience difficulty breathing (i.e., resistance) while wearing their masks.

Based on discussions with our respirator distributor about XYZ Seating's workplace exposure conditions, employees voluntarily wearing APRs with organic vapor cartridges shall change the

cartridges on their respirators at the end of each work week to ensure the continued effectiveness of the respirators.

Storage

Respirators must be stored in a clean, dry area, and in accordance with the manufacturer's recommendations. Each employee will clean and inspect their own air-purifying respirator in accordance with the provisions of this program and will store their respirator in a plastic bag in their own locker. Each employee will have his/her name on the bag and that bag will only be used to store that employee's respirator.

Atmosphere supplying respirators will be stored in the storage cabinet outside of the Program Administrator's office.

The Program Administrator will store XYZ's supply of respirators and respirator components in their original manufacturer's packaging in the equipment storage room.

Defective Respirators

Respirators that are defective or have defective parts shall be taken out of service immediately. If, during an inspection, an employee discovers a defect in a respirator, he/she is to bring the defect to the attention of his or her supervisor. Supervisors will give all defective respirators to the Program Administrator. The Program Administrator will decide whether to:

- Temporarily take the respirator out of service until it can be repaired.
- Perform a simple fix on the spot such as replacing a headstrap.
- Dispose of the respirator due to an irreparable problem or defect.

When a respirator is taken out of service for an extended period of time, the respirator will be tagged out of service, and the employee will be given a replacement of similar make, model, and size. All tagged out respirators will be kept in the storage cabinet inside the Program Administrator's office.

Training

The Program Administrator will provide training to respirator users and their supervisors on the contents of the XYZ Seating Respiratory Protection Program and their responsibilities under it, and on the OSHA Respiratory Protection standard. Workers will be trained prior to using a respirator in the workplace. Supervisors will also be trained prior to using a respirator in the workplace or prior to supervising employees that must wear respirators.

The training course will cover the following topics:

- the XYZ Seating Respiratory Protection Program
- the OSHA Respiratory Protection standard
- respiratory hazards encountered at XYZ Seating and their health effects
- proper selection and use of respirators
- limitations of respirators
- respirator donning and user seal (fit) checks
- fit testing
- emergency use procedures
- maintenance and storage
- medical signs and symptoms limiting the effective use of respirators

Employees will be retrained annually or as needed (e.g., if they change departments and need to use a different respirator). Employees must demonstrate their understanding of the topics covered in the training through hands-on exercises and a written test. Respirator training will be documented by the Program Administrator and the documentation will include the type, model, and size of respirator for which each employee has been trained and fit tested.

5.0 Program Evaluation

The Program Administrator will conduct periodic evaluations of the workplace to ensure that the provisions of this program are being implemented. The evaluations will include regular consultations with employees who use respirators and their supervisors, site inspections, air monitoring and a review of records.

Problems identified will be noted in an inspection log and addressed by the Program Administrator. These findings will be reported to XYZ Seating management, and the report will list plans to correct deficiencies in the respirator program and target dates for the implementation of those corrections.

6.0 Documentation and Recordkeeping

A written copy of this program and the OSHA standard is kept in the Program Administrator's office and is available to all employees who wish to review it.

Also maintained in the Program Administrator's office are copies of training and fit test records. These records will be updated as new employees are trained, as existing employees receive refresher training, and as new fit tests are conducted.

The Program Administrator will also maintain copies of the medical records for all employees covered under the respirator program. The completed medical questionnaire and the physician's documented findings are confidential and will remain at ABC Medical Clinic. The company will only retain the physician's written recommendation regarding each employee's ability to wear a respirator.

TABLE 3: XYZ SEATING HAZARD ASSESSMENT - JUNE 1998

Department	Contaminants	Exposure Level (8 hrs TWA)*	PEL	Controls
Prep: Sanding	wood dust	2.5 - 7.0 mg/m^3	5 mg/m^3 (TLV= 1 mg/m^3)	Local exhaust ventilation (LEV) for sanders. Half-facepiece APR with P100 filter.
Prep: Cleaning	methylene chloride	70 ppm	25 ppm 125 ppm = STEL	LEV to be installed for cleaning stations. Continuous flow SAR hood until then needed for respiratory protection. Will reevaluate after LEV installation.
	methanol	150 ppm	200 ppm	
	acetone	400 ppm	1,000 ppm	
Coating: Spray booth painting	toluene	(300 ppm)**	200 ppm 500 ppm =10 min peak	Continuous flow SAR hood
	xylene	(40 ppm)**	100 ppm 150 ppm = STEL	
	MEK (methyl ethyl ketone)	(25 ppm)**	200 ppm	
	methanol	(20 ppm)**	200 ppm	

Department	Contaminants	Exposure Level (8 hrs TWA)*	PEL	Controls
Coating: Spray booth gun cleaning	toluene	80 ppm (30 min)	200 ppm 500 ppm =10 min peak	Half-facepiece APR with organic vapor cartridge
	methanol	300 (30 min)	200 ppm	
Coating: Dip Coat	toluene	25 ppm	200 ppm 500 ppm =10 min peak	Automated line is vented. Workers may voluntarily wear half-facepiece APR with organic vapor cartridge.
	xylene	50 ppm	100 ppm 150 ppm = STEL	
	MEK	60 ppm	200 ppm	
	MIBK	10 ppm	100 ppm	
	methanol	50 ppm	200 ppm	
Drying (oven)	None (monitoring revealed no significant exposures)	NA	NA	NA

Department	Contaminants	Exposure Level (8 hrs TWA)*	PEL	Controls
Assembly: Sanding, gluing and nailing	wood dust	2.5 -6.0 mg/m^3	5 mg/m^3 (TLV= 1 mg/m^3)	aqueous-based glues will be used to eliminate exposures to methylene chloride, formaldehyde and epichlorohydrin
	formaldehyde	1.0 ppm	0.75 ppm 2 ppm = STEL	
	epichlorohydrin	4 ppm	5 ppm	
	methylene chloride	60 ppm	25 ppm 125 ppm = STEL	
Maintenance: Dip tank cleaning	toluene, xylene, MEK, MIBK, methanol	IDLH conditions		SAR, pressure demand with auxiliary SCBA must be worn
Maintenance: Spray booth cleaning/filter change	particulates	1.8 mg/m^3	5 mg/m^3	Voluntary use, half-facepiece APR with P100 filter

Department	Contaminants	Exposure Level (8 hrs TWA)*	PEL	Controls
Maintenance: Loading coatings into supply systems	toluene	40 ppm (1 hr)	200 ppm 500 ppm =10 min peak	Voluntary use, half-facepiece APR with organic vapor cartridges
	xylene	80 ppm (1 hr)	100 ppm 150 ppm = STEL	
	MEK	100 ppm (1 hr)	200 ppm	
	MIBK	15 ppm (1 hr)	100 ppm	
	methanol	125 ppm (1 hr)	200 ppm	
Warehouse	None	NA	NA	NA

* Summarized from Industrial Hygiene report provided by ABC Industrial Hygiene Services
** These values were obtained from a survey on average exposures in downdraft spray booths utilized in the furniture coating industry as published in the American Journal of Industrial Hygiene _____.

APPENDIX V
References

REFERENCES

QUESTIONS AND ANSWERS ON THE RESPIRATORY PROTECTION STANDARD OSHA PUBLICATION
AVAILABLE FROM: OSHA, SEE THE LIST OF AREA AND REGIONAL OFFICES IN APPENDIX II; WEB SITE: WWW.OSHA.GOV.

OSHA INSTRUCTION: INSPECTION PROCEDURES FOR THE RESPIRATORY PROTECTION STANDARD OSHA PUBLICATION. AVAILABLE FROM OSHA WEB SITE: WWW.OSHA.GOV.

RESPIRATOR SELECTION GUIDE OSHA PUBLICATION
AVAILABLE FROM: OSHA, SEE THE LIST OF AREA AND REGIONAL OFFICES IN APPENDIX II; WEB SITE: WWW.OSHA.GOV.

DOCUMENTATION OF THE THRESHOLD LIMIT VALUES
AVAILABLE FROM: ACGIH PUBLICATIONS OFFICE, 6500 GLENWAY AVE., BUILDING D-5, CINCINNATI, OH 45221

NIOSH/OSHA POCKET GUIDE TO CHEMICAL HAZARDS
AVAILABLE FROM: NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
Phone Number: (800-356-4674); Web site: www.cdc.gov/niosh/homepage.html

ANSI RESPIRATOR STANDARD 1992 Z88.2

CONDENSED CHEMICAL DICTIONARY
GESSNER G. HAWLEY, VAN NOSTRAND REINHOLD CO., 135 W. 50TH ST., NEW YORK, NY 10020

INDUSTRIAL RESPIRATORY PROTECTION NIOSH PUBLICATION
AVAILABLE FROM: NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
Phone Number: (800-356-4674); Web site: www.cdc.gov/niosh/homepage.html

Respirator Decision Logic NIOSH PUBLICATION
AVAILABLE FROM: NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
Phone Number: (800-356-4674); Web site: www.cdc.gov/niosh/homepage.html

NIOSH GUIDE TO THE SELECTION AND USE OF PARTICULATE RESPIRATORS CERTIFIED UNDER 42 CFR 84
AVAILABLE FROM: NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
Phone Number: (800-356-4674); Web site: www.cdc.gov/niosh/homepage.html

QUESTIONS AND ANSWERS ON THE RESPIRATORY PROTECTION STANDARD

Note: The page numbers referenced at the end of some of the Questions refer to specific pages in the January 8, 1998, Federal Register, Volume 63, No. 5.

(Revised August 17, 1998)

August 3, 1998

MEMORANDUM TO: ALL REGIONAL ADMINISTRATORS

FROM: JOHN B.MILES JR., DIRECTOR

SUBJECT: QUESTIONS AND ANSWERS ON THE RESPIRATORY PROTECTION STANDARD

The purpose of this memorandum is to provide the Regional Offices with a copy of the Question and Answers on the Respiratory Protection Standard (Q and A document.) It is intended to provide guidance to the field on topics relating to the Respiratory Protection Standard, 29 CFR 1910.134. This document will be useful to assist the staff in the Area Offices to answer most of most frequently asked questions.

The Q and A provides a series of questions and answers on each paragraph of the revised standard. The document includes four "attachments" that the compliance staff can use for outreach to employers. The attachments include a Spanish translation of Appendix D, a respirator-use flowchart, addresses and phone numbers of State Licensing Boards, and a "usable" copy of the Medical Questionnaire, both in English and Spanish.

The National Office will issue a Compliance Directive on the Respirator standard. The Directive will include inspection and citation guidance to ensure uniform enforcement of the respiratory standard as well as interpretations of the standard.

TABLE OF CONTENTS

1. Paragraph (a) Permissible Practice 1

2. Paragraph (b) Definitions 3

3. Paragraph (c) Respiratory Protection Program 7

4. Paragraph (d)Selection of Respirators 11

5. Paragraph (e) Medical Evaluation 16

6. Paragraph (f) Fit testing 24

7. Paragraph (g) - Use of Respirators 29

8. Paragraph (h) Maintenance and Care of Respirators 38

9. Paragraph (i) Breathing air quality and use 43

10. Paragraph (j) Identification of filters, cartridges, and canisters 49

11. Paragraph (k) Training and Information 50

12. Paragraph (l) Program Evaluation 54

13. Paragraph (p) Revisions to Specific OSHA Standards 56

14. Fit Testing Procedures, Appendix A 59

Attachment 1 - Appendix D (Spanish Translation) 62

Attachment 2 - Respirator-Use Requirements Flowchart 63

Attachment 3 - State Licensing Boards Information 64

Attachment 4 - Respirator Medical Evaluation Questionnaire (English and Spanish) 68

Paragraph (a) Permissible Practice

(a)(1) and (2)

Q. What changes did OSHA make to paragraph (a) of the old standard that are now reflected in the new final rule? (FR p. 1179)

A. The final rule is essentially unchanged from the corresponding paragraphs (a)(1) and (a)(2) in the prior rule and the proposed rule. Paragraph (a)(3) was removed and not included in the Final rule.

Q. When does the standard require respirators to be worn? (FR p.1180 & 1181)

A. Whenever it is necessary to protect the health of the employee from contaminated or oxygen deficient air. This includes situations where respirators are necessary to protect employees in an emergency.

Q. Does the standard cover biological hazards? (FR p.1180)

A. The standard applies to most biological hazards (such as Histoplasma capsulatum spores and Bloodborne pathogens) with the exception of *Mycobacterium tuberculosis* (TB). OSHA will continue to enforce respirator use for TB under the previous respirator standard that has been redesignated 29 CFR 1910.139.

Q. When is the employer required to provide engineering controls? (FR p. 1181)

A. This standard does not make any changes to the longstanding hierarchy of controls which requires employers to use engineering and work practice controls where feasible. Only if such controls are not feasible or while they are being implemented may an employer rely on a respirator to protect employees.

Q. Can a combination of administrative controls and respirators be used as interim controls while engineering control measures are developed and implemented?

A. In general, yes. However, some of OSHA's substance specific standards, such as the asbestos standard, prohibit the use of employee rotation as an administrative control .

Q. Will OSHA require respirators to be worn for chemicals that do not have Permissible Exposure Limits (PEL) ? (p.1181)

A. OSHA requires respirators to be worn whenever such equipment is necessary to protect the health of employees. If an exposure to an airborne contaminant, that does not have a PEL, could result in serious illness or injury, the general duty clause could be cited in accordance with the provisions in the Field Inspection Reference Manual (FIRM), CPL 2.103 Chapter 3.

Q. Why did OSHA drop paragraph (a)(3)?

A. This paragraph stated that employees must use the respiratory protection provided in accordance with instructions and training they have received. However, employees' responsibilities are already stated in the OSH Act.

Paragraph (b) Definitions

Q. Why did the final revised standard remove the definition of **Adequate Warning Properties**? (FR p. 1181 and p. 1204)

A. The proposed definition of "adequate warning properties" was deleted from the final standard because the new standard does not permit employers to rely on such properties as the sole cause for changing filters. The two major warning properties, odor and irritation, are unreliable or otherwise inappropriate to use as indicators because of the fact that the air purifying materials are no longer providing adequate protection (sorbent exhaustion). Most toxic substances do not have appropriate sensory warning properties, and reported values for odor thresholds vary widely and are experienced differently by each individual. However, upon smelling or being irritated by a substance when wearing a respirator, the worker must leave the work area to change filters or replace the respirator..

Q. For which specific air contaminants will OSHA allow the use of **air purifying respirators**? (FR p.1182)

A. With some exceptions, air purifying respirators can be used for most air contaminants. Respirators for gases and vapors must either be equipped with an end-of-service-life indicator (ESDI) or the employer must implement a canister or cartridge change schedule.

Air purifying respirators must not be worn in unknown and/or Immediately Dangerous to Life or Health (IDLH), atmospheres in oxygen deficient atmospheres or in situations where the employer cannot prevent the canister or cartridge from becoming saturated. They also cannot be worn if prohibited by the respirator requirements for substance specific standards (i.e. methylene chloride) or other OSHA standards (i.e., abrasive blasting section in 29 CFR 1910.94, Ventilation). Also, the respirator manufacturer have lists of contaminants for which air purifying respirators are not recommended.

Q. Will OSHA be using the NIOSH or the ANSI **assigned protection factors** for enforcement?(FR p. 1182)

A. OSHA decided to address the entire "assigned protection factor"(APF) issue in a subsequent phase of the rulemaking. OSHA will continue to refer to NIOSH APFs in the interim, except in cases where APFs have been published in substance specific standards. Employers must rely on the best available information when selecting the appropriate respirator.

Q. Does OSHA consider a disposable paper respirator (or **dust mask**) a negative pressure

particulate respirator? (FR p. 1183)

A. Yes, this type respirator is referred to as a **filtering facepiece** in the final standard and is defined as a negative pressure particulate respirator with a filter that is an integral part of the facepiece or with the entire facepiece composed of the filter medium.

Emergency Situation

Q. Which standard would apply where respirators are in use on a hazardous waste site?(FR p. 1182)

A. The respirator standard is applicable whenever respirators are used unless a more specific applicable standard addresses the hazard of breathing contaminated or oxygen deficient air. The Hazardous Waste Operations standard (29 CFR 1910.120) has provisions that address respiratory protection. Therefore, those provisions would apply.

Escape -Only Respirators

Q. Can employees use mouthpiece respirators (also known as mouth breathers) for escape? (p. 1182)

A. Yes, if the mouthpiece respirator is properly selected for the potential hazard. It is important that escape-only respirators be NIOSH approved and appropriate for the potential airborne concentration and class of substances involved. However, a mouthpiece type respirator alone would not be appropriate for escape from a chlorine spill because irritation to the eyes could impede the ability of the worker to escape. However if chemical goggles are also provided, the use of a mouthbit respirator in conjunction with chemical goggles might be acceptable in cases where employees can make an immediate and unobstructed exit from an outdoor, relatively level area involved in an emergency.

Fit Factor vs Fit Test

Q. What is the difference or relationship between a fit test and fit factor ? (FR p. 1183)

A. A fit test is used to estimate how well the face piece of the respirator is able to form a seal with an individual's face. The "test" consists of procedures specified in Appendix A of the standard. The fit factor is a number based on the ratio of concentration of contaminate outside the respirator to the concentration inside the respirator.

High Efficiency Particulate Air (HEPA)

Q. Why is OSHA using this outdated terminology in this standard?(FR p.1183)

A. This definition is included because the term "HEPA filter" is used in many of OSHA's substance specific standards is familiar to the regulated community. NIOSH 42 CFR 84 particulate filters, that are considered as protective, are the N100, R100, and P100 filters.

Immediately Dangerous to Life or Health (IDLH)

Q. There are various published and sometimes conflicting IDLH limits. What levels will OSHA use for enforcement purposes?(FR p.1185)

A. OSHA has not established its own set of IDLH values. OSHA considers an atmosphere to be IDLH when it poses an immediate threat to life, could cause irreversible adverse health effects, or could impair an employee's ability to escape. The 1990 recommended IDLH values found in the NIOSH Pocket Guide to Chemical Hazards may be used to support OSHA enforcement action. An employer may show however that another source of IDLH values is valid and then may rely on such a source.

Q. How will OSHA address a short, one time acute exposure that does not immediately cause death but causes immediate or near-term adverse effects that do not last? For example, a single exposure to an atmosphere containing life threatening or health impairing concentrations of fluoride, cadmium fumes or radioactive substances may not cause death or permanent impairment for days or even weeks after the exposure.(FR p.1184)

A. In these situations the key considerations are the severity of the adverse effects and the certainty that health impairment will occur following an acute exposure . Where the immediate adverse effects are severe or ultimate health impairment is certain, the short duration of the effect or the delay in the onset of the health impairment is not a factor.

Q. Does OSHA consider exposures in excess of short term exposure limits (STELs), or ceiling limits a potential IDLH atmosphere? (FR p.1184)

A. Generally, no. Most STELs and ceiling values are designed to reduce the risk of less serious effects, such as sensory irritation. Only an acute exposure, that would threaten life, cause irreversible health effects, or impede the ability of the worker to escape is considered IDLH.

Q. Does OSHA consider all oxygen deficient atmospheres to be potential IDLH situations? (FR p.1186)

A. Yes. An atmosphere with an oxygen content below 19.5% by volume is considered

oxygen deficient. 29 CFR 1910.134(d)(2)(iii) of the final Respiratory Protection Standard provides specific exceptions in accordance with various altitudes as described in Table II of the standard.

Physician or Other Licensed Health Care Professional (PLHCP)

Q. Is a licensed vocational or practical nurse, (LVN or LPN) and/or Registered Nurse, (RN) considered a PLHCP and qualified to review the employee medical evaluation questionnaire?(FR p.1186)

A. The OSHA standard requires the Health Care Professional to be legally permitted to provide the healthcare services required by paragraph (e). It is state law that determines the legal scope of practice. Licensing rules vary from state to state.

Qualitative Fit Test, (QLFT)

Q. What is the maximum fit factor for which an employer may use a QLFT? (FR p.1225)

A. 100, since the OSHA accepted QLFT protocols have been validated for a fit factor of 100.

User Seal Check

Q. Specifically, what action is required of the respirator user to determine if the respirator is properly seated? How often must a seal check be done?(FR p.1187)

A. The "action" required in a user seal check is described in Appendix B-1 of the standard. The standard in paragraph (g)(1)(iii) requires the user to perform a user seal check each time a tight fitting respirator is put on.

Paragraph (c) Respiratory Protection Program

(c)(1)

Q. Do all the required elements of a respiratory protection program need to be addressed in writing? (FR p. 1190)

A. All the worksite specific procedures and elements for required respirator use applicable to the particular worksite must be in writing. However , paragraph (c)(2)(ii) makes clear that the written program need not address those employees who are not required to use respirators, but who voluntarily wear filtering facepiece respirators.

(c)(1)

Q. How frequently should the written respiratory protection program be updated?

A. The standard requires that employers revise the program as necessary to reflect changes in the workplace or in respirator use. The written program shall be updated whenever the change occurs. Changes would include different respirator choices, changes in fit testing , and work operations that change.

(c)(1)

Q. What if the employer requires respirators to be worn, although employees are not exposed to airborne contaminants in excess of the PEL? (FR p.1191)

A. Employer required use triggers a full respirator program covering all the elements.

(c)(1)(vii)

Q. Does training on hazardous chemicals required by the Hazard Communication standard meet the requirement for training on respiratory hazards? (FR p.1193)

A. Yes, but only partially. Some respiratory hazards are exempt from the Hazard Communication rule; i.e., biological hazards and radioactive hazards. Annual training on all applicable respiratory hazards is required by the Respiratory Protection standard.

(c)(1)(ix)

Q. How often should the effectiveness of the respiratory protection program be evaluated?(FR p. 1193)

A.. OSHA does not have a required interval. In workplaces where worksite specific conditions are relatively stable, such as a manufacturing site, program evaluation may be conducted on a regular schedule. Where worksite conditions are less stable, such as in the construction industry, employers must develop evaluation schedules that reflect the actual conditions at the worksite as necessary.

Q. Does the employer have the flexibility to develop a corporate written program that would be applicable to all facilities (a generic program)?

A. Yes. The employer may have different sites with very similar operations, where a corporate program could be used. It must however, include site specific provisions to reflect different site conditions.

(c)(2)

Q. In situations where employees choose to wear elastomeric respirators voluntarily, is a written respiratory program addressing medical evaluation, cleaning, disinfecting, storage and maintenance required?(FR p.1189)

A. Yes, the employer must have a written program that covers the elements that could affect the health of any employee who wears this type of respirator.(FR p.1183)

(c)(2)(ii)

Q. Is a written respiratory protection program required for voluntary use of filtering facepieces?

A. No. The employer is obligated to determine that such respirator use will not itself create a hazard and to provide the respirator users with the information contained in Appendix D of the standard.

Q. If the employer has determined that no hazard exists, but an employee asks the employer for a respirator because a "smell" is bothersome, would this be considered "voluntary use"? If all the employees in the area wore a respirator, is this still voluntary use?

A. Yes, in both situations.

(c)(3)

Q. How will the Compliance Safety and Health Officer (CSHO) determine that a person is

qualified and/or trained to be a respirator program administrator? (FR p.1194)

A. The CSHO will review the written program and interview the respirator program administrator (program administrator). Questions asked during the interview would focus on determining how familiar the person is with the respirator standard and the use of the respirators at the particular workplace.

(c)(3)

Q. What is meant by "appropriate" training or experience? (FR p.1194)

A. Training or experience must be extensive enough for the program administrator to fulfill the minimum requirements. The appropriate training will be dependent on the complexity of their respiratory program needs.

(c)(3)

Q. May an employer have more than one program administrator? (FR p.1195)

A. Yes. Each worksite where respirators are required must have a respiratory program. However, where there is more than one worksite, there will be a program at each site. In that circumstance there may be a program administrator for each program.

(c)(3)

Q. Does the standard provide a list of approved training courses for program administrators(FR p.1193)

A. No. OSHA only requires the program administrator to have a level of training adequate to deal with the complexity of the respirator program at the worksite.

(c)(3)

Q. Where can a small employer receive help on compliance with this standard?

A. OSHA is preparing a Small Entity Compliance Guide with a sample respirator program. It will be available on the OSHA web site at *http://www.osha.gov*.

(c)(4)

Q. Does the employer have to pay for any of the expenses associated with the voluntary use of respirators? (FR p.1195)

A. The voluntary use of an **elastomeric mask** requires that the employer have a written

program, ensure the employee is medically able to use the respirator, and that the respirator does not present a health hazard and provide a copy of Appendix D to the employee. To the extent that the above items may create an expense, these costs would be covered by the employer. The employer can choose to supply the respirator and cartridges at no cost to the employee. If the employee supplies their own respirator, the cost of the respirator and cartridges would be the responsibility of the employee. For **voluntary users wearing dust masks**, the employer must provide at no cost to the employee, a copy of Appendix D. Where respiratory protection is required either by the employer or by the OSHA, the employer must pay all costs associated with the standard.

Q. Can an employer (whether or not a small business) rely on the Small Entity Compliance Guide?

A. The Small Entity Compliance Guide is being provided to help employers to comply with the standard. All businesses, small and large, must have a full respirator program where respirators are required. This guide contains a sample Respiratory protection program that many employers will find useful. Under the Small Business Regulatory Enforcement Act, small businesses may use the guide in challenging the appropriateness of a penalty in an OSHA enforcement action.

Paragraph (d)Selection of Respirators

(d)(1)(i)

Q. What is meant by user factors? (FR p.1196)

A. User factors may include medical conditions that may make usage of particular types of respirators difficult i.e. high level of exertion, poor sense of smell, and physical characteristics such as facial scars that may cause difficulties with fit.

(d)(1)(i)

Q. What is meant by workplace factors? (FR p. 1196)

A. "Workplace factors" mean the amount of time the respirator will be worn, dimensions and configuration of the work space , temperature and humidity of the work environment, need for unimpeded vision, need for communication with other workers, need for other personal protective equipment, and the presence of other contaminants.

(d)(1)(ii)

Q. What is meant by conditions of a respirator's certification? (FR p. 1197)

A. Respirators are certified by NIOSH as an assembly. Also conditions of certification means limitations of use stated by NIOSH that accompany certification. Parts from other manufacturers or models cannot be substituted. In the case of airline respirators, the conditions of the certification include operating pressures and hose specifications. Air purifying respirators are certified with limitations that include not using them in IDLH conditions and not using them in atmospheres containing less than 19.5% oxygen.

(d)(1)(iii)

Q. What is meant by "a reasonable estimate of employee exposures?" (FR p. 1198)

A. Exposures must be characterized, through methods that may include actual measurements of exposure at a worksite , exposure data from industry or supplier, and calculations of concentration based on amount used (mathematical models). Data from industry-wide surveys by trade associations may be used as long as they closely resemble the processes and work conditions as described in the survey. The standard does not specify how an employer is to make a reasonable estimate, nor does it require the employer to measure employee exposure. (The comprehensive substance-specific health standards have employee exposure monitoring requirements.) Even with actual measurements of exposure, some estimation is still involved, since monitoring only determines the exposure on a particular day for a specific employee.

(d)(1)(iii)

Q. Is the employer required to have personal monitoring data when selecting a respirator? (FR p. 1200)

A. While personal exposure monitoring is the most reliable approach for assessing the level of respiratory protection required, it may not always be necessary to take personal exposure measurements to determine whether (or what level of) respiratory protection is needed. Appropriate safety factors should be used when using estimates of employee exposures.

(d)(1)(iii)

Q. Do estimates of employee exposures have to be made by a credentialed individual, for example, a certified industrial hygienist? (FR p. 1200)

A. The standard does not require that the person making the estimate have a particular credential. Persons trained and experienced in evaluating respiratory hazards posed by workplace atmospheres are the most competent to evaluate exposure levels.

(d)(1)(iii)

Q. If an employer cannot identify the contaminant or reasonably estimate employee exposures, is the employer required to consider the atmosphere to be IDLH?

A. Yes, unless under worst case assumptions, exposures would not be IDLH. For example, there may be some information available on air concentrations, but not enough data to reasonably estimate the actual employee exposures. However, by making reasonable assumptions about the maximum concentrations that could exist, the employer may be able to show that IDLH conditions would not occur. In other situations it may not be feasible to identify <u>all</u> of the air contaminants, but through information on the process one may be able to determine that IDLH conditions could not occur.

(d)(1)(iv)

Q. How many respirator models and sizes are sufficient? (FR p. 1200)

A. The requirement of the standard is performance- based; the numbers of models and sizes must be sufficient to provide a range of sizes and configurations so that all users can achieve acceptable fits.

(d)(2)(i)

Q. Can any supplied air respirator be used for entry into IDLH atmospheres? (FR p.1201)

A. No. Paragraph (d)(2)(i) requires a full facepiece pressure demand Self Contained Breathing Apparatus (SCBA) certified by NIOSH for a minimum service life of thirty minutes or a combination full facepiece pressure-demand supplied-air respirator with auxiliary self-contained air supply.

(d)(2)(iii)

Q. When is an oxygen-deficient atmosphere considered IDLH? (FR p.1202)

A. All oxygen-deficient atmospheres(O_2 <19.5% by volume) are considered IDLH with one exception. If the employer demonstrates that, under all foreseeable conditions, the oxygen concentration can be maintained within the ranges specified in Table II (i.e., for the altitudes set out in Table II), then any atmosphere-supplying respirator may be used.

(d)(2)(iii)

Q. Why is altitude an important consideration for determining oxygen deficiency? (FR p.1202-1203)

A. An increase in altitude results in a decrease of atmospheric pressure along with a decrease in the partial pressure of oxygen. A reduction in the partial pressure of oxygen may result in oxygen deficiency for the worker. For additional information reference American National Standards Institute (ANSI) Z88.2-1992, Section A.5.

(d)(3)(i)

Q. Does the employer need to consider emergency situations? (FR p. 1203)

A. Yes. When selecting respirators for non-IDLH routine use, the employer must consider additional problems related to reasonably foreseeable emergency situations. In addition, there are substance-specific standards such as asbestos, and other standards such as HAZWOPER that have requirements to be followed in the event of an emergency.

(d)(3)(i)(A)

Q. What assigned protection factors (APFs) may be used? (FR p. 1203)

A. Until APFs are established through rulemaking, employers must rely on the best available information when selecting the appropriate respirator. OSHA will continue to refer to NIOSH APF's except where different APF's have been published in substance specific standards. Where OSHA has specific compliance interpretations that set APFs for certain respirators, such as abrasive blasting respirators used for protection against lead, these must be followed.

(d)(3)(ii)

Q. What is meant by 'physical form' of air contaminant? (FR p. 1204)

A. Physical form refers to whether the air contaminant is a gas, vapor, mist, fume, or dust; or some combination. For example, solvents commonly used in paints may be present as vapors and as mists, and an air purifying respirator would need to provide protection against both.

(d)(3)(ii)

Q. What is meant by 'chemical state' of an air contaminant? (FR p. 1204)

A. Chemical state refers to its valence state. For example, chromium needs to be identified by its valence state (or the chemical compound) because chromium VI compounds have much lower exposure limits than chromium metal, chromium II or chromium III compounds.

(d)(3)(iii)(B)

Q. Can end of service life indicators (ESLI) be used under all workplace conditions? (FR p. 1205)

A. ELSIs are NIOSH certified for only a few contaminants. NIOSH tests them under most conditions of use. Cartridges and canisters equipped with ESLIs can be used only if they are appropriate for the conditions of the employer's workplace. An example of a workplace condition that may adversely affect an ELSI is where a cartridge equipped with a moisture dependent ESLI is used in an extremely dry atmosphere.

(d)(3)(iii)(B)

Q. Where can change schedules be obtained? (FR p. 1205)

A. Data supporting schedules may be available for certain chemicals and respirator cartridges through respirator manufacturers and suppliers, industry associations and chemical manufacturers.

(d)(3)(iii)(B)

Q. How can an employer develop a change schedule? (FR p. 1206)

A. Employers must develop cartridge change schedules based on available data or information that can be relied upon to ensure cartridges are changed before the end of their useful service life. Workplace factors such as contaminant concentration, presence of other contaminants, airflow through the filter, temperature, and humidity must be

considered. Certain chemicals "migrate" through the sorbent in storage. Employees must be aware of this information as well.

(d)(3)(iv)

Q. Are N95 filters allowed for contaminants with permissible exposure limits below 0.05 mg/m^3?

A. Yes, if oil aerosols are not present, and there are no applicable OSHA standards requiring the use of HEPA filters. If filters are chosen from among those certified under 30 CFR Part 11, which carry the designation TC 21C-xxxx, only HEPA filters can be used.

(d)(3)(iv)

Q. How can an employer determine if the mass median aerodynamic diameter (MMAD) of a contaminant is less than 2 micrometers?

A. Ranges of MMAD for various processes have been reported in published articles. It also is possible to determine ranges through testing. If the MMAD cannot be determined, a HEPA filter, or a filter certified for particulates by NIOSH under 42 CFR part 84 (N95 or higher) must be selected.

Paragraph (e) Medical Evaluation

(e)(1)

Q. Are seasonal or temporary workers exempt from the requirement for medical evaluations? (FR p. 1209-1210)

A. No. The frequency and duration of respirator use and the worker's term of employment, does not affect the requirement for medical evaluation.

Q. Can a fit test for a respirator be performed before the initial medical evaluation has been completed? (FR p.1209)

A. No. The initial medical evaluation must be conducted prior to fit testing to identify individuals whose health may be harmed by the limited amount of respirator use associated with fit testing.

Q. Are employees who use filtering facepiece respirators (dust masks) voluntarily (e.g., for employee comfort) also required to have medical evaluations? (FR p.1190, 1210)

A. No. If the employer has determined that there is no hazard, and dust mask use is voluntary, then no medical evaluation is required. If employers allow voluntary use of this type of respirator, then they must provide the employee the information contained in Appendix D of the standard, and ensure that such respirator use will not itself create a hazard.

Q. Are medical evaluations required for positive pressure, as well as negative pressure, respirators? (FR p.1210)

A. Yes. Clinical studies show that positive pressure respirator use can harm the employee.

(e)(2)(i)

Q. Are physicians the only medical professionals allowed to perform medical evaluations for respirator use? (FR p.1211)

A. No. A variety of health care professionals may do this depending on the scope of practice permitted by the state's licensing, registration, or certification agencies. Each employer must check with the state licensing agency to see if other health care professionals under their state law can independently perform this evaluation, or must do so under the direction of a licensed physician. Attached to this document is a phone listing of all the

State Licensing Boards in the United States, to assist in determining compliance with this provision.

Q. Can a nurse who does not meet the qualifications of a PLHCP assess a questionnaire? (FR p. 1212)

A. A nurse not otherwise qualified to be the PLHCP can perform some tasks, such as distributing the questionnaire, respond to some questions such as providing advice to employees on where they can obtain assistance in understanding or reading the questions, and gathering the completed forms in preparation for delivery to the PLHCP. If the nurse is working under the direction of a physician (or other PLHCP consistent with state law) who will perform the final review of the assessment, then this arrangement is acceptable.

(e)(2)(ii)

Q. Does the employer have to use the exact language of the questionnaire in Appendix C if they choose to evaluate by medical questionnaire? (FR p. 1212)

A. The language of Part A , Appendix C is mandatory if the employer chooses to medically evaluate by questionnaire. The employer may choose a medical examination in lieu of the medical questionnaire.

Q. If the employer chooses to provide physical exams , rather than use the questionnaire, what information must be obtained?

A. The employer who chooses to skip the questionnaire, and instead go directly to an exam shall ensure that the exam obtains the same information as is found in the questionnaire.

Q. May the PLHCP add questions to the questionnaire provided in Appendix C? (FR p. 1283)

A. Yes. Part B of the questionnaire contains 19 optional questions that may be added In addition, the instructions to Part B state that any other questions not listed can be added.

Q. Why do employees have to answer questions about hearing and vision impairments ? (FR 1214)

A. Questions 10 through 15 of Appendix C must only be answered by those who will use full facepiece or SCBA respirators. The configuration of these respirators can further reduce hearing and vision.

Q. If an employee will be wearing an SCBA, does a positive response to any of the items in Questions 10 thru 15 of Part A, Section 2 require a medical exam?.

A. Yes.

(e)(3)(i)

Q. Who determines the scope and form of the medical evaluation if an employee gives a positive response to questions 1 through 8 in Section 2, Part A of the questionnaire? (FR 1214)

A. The PLHCP makes this determination. The PLHCP is also expected to refer the employee to a physician if warranted.

Q. If there is a single positive response on the questionnaire, does that automatically require a face-to-face visit with the PLHCP? (FR p. 1214)

A. No, the scope of the medical evaluation is left to the discretion and professional judgment of the PLHCP. There may be occasions where all that is needed is clarification of an issue by telephone.

(e)(3)(ii)

Q. If a PLHCPs scope of practice is limited to questionnaire evaluation or a basic physical exam, can that PLHCP still be used even though further testing and decision making may be necessary? (FR p.1214)

A. Yes. In some cases where medical issues arise that are beyond the scope of the PLHCP's license, the remainder of the evaluation will need to involve a physician or other authorized health care professional (for example, conducted under the direction of a physician).

Q. Can an employee decline to be medically evaluated for the use of a respirator? (FR p.1220-1221)

A. Paragraph (e)(1) requires the employer to provide a medical evaluation to an employee before the employee uses a respirator in the work place. Therefore, an employee cannot refuse to undergo medical evaluation and continue to use a respirator.

(e)(4)(i)

Q. Who pays for the medical evaluation and any subsequent exams? (FR 1214)

A. The employer must pay for the medical evaluation and any related expenses incurred by the employee during the evaluation, including travel costs.

Q. Does the medical questionnaire have to be administered by a PLHCP? (FR 1214-1215)

A. While the employee must be able to discuss the results of the questionnaire with the PLHCP, the standard does not specify the qualifications of the individual who administers the medical questionnaire.

Q. How does an employer ensure the employee understands the questions on the medical questionnaire if the employee only speaks and/or reads a language other than English? (FR p. 1215)

A. Under these circumstances, the PLHCP can assist the employee in filling out the questionnaire, with the aid of an employer-provided interpreter. The interpreter need not be a professional and can be a bilingual employee, family member, or friend who is fluent in the native language of the person answering the questionnaire. The employer may also have the questionnaire translated into the appropriate language.

Q. What happens if an employee has difficulty reading or understanding the questionnaire? (FR p.1215)

A. The employer must take action to ensure the employee understands the questionnaire. The employer may have the PLHCP assist the employee in filling out the medical questionnaire or go directly to a physical examination.

Q. Why does the questionnaire in Appendix C begin with the question "can you read"? (FR p.1215 & 1282)

A. This question is included to remind those who are responsible for administering and reviewing the questionnaire that employees who cannot read may need additional assistance in completing the questionnaire.

(e)(4)(ii)

Q. How can an employer ensure the employee understands the medical questionnaire while still meeting the requirements of confidentiality? (FR p.1215)

A. Since the medical questionnaire provided in the standard was designed to be easily understood, oversight should not generally be necessary. When employees have questions

about the questionnaire, they must be provided with the opportunity to discuss the questions with the PLHCP.

Q. What procedures should be used to maintain confidentiality if the questionnaire is administered by the employer? (FR p.1215 & 1282)

A. The directions to the employee for answering the medical questionnaire state that the employer must not look at or review their answers. The employee must be instructed on how to deliver or send the completed questionnaire to the PLHCP who will review it. One method for accomplishing this task is for the employer to provide the employee with a stamped envelope addressed to the PLHCP at the time the questionnaire is administered.

(e)(5)(i)

Q. Why does supplemental information need to be provided to the PLHCP? (FR p.1216-1217)

A. When evaluating an employee's medical limitations, the PLHCP may need to consider other workplace variables that may increase pulmonary and cardiovascular stress during respirator use.

Q. Why is there no specific requirement to give the PLHCP a list of substances the employee may be exposed to? (FR 1215-1216)

A. The company's written respiratory program already specifies the exposure conditions that require the use of a respirator. A copy of the written program must be provided to the PLHCP instead. The program will provide the necessary information to the PLHCP without imposing an additional paperwork burden on employers.

Q. Does the PLHCP have to visit the worksite to perform a medical evaluation? (FR p.1217)

A. While it might be helpful for the PLHCP to visit the site, there is no requirement to do so under the standard. The supplemental information required to be provided to the PLHCP by the standard is sufficient for the PLHCP to make a valid recommendation on the employee's ability to wear a respirator.

(e)(5)(ii)

Q. How often must supplemental information be provided to the PLHCP? (FR p.1217)

A. It need only be provided once, unless there are changes in the supplemental information;

in that case updated information must be provided to the PLHCP. If you change PLHCP's, then the employer must assure that all the information has been transferred or that new documents are provided to the new PLHCP.

Q. Can an employer choose to let each employee use their own personal physician to provide a medical evaluation rather than using the employer's PLHCP? (FR p.1217)

A. Yes. This may be a workable system where few employees are involved. The employer will have to contact each of these PLHCPs and provide them with a copy of the Respiratory Protection standard and other required supplemental information, as well as updates when required. The employer shall bear the costs of the evaluation. It is not acceptable for an employee to use their health insurance for this purpose, unless the employer pays 100% of the insurance premiums.

(e)(6)(i)

Q. Who is responsible for determining an employee's ability to use a respirator? (FR p.1218)

A. The responsibility rests with the employer. The PLHCP's opinion regarding the employee's medical ability to wear a respirator is an important element in making the final determination.

Q. Does the PLHCP's opinion on the employee's medical ability to use a respirator have to be in writing? (FR p. 1218)

A. Yes.

Q. If the PLHCP discovers that the employee uses drugs, does the PLHCP have an obligation to tell the employer? (FR p.1218)

A. No. The PLHCP must maintain strict confidentiality on specific medical findings unrelated to the ability to wear a respirator. Information regarding pregnancy, genetic susceptibility, mental health problems, and drug use are not to be revealed to the employer when they result from the medical evaluation process. These findings must remain confidential. How specific medical information is addressed between the employee and PLHCP should be determined by the legal, professional, and ethical standards that govern the PLHCP's practice.

Q. Can the employer maintain a copy of the employee's completed medical questionnaire? (FR p.1218 & 1282)

A. No. The employer must maintain only the PLHCP's written recommendation on an employee's eligibility to wear a respirator. The completed questionnaire and PLHCP's documented findings or diagnosis are confidential and must not be maintained by the employer. An exception is made when the employer's health office is administratively separate from the employer's central administration offices.

Q. How does the PLHCP's opinion affect periodic medical evaluation? (FR p. 1218)

A. The final standard does not automatically require periodic medical reevaluation. It is critical, however, that the PLHCP address this issue in their medical opinion. If there is an underlying medical concern that requires periodic medical reevaluation, it must be included in the written medical opinion so that the employee can be monitored in the future by the PLHCP.

Q. How can the employee obtain a copy of their medical evaluation or the medical questionnaire? (FR p.1218)

A. The employer is required to provide a copy of the written opinion to the employee. The written opinion should be provided by the PLHCP but can be provided by the employer. Requests for copies of the questionnaire should be made to the PLHCP consistent with the requirements of 29 CFR 1910.1020, "Access to Employee Exposure and Medical Records".

(e)(6)(ii)

Q. Does the employer have to provide a powered air-purifying respirator (PAPR) to an employee who can't wear a negative pressure respirator? (FR p.1218-1219)

A. The employer must provide a PAPR if the PLHCP determines that the use of a negative pressure respirator would place the employee at increased risk for adverse health effects and the PLHCP finds that the employee can use a PAPR. If a subsequent medical evaluation finds that the employee is able to use a negative pressure respirator, a PAPR need no longer be provided.

(e)(7)

Q. Does the employer have to medically reevaluate the employee's ability to wear a respirator on an annual basis? (FR 1219)

A. No. There is no annual or periodic requirement for medical reevaluation. The standard lists four conditions that trigger medical reevaluation: an employee reports signs or symptoms related to the ability to wear a respirator; the PLHCP, administrator or

supervisor determine it is necessary; information from the respiratory protection program indicates a need for reevaluation; or a change in workplace conditions substantially increases the physiological burden placed on the employee.(FR p.1219-1220)

Q. Is there a medical removal provision in this standard for persons medically unable to wear a respirator? (FR p.1220)

A. No. The final standard does not include a medical removal provision.

Paragraph (f) Fit testing

(f)(1)

Q. Do all tight-fitting respirators which are required by the employer or by OSHA have to be fit tested? (FR p. 1188, 1189, 1191, 1222)

A. Yes. Both negative pressure and positive pressure tight-fitting respirators must be fit tested.

(f)(1)

Q. Does a Self-Contained Breathing Apparatus (SCBA) require fit testing? (FR p. 1223, 1224)

A. Yes, SCBAs require a fit test. Most workplace use of positive pressure atmosphere-supplying respirators occurs in high hazard atmospheres where a high degree of certainty is required that the respirator is maximally effective. Fit testing of tight-fitting positive pressure facepieces is appropriate to reduce the chance of leakage into the facepiece.

(f)(1)

Q. Do tight-fitting negative pressure respirators that are worn voluntarily require a fit test? (FR p. 1222)

A. No, respirators worn when not required by OSHA or the employer do not require a fit test.

(f)(1)

Q. Do loose-fitting respirators require a fit test? (FR p. 1222)

A. No, loose-fitting respirators do not require a qualitative or quantitative fit test. (FR p.1222)

(f)(2)

Q. Which respirator use requires fit testing? (FR p. 1222, 1223, 1225)

A. Fit testing is required when OSHA or the employer requires employees to wear tight-fitting respirators. The employee must pass a fit test prior to the initial use of the respirator. Additional fit tests are required whenever the employee reports, or the employer, PLHCP, Supervisor or Program Administrator observes changes in the employee's physical condition that could affect respirator fit.

If the employee changes to a different fitting facepiece a new fit test is required. An annual fit test is required after the initial fit test.

(f)(4)

Q. When would the fit of a respirator be unacceptable? (FR p. 1225)

A. A respirator may be unacceptable if it causes irritation or pain to an employee, if the employee is unable because of discomfort to wear the respirator for the time required, or if the employee is unable to maintain proper seal.

(f)(5)

Q. Can an employer use any method of fit testing? (FR p. 1223,1226)

A. No. The employer must use one of the OSHA-accepted qualitative or in some cases quantitative fit test protocol. OSHA-accepted protocols are found in Appendix A of the 29 CFR 1910.134 Respiratory Protection Standard.

(f)(5)

Q. Can an employer develop its own fit testing method?(FR p. 1228)

A. Any new fit testing methods must first meet the acceptance requirements of Section II of Appendix A, before it can be used.

(f)(5)

Q. Does a "user seal check" qualify as a fit test? (FR p. 1188)

A. No, a User Seal Check is a procedure the employee performs each time they don the respirator. The purpose of the User Seal Check is to ensure the respirator is properly seated to the user's face. It is not a substitute for a fit test of a particular type, model, and size of a respirator.

Q. Can a qualitatively fit-tested tight fitting negative pressure air-purifying respirator be used in an atmosphere greater than 10 times the PEL? (FR p. 1227)

A. No. A qualitatively fit-tested tight fitting negative pressure air-purifying respirator can only be used in an atmosphere less than or equal to 10 times the PEL.

(f)(5)

Q. Will OSHA establish a mechanism to evaluate and approve new fit testing methods?

A. The mechanism is already described in Part II of Appendix A of the standard. Parties with a new fit testing method must supply a detailed description of the method as well as data from an independent government research laboratory or from a study published in a peer reviewed industrial hygiene journal supporting the new method's performance. Upon receipt of this information, OSHA will initiate rulemaking to add this method to Appendix A of the Respirator Standard.(FR p. 1221)

(f)(6)

Q. What negative-pressure respirators may be fit tested with a QLFT?

A. Negative-pressure air purifying respirators that will be worn in concentrations that are equal to or less than ten times the Permissible Exposure Level may be fit tested using QLFT. The limitation on the air contaminant concentration is discussed in (f)(7) below.

(f)(6)

Q. Can QLFT be used to test the fit of a full facepiece negative pressure air purifying respirator? (FR p. 1222)

A. The factor that limits the use of QLFT is the concentration of the air contaminant in which it is being worn. If the full facepiece respirator is only being worn in air contaminant concentrations that are equal to or less than ten times the PEL, then QLFT can be used. However, it cannot be used in air concentrations greater than ten times the PEL unless it is fit tested using a Quantitative Fit Test (QNFT).

(f)(6)

Q. How will OSHA deal with an application for a QLFT protocol that measures fit factors greater than 100?

A. If new methods are developed that permit QLFT use for higher fit factors, OSHA may, as part of the acceptance process for these new methods (described in the explanation for (f)(5) above), adjust the present language in (f)(6) appropriately.

(f)(7)

Q. Since the standard does not define the term "assigned protection factor" can an employee wear tight fitting air purifying respirators to concentrations of 100 times the PEL for half facepiece respirators and 500 times the PEL for full facepiece respirators if they are quantitatively fit tested?

A. No. The fit factors of 100 and 500 only define what fit factor is necessary to pass the fit test. The preamble states that the standard incorporates a safety factor of ten because protection factors in the workplace tend to be much lower than the fit factors achieved during fit testing. The use of a safety factor is a standard practice supported by most experts to offset this limitation. The use of safety factors of ten is recommended by a number of experts and is included in the ANSI standard for respiratory protection.

(f)(7)

Q. What are acceptable fit factors for tight-fitting half facepieces and tight-fitting full facepieces respirators that are fit tested using QNFT?

A. The acceptable fit factors are explained in section (f)(7): 100 for a half facepiece and 500 for a full facepiece.

(f)(8)

Q. Does this paragraph require fit testing of positive pressure respirators such as SCBAs, PAPRs, and Supplied Air Respirators (SARs) ? (FR p. 1226)

A. Yes. The standard requires fit testing of the facepiece to check for leakage. The standard allows the employer to conduct the test by using a negative pressure respirator with a facepiece of the same make, model and size as the positive pressure facepiece, or by temporarily converting the facepiece for the positive pressure apparatus to a negative pressure device and performing the fit test.

(f)(8)

Q. Can a tight fitting PAPR be tested simply by not turning the fan motor on?

A. Yes. By not turning on the fan motor, a PAPR would be operating in the negative pressure mode.

(f)(8)

Q. Is there a frequency of use below which fit testing would not be required for atmosphere supplying respirators? Often, emergency SCBAs are available for fire brigade or hazardous substance emergency response personnel, but these personnel may not use the equipment in a hazardous atmosphere for several years.(FR p. 1226)

A. The standard's requirement of annual fit testing applies to emergency response personnel who wear respirators to protect against hazardous atmospheres. Proper fit is especially necessary for emergency personnel.

These people may only wear the equipment infrequently, but when they do use the equipment, they often use it in very dangerous atmospheres.

(f)(8)(iii)

Q. Can a probe hole be drilled in a facepiece to perform QNFT and then the probe hole be sealed so the facepiece can be used on the respirator?

A. No. As the second sentence of section (f)(8)(ii) says, the permanently probed respirator only serves as a surrogate for testing purposes. A face piece with a probe hole drilled in it cannot be restored to its NIOSH-approved configuration.

Q. For quantitative fit testing, must employers still perform three fit tests?

A. No.

Paragraph (g) - Use of Respirators

(g)(1)(i)(A)

Q. Can an employee wear a tight-fitting respirator with a beard or other facial hair? (FR p.1237)

A. No. When respirators are required, an employer is prohibited from allowing respirators with tight-fitting facepieces to be worn by employees who have "facial hair that comes between the sealing surface of the facepiece and the face or that interferes with valve function."

Q. May employees who have facial hair wear respirators? (FR p. 1238)

A. The standard requires employers to take the presence or absence of facial hair into consideration in selecting respirators; different company policies may affect the range of choices available. However, several types of respirators such as loose-fitting hoods or helmets accommodate facial hair.

Q. Does section (g)(1)(i)(A), facial hair, apply to voluntary use?

A. If the employer has determined that there is no hazard, voluntary users are not prohibited by the standard from wearing a beard. Traditionally, good industrial hygiene practice recommends that facial hair that interferes with the face-to-facepiece seal should be avoided.

(g)(1)(i)(B)

Q. What employee conditions prohibit the use of tight-fitting respirators? (FR p. 1238)

A. An employer cannot allow employees who have any condition that interferes with the face-to-facepiece seal or valve function to wear respirators with tight-fitting facepieces. Examples of these conditions include, but are not limited to, missing dentures, the presence of facial scars, the wearing of jewelry, or the use of headgear that projects under the facepiece seal. This provision prohibits employers from placing an employee in a tight-fitting respirator if there is any factor that could prevent an adequate facepiece-to-face seal. Respirator use is permitted where conditions such as missing dentures or facial scars do not prevent an adequate seal.

(g)(1)(ii)

Q. Can corrective glasses, goggles, or other personal protective equipment be used with tight-fitting respirators? (FR p.1239)

A. The standard is written in performance terms so that any particular piece of equipment may be used as long as it does not interfere with the facepiece seal. Corrective glasses or goggles or other personal protective equipment can be used with tight-fitting respirators, but employers must ensure that they are worn in a manner that does not interfere with the seal of the facepiece to the face of the user. Eyeglass inserts or spectacle kits are acceptable if the devices: (1) do not interfere with the facepiece seal; (2) do not cause any distortion of vision; and (3) do not cause any physical harm to the wearer during use.

(g)(1)(ii)

Q. What does OSHA mean by "other personal protective equipment"? (FR p. 1239)

A. "Other personal protective equipment" applies to faceshields, protective clothing, and helmets, as well as to any other form of personal protective equipment that an employee may wear that could interfere with safe respirator use.

(g)(1)(ii)

Q. May employees wear contact lenses with respirators ? (FR p. 1239)

A. Contact lenses may be used with respirators. OSHA's review of the record identified no evidence that the use of contact lenses with respirators increases safety hazards. Employers who have employees who wear corrective eyewear must be sure that the respirator does not interfere with the eyewear, make it uncomfortable, or force the employee to remove the eyewear. Employers should use the respirator selection process to make accommodations to ensure that their respirator-wearing employees can see properly when wearing these devices.

(g)(1)(iii)

Q. What procedures must be followed to perform a "user seal check"? (FR 1239)

A. The "user seal check" procedures in Appendix B-1 or equally effective procedures recommended by the respirator manufacturer must be used.

The positive/negative user seal checks described in Appendix B-1 cannot be performed on some tight-fitting respirators by employees with small hands who cannot block off the valves. Some manufacturers make a fit check cup that can be used to perform a user seal check with filtering facepiece respirators. The final rule allows for the use of the methods in Appendix B-1 as well as manufacturers' recommended procedures for user

seal checks where these are equivalently effective. This means that respirator manufacturers' recommended procedures may be used for user seal checking if the employer demonstrates that the manufacturer's procedures are as effective as those in Appendix B-1 of the standard. The "equally effective" phrase ensures that the procedures used have been demonstrated to be effective in identifying respirators that do not seal properly when donned or adjusted.

OSHA does not permit the use of respirators that cannot be seal checked. If no method exists to check whether a respirator re-seals during multiple re-donnings, under actual workplace conditions, OSHA does not consider the respirator acceptable for use.

(g)(1)(iii)

Q. What does OSHA mean by "...ensure that employees perform "user seal checks"..."? (FR 1240)

A. It is not OSHA's intent that each employee be continually monitored. Employers are required to take actions that will result in appropriate employee use. These actions consist of: rules with sanctions, training employees in the required use, and exercising reasonable care in monitoring the safety behavior of employees.

(g)(2)(i)

Q. What is meant by "..appropriate surveillance..."? (FR p.1240)

A. This means that employers are required to evaluate workplace conditions routinely so that they can provide additional respiratory protection or different respiratory protection, when necessary. By observing respirator use under actual workplace conditions, employers can note problems such as changes in the fit of a respirator due to protective equipment or conditions leading to skin irritation. The employer can then make adjustments to ensure that employees continue to receive appropriate respiratory protection.

(g)(2)(ii)

Q. When employees must leave the respirator use area where are they supposed to go? (FR p. 1241)

A. Employers must ensure that employees are allowed to leave the respirator use area in several circumstances. The intent of this requirement is to ensure that employees leave the area where respiratory protection is necessary when they need to remove the respirator or where it appears that the respirator is not functioning properly. The final standard stipulates that, in these circumstances, employees are to leave the "respirator use" area, which does not always equate with the work area or workplace. This language is intended to give employers the flexibility to establish safe areas in their workplaces that will minimize interruptions in work flow and production while ensuring that the area

where respirators are removed is free of respiratory hazards or contamination.

(g)(2)(iii)

Q. When do respirators have to be replaced or repaired? (FR p. 1241)

A. The employer must replace, repair, or discard a respirator that is not functioning properly. This requirement applies in addition to the provisions in paragraphs (d) and (h) of this section that address the routine replacement of respirators and respirator parts. A malfunctioning or otherwise defective respirator must be replaced or repaired before the user returns to the work area. Employees must receive the necessary protection whenever they are in a respirator use area, and employers must ensure that employees in the respirator use area are wearing respirators that are in good working order. This is a performance-oriented approach to the replacement, repair, or discarding of respirators, and focuses on the need for respirators to function properly to provide protection to employees.

(g)(3)(i)

Q. For all IDLH entry, how many employees must be located outside an IDLH atmosphere.

A. Environments containing IDLH atmospheres are frequently well-enough understood and controlled that a single standby person is adequate. In most fixed workplaces, the atmosphere is known, i.e., has been well defined either through analysis of monitoring results or through a process hazard analysis. In many industrial IDLH situations, only one respirator user is exposed to the IDLH atmosphere at a time, which means that a single standby person can easily monitor that employee's status. (when needed, the standard requires more than one employee outside) Even in situations where more than one respirator user is inside an IDLH atmosphere, a single standby person can often provide adequate communication and support. For example, in a small pump room or shed, even though two or three employees may be inside an IDLH atmosphere performing routine maintenance activities such as changing pump seals, one standby person can observe and communicate with all of them. In this type of situation, one standby person is adequate and appropriate, as long as the employee(s) outside is able to perform an effective rescue..

There are instances where more than one standby person is needed, however. The requirement for standby personnel is performance-oriented: "one employee or, when needed, more than one employee must be located outside the IDLH atmosphere." For example, to clean and paint the interior of a multi-level, multi-portal water tower, a process that often generates a deadly atmosphere as a result of cleaning solution and paint solvent vapors, employees often enter the tower through different portals to work on different levels. In such a situation, there will be a need for good communications at each entry portal, and more than one standby person would be needed to maintain adequate communication and accessibility.

(g)(3)(iv)

Q. What does OSHA require in the situation where the standby person must enter an IDLH atmosphere to provide emergency rescue? (FR p.1244)

A. The employer has flexibility in determining who will respond to such emergency rescue situations. The employer or authorized designee must be notified before the standby personnel undertake rescue activity and the employer or designee must then provide appropriate assistance for the particular situation. The employer must ensure that before entering an IDLH environment to provide emergency rescue, standby personnel notifies the employer or the employer's designee who has been authorized by the employer to provide necessary assistance that they are about to enter. The employer will have determined, in advance, as part of the written respirator program's worksite-specific procedures, the procedures that standby personnel will follow and whom they specifically need to notify in rescue situations. The employer's emergency response team may provide the necessary support, or other arrangements may have been made with local firefighting and emergency rescue personnel.

(g)(3)(v)

Q. Must the standby person(s) wait for a backup before beginning rescue operations? (FR p.1244)

A. Normally, standby personnel must contact the employer or employer's designee before undertaking any rescue activities in an IDLH atmosphere. The employer or authorized designee must take responsibility for ensuring that rescue operations are carried out appropriately, that rescuers are provided with proper respiratory equipment, and that employees are prepared to facilitate rescue attempts through proper preparation. However, the notification provision does not require standby employees to delay entry as they attempt to contact the employer or wait indefinitely for their employer or designee to respond to notification before entering the IDLH atmosphere when employees inside are in danger of succumbing and standby personnel are appropriately trained and equipped to provide assistance.

In the majority of cases, however, rescuers should not enter the IDLH environment until receiving some response to the notification that rescue is necessary, i.e., the employer or designee should know that the rescuers are entering, and emergency response units should be on their way to the incident.

Once the employer or designee has been notified the employer or designee who is authorized to do so must provide the necessary assistance appropriate to the situation. Such assistance does not always require that additional standby personnel enter the hazardous atmosphere. In some cases, the appropriate assistance could be, for example, the provision of emergency medical treatment. If standby employees do need to enter the

hazardous environment to perform rescue operations, however, the employer must ensure that those rescuers are fully protected.

(g)(3)(vi)

Q. What equipment must be available for rescue efforts? (FR p.1245)

A. Standby personnel must have appropriate equipment to minimize the danger to themselves during rescue efforts. They must be equipped with pressure demand or other positive pressure SCBA, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA. The requirements that address appropriate retrieval equipment and means of rescue are written in performance-based language. Established rescue procedures are well-known, and retrieval equipment is readily available. Retrieval equipment must be used unless its use would increase the overall risk associated with entry into or rescue from the IDLH environment. Situations exist in which retrieval lines (harnesses, wristlets, anklets) may pose an entanglement problem, especially in areas in which air lines or electrical cords are present in the work areas in which the IDLH atmosphere occurs. Most of the time, however, rescue with retrieval equipment is effective, and much safer for the rescuers.

(g)(4)

Q. Who must comply with "two-in, two-out"?

A. The Federal Respiratory Protection Standard applies directly to private sector workers engaged in firefighting, including those working in industrial fire brigades and private incorporated fire companies, and to Federal employees covered under Section 19 of the Occupational Safety and Health Act. Federal OSHA's jurisdiction does not extend to employees of State and local governments; however, States that have chosen to operate OSHA-approved occupational safety and health State plans are required to extend their jurisdiction to these workers. Therefore, **public sector firefighters are covered only in the 23 States and two Territories which have chosen to operate their own OSHA-approved State programs**. These States and Territories are: Alaska, Arizona, California, Connecticut, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, New York, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Virgin Islands, Washington and Wyoming.

States with OSHA plans are required to adopt a standard at least as effective as the Federal standard within six months of Federal promulgation and must cover public sector employees. **Coverage of volunteers varies by State and depends on State law.** State and local government employees in States which do not operate OSHA-approved State plans are not covered by these requirements, unless the requirements are voluntarily adopted for local applicability.

Q. What is the difference between incipient stage firefighting and interior structural firefighting? How can one tell when the"two-in, two-out" requirement takes effect?

A. The "two-in, two-out" requirement does not take effect until firefighters begin to perform interior structural firefighting. Interior structural firefighting is firefighting to control or extinguish a fire in an advanced stage of burning inside a building. Because the fire is producing large amounts of smoke, heat and toxic products of combustion, exposure of firefighters is extremely hazardous and is considered an "immediately dangerous to life or health" (IDLH) environment.

Incipient stage firefighting, on the other hand, involves the control or extinguishment of a fire in the initial or beginning stage, using portable fire extinguishers or small hose lines without the need for personal protective equipment. Interior incipient fires expose firefighters to limited amounts of smoke and heat. Firefighters can approach and extinguish these fires without the need for self-contained breathing apparatus and, sometimes, without turnout gear.

It is the incident commander's responsibility, based on training and experience, to judge whether a fire is an interior structural fire, and how it will be attacked.

Q. If firefighters put on respiratory protection, does that mean that an Immediately Dangerous to Life or Health (IDLH) atmosphere exists, and that "two-in, two-out" applies?

A. Not necessarily. **Respiratory protection and "two-in, two-out" are required in all interior structural firefighting situations. Interior structural fires are considered to be IDLH atmospheres**. However, the use of respiratory protection does not, by itself, invoke the requirements associated with an IDLH atmosphere. The use of a self-contained breathing apparatus could be unrelated to exposure to an IDLH atmosphere associated with an interior structural fire. For example, many fire companies require that firefighters put on respiratory protection while on their way to the fire. It may later be determined that the fire is still in the incipient stage, and therefore not an IDLH atmosphere. It is only when firefighters are engaged in interior structural firefighting that the use of respirators is mandatory and the "two-in, two-out" requirement applies.

Q. Must the number of firefighters stationed outside always equal the number of firefighters sent inside to conduct interior structural firefighting?

A. No. There must always be at least two firefighters stationed outside during interior

structural firefighting, prepared to enter if necessary to rescue the firefighters inside. However, the incident commander has the flexibility to determine whether more than two outside firefighters are necessary when more than two firefighters go inside. In a situation where the burning structure is very large, additional outside firefighters may be warranted to ensure effective assistance and rescue. For example, where the firefighting involves entry from different locations or levels, two outside firefighters may have to be stationed at each point of entry.

Q. What duties may the outside firefighters perform in addition to monitoring the inside firefighters?

A. One of the outside firefighters must actively monitor the status of the inside firefighters and may not be assigned additional duties. The second outside firefighter may be involved in a wide variety of activities. Both of the outside personnel must be able to provide support and assistance to the two interior firefighters; any assignment of additional duties for the second firefighter must be weighed against the potential for interference with this requirement. OSHA cannot describe all specific compliance scenarios with a performance oriented standard. From OSHA's perspective, proper assignment of firefighting activities at an interior structural fire must be determined on a case-by-case basis and are dependent on the existing firefighting situation.

Some examples of other activities or duties that are commonly performed by firefighters and may be performed by one of the outside team members include: pump operations, incident command, the feeding and direction of hose to the entry team, hydrant operations, and outside hose line operation. Factors such as the distance of an individual from the entry point into the involved structure, training and equipment provided to the individual, and the existence of an immediate communication link between the individual and the firefighters entering the structure should be considered in making the assignment. Outside firefighters assigned additional duties must be able to immediately discontinue their other work assignments to perform rescue. Rescue and personal protective equipment must be available to outside firefighters so that there will be no delay in performing rescues. Compliance will always depend on consideration of all the worksite variables and conditions, and the judgement of the incident commander is critical in meeting this performance standard.

Q. Must firefighters wait until four workers are assembled before attempting to rescue victims inside the burning structure?

A. No. There is an explicit exemption in the respiratory protection standard that if life is in jeopardy, the "two-in, two-out" requirement is waived. The incident commander and the

firefighters at the scene must decide whether the risks posed by entering an interior structural fire prior to the assembly of at least four firefighters is outweighed by the need to rescue victims who are at risk of death or serious physical harm. There is no violation of the standard under rescue circumstances.

Q. Is "two-in, two-out" a staffing requirement?

A. No. The "two-in, two-out" requirement is and has been standard practice in the firefighting community for many years, and reflects only the number of firefighters who must be on the scene prior to initiating the interior attack on an interior structural fire. "Two-in, two-out" is strongly supported by an analysis of information from the International Association of Fire Fighters, the National Fire Protection Association, and existing OSHA standards and interpretations. OSHA's respiratory protection standard codifies recommended practice. It does not require fire departments to hire additional firefighters; it does not require four-person fire companies; it does not require four persons on a fire truck. Most fire departments have more than four firefighters and can assemble the numbers required on the scene by waiting for others to arrive. During this time the fire may be attacked from the outside, sizing-up operations may occur, and emergency rescue necessary to save lives may take place. Additional staff can be assembled by such means as calling for a second fire company at the scene, calling in additional firefighters who are on standby, and calling on other nearby fire departments when necessary. It is anticipated that small fire departments may rely on "mutual aid" agreements with neighboring jurisdictions to supply additional firefighters to assist with interior structural firefighting, if that is necessary to ensure compliance with "two-in, two-out." The intent of the "two-in, two-out" rule is a worker safety practice requirement, not a staffing requirement.

Paragraph (h) Maintenance and Care of Respirators

(h)(1)

Q. Does OSHA require the employer to provide company time to employees to clean and maintain the respirators assigned for their exclusive use?(FR p. 1250)

A. The employer is allowed to choose the cleaning and disinfecting program the best meets the requirements of the standard and the particular circumstances of the workplace. It is OSHA policy that if the employer elects to have employees clean their own respirators, the employer must provide the cleaning and disinfecting equipment, supplies, and facilities, as well as time for the job to be done. Failure to provide the equipment, supplies, facilities, or the on-the-job time to clean the respirators would be a violation of paragraph (h)(1).

(h)(1)

Q. If an employer provides a respirator to an employee at the request of the employee(volunteer use) or in the event that the employee brings his/her own respirator into the workplace (volunteer use) must the respirator be cleaned and disinfected?

A. Yes, cleaning and disinfection would be necessary so as to prevent the use of the respirator from presenting a health hazard to the employee using it. For example, an unsanitary respirator may pose a skin disorder to the employee wearing it.

(h)(1)

Q. Can alcohol wipes be used to clean the inside of the face pieces of respirators?

A. Yes, if permitted by the manufacturer of the respirator. It should be noted that Appendix B-2 of the standard has guidance on appropriate respirator cleaning and disinfecting procedures.

(h)(1)

Q. What is meant by "equivalent effectiveness" when comparing cleaning and disinfection procedures found in Appendix B-2 versus the procedures recommended by the respirator manufacturer? (FR p.1248)

A. "Equivalent effectiveness" simply means that the procedures used must accomplish the objectives set forth in Appendix B-2, i.e., must ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

(h)(1)

Q. Who can clean and disinfect respirators? (FR p. 1249)

A. The employer is allowed to choose the cleaning and disinfecting program the best meets the requirements of the standard and the particular circumstances of the workplace. In other words, the employer can have respirators cleaned and repaired in a centralized type operation where respirators are passed out to employees OR the employer may require the respirator user to handle all cleaning and respirator maintenance functions. What ever method the employer chooses, respirator cleaning, disinfection, and repair activities must be performed by employees who are adequately trained in the proper respirator care procedures.

(h)(1)(i)

Q. Did OSHA intend a set time or frequency when it stated that respirators that are issued for the exclusive use of an employee shall be cleaned and disinfected as often as necessary to be maintain in a sanitary condition?(FR p. 1249)

A. The standard is written in performance language, so the decisions must be made on a case-by-case basis. The employer should pay particular attention to where the respirator is stored during breaks and lunch and the extent to which the respirator is protected between each wearing, to determine if the respirator is maintained in a sanitary condition. A respirator worn by employees working in a very dusty environment and left hanging on a nail in the workplace would need cleaning each time it is donned. The respirator must be checked and cleaned as often as necessary to ensure that the respirator continues to function properly.

(h)(2)(i)

Q. Is there any additional guidance as to what constitutes acceptable respirator storage conditions besides what is required in subparagraph (h)(2)(i) on storage?

A. Questions about appropriate storage of respirators, such as protection against excessive moisture, extreme temperatures, damaging chemicals, etc. can best be addressed by the employer contacting the respirator manufacturer to determine what if any additional specific recommendations are warranted for the workplace-specific use of the respirator(s).

(h)(2)(ii)(B)

Q. What is acceptable storage of emergency respirators such as SCBA's used on fire trucks for firefighters? (FR p. 1250)

A. The standard allows emergency use respirators to be stored in compartments OR in covers, both of which must be clearly marked as containing the emergency respirators. Brackets with covers that are mounted on a wall or to a stable surface (e.g. on a fire

truck) may be used to store emergency respirators so long as the respirator is secured and covered to prevent damage when not in use.

(h)(3)

Q. What constitutes a minimally acceptable inspection of a respirator? (FR p. 1251)

A. For ALL respirators the employer must ensure that the following items are included in the visual inspection : a check of respirator function, tightness of connections and the condition of the various parts, including but not limited to, the face piece, head straps, valves, connecting tube, and cartridges, canisters, or filters, and a check of the respirator's elastic parts for pliability and signs of deterioration. At the minimum, the employer should follow the manufacturer's instructions that accompany the respirator.

Self-contained breathing apparatus (SCBA) type respirators require an inspection of the air and oxygen cylinders to assure that the cylinder pressure is maintained at or above 90% of the manufacturer's recommended pressure level and that the regulator and low pressure warning devices function properly. To assure that both the regulator and low pressure warning devices function properly the warning device must be activated and heard by the person performing the inspection.

For respirators that are available for emergency use: the employer must certify in writing, on a tag or label attached to the storage compartment, that an inspection was performed and include, the name (or signature) of the person who made the inspection, the findings of the inspection, any remedial action, and a serial number or other means of identifying the inspected respirator.

(h)(3)(i)(B) & (h)(3)(ii)(A)

Q. What is meant by "a check of respirator function" under paragraph (h)(3) dealing with respirator inspection?(FR p. 1251)

A. OSHA does not intend that the respirator be physically placed on the employee to ensure that it is working properly. Visual inspection can detect factors that would interfere with proper performance, e.g. distortion in shape (often the result of improper storage), missing or loose components, blockage, and improper connections. Alarms can also be examined without actually putting the respirator on the employee. In addition, examining elastic parts for pliability and signs of deterioration, as required in (h)(3)(ii)(B), can be performed without wearing the respirator.

(h)(3)(i)(C)

Q. What does OSHA require for the inspection of emergency escape-only type respirators?(FR p. 1251)

A. Emergency escape-only respirators must be inspected before being carried into the workplace for use. These types of respirators (e.g. mouthbit type respirators) are carried in by the individual worker into the workplace for personal use in an emergency, and must be inspected for proper condition prior to being carried into the workplace. The monthly inspections are no longer required.

(h)(3)(iii)

Q. Why was **90%** "of manufacturer's recommended pressure level" chosen as the minimum pressure level for SCBA's cylinders? (FR p. 1251)

A. OSHA selected the **90%** level to "ensure that sufficient air remains in the cylinder to allow emergency responders to perform their required duties in the contaminated or oxygen-deficient atmosphere, and still have air available to escape from these conditions." The **90%** level was also recommended by the American Industrial Hygiene Association.

(h)(3)(iii)

Q. Do the air or oxygen cylinders for SCBA's have to be inspected monthly even if they are not available for immediate use?

A. No, as long as the cylinders are out-of-service and not available for employees to use under <u>any</u> circumstances.

(h)(3)(iv)(A)&(B)

Q. Do the certification and tag or label requirements of these paragraphs apply to emergency escape type respirators that are stored in the workplace?

A. Yes.

(h)(4)

A. What is an example of a way of ensuring that respirators that fail an inspection or are otherwise found to be defective are removed from service and not used?(FR p.1252)

Q. The employer could use a tag system where a tag stating "out of service" is placed on the respirator to help ensure that a defective respirator is not inadvertently used.

(h)(4)(i)

Q. What would constitute an "appropriately trained" person who is responsible for performing repairs or adjustments to respirators?(FR p. 1252)

A. The use of the term 'appropriately trained' refers to an individual who has received training from the manufacturer or otherwise has demonstrated that he/she has the skills to return the respirator to its original state of effectiveness.

(h)(4)(iii)

Q. Can any employee repair the respirator reducing or admission valves?

A. No. These are two types of valves found in atmosphere-supplying respirators. They are used in conjunction with the respirator's regulator to provide the respirator wearer with proper pressure and flow of air supply. These valves serve such a critical function and the respirator standard requires that these parts be returned to the manufacturer or given to an appropriately trained technician for adjustment or repair.

Paragraph (i) Breathing air quality and use.

(i)(1)

Q. What are employers required to do to ensure that breathing air is of high purity? (FR p. 1252)

A. Paragraph(i) provides standard references which establish parameters for breathing air quality. Compressed and liquid oxygen are required to meet the specifications for breathing air outlined by the United States Pharmacopoeia (USP); compressed air, at a minimum, is required to meet the specifications outlined in the ANSI/Compressed Gas Association (CGA) Commodity Specification for Air, G-7.1-1989 for Grade D breathing air. Cylinders of purchased breathing air must have a certificate of analysis for purchased breathing air quality obtained through the supplier.

Q. What guidance is available for determining adequate air quantity and air flow for atmosphere-supplying respirators?

A. The NIOSH respirator certification standard, 42 CFR Part 84 can provide additional guidance. Compressed air sources must have the capacity to provide an adequate supply of breathing air. Since each airline respirator requires a minimum of 4-6 cubic feet per minute (cfm) air, compressed air sources should be sized to provide at least this amount of air for each respirator at the operating pressure specified for the particular respirator(s) in use. Proper air flow can then be verified by monitoring airline pressure. The NIOSH respirator certification process establishes the proper air pressure required for each particular respirator and airline combination. If the air pressure is within the proper range, the air flow should also be correct. For this reason, an air pressure gauge should be installed at the point where the airlines are connected to the air supply manifold.

Q. What are the minimum specifications for Grade D breathing air? (FR p. 1252 - 1253)

A. The ANSI/CGA G.7-1 - 1989 specifies the contents of Grade D breathing air as: oxygen (volume/volume) of 19.5 to 23.5 %; hydrocarbon (condensed) of 5 mg/m^3 of air or less; carbon monoxide of 10 parts per million (ppm) or less; carbon dioxide of 1,000 ppm or less; and a lack of a noticeable odor.

(i)(2)

Q. Why is the use of compressed oxygen or utility oxygen prohibited in atmosphere-supplying respirator systems which have previously used compressed air? (FR p. 1253)

A. The use of compressed air can introduce oil and grease into the air lines. This provision is intended to reduce the potential for fire and explosion which can occur where high pressure oxygen comes in contact with residual oil or grease.

(i)(3)

Q. When may oxygen in greater concentrations than 23.5 % be used in supplied air systems? (FR p. 1253)

A. To avoid the potential for fire and explosions, oxygen in greater concentration than 23.5% may only be used with equipment designed specifically for oxygen service or distribution.

(i)(4)(i)

Q. What regulations apply to the handling, testing, and storage of cylinders used to supply breathing air to respirators? (FR p. 1253)

A. Cylinders must be constructed, tested and maintained in accordance with the Shipping Container Specification Regulations of the Department of Transportation (DOT) 49 CFR Parts 173 and 178. These regulations are also required for NIOSH certification. The in-plant handling and storage of compressed gas cylinders must be in accordance with 29 CFR 1910.101(b) which incorporates by reference CGA Pamphlet P-1-1965.
(Note: Air receivers used to supply breathing air must be maintained in accordance with 29 CFR 1910.169 Air receivers.)

(i)(4)(ii)

Q. Is the employer required to obtain a certificate of analysis from the supplier for every cylinder of breathing air that is purchased, documenting that the contents and quality meet the requirements of Grade D breathing air? (FR p. 1253)

A. No, the supplier could provide one certificate for a lot or batch of cylinders that were all filled the same day, using the same source.

(i)(4)(iii)

Q. If an air compressor used to fill breathing air cylinders does not meet the minimum moisture content in the cylinders(not to exceed the dew point of -50" F/-45.6" C at 1 atmosphere pressure) will OSHA require the facility to purchase a new compressor to meet this specification?

A. This requirement prevents respirator valves from freezing which can occur when excess moisture accumulates on the valves. Most compressors can be retrofitted with specially designed water traps similar to those used for air compressors supplying self-contained

underwater breathing apparatus (SCUBA) systems. Contact the manufacturer of the compressor to determine if this option is available.

(i)(5)

Q. Are there any restrictions on the placement of compressors supplying breathing air? (FR p. 1254)

A. Yes. The location of the compressor intake is critical to the purity of air supplied to the respirator user. The compressor must be located in an area uncontaminated by either combustion exhaust gases produced by vehicles or the compressor motor itself (if applicable), or by other gases from plant processes.

Q. OSHA requires compressors to be equipped with suitable in-line air-purifying sorbent beds and filters to ensure breathing air quality. What does "suitable" mean? Do all compressors which supply breathing air have to be equipped with sorbent beds and filters? (FR p. 1254)

A. The term suitable means that the compressor is capable of delivering a continuous supply of Grade D breathing air. On some compressors, especially those that are oil-lubricated, in-line sorbent beds and filters will need to be installed and maintained to ensure Grade D air. To further ensure breathing air quality, the air-purifying sorbent beds and filters must be changed according to the manufacturers' instructions. Other compressors, such as some ambient air movers, may be capable of delivering Grade D air without the addition of sorbent beds and filters.

Q. Tags that contain the signature of the person authorized by the employer to change the in-line sorbent beds and filters and the date of the change shall be maintained at the compressor. Must all the tags be retained under the OSHA recordkeeping requirements? (FR p.1254 - 1255)

A. No, only the tag containing the most recent change must be kept at the compressor.

(i)(6) & (7)

Q. Do all air compressors used to supply breathing air have to have a carbon monoxide alarm? (FR p. 1255 - 1257)

A. A compressor that is not oil lubricated is not required to have an alarm. However, the employer must ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm. Methods for ensuring that the carbon monoxide level does not exceed 10 ppm include the placement of the air intake for the compressor in an area known to be free

from contaminants, frequent or continuous monitoring of the breathing air supply, the use of carbon monoxide filters, or the use of high temperature alarms or shut off devices where necessary.

For an oil lubricated air compressor carbon monoxide can be produced where oil enters into the compression chamber and is partially combusted. Carbon monoxide can also enter the air intake for the compressor if the intake is not properly located. This type of compressor must have either a carbon monoxide alarm, high temperature alarm, or both. If only a high temperature alarm is used then the breathing air must be tested for the presence of carbon monoxide at intervals sufficient to ensure that carbon monoxide levels do not exceed 10 ppm.

Q. Is it required for an employer to monitor for the presence of carbon monoxide if the employer is using a oil-lubricated compressor equipped with a high temperature alarm or automatic shutoff device?

A. Yes, carbon monoxide which enters the compressor due to an improperly located air intake would not be detected by a high temperature alarm. Also, the location of high temperature alarms on air compressors can vary and are typically placed to protect the equipment from damage due to overheating. When the alarm sounds, depends on the location of the alarm sensor.

Q. What type of testing equipment is available to test for the presence of carbon monoxide?

A. Common methods of measuring carbon monoxide include the use of chemical detector tubes or direct reading instruments employing electrochemical sensors. When using a detector tube to test for the presence of carbon monoxide, either a "grab" sample of the breathing air may be tested or the air may be sampled directly using a specialized kit available by several manufacturers. The tube reading error for most low range carbon monoxide detector tubes ranges from 10 - 15 %. Electrochemical sensors can be used for periodic and continuous monitoring of breathing air for the level of carbon monoxide. These sensors must be calibrated periodically (typically on a monthly basis) to perform accurately. The measurement error reported for most electrochemical sensors is 5%.

Q. May the carbon monoxide filters with color-change indicators which convert carbon monoxide to carbon dioxide be used to detect the presence of carbon monoxide in breathing air? (FR p. 1255 - 1256)

A. No, the color change in the indicator is a warning of the presence of moisture in the

breathing air that is trapped in the filter. Moisture can render the filter ineffective. Thus, the color-change indicator cannot be used to detect the presence of carbon monoxide.

Q. How often should the employer test breathing air which is supplied by a compressor for the presence of carbon monoxide?

A. The frequency of monitoring will depend on the breathing air system in place in the facility, adherence to required maintenance procedures, and the location of the air intake for the compressor. For example, keeping in mind that a given measurement represents only that instant in time and must be representative of long-term air quality, periodic monitoring may be appropriate in situations where the compressor is well maintained and the air intake for the compressor is located in an area free from contaminants. In contrast, continuous monitoring would be warranted for older compressors where oil blow-by is more likely due to piston ring and cylinder wear, or in situations where rental compressors are used and/or the maintenance history is not known.

Q. Under the previous standard, OSHA required that the compressor be equipped with a "receiver of sufficient capacity to enable the respirator wearer to escape from a contaminated atmosphere in the event of compressor failure". Why was this provision dropped from the new standard? (FR p. 1254)

A. Paragraph (d)(2) of the new standard requires that respirators used in IDLH situations be either a SCBA or an airline respirator equipped with an auxiliary escape air supply. This requirement eliminates the need for a compressed air receiver. (Ambient air movers, small compressors that are not oil lubricated and have no air receiver, are considered to be compressors and fall under the requirements of paragraph (i)).

(i)(8)

Q. May the same air line couplings be used on both breathing air lines and worksite airlines used to pneumatically power other industrial equipment ? (FR p. 1257)

A. No, all couplings for breathing air must be incompatible with couplings and outlets for non-respirable compressed air and other gases used at your workplace. This provision is intended to prevent the cross-contamination and introduction of hazardous contaminants into breathing air lines.

Q. May nitrogen be used to purge or blow out the breathing air lines ? (FR p. 1257)

A. No, to prevent the contamination of breathing air lines with a non-respirable gas, the

standard specifically prohibits the introduction of an asphyxiating substance such as nitrogen into breathing air lines under any circumstance.

(i)(9)

Q. May breathing gas containers be labeled in accordance with the American National Standard (ANSI) Method of Marking Portable Compressed Gas Containers to Identify the Material Contained, Z48.1-1954(Revised 1971)? (FR p. 1257)

A. Yes, the standard requires that breathing gas containers be marked in accordance with the NIOSH respirator certification standard, 42 CFR Part 84. The ANSI standard as well as the Federal Specification BB-A-1034a, 1968, and the Federal Specification GC-13-00676b, 1976 have been incorporated by reference by NIOSH in 42 CFR Part 84.

Paragraph (j) Identification of filters, cartridges, and canisters

Q. Why does OSHA require that the employer ensure that the NIOSH label is not removed, obscured, or defaced while in service?

A. The NIOSH label serves several purposes. It ensures selection of appropriate filters for the contaminants encountered in the workplace and permits the employee using the respirator to check and confirm that the respirator has the appropriate filters before the respirator is used. Color coding and labeling allow fellow employees, supervisors, and the respirator program administrator to readily determine that the employee is using the appropriate filters.

Q. Would dust, dirt, paint overspray, or other substances on the label cause the employer to be cited if the label is still legible?

A. No. The label only needs to be legible. The employer may adopt whatever procedures are appropriate to ensure that the label remains on the filter and is not removed, defaced, or obscured during respirator usage.

Paragraph(k) Training and Information

(k) Introduction

Q. Is the annual retraining required by the standard expected to be a full retraining exercise?

A. The annual retraining must address each element required by this section. Emphasis in the training elements can vary based on the need of the worksite and knowledge of the workers.

Q. Does the standard specify the format or method of training?

A. The standard is performance oriented with respect to the format of training. The employer may use whichever training method is effective for the particular worksite provided the method addresses the required topics. Thus, the employer may use audiovisual and slide presentations, classroom discussion, informal discussions during safety meetings, etc., or a combination of these methods.

Q. May an employer use computer-mediated training?

A. Yes. However the employer must ensure that training is conducted in a manner that is understandable to the employee.

(k)(1)

Q. How can the employer comply with the section (k)(1) requirement that the employer ensure that the employee demonstrates an understanding of the information communicated during the training program ?

A. The employer can comply with this provision by asking the employee, either in writing or orally, about the required information and by observing the employee's hands-on use of respirators. The employer is not required to have written documentation.

(k)(1)(i)

Q. What type of information would be discussed when a employer explains to the employee why the respirator is necessary, as required in section (k)(1)(i) of the standard?

A. The type of information involved would include the nature, extent, and effects of the respiratory hazards. This includes identification of the hazardous chemicals involved, what contaminant levels the employee would breathe if no respiratory protection were used, and what the potential health effects of that exposure would be. Training

concerning the health effects of hazardous chemicals is also required under the Hazard Communication standard. Training under the Hazard Communication standard could help satisfy this portion of the training under the respirator standard.

(k)(1)(ii)

Q. What type of information would the employer transmit to the employee concerning the limitations and the capabilities of the respirator, as required in section (k)(1)(ii) of the standard?

A. A discussion of the limitations and capabilities of the respirator would address how the respirator operates. This would include an explanation of how the respirator provides protection by filtering the air, absorbing the vapor, or providing clean air from an uncontaminated source. Where appropriate, it should also include limitations on the equipment such as prohibitions against using air-purifying respirators in case of an emergency in IDLH atmosphere, and an explanation of why they should not be used in such situations.

(k)(1)(iii)

Q. What type of information must the employer provide concerning respirator use in emergency situations, as required in 29 CFR 1910.134(k)(1)(iii)?

A. The training program must discuss different emergency situations as appropriate to the facility such as respirator malfunctions, changes in work routines, and emergency situations that require the use of a different respirator.

(k)(1)(iv)

Q. What type of information would the employer transmit to the employee concerning how to inspect and check the respirator?

A. This would include the steps that employees are to follow if they discover any problems during the inspection, i.e., to whom they should report problems and where they can obtain replacement equipment if necessary. If the employer routinely has extensive inspections done by separate personnel then the standard does not require that individual respirator wearers be trained how to do full inspections. Training the employees in only those parts of the inspection process that they are expected to do is sufficient. The training must also include the procedures for donning and removing the respirator, checking the fit and seals, and using the respirator.

Employees are to be trained in how to check the respirator seal. Employers must train employees in the methods set forth in Appendix B or in alternative methods that are equally effective.

(k)(1)(v)

Q. How extensively must the employees be trained concerning the maintenance and storage of respirators?

A. Where employees perform some or all respirator maintenance and store respirators while not in use, detailed training in maintenance and storage procedures may be necessary. In other facilities, where specific personnel or central repair facilities are assigned to perform these activities, most employees may need only to be informed of the maintenance and storage procedures without having to learn significant technical information.

(k)(1)(vi)

Q. What type of information would the employer provide concerning recognition of the medical signs and symptoms that may limit or prevent the effective use of respirators as required in section (k)(1)(vi) of the standard?

A. The employer need only give employees medical information sufficient for them to recognize the symptoms of medical conditions that may affect their use of respirators. Examples of medical conditions and signs and symptoms that may affect an employee's ability to use a respirator are provided in Appendix C of the standard.

(k)(1)(vii)

Q. How extensive must the employer train employees on the general requirements of the standard as specified in 29 CFR 1910.134(k)(1)(vii)?

A. The discussion does not need to focus on all the details of the standard but could, for example, simply inform employees that employers are obligated to develop a written program, properly select respirators, evaluate respirator use, correct deficiencies in respirator use, conduct medical evaluations, provide for the maintenance, storage, and cleaning of respirators, and retain and provide access to specific records.

(k)(2)

Q. Section (k)(2) requires that the employer conduct training in a manner that is understandable to employees. How is the employer to accomplish this?

A. Employers are to develop training programs suitable to the employee's educational level and language background.

(k)(4)

Q. Under what circumstances is an employer allowed to wait before repeating training for a new employee?

A. This standard provides for limited "portability" of training. The employer may wait up to 12 months from an employee's previous training, if the employee demonstrates sufficient knowledge concerning the training elements in section (k)(1). This may be accomplished through a discussion with the employee and the previous employer.

(k)(5)

Q. Employees who are emergency responders as well as other employees who may use SCBAs may need training more than annually. Is this addressed in the standard?

A. The employer must assure that an employee can demonstrate knowledge of the elements specified in (k)(1)(i) through (vii). Employees who can not demonstrate such knowledge are to receive additional training even if they have received training within the last 12 months.

Q. Section (k)(5) requires retraining annually and in certain situations. Explain the certain situations.

A. The training for those situations is different from the annual retraining provisions of the standard. Retraining is needed only on those elements for which there exists a need to provide the retraining. For example, retraining with respect to the nature of the hazard may be necessary because of an increase in the workplace level of a hazardous substance. Retraining under section (k)(5) is required if a change in the written respirator program renders one or more of the elements listed in paragraph (k)(1) obsolete, thus requiring retraining in the elements affected. Retraining is also required on any program element of the section that is not sufficiently understood by the employee.

(k)(6)

Q. How often is the employer required to provide information to employees who voluntarily use respirators that are not required to be worn by the standard or by the employer?

A. Section (k)(6) requires that the employer initially provide the basic advisory information in Appendix D to employees who voluntarily use respirators that are not required by OSHA standards or the employer. Appendix D, a mandatory appendix may be used or alternatively, the employer may develop material that is equivalent in content to this appendix. This information may be transmitted either in written form or verbally. This information is not required to be provided other than initially.

Paragraph (l) Program Evaluation

(l)(1)

Q. How often should the respirator program be re-evaluated? (FR p. 1262)

A. Employers must review the written program and revise, as necessary, the written program elements specified in paragraph (c)(1) when workplace conditions affecting the use of respirators change. An annual written program review is not required, but instead a program review and revision is required as necessary based on workplace changes. Evaluation frequency is to be based on program complexity and on factors such as the nature and extent of workplace hazards, types of respirators in use, variability of workplace processes and operations, number of respirator users, and worker experience in the use of respirators. The employer must review respirator use in the workplace with sufficient frequency to ensure that continuous, successful implementation of all written respirator program elements prescribed under paragraph (c) is being achieved.

(l)(1)

Q. What must be reevaluated? (FR p. 1263)

A. The areas to be reevaluated include: whether the respirator program is achieving proper respirator fit, whether the appropriate respirators are being selected, and the proper use and maintenance of respirators. If respirators are not being used properly, the employer is required to correct any problems found during the assessment.

(l)(2)

Q. What type of information would be obtained from employees in the periodic assessment of the respirator program? (FR p. 1262)

A. The type of information involved includes difficulty with breathing or fatigue during respirator use, whether the respirator interferes with hearing, vision, communication, or job performance or restricts movement, whether the respirator causes discomfort, and whether the employee has confidence in the respirator's effectiveness. The employer must correct any problems that are revealed by the evaluation.

(l)(2)

Q. Is the presence of medical conditions part of the program evaluation? (FR p. 1264)

A. Identification of respirator-related medical conditions, such as skin irritation, would properly be part of the program evaluation. Employees identified during the evaluation as having skin irritation can either be referred to the PLHCP or be advised by the program

administrator about the need to leave the respirator use area as necessary to wash the face and face piece, as permitted by paragraph (g). It should be noted that final paragraph (e)(7)(iii) requires medical evaluation if observations made during the program evaluation indicate that such evaluation is necessary.

Paragraph (p) Revisions to Specific OSHA Standards

Q. Why is OSHA revising the respirator-related provisions of existing standards? (FR p. 1265)

A. The primary purpose of revising the respirator-related provisions of existing standards is to be consistent with OSHA's respiratory protection requirements. OSHA believes that uniformity will improve compliance with respiratory requirements, reduce the regulatory burden on employers, and enhance the protection for workers who use respiratory protection. Where appropriate, the respiratory protection requirements of future standards will refer to provisions of revised 29 CFR 1910.134 as well.

Q. Which specific standards are affected by the revision of 29 CFR 1910.134? (FR p. 1265, 1266)

A. Both industry-specific and substance-specific standards are affected by this revision. Specific standards that reference the Bureau of Mines and MSHA/NIOSH 30 CFR Part 11 for respirator certification or the ANSI Z88.2 - 1969 for respirator use requirements are updated to the recently published NIOSH regulation at 42 CFR Part 84 and the revised 29 CFR 1910.134 respectively. Standards that reflect this revision include 29 CFR 1910.94, 1910.111, 1910.156, 1910.252, 1910.261, 1926.57, and 1926.800.

In general, substance-specific standards that have provisions addressing respirator use, selection, and fit testing now reference the corresponding provisions of the revised 29 CFR 1910.134 (paragraph (b)Definitions; paragraph (c) Respiratory protection program; certain sections of paragraph (d) Selection of respirators; paragraph (f) Fit testing; paragraph (g) Use of respirators; paragraph (h) Maintenance and care of respirators; paragraph (i) Breathing air quality; paragraph (j) Identification of filters, cartridges, and canisters; paragraph (k) Training and information; paragraph (l) Program evaluation; and paragraph (m) Recordkeeping). Standards which reflect this revision include 29 CFR 1910.94, 1910.1001, 1910.1003 (this standard also references paragraph (e), the provision for medical evaluation), 1910.1017, 1910.1018, 1910.1025, 1910.1027, 1910.1028, 1910.1029, 1910.1043, 1910.1044, 1910.1045, 1910.1047, 1910.1048, 1910.1050, 1910.1051, 1910.1052, 1926.57, 1926.60, 1926.62, 1926.1101, and 1926.1127.

Q. Which portions of revised 29 CFR 1910.134 paragraph (d) have not been incorporated into the substance-specific standards? (FR p. 1267)

A. Revised paragraphs (d)(1)(iii) & (iv) and (d)(3) of 29 CFR 1910.134 have not been incorporated into the 13 Carcinogens standard, 29 CFR 1910.1003. In this standard there are no permissible exposure limits or other exposure criteria relevant to respirator

selection. In addition, paragraph (d)(1)(iii) of the revised 29 CFR 1910.134 has not been incorporated into any of the substance-specific standards. This paragraph requires employers to estimate exposures for respirator selection. The substance-specific standards already have requirements for exposure assessments that are more specific than those of paragraph (d)(1)(iii). Also, paragraphs (d)(3)(iii)(B)(1) and (2) of revised 29 CFR 1910.134 have not been incorporated into those substance-specific standards that already contain requirements for cartridge- and canister-change schedules (Vinyl Chloride, Benzene, Acrylonitrile, Formaldehyde, and 1,3-Butadiene). The change schedules in these substance-specific standards were based on the chemistry of the substances, exposure conditions, and respirator type and are more specific than the general requirements found in paragraph (d)(3)(iii)(B)(1) and (2).

Q. Are the tables in the substance-specific standards that specify requirements for respiratory selection affected by the revision? (FR p. 1203 - 1204, 1266)

A. No. The tables will remain unchanged in the substance-specific standards (29 CFR 1910.1001, 1910.1017, 1910.1018, 1910.1025, 1910.1027, 1910.1028, 1910.1029, 1910.1043, 1910.1044, 1910.1045, 1910.1047, 1910.1048, 1910.1050, 1910.1051, 1910.1052, 1926.60, 1926.62, 1926.1101, and 1926.1127) until OSHA's supplemental rulemaking on assigned protection factors is completed.

Q. In standards with a fit testing requirement, what is the frequency at which employees must now be fit tested? (FR p. 1266)

A. The revised standard requires annual fit testing.

Q. Will the revision of 29 CFR 1910.134 affect the medical evaluation requirements for the substance-specific standards?

A. Only the 13 Carcinogens standard (29 CFR 1910.1003) will be affected by the medical evaluation requirements of the revised 29 CFR 1910.134. The 13 Carcinogens standard did not contain medical evaluation requirements for employees who use respirators. OSHA incorporated paragraph (e) of the revised 29 CFR 1910.134 into the 13 carcinogens standard to conform with current industry practice and facilitate compliance with the respiratory protection requirements of 29 CFR 1910.1003. The remaining substance-specific standards have provisions for medical evaluation that are unique to a particular substance and, therefore these provisions were not changed to correspond to the medical evaluation requirements of the revised Respiratory Protection standard.

Q. Will the revision of 29 CFR 1910.134 affect substance-specific standards which contain specific fit testing procedures?

A. Yes, the appendices and regulatory text addressing fit testing procedures will be removed from the affected substance-specific standards and replaced with a reference to Appendix A of the revised 29 CFR 1910.134. Substance-specific standards affected by this revision include Asbestos (29 CFR 1910.1001 and 1926.1101), Inorganic Arsenic (29 CFR 1910.1018), Lead (29 CFR 1910.1025 and 1926.62), Cadmium (29 CFR 1910.1027 and 1910.1127), Benzene (29 CFR 1910.1028), Acrylonitrile (29 CFR 1910.1045), Formaldehyde (29 CFR 1910.1048), Methylenedianiline (29 CFR 1910.1050 and 1926.60), 1,3-Butadiene (29 CFR 1910.1051), and Methylene chloride (29 CFR 1910.1052).

Note: CFR 1910.1029 (Coke Oven), CFR 1910.1043 (Cotton Dust), CFR 1910.1045 (DBCP), and CFR 1910.1047 (Ethylene Oxide) fit testing requirements have been improved with this revision.

Respirator Standard Appendix A
Fit Testing Procedures

Q. May fit testing methods not listed in this appendix be used to comply with the fit testing requirements in section (f) of the standard?

A. No. Section (f)(5) limits the acceptable fit testing methods to those listed in Appendix A.

Part I. OSHA Accepted Fit Test Protocols

Q. How many respirators must be available for an employee to choose from when picking out their respirator?

A. There must be enough models and sizes of respirators present so that the user can find a respirator that is acceptable and that fits correctly.

Q. Why isn't the grimace required for a QLFT?

A. The grimace is designed to temporarily break the face piece to face seal to test how well the respirator reseals itself if the seal is temporarily broken. A break in the seal during QLFT could cause sensory fatigue that would invalidate the results of the exercises, and if the grimace is performed as the last exercise, there will be no future testing to assess how well the respirator resealed.

B. Qualitative Fit Test Protocols (a)

Q. How can an employer ensure that persons administering the QLFT are able to make up the solutions, calibrate the equipment and perform the tests properly, recognize invalid tests and ensure that test equipment is in proper working order?

A. The employer must ensure the capabilities of the tester regardless of whether the tester works for the employer or for an outside contractor. This is a performance oriented provision giving the employer wide discretion. Some possibilities would include training an employee to perform the tests, hiring a credentialed professional to conduct the tests or learning to perform the tests and performing the tests himself or herself.

(b)(5)

Q. How can it be demonstrated that an isoamyl acetate (IAA) swab or ampule will generate a sufficient atmosphere of IAA that the swab or ampule can be used in place of the IAA soaked paper towel described in the appendix?

A. The National Bureau of Standards found that the minimum IAA concentration in the chamber using the soaked towel method is 100 parts per million during fit testing. An employer who wishes to use test swabs or ampules will have to show that the swab or ampule in use generates a similar minimum concentration. The employer may rely on data obtained from the manufacturer of the swabs or ampules as long as the employer uses the products in a way that reproduces the concentrations obtained by the manufacturer under the original test conditions. Of course, the employer could conduct studies and generate company specific data, as well.

3.(a)(4), 4.(a)(4)

Q. Does one have to use the DeVilbiss Model 40 inhalation medication nebulizer to spray the saccharin or the Bitrex test agent into the test chamber?

A. No. The wording now allows the employer to use that nebulizer or an equivalent.

Q. Since the irritant smoke method uses a toxic gas, how does OSHA intend to ensure the safety of the procedure?

A. The preamble lists a large number of presenters at the hearings that presented data that the test can be done safely. Many felt that any risk to the employee during the test is outweighed by the efficaciousness of the test in assuring adequate respirator fit. However, it is very important that testers be properly trained to carry out this procedure. The preamble points out that conducting this test improperly is a violation of the standard.

(a)(3)

Q. Why can't the irritant smoke protocol be performed in a test enclosure or hood?

A. The irritant smoke method generates hydrogen chloride, a toxic material that can cause permanent lung damage at elevated concentrations. Therefore, this test must be done in a well ventilated area so that there is no build up of the hydrogen chloride concentration. It may never be performed in a test enclosure or hood.

(b)(1)

Q. Does the irritant smoke protocol still require the use of an air pump that pumps 200 ml of air per minute through the smoke tube?

A. No. The text also allows the use of an aspirator bulb. However, the preamble states that the aspirator should be squeezed in such a manner that it pumps 200 ml per minute through the tube. The tester should know the volume of air that the aspirator aspirates with each squeeze and squeeze the bulb the number of times per minute that will make the

flow 200 ml per minute. For example, if the aspirator pumps 50 ml of air with each squeeze, the tester should squeeze the bulb 4 times per minute.

Exposure Management

Federal Register

Monday
March 21, 1994

Part V

Department of Health and Human Services

Centers for Disease Control and Prevention

Ryan White Comprehensive AIDS Resources Emergency Act; Emergency Response Employees; Notice

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Centers for Disease Control and Prevention

Implementation of Provisions of the Ryan White Comprehensive AIDS Resources Emergency Act Regarding Emergency Response Employees

AGENCY: Centers for Disease Control and Prevention (CDC), Public Health Service, Department of Health and Human Services.

ACTION: Final notice.

SUMMARY: The Ryan White Comprehensive AIDS Resources Emergency (CARE) Act (Pub. L. 101–381) includes provisions for emergency response employees (EREs) who may be exposed to potentially life-threatening diseases during the course of an emergency. This notice sets forth the final list of diseases to which these provisions apply; final guidelines describing circumstances under which exposure to listed diseases may occur; and final guidelines for determining whether an exposure to the listed diseases has occurred. The final list of diseases and guidelines incorporate comments received by CDC on a draft list and guidelines (57 FR 54794, November 20, 1992).

DATES: The list of diseases and guidelines in this notice are effective on March 21, 1994. All other applicable provisions of the Act pertaining to this notice are effective on April 20, 1994.

FOR FURTHER INFORMATION CONTACT: Dr. Robert Mullan, Centers for Disease Control and Prevention, 1600 Clifton Road, NE., M/S F40, Atlanta, GA 30333, telephone (404) 639–0983.

SUPPLEMENTARY INFORMATION:

Introduction

The Ryan White CARE Act amended the Public Health Service Act to include provisions regarding emergency response employees (EREs). (See sections 2681–2690 of the PHS Act, 42 U.S.C. 300ff–81 to 300ff–90. References are to Title 42 of the U.S. Code.)

Section 300ff–81 requires the development and publication of the following: (1) A list of potentially life-threatening infectious diseases to which EREs may be exposed in responding to emergencies; (2) guidelines describing circumstances in which EREs may be exposed to such diseases; and, (3) guidelines for medical facilities to determine whether such exposure occurred.

Sections 300ff–82 through 300ff–83 specify that EREs must be notified of exposure to any of the airborne infectious diseases on the list and may request notification of exposure to other listed diseases. Sections 300ff–84 and 300ff–85 specify the procedures for notifying EREs when there has been an exposure to a listed disease. Under section 300ff–86, every State public health officer must designate an official of every employer of EREs in the State who will be responsible for notifying EREs of exposure. This official is referred to as the Designated Officer. A medical facility that receives an infectious patient to which an ERE may have been exposed is responsible for notifying the Designated Officer that the ERE was exposed to a listed disease.

Section 300ff–87 limits the time period for which medical facilities must maintain medical information on patients and respond to the request under section 300ff–83.

Under section 300ff–88 these provisions may not be construed to authorize civil actions or penalties against a medical facility or Designated Officer; to require a medical facility to test patients for any infectious disease; to authorize or require the disclosure of identifying information; or, to authorize any ERE to fail to respond, or to deny services, to victims of emergencies.

Section 300ff–89 requires the Secretary of Health and Human Services (the Secretary) to establish an administrative process through which the Department can be notified of alleged violations of the provisions and, as appropriate, investigate such alleged violations. The Secretary may seek injunctive relief for violations of these provisions.

Under section 300ff–90, the provisions of the Act and the notification system do not apply in a State that has certified to the Secretary that its notification laws are in substantial compliance with the Act.

The list of diseases and guidelines specified in section 300ff-81 are effective on the date of publication. All other requirements of the notification process take effect 30 days after the publication of the list and guidelines.

This notice includes definitions (Part I), the final list of potentially life-threatening diseases under section 300ff-81 (Part II), the final guidelines required under section 300ff-81 (Part III), and steps to implement sections 300ff–82–300ff–90 (Part IV). Three addenda are provided for background and informational purposes: A. The text of the Act; B. Excerpts concerning hepatitis B vaccination, and C. References.

Responses to Comments

On November 20, 1992, CDC published in the Federal Register (57 FR 54794) a request for comments, including a draft of the required list of infectious diseases and guidelines. CDC received comments from 101 individuals and/or organizations. CDC solicited comments to the following questions:

- What procedural steps can be taken to protect the confidentiality of patient information subject to the provisions of the Act?
- Can the ERE notification process be carried out within existing State confidentiality laws?
- What will be the resource implications in carrying out this legislation?
- What are the likely benefits to be gained in implementing these requirements?
- Which States have notification laws that, under section 300ff-90, could be viewed as being in substantial compliance with the Act?

CDC received a total of 275 comments in response to these questions. In addition, there were 432 comments to other issues in the notification process. The comments to the five specific questions and the additional comments are addressed below.

1. What procedural steps can be taken to protect the confidentiality of patient information subject to the provisions of the Act?

According to section 300ff–88(c), this statute may not be construed to authorize or require any medical facility, any designated officer of emergency response employees, or any such employee, to disclose identifying information with respect to a victim of an emergency or with respect to an emergency response employee."

CDC received 74 comments to the question regarding this provision. Many of the comments expressed concern that the victim's confidentiality could be breached. However, commenters also acknowledged that EREs and medical facilities are already responsible for protecting patient confidentiality and that additional protection could be provided through training.

Other commenters were concerned with the possible liability for medical facilities that provide patient information to Designated Officers. The statute addresses liability only from the perspective of failure to comply with duties established under the statute, not for breaches of confidentiality. As in other situations involving patient information, liability for breach of confidentiality is an issue of State law

Several commenters stated that informed consent must be obtained before information on a victim could be provided to a Designated Officer. The statute does not address informed consent and informed consent to sharing patient information. Therefore, medical facilities must look to State laws regarding informed consent and the sharing of patient information.

The confidentiality provision (section 300ff–88(c)) must also be read in relation to section 300ff–84, procedures for notification of exposure. Under this later section, when a medical facility determines that a victim had an airborne infectious disease or that an ERE was exposed to an infectious disease on the list, the medical facility is required to provide (1) the name of the infectious disease involved; and (2) the date on which the victim of the emergency involved was transported by emergency response employees to the medical facility involved." These sections can be read together to mean that a medical facility that provides the required information under section 300ff-84 is not disclosing identifying information under section 300ff–88(c).

States should review their confidentiality statutes and resolve any conflict with this Federal legislation. Medical facilities must determine whether, under their State and local laws, providing the required information under section 300ff-84 violates State or local confidentiality laws.

2. Can the ERE notification process be carried out within existing State confidentiality laws?

CDC received responses to this question from 21 State health departments. Of these States, 11 thought the notification process could be implemented within the existing State confidentiality laws, 6 States did not think it could, and 4 States indicated that it could be carried out for some diseases, but not for other diseases, e.g., exposure to human immunodeficiency virus (i.e., acquired immunodeficiency syndrome, AIDS).

3. What will be the resource implications in carrying out this legislation?

CDC received 86 responses to this question. The vast majority (75) stated that the notification process would require an allocation of resources. Several commenters expressed a belief that the cost would be significant to medical facilities that are served by a large number of EREs requesting notification.

4. What are the likely benefits to be gained in implementing these requirements?

CDC received 41 comments to this question. Of these comments, 28 expressed doubt that the notification process would be beneficial to EREs. According to the comments, the process was not projected to confer many benefits because EREs are already covered by the Occupational Health and Safety Administration's Bloodborne Pathogens Standard, and because EREs should be using universal precautions. The 13 commenters who stated the process would be beneficial believed that it would increase uniformity in notification of EREs, reduce noncompliance among medical facilities in informing EREs of exposures, and provide additional protection to EREs.

5. Which States have notification laws that, under section 300ff–90, could be viewed as being in substantial compliance with the Act?

Under section 300ff–90, the requirements under the Act do "not apply in a State if the chief executive officer of the State certifies to the Secretary that the law of the State is in substantial compliance with" the Act.

A total of 30 commenters responded to this question. Of these, 14 said that their State would be in substantial compliance with the law and 16 said that their State would not be in compliance with the law.

Two commenters said that States should be allowed latitude in the determination whether they are in substantial compliance with the Act. Another commenter requested criteria that would be used to determine whether a State is in substantial compliance. However, the Act does not list any criteria for determining whether a State is in substantial compliance with the provisions of the Act. Therefore, CDC will accept the certification from the chief executive officer or designee of a State who certifies that the State is in substantial compliance with the Act. The certification must include the State statute(s) or regulation(s) upon which the certification is based. However under section 300ff–89, the Secretary retains the authority to "commence a civil action to obtain temporary or permanent injunctive relief with respect to any violation of" the Act.

6. List of diseases.

Under section 300ff–81, the Secretary must develop "a list of infectious disease to which emergency response employees may be exposed in responding to emergencies. The list * * * shall include a specification of those infectious diseases on the list that are routinely transmitted through airborne or aerosolized means."

CDC received 31 comments to the draft list.

According to one commenter, "uncommon or rare diseases" should be deleted. However, the legislation calls for the list to include potentially life-threatening diseases regardless of their incidence. Therefore, the rarity of a disease should not determine whether it is included on the list.

Other commenters suggested adding chicken pox, syphilis, childhood diseases, and meningitis to the list. These diseases are not appropriate for the list because chicken pox is not generally life-threatening, syphilis does not pose a significant risk of transmission if an ERE is exposed to an infectious patient, and childhood diseases (i.e., measles and rubella) are not life-threatening to the ERE. Meningococcal disease is already on the list. Another commenter noted that meningococcal disease is not rare, and that it is transmitted through direct contact, and that the ERE is not likely to be aware of exposure. As noted in Part III, "Under special circumstances, *C. diphtheriae*, *N. meningitidis*, and *Y pestis* could be transmitted to EREs by direct contact with droplets from the respiratory tract of infected persons. However, such transmission is rare." Although one commenter recommended that diphtheria and meningococcal disease be classified as airborne diseases, they are transmitted by direct contact only. Likewise, another reviewer recommended that hemorrhagic fevers be classified as bloodborne diseases, rather than as uncommon or rare diseases. Although the hemorrhagic fevers have been reported to have been transmitted via inoculation with contaminated needles,[1] it was decided to place the entire group under the uncommon or rare disease category to emphasize the decreased probability of exposure to these diseases.

It was also suggested that hepatitis C be deleted because of difficulty in interpretation of laboratory test, lack of routine test availability, and the lack of definitive treatment. Hepatitis C has been removed from the list at this time for the following reasons: Available laboratory tests do not distinguish between current or past infections, evidence of transmission in the health care setting is limited, and the withdrawal by the Immunization Practices Advisory Committee of its recommendations for prophylaxis with immune serum globulin following percutaneous exposure to hepatitis C. Moreover, there are no specific recommendations for following workers

[1] Benenson AS (ed). Control of communicable diseases in man. Washington, D.C.: The American Public Health Association, 15th edition, 1990.

after an exposure incident involving hepatitis C. CDC will continue to monitor the scientific literature on hepatitis C, however, and if new information becomes available that suggests that hepatitis C should be returned to the list of diseases contained here, CDC will amend the list.

A number of comments were received regarding tuberculosis. One commenter stated that tuberculosis is not life threatening, which should be noted in the regulation. However, tuberculosis, especially multiple drug-resistant tuberculosis (MDR-TB), can pose a threat to life; therefore it will remain in the list. Another commenter recommended that the list should specify tuberculosis disease as infectious "pulmonary" TB. This recommendation has been incorporated into the list.

It was also recommended that tuberculosis should be deleted from the list since no emergency treatment is indicated and EREs are required to have annual skin tests. However, in the event of a recognized exposure to tuberculosis, employees should be skin tested six weeks thereafter for conversion. In the event of a conversion, a decision concerning chemoprophylaxis should be made as soon as feasible.

One commenter suggested CDC reorganize the list of diseases into "mandatory reporting" and "exposure-triggered reporting." However, it was thought that the current organization made the most sense, since "exposure-triggered reporting" is still "mandatory," if an infectious disease exposure occurs that meets the criteria set forth in the Act. Some commenters thought the division of diseases into airborne and other modes of transmission was unnecessary. The diseases are distinguished by their mode of transmission because, under section 300ff-81(b), the statute requires a "specification of those infectious diseases on the list that are routinely transmitted through airborne or aerosolized means."

Many States commented that they already have a more comprehensive list of diseases requiring reporting. A more comprehensive list of diseases is not prohibited by the legislation; therefore, States may add diseases to the list, but no diseases on the list published herein may be removed by a State.

7. Definitions.

Under section 300ff-76, definitions for some of the terms applied in the statute can be found. Where it was necessary, additional definitions were added to the draft for clarification. A total of 32 comments regarding the definitions used in the notification process were received.

One commenter requested the definition of "Secretary" be added to the definitions to clarify that it is the Secretary of the Department of Health and Human Services who is responsible for injunctions under section 300ff-89. Therefore, the definition of "Secretary" has been added to the definitions.

Many commenters requested a definition of medical facility. This term was not defined in the Act, therefore, a definition of medical facility has been added to the list of definitions. A medical facility, for purposes of this statute, is any facility that treats victims of emergencies.

One commenter requested clarification whether the definition of an ERE included "non-governmental EREs." The definition of EREs includes employees of non-governmental organizations. One commenter recommended that law enforcement personnel be included under the definition of EREs. Under the Act, the definition of EREs includes law enforcement officers." One commenter stated that it is unclear whether EREs who treat a victim but do not transport the victim are covered under the Act. Under section 300ff-82, when a medical facility makes a determination that a victim has an airborne infectious disease, the medical facility must notify only the Designated Officer of the EREs who transported the victim, not those who also treated the victim. However, under section 300ff-83, any ERE who "attended, treated, assisted, or transported" a victim may submit a request for a determination whether there was an exposure to an infectious disease. Therefore, under section 300ff-82, the medical facility is required to notify those EREs who transported a victim who has an airborne infectious disease, even when the ERE has not made a request for notification. For these EREs, section 300ff-82 does not require the medical facility to determine whether the ERE was exposed to the infectious disease. Under section 300ff-83, EREs who attended, treated, assisted, or transported a victim can request a determination from the medical facility of whether the ERE was exposed to an infectious disease from a victim. This determination would include a determination of whether an ERE was exposed to a victim of an airborne infectious disease.

One commenter requested a definition of "public health officer" where, under section 300ff-83(g), a designated officer requests the assistance of the public health officer. Under that section, "the public health officer for the community in which the medical facility is located shall evaluate" a request from a designated officer to a medical facility where the medical facility finds that there is insufficient information to determine whether the ERE was exposed to a disease. Designated Officers must determine who the public health officer for the community is where the medical facility is located based on the jurisdiction where the medical facility is located, i.e., whether the community is a city or county.

The majority of comments received on the definitions related to the definition of "exposed" as it is defined in the statute and applied in the notification process.

The term "exposed" is found in two sections of the statute. Under section 300ff-81, the Secretary must develop the following: "a list of potentially life-threatening infectious diseases to which emergency response employees may be exposed in responding to emergencies; guidelines describing the circumstances in which such employees may be exposed to such diseases * * *; [and] guidelines describing the manner in which medical facilities should make determinations for purposes of section 300ff-83(d)." Under section 300ff-83(d), the medical facility must evaluate the facts submitted by a Designated Officer and make a determination whether, on the basis of the medical information possessed by the facility regarding the victim involved, the emergency response employee was exposed to an infectious disease included on the list, according to the guidelines issued by the Secretary.

Under section 300ff-76(6), "the term 'exposed,' with respect to HIV disease, or any other infectious disease, means to be in circumstances in which there is a significant risk of becoming infected with the etiologic agent for the disease involved." Neither the statute nor the legislative history of the statute provide any additional information regarding the definition of significant risk. Therefore, without statutory or legislative elucidation as to the meaning of significant risk", the term can be understood with reference to its use in other circumstances.

Under the Supreme Court case *School Board of Nassau County* v. *Arline*, the Court listed the criteria by which it could be determined whether an individual poses a "significant risk" to others (480 U.S.C. 273, 288). These criteria were recommended by the American Medical Association and included:

A finding of facts, based on reasonable medical judgments given the state of medical knowledge, about

(a) The nature of the risk (how the disease is transmitted),

(b) The duration of the risk (how long is the carrier infectious),

(c) The severity of the risk (what is the potential harm to others), and

(d) The probabilities the disease will be transmitted and will cause varying degrees of harm.

Subsequently, these criteria were incorporated into the definition of "direct threat" under the Americans With Disabilities Act. (See Senate Report No. 101–116, 101st Congress, 1st Session, 1989, page 40.) These criteria have been incorporated into the definition of "exposed" and into the guidelines under section 300ff–81(a)(2).

One commenter suggested that a system should be established that specifies the information required from a Designated Officer regarding exposure, thereby reducing the chance for confusion or insufficient information. Such a system is not required under the statute and has not been developed. The parties involved in this system must be given the latitude to develop procedures appropriate for their situation.

Several commenters stated that the determination of exposure is complex and should be left to public health or occupational health officials and that the determination of exposure cannot be the responsibility of the medical facility. The responsibility for determining exposure is specified in the statute and rests with medical facilities. This process cannot be altered by CDC.

Commenters also noted the need for more "user-friendly" exposure determination guidelines for Designated Officers with no medical background. The guidelines for Designated Officers describe the circumstances in which employees may be exposed to the diseases on the list. These guidelines are as succinct as possible within the specifications of the statute.

It was noted that exposure to persons undergoing tuberculosis drug therapy and skin test converters, who are not infectious, should not be reported. CDC agrees with this comment and it is addressed under Comments on the Disease List. Another comment on tuberculosis stated that the section on airborne diseases is a problem because merely sharing air space is not sufficient to transmit tuberculosis and would not require treatment or followup. However, sharing air space is the main route of transmission for tuberculosis. EREs who transport patients with infectious TB are at risk of infection and should be medically evaluated.

One individual asked whether States are ultimately responsible for determining which circumstances constitute exposure and whether State health officers or other professionals have input in this determination. Under the statute, in the case of airborne transmission, no determination of exposure must be made: if the medical facility determines that the victim has an airborne disease, the facility must notify the Designated Officer of the ERE who transported the victim. In the case of bloodborne exposures, it is the responsibility of Designated Officers and medical facilities to make these determinations based on the guidelines.

One commenter stated that the duties of the medical facility should apply, as long as there is documentation that an ERE may have been exposed to one of the listed diseases. However, the period for which medical facilities must retain information on a victim is limited by section 300ff–87.

As suggested by commenters, in section III.A.2 a recommendation has been added that when an exposure incident occurs or there is a breach of universal precautions, OSHA's Bloodborne Pathogens Standard protocols should be followed. Also, in defining occupational exposure to bloodborne pathogens, skin contact is limited to contact with non-intact skin.

One commenter suggested that ERE employers should provide, at no cost, counseling and medical evaluation, medical treatment, or prophylaxis whenever EREs are notified of occupational exposure. This suggestion is consistent with the OSHA Bloodborne Pathogens Standard. However, the Act does not require compliance with these provisions.

One commenter stated that rural States with low prevalence of HIV and hepatitis B virus infection do not need a sophisticated notification system as specified under this legislation. However, the statute does not allow for distinguishing between States with high and low prevalences of the notifiable diseases.

One commenter stated that the use of *Control of Communicable Diseases in Man* is not adequate to make exposure determinations. *Control of Communicable Diseases in Man* is intended to serve in conjunction with prior infection control training and experience of the Designated Officer in making exposure determinations.

8. First responders.

Several commenters stated that first responders should be covered under the notification system established by the Act, while one stated they should not be covered. First responders are individuals who have other responsibilities within an organization but who also, as part of their official responsibilities or as a volunteer, respond to emergencies that occur. Whether first responders are covered under the Act depends upon whether they fit within the definition of an ERE. The definition of ERE includes "firefighters, law enforcement officer, paramedics, emergency medical technicians, and other individuals (including employees of legally organized and recognized volunteer organizations, without regard to whether such employees receive nominal compensation) who, in the course of professional duties, respond to emergencies in the geographic area involved." Therefore, for first responders to be covered by the Act, they must respond to emergencies as part of their professional duties.

9. Patient testing.

Twelve comments regarding the patient testing provision of the Act were received. Patient testing is addressed under 300ff–88(b). This section states that the Act "may not, with respect to victims of emergencies, be construed to authorize or require a medical facility to test any such victim for any infectious disease."

One commenter recommended that patient testing be mandatory and others suggested that this provision establishes an incentive to test patients. One other comment recommended routinely testing victims for tuberculosis. The Act does not authorize mandatory patient testing.

Several commenters requested that the testing provision be incorporated into the guidelines for clarification. This has been done in a footnote to section III.C.3.

Several comments addressed patient consent for testing. One commenter suggested that consent should be requested when knowledge of the patient's infected status is necessary in order to determine whether there has been an exposure. The Act does not prohibit seeking patient consent where consent is required in order to test the patient.

Other commenters stated that, in their medical facility, patient consent is necessary before a patient can be tested. Whether consent is required in order to test a patient is a matter of State laws. Medical facilities should consult their State health department or other regulatory agency for State laws and regulation on patient consent.

The patient testing provision must also be read in conjunction with the provisions of OSHA's Occupational Exposure to Bloodborne Pathogens Standard (29 CFR part 1910). Under OSHA's standard, following a report of an exposure incident, "(A) [t]he source

individual's blood shall be tested as soon as feasible and after consent is obtained in order to determine HBV and HIV infectivity. If consent is not obtained, the employer shall establish that legally required consent cannot be obtained. When the source individual's consent is not required by law, the source individual's blood, if available, shall be tested and the results documented" (29 CFR § 1910.1030(f)(3)(A)). Therefore, while the ERE notification system established under the Act does not authorize or require a medical facility to test a victim for any infectious disease, other laws or regulations may require or permit testing of victims. Also, other laws, particularly State laws, may address patient consent to testing. When there has been an exposure, employers should follow the OSHA Bloodborne Pathogens Standard and applicable State and local laws regarding patient testing and consent.

10. 30-day implementation period.

Under the Act, the provisions of the notification system take effect 30 days after publication of the list of diseases and guidelines under section 300ff–81. (42 U.S.C. 300ff–80 note.) Of the twenty comments received regarding this provision, nineteen stated that the 30-day period was insufficient to implement the provisions of the Act. However, the 30-day implementation provision is statutorily defined, and CDC cannot alter it.

11. 48-hour notification period.

Under section 300ff–82(b), a medical facility must inform the Designated Officer as soon as is practicable, but not later than 48 hours, when it determines that a victim has an airborne infectious disease, including when the victim dies before reaching the medical facility. The same time limitation applies, under section 300ff–83(e), when it determines that an ERE requesting notification was or was not exposed to an infectious disease.

Of the comments received, fifteen stated that the statutory time frame for reporting was too short. In general these comments reflected the position that it would be difficult for medical facilities to comply with the time frame due to staff shortages, low weekend coverage, and occasions when appropriate medical personnel are unavailable. An additional nine comments stated that the time frame was too long. Several commenters stated that 48 hours was too long to wait for notification when the ERE has been exposed to meningococcal disease due to its incubation period. Another commenter stated that 48 hours is unacceptable for exposure to cases of plague, rabies, and hepatitis B.

Since the time limits are established in the Act, they cannot be altered. However, it should be noted that, in the case of an airborne disease, notification is not required until a determination has been made that the victim has such a disease. The time limit begins after such a determination is made. For other diseases, if, after 48 hours, exposure cannot be determined without additional information, the medical facility must inform the designated officer that there are insufficient facts to make a determination or that the facility does not have the necessary information on a victim to determine whether the victim has a disease on the list of diseases.

Both medical facilities and designated officers should be aware of the provisions of section 300ff–87 regarding time limits and information available on a victim. This section states that the duties of medical facilities under the Act

(1) Shall apply only to medical information possessed by the facility during the period in which the facility is treating the victim for conditions arising from the emergency, or during the 60-day period beginning on the date on which the victim is transported by emergency response employees to the facility, whichever period expires first; and

(2) Shall not apply to any extent after the expiration of the 30-day period beginning on the expiration of the applicable period referred to in paragraph (1), except that such duties shall apply with respect to any request under section 300ff–83(c) received by a medical facility before the expiration of such 30-day period.

One commenter requested clarification as to the meaning of this language. Subsection (1) establishes the time limit for which a medical facility must retain information on a victim of an emergency. The meaning of subsection (2) is somewhat ambiguous. Accordingly, the two subsections are interpreted and will be applied to mean that the duties of medical facilities terminate at the end of the period during which the facility provides medical care to the victim for conditions arising from the emergency, or at the end of the 60-day period beginning on the date on which the victim is transported by EREs to the facility, whichever period is shorter. However, the duties of the medical facility shall continue if, under section 300ff–83(c) a request is received within 30 days of the date of the applicable period under subsection (1) of section 300ff–87. In practice, if a victim is transported to a medical facility and released after two days, the facility must respond to a request submitted under section 300ff–83(c) if the request is received within 30 days of the date the victim was discharged from the facility. Also, if a victim of an emergency is transported to a medical facility and remains in the facility for more than 60 days, the facility must respond to a request under section 300ff–83(c) when the request is received within 30 days from the expiration of the 60-day period.

12. Designated Officers

Under 42 U.S.C. 300ff–87:

(a) For the purposes of receiving notifications and responses and making requests * * * on behalf of emergency response employees, the public health officer of each State shall designate 1 official or officer of each employer of emergency response employees in the State.

(b) In making the designations required in section (a), a public health officer shall give preference to individuals who are trained in the provision of health care or in the control of infectious diseases.

A total of 56 comments regarding these provisions were received. The majority of comments stated that it is impractical for State public health officers to make such designations due to the large number of employers of EREs in the State, the high turnover rate among some employees, and the lack of individuals trained in the control of infectious diseases among some employers of EREs. Other commenters stated that it would be more efficient for employers to designate the official or officer for their EREs. In order to address the concern that designating an official or officer for each employer of EREs is impractical or too burdensome on State public health officers, it would be permissible for States to allow employers to submit the name of an individual whom the employer would like for the State public health officer to designate as the designated officer for the employer.

Many commenters recommended that the Designated Officer should be a physician or, in one comment, an epidemiologist or infection control practitioner. Many other commenters stated that it will be very difficult for employers to have a designated officer who is qualified to make the determinations required under the statute. Regarding the qualifications of the Designated Officer, the statute only requires that the State public health officer "give preference to individuals who are trained in the provision of health care or in the control of

infectious disease." While, under the statute, a State public health officer cannot require an employer to have a physician as the Designated Officer, employers can recommend to the State public health officer that a physician who is an employee be designated as the Designated Officer. In those cases where an employer does not consider any employee qualified to act as the Designated Officer, a qualified individual, such as a physician, could be retained by the employer to serve solely as the Designated Officer.

A number of commenters suggested permitting the State public health officer to designate a regional Designated Officer, who could function in that capacity for several employers. This would be permitted under the statute only where the regional designated officer is also an employee of all the employers in the specified region.

Two commenters stated that the duties of the Designated Officers may create liability for them. While the duties of the Designated Officer may create liability issues under State law for acts or omissions, the statutes provides that it * * * may not be construed to authorized any cause of action for damages or any civil penalty against any * * * designated officer, for failure to comply with the duties established. * * *"

13. Comments on prevention.

CDC received 44 comments regarding preventing disease in EREs. It was suggested that if EREs are using universal precautions, then there would not be a need for this regulation. However, universal precautions do not address airborne disease transmission. Moreover, universal precautions cannot protect entirely from inadvertent needlestick injury.

It was also suggested that EREs may become lax regarding compliance with universal precautions if they know they can get patient information. Since exposure precedes notification, notification is not expected to deter EREs in the practice of universal precautions.

One commenter thought that the concept of body substance isolation should be used instead of universal precautions. As noted under III.A.2, "Under emergency circumstances in which differentiation between fluid types is difficult, if not impossible, all body fluids are considered potentially hazardous." This is essentially body substance isolation.

One commenter suggested that, to avoid confusion and duplication, CDC should adopt language crafted by OSHA in their Bloodborne Pathogens Standard and tuberculosis compliance memorandum. This was agreed to; as noted above, several changes have been made to bring the two documents into closer alignment.

One commenter suggested that purified protein derivative (PPD) testing should be given to EREs every 6 months. CDC recommends that tuberculin skin testing be performed every 6 months in areas where there is a high risk for tuberculosis transmission. For other, lower-risk areas, annual tuberculin skin testing is recommended.

One commenter stated that EREs need to be trained to recognize symptoms of active tuberculosis. CDC agrees with this.

Another commenter noted that patients suspected of having active tuberculosis should be tested and isolated in a timely manner. CDC acknowledges that this is a key concept in tuberculosis control efforts.[2,3]

One commenter thought that CDC should explain if or how the proposed notification requirements will reduce transmission of airborne disease and how they will fit into the infection control strategy outlined in the 1990 CDC *Guidelines for Preventing the Transmission of Tuberculosis in Health Care Settings*. There is no conflict between these requirements and either the 1990 document[4] or the 1993 draft *Guidelines*.[5]

One commenter noted that tetanus/diphtheria boosters should be given every 10 years. This is current CDC policy.[6]

One commenter thought that diphtheria vaccination virtually eliminates the possibility of occupational transmission. This is true; notification of exposure then provides an impetus for ensuring that diphtheria vaccination has been obtained recently enough to ensure that immunity has been maintained.

It was also suggested that infection control education programs are needed for EREs. However, the legislation is not directed to this need. The OSHA Bloodborne Pathogens Standard has provisions for employee training programs for bloodborne pathogens.

For plague and rabies, it was noted that education offers the best prevention against infection. Nonetheless, notification and follow-up are indicated upon potential exposure to either of these diseases.

One commenter proposed that an ERE who sustains significant exposure should be assured counseling and testing, and that this is more important than inordinate efforts to determine patient HIV status. CDC believes that counseling and testing are key elements in follow-up of an employee exposure to a potentially life-threatening infectious disease. Additional language from the OSHA Bloodborne Pathogens Standard has therefore been appended in Addendum B for follow-up of a potential HIV exposure: "Following a report of an exposure incident, the employer shall make immediately available to the exposed employee a confidential medical evaluation and follow-up including at least the following elements: * * * counseling."

One commenter stated that medical facilities should not be responsible for follow-up testing of EREs. There is no provision in the legislation that charges medical facilities with follow-up testing of EREs.

One commenter suggested that regulation provides little incentive for ERE employers to adopt infection control plans. The threat of HIV infection should provide a powerful incentive for implementation of infection control plans. Moreover, there are Federal agencies and other organizations that require and recommend infection control procedures (e.g., OSHA and the National Fire Protection Administration).

14. Airborne versus bloodborne.

Ten comments were received regarding notification for airborne diseases versus notification for other diseases. It was suggested that EREs should be notified of all the listed diseases, not just airborne diseases, without making a request, and that the ERE request should be a "back-up." This is not consistent with the legislation.

One commenter suggested that in making a distinction between airborne and bloodborne exposures, the Act frustrates its intent, placing the burden on the ERE to request determinations of bloodborne exposures. The commenter thought that this would lead to more requests than if all diseases were treated alike. Again, this concept is not consistent with the legislation.

15. Coordination with OSHA.

Ten comments were received regarding this notification system and

[2] CDC. Guidelines for preventing the transmission of tuberculosis in health-care facilities, with special focus on HIV-related issues. MMWR 1990;39(no. RR-17).

[3] CDC. Draft Guidelines for Preventing the Transmission of Tuberculosis in Health-Care Facilities, Second Edition. **Federal Register** 1993;58 (no. 195):52810–52864. October 12.

[4] See footnote 2.

[5] See footnote 3.

[6] CDC. General recommendations on immunization. Recommendations of the Advisory Committee on Immunization Practices (ACIP) MMWR 1994; 43(No. RR-1).

requirements of the OSHA Bloodborne Pathogens Standard.

In one response, CDC was urged to cooperate with OSHA to develop a joint advisory notice on tuberculosis. However, OSHA has announced its intention to promulgate an occupational health standard addressing tuberculosis and other airborne pathogens. CDC will be assisting OSHA in this regulatory effort.

Another commenter felt that CDC should require States without State plan OSHA programs to develop worker protection programs at least as effective as those in the already Federally approved States. States without State OSHA plans are already covered by Federal OSHA programs.

One commenter thought it was unclear how the notification process interfaces with OSHA regulations and that there appeared to be duplication. Since a significant portion of EREs are not covered by OSHA regulations, some degree of overlap is inescapable.

One reviewer stated that the draft notification process recommended that workers be immunized with hepatitis B virus vaccine," but noted that this is a requirement under the OSHA Bloodborne Pathogens Standard. The recommendation for immunization was added for those EREs not covered by the OSHA Bloodborne Pathogens Standard. The OSHA requirement is presented in Addendum B.

Several commenters noted that the definition of bloodborne transmission is inconsistent with the OSHA Bloodborne Pathogens Standard's use of the term "other potentially infectious material." Part III.2 has been expanded to comply with the OSHA definition.

One commentar asked whether the Designated Officer represents the employer or the employee. According to the commenter, it would be inconsistent under the OSHA Bloodborne Pathogens Standard for the Designated Officer to represent the employee. In the ERE notification system, the Designated Officer is acting in the interest of the employee. This is not seen as inconsistent with OSHA regulations, however, since employers are still required to meet the notification provisions of the OSHA Bloodborne Pathogens Standard. In addition, many EREs are not covered by OSHA regulations.

One commenter stated that his State has an approved occupational safety and health plan, and suggested that the notification process therefore is redundant. As noted in section 300ff-90, "this [ERE portion of the Act] shall not apply in a State if the chief executive officer of the State certifies to the Secretary that the law of the State is in substantial compliance with this subpart."

One commenter suggested that all medical facilities are covered by OSHA regulations regarding exposure; therefore, Designated Officers should be aware of them and educate EREs. In fact, not all medical facilities are covered by OSHA (e.g., public hospitals in states without State OSHA plans). Moreover, EREs are not typically employees of the medical facility, thus necessitating another route of notification to that provided by the OSHA Bloodborne Pathogens Standard.

16. Injunctive relief.

Authority for injunctive relief is provided in section 300ff-89. This section states:

(a) The Secretary may, in any court of competent jurisdiction, commence a civil action for the purpose of obtaining temporary or permanent injunctive relief with respect to any violation of [these provisions].

(b) The Secretary shall establish an administrative process for encouraging emergency response employees to provide information to the Secretary regarding violations of [these provisions]. As appropriate, the Secretary shall investigate alleged such violations and seek appropriate injunctive relief.

Regarding subsection (b) of these provisions, anyone alleging a violation of any of these provisions should contact CDC. Alleged violations of these provisions will be investigated. In any case that injunctive relief may be sought, the Department of Health and Human Services will coordinate its efforts with the Department of Justice.

Final Notice: Provisions of Section 411 of the Ryan White Comprehensive AIDS Resources Emergency Act Regarding Emergency Response Employees

Section 411 of the Ryan White Comprehensive AIDS Resources Emergency (CARE) Act (Pub. L. 101-381), amends the Public Health Service Act to include provisions regarding emergency response employees (sections 2681-2690 of the PHS Act, 42 U.S.C. 300ff-81 to 300ff-90). This notice sets forth the final list of diseases; final guidelines describing circumstances under which exposure to infectious diseases may occur; and final guidelines for determining whether an exposure to such a disease has occurred, as required under section 411 of the Act. The final list of diseases and guidelines incorporate comments received by CDC to the draft list and guidelines (57 FR 54794, November 20, 1992). The list of diseases and guidelines are effective on March 21, 1994. All other provisions of section 411 of the Act are effective on April 20, 1994.

CDC will continue to monitor the scientific literature on infectious diseases. If new information becomes available that suggests that additional infectious diseases should be added to the list of diseases contained here, CDC will amend the list.

Dated: March 15, 1994

Walter R. Dowdle,

Deputy Director, Centers for Disease Control and Prevention (CDC).

Contents

Part I. Definitions
Part II. List of Potentially Life-Threatening Infectious Diseases to Which Emergency Response Employees Can Be Exposed
Part III. Guidelines for Determining Exposure
Part IV. Implementation of the Law
Addendum A: Background—Text of Sections 2681-2690 of the PHS Act as amended by Pub. L. 101-381 (42 U.S.C. 300ff-81 to 300ff-90)
Addendum B: Excerpts Concerning Hepatitis B Vaccination
Addendum C: References

Statutory citations within this notice are to the Title 42 of the U.S. Code.

Part I. Definitions

Aerosol. Small particles of matter that float on air currents.

Airborne transmission. Person-to-person transmission of an infectious agent by an aerosol.

Bloodborne transmission. Person-to-person transmission of an infectious agent through contact with an infected person's blood.

Designated Officer of Emergency Response Employees. An individual designated under 42 U.S.C. 300ff-86 by the public health officer of the State involved (42 U.S.C. 300ff-76).

Emergency. An emergency involving injury or illness (42 U.S.C. 300ff-76).

Emergency response employees (EREs). Firefighters, law enforcement officers, paramedics, emergency medical technicians, and other persons (including employees of legally organized and recognized volunteer organizations, without regard to whether such employees receive nominal compensation) who, in the course of professional duties, respond to emergencies in the geographic area involved (42 U.S.C. 300ff-76).

Employer of Emergency Response Employee. An organization that, in the course of professional duties, responds to emergencies in that geographic area involved (42 U.S.C. 300ff-76).

Exposed. With respect to HIV disease or any other infectious disease, to be in circumstances in which there is a significant risk of becoming infected with the etiologic agent for the disease involved (42 U.S.C. 300ff-76).

Medical Facility. Any facility that receives victims of emergencies who are transported to the facility by emergency response employees.

Patient. A victim of an emergency who has been aided by an Emergency Response Employee and has been transported to a medical facility.

Potentially life-threatening infectious disease. An infectious disease that can cause death in a healthy, susceptible host.

Routinely transmitted by aerosol. A disease that is usually transmitted via the aerosol route.

Secretary. The Secretary of the Department of Health and Human Services as this term is used in Title XXVI of the Public Health Service Act (42 U.S.C. 300ff-80 through 42 U.S.C. 300ff-90).

Significant Risk. A finding of facts relating to a human exposure to an etiologic agent for a particular disease, based on reasonable medical judgments given the state of medical knowledge, about

(a) The nature of the risk (how the disease is transmitted),

(b) The duration of the risk (how long an infected person may be infectious),

(c) The severity of the risk (what is the potential harm to others) and

(d) The probabilities the disease will be transmitted and will cause varying degrees of harm.

Part II. List of Potentially Life-Threatening Infectious Diseases to Which Emergency Response Employees Can be Exposed

In developing the list of infectious diseases to which EREs can be exposed, CDC used the following criteria:

1. The disease is potentially life-threatening, i.e., it carries a significant risk of death if acquired by a healthy, susceptible host, and

2. The disease can be transmitted from person to person.

A. Airborne Diseases

Infectious pulmonary tuberculosis (*Mycobacterium tuberculosis*)

B. Bloodborne Diseases

1. Hepatitis B
2. Human immunodeficiency virus infection (including acquired immunodeficiency syndrome (AIDS))

C. Uncommon or Rare Diseases

1. Diphtheria (*Corynebacterium diphtheriae*)
2. Meningococcal disease (*Neisseria meningitidis*)
3. Plague (*Yersinia pestis*)[7]
4. Hemorrhagic fevers (Lassa, Marburg, Ebola, Crimean-Congo, and other viruses yet to be identified)
5. Rabies

Part III. Guidelines for Determining Exposure

A. Circumstances Under Which Exposure can Occur

1. Airborne Diseases

Infectious pulmonary tuberculosis (*Mycobacterium tuberculosis*)

Occupational exposure to airborne pathogens may occur when an ERE shares air space with a patient who has an infectious disease caused by an airborne pathogen.

2. Bloodborne Diseases

Human immunodeficiency virus infection (including acquired immunodeficiency syndrome (AIDS))

Hepatitis B

Occupational exposure to bloodborne pathogens may occur as the result of contact during the performance of normal job duties with blood or other body fluids to which universal precautions apply. When EREs have contact with body fluids under emergency circumstances in which differentiation between fluid types is difficult, if not impossible, all body fluids are considered potentially hazardous. Universal precautions, as outlined in *Guidelines for Prevention of Transmission of Human Immunodeficiency Virus and Hepatitis B Virus to Health-Care and Public-Safety Workers*, are recommended for all EREs to reduce the risk of exposure to bloodborne pathogens. In the Occupational Safety and Health Administrations Bloodborne Pathogens Standard, an exposure incident is defined as a "specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee's duties." Bloodborne pathogens are defined therein as "pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV)."[8]

These precautions, and other provisions of the Occupational Safety and Health Administration (OSHA) rule governing occupational exposure to bloodborne pathogens (29 CFR 1910.1030), may be mandatory for some EREs, depending upon whether they are employed in the public or private sector and whether the State in which they are employed has an approved occupational safety and health plan. Employers covered under the OSHA Bloodborne Pathogens Standard should comply with provisions contained in the standard when there is an exposure incident or a breach of universal precautions.

Also, it is recommended that workers with occupational exposure to blood be vaccinated with hepatitis B vaccine (see Addendum B).

3. Uncommon or Rare Diseases

Diphtheria (*Corynebacterium diphtheriae*)

Meningococcal disease (*Neisseria meningitidis*)

Plague (*Yersinia pestis*)

Hemorrhagic fevers (Lassa, Marburg, Ebola, Crimean-Congo, and other viruses yet to be identified)

Rabies

While person-to-person transmission of pathogens in this category is rare or theoretical, infection with any of these pathogens could be life-threatening. Under special circumstances, *Corynebacterium diphtheriae*, *Neisseria meningitidis*, and *Yersinia pestis* could be transmitted to EREs by direct contact with droplets from the respiratory tract of infected persons. However, such transmission is rare. Person-to-person transmission of plague, for example, has not been documented since 1924. Hemorrhagic fever viruses are primarily bloodborne pathogens, but none occur naturally in the U.S. Any suspected importation of these infectious agents are thoroughly investigated by the Public Health Service.

B. Guidelines for Determining Exposure to an Airborne Infectious Disease Listed in Part II

Under section 300ff-82, if it is determined that a patient has an airborne infectious disease, the medical facility must notify the Designated Officer of the EREs who transported the patient as soon as practicable but not later than 48 hours after the determination has been made.

C. Guidelines for Determining Exposure to a Bloodborne or Other Infectious Disease Listed in Part II.

1. Under section 300ff-83(a), an ERE may submit a request for a determination whether he or she was exposed to an infectious disease.

2. Upon receipt of such a request from an ERE, under section 300ff-83 (b) and (c) the Designated Officer must:

a. Collect facts relating to the circumstances under which the ERE may have been exposed to an infectious disease, and

b. Evaluate the facts and determine if the ERE would have been exposed to an infectious disease (see Part III.A.).

c. If the Designated Officer determines that the ERE may have been exposed to an infectious disease, he or she must send to the medical facility to which the patient was transported a signed written request, along with the facts collected, for a determination of whether the ERE was exposed to a listed disease.

3. When a medical facility receives such a request, under section 300ff-83(d), it must:

a. Determine if there is sufficient information in the request to identify the patient suspected of having an infectious disease (see Part III).[7]

b. If the medical facility can identify the patient in question, medical records should be reviewed for:

(i) Results of tests diagnostic for any of the diseases listed in Part II.

(ii) Signs or symptoms compatible with any of the diseases listed in Part II.

c. If it is determined that the patient is infected with any of the diseases listed in Part II, the medical facility must review the information sent with the request to determine if the ERE was exposed.

(i) In determining whether the ERE was exposed, the medical facility should consider whether, based on the facts, the ERE was in circumstances in which there is a significant risk of becoming infected with the etiologic

[7] During the 1980s, a mean of 18 cases of plague was reported annually in persons exposed in enzootic areas of the southwestern United States. Thus, normally only EREs in this area face potential occupational exposure to plague.

[8] Occupational Safety and Health Administration, Occupational exposure to bloodborne pathogens: final rule. 29 CFR Part 1910.1030. Federal Register, December 6, 1991.

[7] Note however, that per section 300ff-88, "this subpart may not, with respect to victims of emergencies, be construed to authorize or require a medical facility to test any such victim for any infectious disease."

agent for the disease with which the patient is infected.

(ii) In determining whether there was a significant risk of the ERE becoming infected with the etiologic agent for the disease with which the patient is infected, the medical facility should consider:

(a) The nature of the risk (how the disease is transmitted),

(b) The duration of the risk (how long is the carrier infectious),

(c) The severity of the risk (what is the potential harm to others), and

(d) The probabilities the disease will be transmitted and will cause varying degrees of harm.

(iii) Under section 300ff-83(e), if a determination of exposure is made, the medical facility must notify the Designated Officer in writing as soon as practicable, but not later than 48 hours after receiving the request, that the ERE was exposed to a listed disease.

(iv) If the information provided by the Designated Officer is insufficient to make a determination, the medical facility must so notify the Designated Officer in writing as soon as practicable but not later than 48 hours after receiving the request.

(v) Under section 300ff-83(g), if the Designated Officer receives notice of insufficient information, he or she may request the public health officer for the community in which the medical facility is located to evaluate the request and the medical facility's response. The public health officer must then evaluate the request and the medical facility's response and report his or her findings to the Designated Officer as soon as practicable but not later than 48 hours after receiving the request.

(a) If the public health officer finds the information provided is sufficient to make a determination of exposure, he or she must submit the request to the medical facility.

(b) If the public health officer finds the information provided was insufficient to make a determination of exposure, he or she must advise the Designated Officer about collecting more information. If sufficient facts are subsequently collected by the Designated Officer, the public health officer must resubmit the request to the medical facility.

D. References

In making determinations or evaluations described in this Part, the Designated Officer, the medical facility, or the public health officer may use standard medical references or the latest edition of The Control of Communicable Diseases in Man. Additional references are listed in Addendum C.

Part IV. Implementation of the Law

A. By April 20, 1994, State public health officers must have selected persons to serve as Designated Officers of EREs for each employer of EREs in their States. In the selection of Designated Officers, the State public health officer shall give preference to individuals who are trained in the provision of health care or the control of infectious diseases (section 300ff-86).

B. By April 20, 1994, medical facilities must have in place procedures for:

1. Notifying Designated Officers within 48 hours of any instances in which it is known that a patient who has been transported to the medical facility is infected with an airborne disease listed in Part II (section 300ff-82(a) and (b)).

2. Responding within 48 hours to written requests from Designated Officers for determination of possible exposure to diseases listed in Part II (section 300ff-83(e))

C. By April 20, 1994, ERE employers must have in place procedures by which EREs can make requests of Designated Officers and procedures by which the Designated Officers would make appropriate disposition of such requests (section 300ff-83(a)).

D. By April 20, 1994, local health agencies must have in place procedures for handling requests for evaluations from Designated Officers (section 300ff-83(g)).

E. By April 20, 1994, the Secretary of Health and Human Services will:

1. Send copies of the list of potentially life-threatening diseases and the exposure guidelines to State public health officers requesting appropriate distribution (section 300ff-81(c)(1)).

2. Make copies of the list and guidelines available to the public (section 300ff-81(c)(2)).

3. Have in place procedures for receiving and handling allegations of violations of the exposure notification process (section 300ff-89(b)).

Addendum A

Background—Text of Sections 2681–2690 of the PHS Act as amended by Pub. L. 101–381 (42 U.S.C. 300ff-81 to 300ff-90. References are to Title 42 U.S.C.). (Published for informational purposes only)

SUBPART II—Notifications of Possible Exposure to Infectious Diseases

SEC. 300ff-81. Infectious Diseases and Circumstances Relevant to Notification Requirements.

(a) In General.—Not later than 180 days after the date of the enactment of the Ryan White Comprehensive AIDS Resources Emergency Act of 1990, the Secretary shall complete the development of—

(1) A list of potentially life-threatening infectious diseases to which emergency response employees may be exposed in responding to emergencies;

(2) Guidelines describing the circumstances in which such employees may be exposed to such diseases, taking into account the conditions under which emergency response is provided; and

(3) Guidelines describing the manner in which medical facilities should make determinations for purposes of Section 300ff-83(d).

(b) Specification of Airborne Infectious Diseases.—The list developed by the Secretary under subsection (a)(1) shall include a specification of those infectious diseases on the list that are routinely transmitted through airborne or aerosolized means.

(c) Dissemination.—The Secretary shall—

(1) Transmit to the state public health officers copies of the list and guidelines developed by the Secretary under subsection (a) with the request that the officers disseminate such copies as appropriate throughout the states; and

(2) Make such copies available to the public.

Sec. 300ff-82. Routine Notifications With Respect to Airborne Infectious Diseases in Victims Assisted.

(a) Routine Notification of Designated Officer

(1) Determination by Treating Facility.—If a victim of an emergency is transported by emergency response employees to a medical facility and the medical facility makes a determination that the victim has an airborne infectious disease, the medical facility shall notify the designated officer of the emergency response employees who transported the victim to the medical facility of the determination.

(2) Determination by Facility Ascertaining Cause of Death.—If a victim of an emergency is transported by emergency response employees to a medical facility, the medical facility ascertaining the cause of death shall notify the designated officer of the emergency response employees who transported the victim to the initial medical facility of any determination by the medical facility that the victim had an airborne infectious disease.

(b) Requirement of Prompt Notification.—With respect to a determination described in paragraph (1) or (2), the notification required in each of such paragraphs shall be made as soon as is practicable, but not later than 48 hours after the determination is made.

Sec. 300ff–83. Request for Notifications with Respect to Victims Assisted.

(a) Initiation of Process by Employee.—If an emergency response employee believes that the employee may have been exposed to an infectious disease by a victim of an emergency who was transported to a medical facility as a result of the emergency, and if the employee attended, treated, assisted, or transported the victim pursuant to the emergency, then the designated officer of the employee shall, upon the request of the employee, carry out the duties described in subsection (b) regarding a determination of whether the employee may have been exposed to an infectious disease by the victim.

(b) Initial Determination by Designated Officer.—The duties referred to in subsection (a) are that—

(1) The designated officer involved collect the facts relating to the circumstances under which, for purposes of subsection (a), the employee involved may have been exposed to an infectious disease; and

(2) the designated officer evaluate such facts and make a determination of whether, if the victim involved had any infectious disease included on the list issued under paragraph (1) of Section 300ff–81(a), the employee would have been exposed to the disease under such facts, as indicated by the guidelines issued under paragraph (2) of such Section.

(c) Submission of Request to Medical Facility.—

(1) In General.—If a designated officer makes a determination under subsection (b)(2) that an emergency response employee may have been exposed to an infectious

disease, the designated officer shall submit to the medical facility to which the victim involved was transported a request for a response under subsection (d) regarding the victim of the emergency involved.

(2) Form of Request.—A request under paragraph (1) shall be in writing and be signed by the designated officer involved, and shall contain a statement of the facts collected pursuant to subsection (b)(1).

(d) Evaluation and Response Regarding Request to Medical Facility.—

(1) In General.—If a medical facility receives a request under subsection (c), the medical facility shall evaluate the facts submitted in the request and make a determination of whether, on the basis of the medical information possessed by the facility regarding the victim involved, the emergency response employee was exposed to an infectious disease included on the list issued under paragraph (1) of Section 300ff-81(a), as indicated by the guidelines issued under paragraph (2) of such Section.

(2) Notification of Exposure.—If a medical facility makes a determination under paragraph (1) that the emergency response employee involved has been exposed to an infectious disease, the medical facility shall, in writing, notify the designated officer who submitted the request under subsection (c) of the determination.

(3) Finding of no Exposure.—If a medical facility makes a determination under paragraph (1) that the emergency response employee involved has not been exposed to an infectious disease, the medical facility shall, in writing, inform the designated officer who submitted the request under subsection (c) of the determination.

(4) Insufficient Information.—(A) If a medical facility finds in evaluating facts for purposes of paragraph (1) that the facts are insufficient to make the determination described in such paragraph, the medical facility shall, in writing, inform the designated officer who submitted the request under subsection (c) of the insufficiency of the facts.

(B)(i) If a medical facility finds in making a determination under paragraph (1) that the facility possesses no information on whether the victim involved has an infectious disease included on the list under Section 2681(a), the medical facility shall, in writing, inform the designated officer who submitted the request under subsection (c) of the insufficiency of such medical information.

(ii) If after making a response under clause (i) a medical facility determines that the victim involved has an infectious disease, the medical facility shall make the determination described in paragraph (1) and provide the applicable response specified in this subsection.

(e) Time for Making Response.—After receiving a request under subsection (c) (including any such request resubmitted under subsection (g)(2)), a medical facility shall make the applicable response specified in subsection (d) as soon as is practicable, but not later that 48 hours after receiving the request.

(f) Death of Victim of Emergency.—

(1) Facility Ascertaining Cause of Death.—If a victim described in subsection (a) dies at or before reaching the medical facility involved, and the medical facility receives a request under subsection (c), the medical facility shall provide a copy of the request to the medical facility ascertaining the cause of death of the victim, if such facility is a different medical facility than the facility that received the original request.

(2) Responsibility of Facility.—Upon the receipt of a copy of a request for purposes of paragraph (1), the duties otherwise established in this subpart regarding medical facilities shall apply to the medical facility ascertaining the cause of death of the victim in the same manner and to the same extent as such duties apply to the medical facility originally receiving the request.

(g) Assistance of Public Health Officer.—

(1) Evaluation of Response of Medical Facility Regarding Insufficient Facts.—

(A) In the case of a request under subsection (c) to which a medical facility has made the response specified in subsection (d)(4)(A) regarding the insufficiency of facts, the public health officer for the community in which the medical facility is located shall evaluate the request and the response, if the designated officer involved submits such documents to the officer with the request that the officer make such an evaluation.

(B) As soon as is practicable after a public health officer receives a request under paragraph (1), but not later than 48 hours after receipt of the request, the public health officer shall complete the evaluation required in such paragraph and inform the designated officer of the results of the evaluation.

(2) Finding of Evaluation.—

(A) If an evaluation under paragraph (1)(A) indicates that the facts provided to the medical facility pursuant to subsection (c) were sufficient for purposes of determinations under subsection (d)(1)—

(i) The public health officer shall, on behalf of the designated officer involved, resubmit the request to the medical facility; and

(ii) The medical facility shall provide to the designated officer the applicable response specified in subsection (d).

(B) If an evaluation under paragraph (1)(A) indicates that the facts provided in the request to the medical facility were insufficient for purposes of determinations specified in subsection (c)—

(i) The public health officer shall provide advice to the designated officer regarding the collection and description of appropriate facts; and

(ii) If sufficient facts are obtained by the designated officer—

(I) the public health officer shall, on behalf of the designated officer involved, resubmit the request to the medical facility; and

(II) The medical facility shall provide to the designated officer the appropriate response under subsection (c).

Sec. 300ff-84. Procedures for Notification of Exposure.

(a) Contents of Notification to Officer.—In making a notification required under section 300ff-82 or section 300ff-83(d)(2), a medical facility shall provide—

(1) The name of the infectious disease involved; and

(2) The date on which the victim of the emergency involved was transported by emergency response employees to the medical facility involved.

(b) Manner of Notification.—If a notification under Section 300ff-82 or Section 300ff-82(d)(2) [sic] is mailed or otherwise indirectly made—

(1) The medical facility sending the notification shall, upon sending the notification, inform the designated officer to whom the notification is sent of the fact that the notification has been sent; and

(2) Such designated officer shall, not later than 10 days after being informed by the medical facility that the notification has been sent, inform such medical facility whether the designated officer has received the notification.

Sec. 300ff-85. Notification of Employee.

(a) In General.—After receiving a notification for purposes of section 300ff-82 or 300ff-83(d)(2), a designated officer of emergency response employees shall, to the extent practicable, immediately notify each of such employees who—

(1) Responded to the emergency involved; and

(2) As indicated by guidelines developed by the Secretary, may have been exposed to an infectious disease.

(b) Certain Contents of Notification to Employee.—A notification under this subsection to an emergency response employee shall inform the employee of—

(1) The fact that the employee may have been exposed to an infectious disease and the name of the disease involved;

(2) Any action by the employee that, as indicated by guidelines developed by the Secretary, is medically appropriate; and

(3) If medically appropriate under such criteria, the date of such emergency.

(c) Responses Other Than Notification of Exposure.—After receiving a response under paragraph (3) or (4) of subsection (d) of section 300ff-83, or a response under subsection (g)(1) of such section, the designated officer for the employee shall, to the extent practicable, immediately inform the employee of the response.

Sec. 300ff-86. Selection of Designated Officers.

(a) In General.—For the purposes of receiving notifications and responses and making requests under this subpart on behalf of emergency response employees, the public health officer of each state shall designate 1 official or officer of each employer of emergency response employees in the state.

(b) Preference in Making Designations.—In making the designations required in subsection (a), a public health officer shall give preference to individuals who are trained in the provision of health care or in the control of infectious diseases.

SEC. 300ff-87. Limitations With Respect to Duties of Medical Facilities.

The duties established in this subpart for a medical facility—

(1) Shall apply only to medical information possessed by the facility during the period in which the facility is treating the victim for conditions arising from the emergency, or during the 60-day period beginning on the date on which the victim is transported by emergency response employees to the facility, whichever period expires first; and

(2) Shall not apply to any extent after the expiration of the 30-day period beginning on the expiration of the applicable period referred to in paragraph (1), except that such duties shall apply with respect to any request under section 300ff–83(c) received by a medical facility before the expiration of such 30-day period.

Sec. 300ff–88. Rules of Construction.

(a) Liability of Medical Facilities and Designated Officers.—This subpart may not be construed to authorize any cause of action for damages or any civil penalty against any medical facility, or any designated officer, for failure to comply with the duties established in this subpart.

(b) Testing.—This subpart may not, with respect to victims of emergencies, be construed to authorize or require a medical facility to test any such victim for any infectious disease.

(c) Confidentiality.—This subpart may not be construed to authorize or require any medical facility, any designated officer of emergency response employees, or any such employee, to disclose identifying information with respect to a victim of an emergency or with respect to any emergency response employee.

(d) Failure to Provide Emergency Services.—This subpart may not be construed to authorize any emergency response employee to fail to respond, or to deny services, to any victim of an emergency.

Sec. 300ff–89. Injunctions Regarding Violation of Prohibition.

(a) In General.—The Secretary may, in any court of competent jurisdiction, commence a civil action for the purpose of obtaining temporary or permanent injunctive relief with respect to any violation of this subpart.

(b) Facilitation of Information on Violations.—The Secretary shall establish an administrative process for encouraging emergency response employees to provide information to the Secretary regarding violations of this subpart. As appropriate, the Secretary shall investigate alleged such violations and seek appropriate injunctive relief.

Sec. 300ff–90. Applicability of Subpart.

This subpart shall not apply in a state if the chief executive officer of the state certifies to the Secretary that the law of the state is in substantial compliance with this subpart.

Effective Date.—Sections 300ff–80 and 300ff–81 of part E of title XXVI of the Public Health Service Act, as added by subsection (a) of this section, shall take effect upon the date of the enactment of this Act. Such part shall otherwise take effect upon the expiration of the 30-day period beginning on the date on which the Secretary issues guidelines under section 300ff–81(a).

(See 300ff–80 Note in Title 42 of the United States Code)

Addendum B

Excerpts Concerning Hepatitis B Vaccination

Guidelines for Prevention of Transmission of Human Immunodeficiency Virus and Hepatitis B Virus to Health-Care and Public-Safety Workers. Morbidity and Mortality Weekly Report 1989; 38 (supplement no. S–6).

Emergency medical workers have an increased risk for hepatitis B infection . . . The degree of risk correlates with the frequency and extent of blood exposure during the conduct of work activities. A few studies are available concerning risk of HBV infection for other groups of public-safety workers (law-enforcement personnel and correctional-facility workers), but reports that have been published do not document any increased risk for HBV infection . . . Nevertheless, in occupational settings in which workers may be routinely exposed to blood or other body fluids as described below, an increased risk for occupational acquisition of HBV infection must be assumed to be present.

Occupational Safety and Health Administration's Occupational Exposure to Bloodborne Pathogens Standard, 29 CFR Part 1910.1030.

(f) Hepatitis B vaccination and post-exposure evaluation and follow-up—

(1) General.

(i) The employer shall make available the hepatitis B vaccine and vaccination series to all employees who have occupational exposure . . .

(ii) The employer shall ensure that . . . the hepatitis B vaccine and vaccination series and post-exposure evaluation and follow-up, including prophylaxis, are:

(A) Made available at no cost to the employee.

(3) Post-exposure Evaluation and Followup. Following a report of an exposure incident, the employer shall make immediately available to the exposed employee a confidential medical evaluation and follow-up, including at least the following elements:

(v) Counseling.

Addendum C

References

General:

Benenson AS (ed). Control of communicable diseases in man. Washington, D.C.: The American Public Health Association, 15th edition, 1990.

For hepatitis B and human immunodeficiency virus:

CDC. Guidelines for prevention of transmission of human immunodeficiency virus and hepatitis B virus to health-care and public-safety workers. MMWR 1989; 38 (supplement no. S–6).

Occupational Safety and Health Administration. Occupational exposure to bloodborne pathogens: final rule. 29 CFR Pa/ 1910.1030. **Federal Register**, December 6, 1991.

For tuberculosis:

American Thoracic Society/Centers for Disease Control. Diagnostic standards and classification of tuberculosis. Amer Rev Resp Dis 1009;142:725–35.

American Thoracic Society/Centers for Disease Control. Control of tuberculosis. Amer Rev Resp Dis. 1983;128:336–342.

[FR Doc. 94–6492 Filed 3–18–94; 8:45 am]

BILLING CODE 4163–18–P

Bloodborne facts

Reporting Exposure Incidents

U.S. Department of Labor
Occupational Safety and Health Administration

OSHA's new bloodborne pathogens standard includes provisions for medical follow-up for workers who have an exposure incident. The most obvious exposure incident is a needlestick. But any specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials is considered an exposure incident and should be reported to the employer.

Exposure incidents can lead to infection from hepatitis B virus (HBV) or human immunodeficiency virus (HIV) which causes AIDS. Although few cases of AIDS are directly traceable to workplace exposure, every year about 8,700 health care workers contract hepatitis B from occupational exposures. Approximately 200 will die from this bloodborne infection. Some will become carriers, passing the infection on to others.

'HY REPORT?

Reporting an exposure incident right away permits immediate medical follow-up. Early action is crucial. Immediate intervention can forestall the development of hepatitis B or enable the affected worker to track potential HIV infection. Prompt reporting also can help the worker avoid spreading bloodborne infection to others. Further, it enables the employer to evaluate the circumstances surrounding the exposure incident to try to find ways to prevent such a situation from occurring again.

Reporting is also important because part of the follow-up includes testing the blood of the source individual to determine HBV and HIV infectivity if this is unknown and if permission for testing can be obtained. The exposed employee must be informed of the results of these tests.

Employers must tell the employee what to do if an exposure incident occurs.

MEDICAL EVALUATION AND FOLLOW-UP

Employers must provide free medical evaluation and treatment to employees who experience an exposure incident. They are to refer exposed employees to a licensed health care provider who will counsel the individual about what happened and how to prevent further spread of any potential infection. He or she will prescribe appropriate treatment in line with current U.S. Public Health Service recommendations. The licensed health care provider also will evaluate any reported illness to determine if the symptoms may be related to HIV or HBV development.

The first step is to test the blood of the exposed employee. Any employee who wants to participate in the medical evaluation program must agree to have blood drawn. However, the employee has the option to give the blood sample but refuse permission for HIV testing at that time. The employer must maintain the employee's blood sample for 90 days in case the employee changes his or her mind about testing--should symptoms develop that might relate to HIV or HBV infection.

The health care provider will counsel the employee based on the test results. If the source individual was HBV positive or in a high risk category, the exposed employee may be given hepatitis B immune globulin and vaccination, as necessary. If there is no information on the source individual or the test is negative, and the employee has not been vaccinated or does not have immunity based on his or her test, he or she may receive the vaccine. Further, the health care provider will discuss any other findings from the tests.

The standard requires that the employer make the hepatitis B vaccine available, at no cost to the employee, to all employees who have occupational exposure to blood and other potentially infectious materials. This requirement is in addition to post exposure testing and treatment responsibilities.

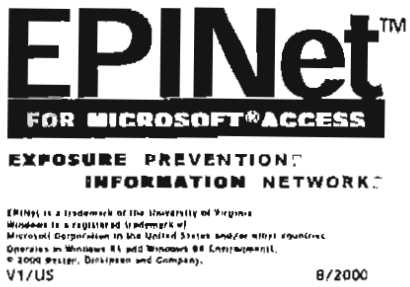
WRITTEN OPINION

In addition to counseling the employee, the health care provider will provide a written report to the employer. This report simply identifies whether hepatitis B vaccination was recommended for the exposed employee and whether or not the employee received vaccination. The health care provider also must note that the employee has been informed of the results of the evaluation and told of any medical conditions resulting from exposure to blood which require further evaluation or treatment. Any added findings must be kept confidential.

CONFIDENTIALITY

Medical records must remain confidential. They are not available to the employer. The employee must give specific written consent for anyone to see the records. Records must be maintained for the duration of employment plus 30 years in accordance with OSHA's standard on access to employee exposure and medical records.

Needlestick & Sharp Object Injury Report



V1/US 8/2000

Last Name:_____ First Name:_____

Injury ID:*(office use only)* S_____ Facility ID:*(office use only)*_____ Completed By:____

1) Date of Injury: ☐☐ ☐☐ ☐☐☐☐ 2) Time of Injury: ☐☐ ☐☐

3) Department where Incident Occurred:_____

4) Home Department:_____

5) **What is the Job Category of the Injured Worker:** (check one box only)

- ☐ 1 Doctor *(attending/staff)*; specify specialty_____
- ☐ 2 Doctor *(intern/resident/fellow)* specify specialty_____
- ☐ 3 Medical Student
- ☐ 4 Nurse: specify ☐ 1 RN ☐ 2 LPN ☐ 3 NP ☐ 4 CRNA ☐ 5 Midwife
- ☐ 5 Nursing Student
- ☐ 18 CNA/HHA
- ☐ 6 Respiratory Therapist
- ☐ 7 Surgery Attendant
- ☐ 8 Other Attendant
- ☐ 9 Phlebotomist/Venipuncture/IV Team
- ☐ 10 Clinical Laboratory Worker
- ☐ 11 Technologist *(non-lab)*
- ☐ 12 Dentist
- ☐ 13 Dental Hygienist
- ☐ 14 Housekeeper
- ☐ 19 Laundry Worker
- ☐ 20 Security
- ☐ 16 Paramedic
- ☐ 17 Other Student
- ☐ 15 Other, describe:_____

6) **Where Did the Injury Occur?** (check one box only)

- ☐ 1 Patient Room
- ☐ 2 Outside Patient Room *(hallway, nurses station, etc.)*
- ☐ 3 Emergency Department
- ☐ 4 Intensive/Critical Care unit: specify type:_____
- ☐ 5 Operating Room/Recovery
- ☐ 6 Outpatient Clinic/Office
- ☐ 7 Blood Bank
- ☐ 8 Venipuncture Center
- ☐ 9 Dialysis Facility *(hemodialysis and peritoneal dialysis)*
- ☐ 10 Procedure Room *(x-ray, EKG,etc)*
- ☐ 11 Clinical Laboratories
- ☐ 12 Autopsy/Pathology
- ☐ 13 Service/Utility *(laundry,central supply,loading dock,etc)*
- ☐ 16 Labor and Delivery Room
- ☐ 17 Home-care
- ☐ 14 Other, describe:_____

7) **Was the Source Patient Identifiable?** (check one box only)

☐ 1 Yes ☐ 2 No ☐ 3 Unknown ☐ 4 Not Applicable

8) **Was the Injured Worker the Original User of the Sharp Item?** (check one box only)

☐ 1 Yes ☐ 2 No ☐ 3 Unknown ☐ 4 Not Applicable

9) **The Sharp Item was:** (check one box only)

- ☐ 1 Contaminated (known exposure to patient or contaminated equipment) ☐☐☐ **was there blood on the device?** ☐ 1 Yes ☐ 2 No
- ☐ 2 Uncontaminated (no known exposure to patient or contaminated equipment)
- ☐ 3 Unknown

10) **For What Purpose was the Sharp Item Originally Used?** (check one box only)

- ☐ 1 Unknown/Not Applicable
- ☐ 2 Injection, Intra-muscular/Subcutaneous, or Other Injection through the Skin *(syringe)*
- ☐ 3 Heparin or Saline Flush *(syringe)*
- ☐ 4 Other Injection into *(or aspiration from)* IV injection site or IV Port *(syringe)*
- ☐ 5 To Connect IV line *(intermittent IV/piggyback/IV infusion/other IV line connection)*
- ☐ 6 To Start IV or Set up Heparin Lock *(IV catheter or winged set-type needle)*
- ☐ 7 To Draw Venous Blood Sample ☐☐☐☐☐
- ☐ 8 To Draw Arterial Blood Sample ☐☐☐☐☐ **If used to draw blood was it?** ☐ Direct stick? ☐ Draw from a Line?
- ☐ 16 To Place an Arterial /Central Line
- ☐ 9 To Obtain a Body Fluid or Tissue Sample *(urine/CSF/amniotic fluid/other fluid, biopsy)*
- ☐ 10 Finger stick/Heel Stick
- ☐ 11 Suturing
- ☐ 12 Cutting
- ☐ 17 Drilling
- ☐ 13 Electrocautery
- ☐ 14 To Contain a Specimen or Pharmaceutical *(glass item)*
- ☐ 15 Other; Describe: _____

11) **Did the Injury Occur?** (check one box only)

- ☐ 1 Before Use of Item *(item broke/slipped, assembling device, etc.)*
- ☐ 2 During Use of Item *(item slipped, patient jerred item, etc)*
- ☐ 15 Restraining patient
- ☐ 3 Between Steps of a Multi-step Procedure *(between incremental injections, passing instruments, etc.)*
- ☐ 4 Disassembling Device or Equipment
- ☐ 5 In Preparation for Reuse of Reusable Instrument *(sorting, disinfecting, sterilizing, etc.)*
- ☐ 6 While Recapping Used Needle
- ☐ 7 Withdrawing a Needle from Rubber or Other Resistant Material *(rubber stopper, IV port, etc.)*
- ☐ 16 Device Left on Floor, Table, Bed or Other Inappropriate Place
- ☐ 8 Other After Use-Before Disposal *(in transit to trash, cleaning, sorting, etc.)*
- ☐ 9 From Item Left On or Near Disposal Container
- ☐ 10 While putting Item into Disposal Container
- ☐ 11 After Disposal, Stuck by Item Protruding from Opening of Disposal Container
- ☐ 12 Item Pierced Side of Disposal Container
- ☐ 13 After Disposal, Item Protruded from Trash Bag or Inappropriate Waste Container
- ☐ 14 Other: Describe:_____

12) **What Type of Device Caused the Injury?** (check one box only)

- ☐ Needles-Hollow Bore
- ☐ Surgical
- ☐ Glass

Which Device Caused the Injury? (check one box from one of the three sections only)

Needles *(for suture needles see "surgical instruments")*

- ☐ 1 Disposable Syringe
  - ☐ a Insulin
  - ☐ b Tuberculin
  - ☐ c 24/25-gauge needle
  - ☐ d 23-gauge needle
  - ☐ e 22-gauge needle
  - ☐ f 21-gauge needle
  - ☐ g 20-gauge needle
  - ☐ h Other
- ☐ 2 Pre-filled cartridge syringe (Includes Tubex™ *, Carpuject ™* - type syringes)
- ☐ 3 Blood gas syringe *(ABG)*
- ☐ 4 Syringe, other type
- ☐ 5 Needle on IV line *(includes piggybacks & IV line connectors)*
- ☐ 6 Winged steel needle *(includes winged-set type devices)*
- ☐ 7 IV catheter stylet
- ☐ 8 Vacuum tube blood collection holder/needle *(includes Vacutainer™ *–type devices)*
- ☐ 9 Spinal or Epidural Needle
- ☐ 10 Unattached hypodermic needle
- ☐ 11 Arterial catheter introducer needle
- ☐ 12 Central line catheter needle *(cardiac, etc.)*
- ☐ 13 Drum catheter needle
- ☐ 14 Other vascular catheter needle *(cardiac, etc.)*
- ☐ 15 Other non-vascular catheter needle *(ophthalmology, etc.)*
- ☐ 28 Needle, not sure what kind
- ☐ 29 Other needle, please describe:_____

Surgical Instrument or Other Sharp Items *(for glass items see "glass")*

- ☐ 30 Lancet *(finger or heel sticks)*
- ☐ 31 Suture needle
- ☐ 32 Scalpel, reusable *(scalpel, disposable code is 45)*
- ☐ 33 Razor
- ☐ 34 Pipette *(plastic)*
- ☐ 35 Scissors
- ☐ 36 Electro-cautery device
- ☐ 37 Bone cutter
- ☐ 38 Bone chip
- ☐ 39 Towel clip
- ☐ 40 Microtome blade
- ☐ 41 Trocar
- ☐ 42 Vacuum tube *(plastic)*
- ☐ 43 Specimen/Test tube *(plastic)*
- ☐ 44 Fingernails/Teeth
- ☐ 45 Scalpel, disposable
- ☐ 46 Retractors, skin/bone hooks
- ☐ 47 Staples/Steel sutures
- ☐ 48 Wire (suture/fixation/guide wire
- ☐ 49 Pin *(fixation, guide pin)*
- ☐ 50 Drill bit/bur
- ☐ 51 Pickups/Forceps/Hemostats/Clamps
- ☐ 58 Sharp item, not sure what kind
- ☐ 59 Other sharp item: Describe:_____

Glass

- ☐ 60 Medication ampule
- ☐ 61 Medication vial *(small volume with rubber stopper)*
- ☐ 62 Medication/IV bottle *(large volume)*
- ☐ 63 Pipette *(glass)*
- ☐ 64 Vacuum tube *(glass)*
- ☐ 65 Specimen/Test tube *(glass)*
- ☐ 66 Capillary tube
- ☐ 67 Glass slide
- ☐ 78 Glass item, not sure what kind
- ☐ 79 Other glass item: Describe:_____

12a) **Brand/Manufacturer of Product:** *(e.g. ABC Medical Company)* _____

12b) **Model:**

- ☐ 98 Please Specify:_____
- ☐ 99 Unknown

13) **If the Item Causing the Injury was a Needle or Sharp Medical Device, Was it a" Safety Design" with a Shielded, Recessed, Retractable, or Blunted Needle or Blade?**

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 Unknown

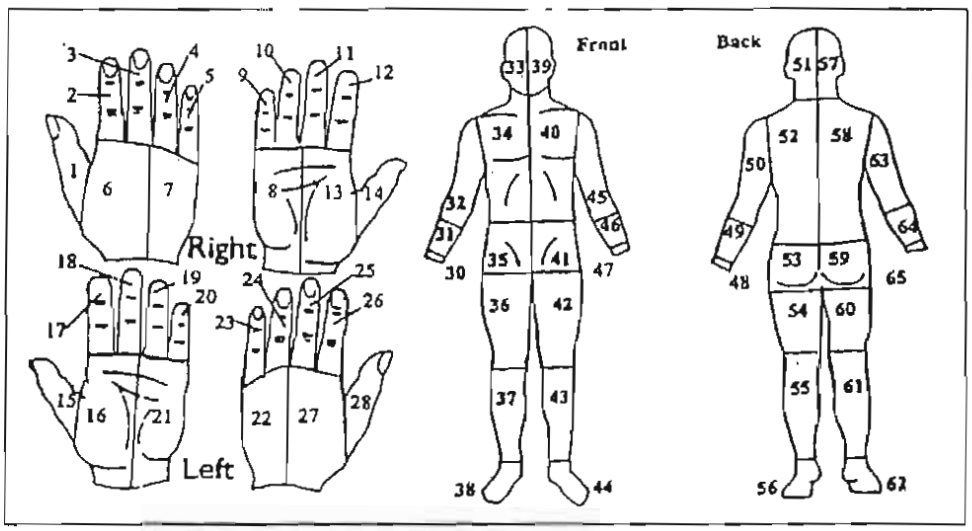
13a) **Was the Protective Mechanism Activated?**

- ☐ 1 Yes, fully
- ☐ 2 Yes, partially
- ☐ 3 No
- ☐ 4 Unknown

13b) **Did Exposure Incident Happen?**

- ☐ 1 Before activation
- ☐ 2 During activation
- ☐ 3 After activation
- ☐ 4 Unknown

14) **Mark the Location of the Injury in the box below:**



15) **Was the Injury?**
- ☐ 1 Superficial *(little or no bleeding)*
- ☐ 2 Moderate *(skin punctured, some bleeding)*
- ☐ 3 Severe *(deep stick/cut, or profuse bleeding)*

16) **If Injury was to the hand, did the Sharp Item Penetrate?**
- ☐ 1 Single pair of gloves
- ☐ 2 Double pair of gloves
- ☐ 3 No gloves

17) **Dominant Hand of the Injured Worker:**
- ☐ 1 Right-handed
- ☐ 2 Left-handed

18) **Describe the Circumstances Leading to this Injury** *(please note if a device malfunction was involved)*:

_____
_____
_____
_____

19) **For Injured Healthcare Worker: If the Sharp had no Integral Safety Feature, Do you have an Opinion that such a Feature could have prevented the Injury?** ☐ 1 Yes ☐ 2 No ☐ 3 Unknown

Describe: _____
_____
_____
_____

20) **For Injured Healthcare Worker: Do you have an Opinion that any other Engineering Control, Administrative or Work Practice could have prevented the Injury?** ☐ 1 Yes ☐ 2 No ☐ 3 Unknown

Describe: _____
_____
_____
_____

Cost:

Lab charges (Hb, HCV, HIV, other)
_____ Healthcare Worker
_____ Source
Treatment Prophylaxis (HBIG, Hb vaccine, tetanus, other)
_____ Healthcare Worker
_____ Source
_____ **Service Charges** (Emergency Dept, Employee Health, other)
_____ **Other Costs** (Worker's Comp, surgery, other)
_____ **TOTAL** (round to nearest dollar)

Is this Incident OSHA reportable? ☐ 1 Yes ☐ 2 No ☐ 3 Unknown

If Yes, Days Away from Work? _____
Days of Restricted Work Activity? _____

Does this incident meet the FDA medical device reporting criteria? (Yes if a device defect caused serious injury necessitating medical or surgical intervention, or death occurred within 10 works days of incident.)

☐ 1 Yes *(If Yes, follow FDA reporting protocol.)* ☐ 2 No

* Tubex™ is a trademark of Wyeth Ayers; Carpuject™ is a trademark of Sanofi Winthrop; VACUTAINER™ is a trademark of Becton Dickinson. Identification of these products does not imply endorsement of these specific brands.

Blood and Body Fluid Exposure Report

EPINet™
FOR MICROSOFT® ACCESS
EXPOSURE PREVENTION INFORMATION NETWORK

EPINet is a trademark of the University of Virginia
Windows is a registered trademark of
Microsoft Corporation in the United States and/or other countries
Operates in Windows 95 and Windows 98 Environments.
© 2000 Boston, Digiman and Germany.
V1/US 8/2000

Last Name:_____ First Name:_____

Exposure ID:*(office use only)* B_____ Facility ID:*(office use only)* _____ Completed By:____

1) Date of Exposure: ☐☐ ☐☐ ☐☐☐☐ 2) Time of Exposure: ☐☐ ☐☐

3) Department where Incident Occurred: _____

4) Home Department: _____

5) **What Is the Job Category of the Injured Worker:** (check one box only)

- ☐ 1 Doctor *(attending/staff)*; specify specialty_____
- ☐ 2 Doctor *(intern/resident/fellow)* specify specialty _____
- ☐ 3 Medical Student
- ☐ 4 Nurse: specify → ☐ 1 RN ☐ 2 LPN ☐ 3 NP ☐ 4 CRNA ☐ 5 Midwife
- ☐ 5 Nursing Student
- ☐ 18 CNA/HHA
- ☐ 6 Respiratory Therapist
- ☐ 7 Surgery Attendant
- ☐ 8 Other Attendant
- ☐ 9 Phlebotomist/Venipuncture/IV Team
- ☐ 10 Clinical Laboratory Worker
- ☐ 11 Technologist *(non-lab)*
- ☐ 12 Dentist
- ☐ 13 Dental Hygienist
- ☐ 14 Housekeeper
- ☐ 19 Laundry Worker
- ☐ 20 Security
- ☐ 16 Paramedic
- ☐ 17 Other Student
- ☐ 15 Other, describe: _____

6) **Where Did the Exposure Occur?** (check one box only)

- ☐ 1 Patient Room
- ☐ 2 Outside Patient Room *(hallway, nurses station, etc.)*
- ☐ 3 Emergency Department
- ☐ 4 Intensive/Critical Care unit: specify type:_____
- ☐ 5 Operating Room/Recovery
- ☐ 6 Outpatient Clinic/Office
- ☐ 7 Blood Bank
- ☐ 8 Venipuncture Center
- ☐ 9 Dialysis Facility *(hemodialysis and peritoneal dialysis)*
- ☐ 10 Procedure Room *(x-ray, EKG,etc)*
- ☐ 11 Clinical Laboratories
- ☐ 12 Autopsy/Pathology
- ☐ 13 Service/Utility *(laundry,central supply,loading dock,etc)*
- ☐ 16 Labor and Delivery Room
- ☐ 17 Home-care
- ☐ 14 Other, describe: _____

7) **Was the Source Patient Identifiable?** (check one box only)

☐ 1 Yes ☐ 2 No ☐ 3 Unknown ☐ 4 Not Applicable

8) **Which Body Fluids were Involved in the Exposure?** (check all that apply)

- ☐ Blood or Blood Products
- ☐ Vomit
- ☐ Sputum
- ☐ Saliva
- ☐ CSF
- ☐ Peritoneal Fluid
- ☐ Pleural Fluid
- ☐ Amniotic Fluid
- ☐ Urine
- ☐ Other, Describe:_____

Was the body fluid visibly contaminated with blood? ☐ Yes ☐ No ☐ Unknown

9) **Was the Exposed Part:** (check all that apply)

- ☐ Intact Skin
- ☐ Non-Intact Skin
- ☐ Eyes *(conjunctiva)*
- ☐ Nose *(mucosa)*
- ☐ Mouth *(mucosa)*
- ☐ Other, Describe:_____ . _____

10) **Did the Blood or Body Fluid:** (check all that apply)

- ☐ Touch Unprotected Skin
- ☐ Touch Skin Between Gap in Protective Garments
- ☐ Soak through Barrier Garment or Protective Garment
- ☐ Soak through Clothing

11) **Which Barrier Garments were Worn at the Time of Exposure:** (check all that apply)

- ☐ Single Pair Latex/Vinyl Gloves
- ☐ Double pair Latex/Vinyl Gloves
- ☐ Goggles
- ☐ Eyeglasses *(not a protective item)*
- ☐ Eyeglasses with Side shields
- ☐ Face shield
- ☐ Surgical Mask
- ☐ Surgical Gown
- ☐ Plastic Apron
- ☐ Lab Coat, Cloth *(not a protective garment)*
- ☐ Lab Coat, Other
- ☐ Other, Describe:_____

12) **Was the Exposure the Result of:** (check one box only)

- ☐ 1 Direct Patient Contact
- ☐ 2 Specimen Container Leaked/Spilled
- ☐ 3 Specimen Container Broke
- ☐ 4 IV Tubing/Bag/Pump Leaked/Broke
- ☐ 10 Feeding/Ventilator/other Tube Separated/Leaked/Splashed. Specify Tubing: _____
- ☐ 5 Other Body Fluid Container Spilled/Leaked
- ☐ 6 Touched Contaminated Equipment/Surface
- ☐ 7 Touched Contaminated Drapes/Sheets/Gowns, etc.
- ☐ 8 Unknown
- ☐ 9 Other, Describe: _____

If Equipment Failure, Please Specify: Equipment Type:_____

Manufacturer:_____

13) **For How Long Was the Blood or Body Fluid In Contact with Your Skin or Mucous Membranes?** (check one)

- ☐ 1 Less than 5 Minutes
- ☐ 2 5-14 Minutes
- ☐ 3 15 Minutes to 1 Hour
- ☐ 4 More than 1 Hour

14) **How Much Blood/Body Fluid Came In Contact with Your Skin or Mucous Membranes?** (check one)

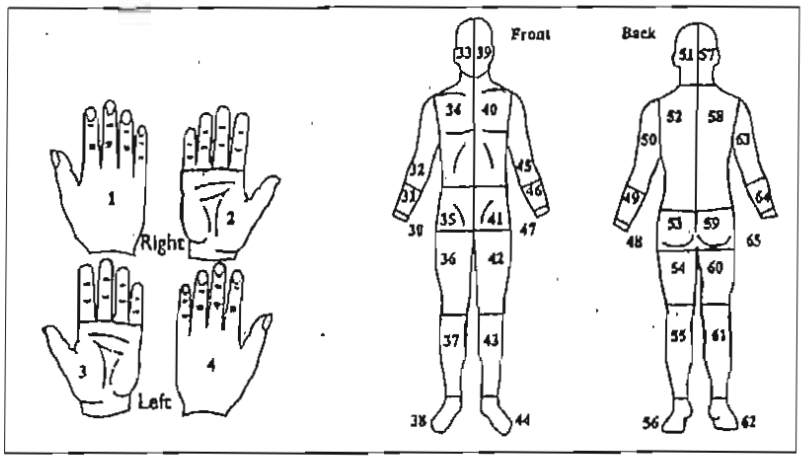
- ☐ 1 Small Amount (up to 5 cc, or up to 1 teaspoon)
- ☐ 2 Moderate Amount (up to 50 cc, or up to quarter cup)
- ☐ 3 Large Amount (More than 50 cc)

15) **Location of the Exposure:**
Write the number of the location of up to three exposed body parts in the blanks below.

Largest area of exposure:_____

Middle area of exposure:_____

Smallest area of exposure:_____



16) **Describe the Circumstances Leading to this Exposure** *(please note if a device malfunction was involved)*:

_____
_____
_____
_____

17) **For Injured Worker: Do you have an Opinion that any other Engineering Control, Administrative or Work Practice could have prevented the Injury?** ☐ 1 Yes ☐ 2 No ☐ 3 Unknown
Describe: _____
_____
_____
_____

Cost:

	Lab charges *(Hb, HCV, HIV, other tests)*
_____	Healthcare Worker
_____	Source
	Treatment Prophylaxis *(HBIG, Hb vaccine, tetanus, other)*
_____	Healthcare Worker
_____	Source
_____	**Service Charges** *(Emergency Dept, Employee Health, other)*
_____	**Other Costs** *(Worker's Comp, surgery, other)*
_____	**TOTAL** *(round to nearest dollar)*

Is this Incident OSHA reportable? ☐ 1 Yes ☐ 2 No ☐ 3 Unknown
If Yes, Days Away from Work? _____
Days of Restricted Work Activity? _____

Does this Incident meet the FDA medical device reporting criteria? (Yes if a device defect caused serious injury necessitating medical or surgical intervention, or death occurred within 10 works days of incident.)
☐ 1 Yes (If Yes, follow FDA reporting protocol) ☐ 2 No

Post Exposure Follow-Up

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Injury ID: (office use only) _____ Facility ID: (office use only)_____

Date of Injury/Exposure: __/__/____

Source Patient:

1) **Was the source patient identifiable?**
☐ source known and tested ☐ source known but not tested, reason:_____ ☐ source not known

2) **Was the source patient positive for the pathogens below?** (even if tested before this exposure?)

Pathogen	Test *(circle)*	Result *(circle result)*			Date Drawn
Hepatitis B	HbsAg	positive	negative	not tested	__/__/____
	HbeAg	positive	negative	not tested	
	Anti HBs	positive	negative	not tested	
	Anti HBc	positive	negative	not tested	
Hepatitis C	Anti-HCV EIA	positive	negative	not tested	__/__/____
	PCR-HCV	positive	negative	not tested	
	RNA	positive	negative	not tested	
HIV	Anti-HIV	positive	negative	not tested	__/__/____
	#CD4 Cells	count_____		not tested	
	Antigen Load	RNA copies/ml_____		not tested	
	Other				__/__/____
Other	_____	_____			__/__/____

3) **If source patient was believed to be in high risk group for blood borne pathogens, check all that apply:**
☐ Blood Product Recipient ☐ Elevated Enzymes ☐ Sexual ☐ Dialysis
☐ Injection Drug Use ☐ Hemophilia ☐ Other, Describe:_____

4) **If the source patient was HIV positive, had he been treated with any of the following before exposure?**
☐ Unknown ☐ 3TC ☐ IDV
☐ AZT ☐ ddC ☐ Other Anti-Retroviral:_____

5) **Additional source patient comments:**_____

Health Care Worker:

1) **Health Care Worker was seen by:** ☐ Employee ☐ Emergency Room ☐ Other, Describe:_____

2) **Was the Health Care Worker Vaccinated against HBV before exposure?** ☐ No ☐ 1-Dose ☐ 2-Doses ☐ 3-Doses
If yes, anitbody level upon completion, if tested: _____ *Date tested:* __/__/____

2a) **Was Health Care Worker Pregnant?** ☐ Yes ☐ No ☐ Not Applicable
If yes, which trimester? ☐ First ☐ Second ☐ Third

3) **Results of baseline tests:**

Pathogen	Test *(circle)*	Result *(circle result)*			Date Drawn
Hepatitis B	HbsAg	positive	negative	not tested	__/__/____
	HbeAg	positive	negative	not tested	
	Anti HBs	positive	negative	not tested	
	Anti HBc	positive	negative	not tested	
Hepatitis C	Anti-HCV EIA	positive	negative	not tested	__/__/____
	Anti-HCV supp.	positive	negative	not tested	
	_____	positive	negative	not tested	
HIV	Anti-HIV	positive	negative	not tested	__/__/____
Other	_____	_____			__/__/____
Other	_____	_____			__/__/____

4) Circle all Post Exposure Treatment/Prophylaxis Given to the Health Care Worker and FILL IN THE DOSAGES

Treatment	Dose	Date Given	Duration/Comments
HBIG	1._____	__/__/____	_____
	2._____	__/__/____	_____
HBV Vaccine	1._____	__/__/____	_____
	2._____	__/__/____	_____
	3._____	__/__/____	_____
	Booster:_____	__/__/____	_____
HIV Antiretroviral Specify:_____		__/__/____	_____
HIV Antiretroviral Specify:_____		__/__/____	_____
HIV Antiretroviral Specify:_____		__/__/____	_____
Other, Specify_____		__/__/____	_____

5) **Result of Follow-Up Tests:** (Space provided for repeated test results, however, testing protocols may vary in different institutions.)

Pathogen	Test *(circle)*	Result *(circle result)*			Date Drawn
Hepatitis B	Panel 1				
	HbsAg	positive	negative	not tested	__/__/____
	Anti HBs	positive	negative	not tested	
	Anti HBc	positive	negative	not tested	
	Panel 2				
	HbsAg	positive	negative	not tested	__/__/____
	Anti HBs	positive	negative	not tested	
	Anti HBc	positive	negative	not tested	
	Panel 3				
	HbsAg	positive	negative	not tested	__/__/____
	Anti HBs	positive	negative	not tested	
	Anti HBc	positive	negative	not tested	
Hepatitis C	Anti-HCV (test 1)	positive	negative	not tested	__/__/____
	Anti-HCV (test 2)	positive	negative	not tested	
HIV	Anti-HIV (test 1)	positive	negative	not tested	__/__/____
	Anti-HIV (test 2)	positive	negative	not tested	__/__/____
	Anti-HIV (test 3)	positive	negative	not tested	__/__/____
	Anti-HIV (test 4)	positive	negative	not tested	__/__/____
Other	_____	_____			__/__/____
Other	_____	_____			__/__/____

6) **Additional Comments:**

_____

_____

_____

_____

SPECIAL ARTICLE

Guideline for infection control in health care personnel, 1998

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Public Health Service
U.S. Department of Health and Human Services

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Table of Contents

I. Infection control issues for health care personnel: An overview

A. EXECUTIVE SUMMARY 291
B. INTRODUCTION 292
C. INFECTION CONTROL OBJECTIVES FOR A PERSONNEL HEALTH SERVICE 292
D. ELEMENTS OF A PERSONNEL HEALTH SERVICE FOR INFECTION CONTROL 293
1. Coordination with other departments 293
2. Medical evaluations 293
3. Personnel health and safety education 293
4. Immunization programs 296
5. Management of job-related illnesses and exposures 298
6. Health counseling 301
7. Maintenance of records, data management, and confidentiality 301
E. EPIDEMIOLOGY AND CONTROL OF SELECTED INFECTIONS TRANSMITTED AMONG HEALTH CARE PERSONNEL AND PATIENTS 302
1. Bloodborne pathogens 302

a. Overview 302
b. Hepatitis B 302
c. Hepatitis C 304
d. Human immunodeficiency virus 305
2. Conjunctivitis 305
3. Cytomegalovirus 305
4. Diphtheria 306
5. Gastrointestinal infections, acute 307
6. Hepatitis A 308
7. Herpes simplex 309
8. Measles 309
9. Meningococcal disease 310
10. Mumps 311
11. Parvovirus 311
12. Pertussis 312
13. Poliomyelitis 313
14. Rabies 313
15. Rubella 314
16. Scabies and pediculosis 315
17. *Staphylococcus aureus* infection and carriage 316
18. *Streptococcus*, group A infection 316
19. Tuberculosis 316
20. Vaccinia (smallpox) 320
21. Varicella 320
22. Viral respiratory infections 323
a. Influenza 323
b. Respiratory syncytial virus 323
c. Work restrictions 324
F. PREGNANT PERSONNEL 324
G. LABORATORY PERSONNEL 324
H. EMERGENCY-RESPONSE PERSONNEL 325
I. LATEX HYPERSENSITIVITY 325
J. THE AMERICANS WITH DISABILITIES ACT 327
II. Recommendations for prevention of infections in health care personnel 328
A. INTRODUCTION 328
B. ELEMENTS OF A PERSONNEL HEALTH SERVICE FOR INFECTION CONTROL 328
1. Coordinated planning and administration 328
2. Placement evaluation 328
3. Personnel health and safety education 329
4. Job-related illnesses and exposures 329
5. Record keeping, data management, and confidentiality 329
C. PROTECTION OF PERSONNEL AND OTHER PATIENTS FROM PATIENTS WITH INFECTIONS 330
D. IMMUNIZATION OF HEALTH CARE PERSONNEL, GENERAL RECOMMENDATIONS 330
E. PROPHYLAXIS AND FOLLOW-UP AFTER EXPOSURE, GENERAL RECOMMENDATIONS 330
F. PERSONNEL RESTRICTION BECAUSE OF INFECTIOUS ILLNESSES OR SPECIAL CONDITIONS, GENERAL RECOMMENDATIONS 330
G. PREVENTION OF NOSOCOMIAL TRANSMISSION OF SELECTED INFECTIONS 330
1. Bloodborne pathogens, general recommendation 330
a. Hepatitis B 331
b. Hepatitis C 331
c. Human immunodeficiency virus 331
2. Conjunctivitis 331
3. Cytomegalovirus 331
4. Diphtheria 331

5. Gastroenteritis 332
6. Hepatitis A 332
7. Herpes simplex 332
8. Measles 332
9. Meningococcal disease 333
10. Mumps 333
11. Parvovirus 333
12. Pertussis 333
13. Poliomyelitis 333
14. Rabies 334
15. Rubella 334
16. Scabies and pediculosis 334
17. Staphylococcal infection or carriage 334
18. Group A *Streptococcus* infections 334
19. Tuberculosis 335
20. Vaccinia 337
21. Varicella 337
22. Viral respiratory infections 337
H. SPECIAL ISSUES 338
1. Pregnancy 338
2. Emergency-response employees 338
3. Personnel linked to outbreaks of bacterial infection 338
4. Latex hypersensitivity 338
References 339
Table 1. Immunobiologics and schedules for health care personnel 294
Table 2. Summary of ACIP recommendations on immunization of health care workers with special conditions 298
Table 3. Summary of suggested work restrictions for health care personnel exposed to or infected with infectious diseases of importance in health care settings, in the absence of state and local regulations 299
Table 4. Recommendation for postexposure prophylaxis for percutaneous or permucosal exposure to hepatitis B virus, United States 303
Table 5. Selected reported etiologic agents causing community or nosocomially acquired gastrointestinal infections in developed countries 307
Table 6. Pregnant health care personnel: Pertinent facts to guide management of occupational exposures to infectious agents 322
Appendix A. Recommended readings for infection control in health care personnel 354

Part I. Infection control issues for health care personnel: An overview

A. EXECUTIVE SUMMARY

This guideline updates and replaces the previous edition of the Centers for Disease Control and Prevention (CDC) "Guideline for Infection Control in Hospital Personnel," published in 1983. The revised guideline, designed to provide methods for reducing the transmission of infections from patients to health care personnel and from personnel to patients, also provides an overview of the evidence for recommendations considered prudent by consensus of the Hospital Infection Control Practices Advisory Committee members. A working draft of this guideline was also reviewed by experts in infection control, occupational health, and infectious diseases; however, all recommendations contained in the guideline may not reflect the opinion of all reviewers.

This document focuses on the epidemiology of and preventive strategies for infections known to be transmitted in health care settings and those for which there are adequate scientific data on which to base recommendations for prevention.

The prevention strategies addressed in this document include immunizations for vaccine-preventable diseases, isolation precautions to prevent exposures to infectious agents, management of health care personnel exposure to infected persons, including postexposure prophylaxis, and work restrictions for exposed or infected health care personnel. In addition, because latex barriers are frequently used to protect personnel against transmission of infectious agents, this guideline addresses issues related to latex hypersensitivity and provides recommendations to prevent sensitization and reactions among health care personnel.

B. INTRODUCTION

In the United States, there are an estimated 8.8 million persons who work in health care professions and about 6 million persons work in more than 6000 hospitals. However, health care is increasingly being provided outside hospitals in facilities such as nursing homes, freestanding surgical and outpatient centers, emergency care clinics, and in patients' homes or during prehospital emergency care. Hospital-based personnel and personnel who provide health care outside hospitals may acquire infections from or transmit infections to patients, other personnel, household members, or other community contacts.[1,2]

In this document, the term *health care personnel* refers to all paid and unpaid persons working in health care settings who have the potential for exposure to infectious materials, including body substances, contaminated medical supplies and equipment, contaminated environmental surfaces, or contaminated air. These personnel may include but are not limited to emergency medical service personnel, dental personnel, laboratory personnel, autopsy personnel, nurses, nursing assistants, physicians, technicians, therapists, pharmacists, students and trainees, contractual staff not employed by the health care facility, and persons not directly involved in patient care but potentially exposed to infectious agents (e.g., clerical, dietary, housekeeping, maintenance, and volunteer personnel). In general, health care personnel in or outside hospitals who have contact with patients, body fluids, or specimens have a higher risk of acquiring or transmitting infections than do other health care personnel who have only brief casual contact with patients and their environment (e.g., beds, furniture, bathrooms, food trays, medical equipment).

Throughout this document, terms are used to describe routes of transmission of infections. These terms have been fully described in the "Guideline for Isolation Precautions in Hospitals."[3] They are summarized as follows: *direct contact* refers to body surface–to–body surface contact and physical transfer of microorganisms between a susceptible host and an infected or colonized person (e.g., while performing oral care or procedures); *indirect contact* refers to contact of a susceptible host with a contaminated object (e.g., instruments, hands); *droplet contact* refers to conjunctival, nasal, or oral mucosa contact with droplets containing microorganisms generated from an infected person (by coughing, sneezing, and talking, or during certain procedures such as suctioning and bronchoscopy) that are propelled a short distance; *airborne transmission* refers to contact with droplet nuclei containing microorganisms that can remain suspended in the air for long periods or to contact with dust particles containing an infectious agent that can be widely disseminated by air currents; and, finally, *common vehicle transmission* refers to contact with contaminated items such as food, water, medications, devices, and equipment.

In 1983 the CDC published the "Guideline for Infection Control in Hospital Personnel."[4] The document focused on the prevention of infections known to be transmitted to and from health care personnel. This revision of the guideline has been expanded to include (a) recommendations for non–patient care personnel, both in and outside hospitals, (b) management of exposures, (c) prevention of transmission of infections in microbiologic and biomedical laboratories, and, because of the common use of latex barriers to prevent infections, (d) prevention of latex hypersensitivity reactions. As in the 1983 guideline, readers are frequently referred to the "Guideline for Isolation Precautions in Hospitals"[3] and other published guidelines and recommendations for precautions that health care personnel may use when caring for patients or handling patient equipment or specimens.[3,6]

C. INFECTION CONTROL OBJECTIVES FOR A PERSONNEL HEALTH SERVICE

The infection control objectives of the personnel health service should be an integral part of a health care organization's general program for infection control. The objectives usually include the following: (a) educating personnel about the principles of infection control and stressing indi-

vidual responsibility for infection control, (b) collaborating with the infection control department in monitoring and investigating potentially harmful infectious exposures and outbreaks among personnel, (c) providing care to personnel for work-related illnesses or exposures, (d) identifying work-related infection risks and instituting appropriate preventive measures, and (e) containing costs by preventing infectious diseases that result in absenteeism and disability. These objectives cannot be met without the support of the health care organization's administration, medical staff, and other health care personnel. Documents that provide more detailed information regarding infection control issues for personnel health are listed in Appendix A.

D. ELEMENTS OF A PERSONNEL HEALTH SERVICE FOR INFECTION CONTROL

Certain elements are necessary to attain the infection control goals of a personnel health service: (a) coordination with other departments, (b) medical evaluations, (c) health and safety education, (d) immunization programs, (e) management of job-related illnesses and exposures to infectious diseases, including policies for work restrictions for infected or exposed personnel, (f) counseling services for personnel on infection risks related to employment or special conditions, and (g) maintenance and confidentiality of personnel health records.

The organization of a personnel health service may be influenced by the size of the institution, the number of personnel, and the services offered. To ensure that contractual personnel who are not paid by the health care facility receive appropriate personnel health services, contractual agreements with their employers should contain provisions consistent with the policies of the facility that uses those employees. Personnel with specialized training and qualifications in occupational health can facilitate the provision of effective services.

1. Coordination with other departments

For infection control objectives to be achieved, the activities of the personnel health service must be coordinated with infection control and other appropriate departmental personnel. This coordination will help ensure adequate surveillance of infections in personnel and provision of preventive services. Coordinating activities will also help to ensure that investigations of exposures and outbreaks are conducted efficiently and preventive measures implemented promptly.

2. Medical evaluations

Medical evaluations before placement can ensure that personnel are not placed in jobs that would pose undue risk of infection to them, other personnel, patients, or visitors. An important component of the placement evaluation is a health inventory. This usually includes determining immunization status and obtaining histories of any conditions that might predispose personnel to acquiring or transmitting communicable diseases. This information will assist in decisions about immunizations or postexposure management.

A physical examination, another component of the medical evaluation, can be used to screen personnel for conditions that might increase the risk of transmitting or acquiring work-related diseases and can serve as a baseline for determining whether future diseases are work related. However, the cost-effectiveness of routine physical examinations, including laboratory testing (such as complete blood cell counts, serologic tests for syphilis, urinalysis, and chest radiographs) and screening for enteric or other pathogens for infection control purposes, has not been demonstrated. Conversely, screening for some vaccine-preventable diseases, such as hepatitis B, measles, mumps, rubella, or varicella, may be cost-effective. In general, the health inventory can be used to guide decisions regarding physical examinations or laboratory tests. However, some local public health ordinances may mandate that certain screening procedures be used.

Periodic evaluations may be done as indicated for job reassignment, for ongoing programs (e.g., TB screening), or for evaluation of work-related problems.

3. Personnel health and safety education

Personnel are more likely to comply with an infection control program if they understand its rationale. Thus, personnel education is a cardinal element of an effective infection control program. Clearly written policies, guidelines, and procedures ensure uniformity, efficiency, and effective coordination of activities. However, because the risk of infection varies by job category, infection control education should be modified accordingly. In addition, some personnel may need specialized education on infection risks related to their employment and on preventive measures that will reduce those risks. Furthermore, educational materials need to be appropriate in content and vocabulary to the educational level, literacy, and

Table 1A. Immunobiologics and schedules for health care personnel (modified from ACIP recommendations[a]): Immunizing agents strongly recommended for health care personnel

Generic name	Primary booster dose schedule	Indications	Major precautions and contraindications	Special considerations
Hepatitis B recombinant vaccine	Two doses IM in the deltoid muscle 4 wk apart; 3rd dose 5 mo after 2nd; booster doses not necessary	Health care personnel at risk of exposure to blood and body fluids	No apparent adverse affects to developing fetuses, not contraindicated in pregnancy; history of anaphylactic reaction to common baker's yeast	No therapeutic or adverse effects on HBV-infected persons; cost-effectiveness of prevaccination screening for susceptibility to HBV depends on costs of vaccination and antibody testing and prevalence of immunity in the group of potential vaccinees; health care personnel who have ongoing contact with patients or blood should be tested 1-2 mo after completing the vaccination series to determine serologic response
Influenza vaccine (Inactivated whole or split virus)	Annual single-dose vaccination IM with current (either whole- or split-virus) vaccine	Health care personnel with contact with high-risk patients or working in chronic care facilities; personnel with high-risk medical conditions and/or ≥65 yr	History of anaphylactic hypersensitivity after egg ingestion	No evidence of maternal or fetal risk when vaccine was given to pregnant women with underlying conditions that render them at high risk for serious influenza complications.
Measles live-virus vaccine	One dose SC; 2nd dose at least 1 mo later	Health care personnel born in or after 1957 without documentation of (a) receipt of two doses of live vaccine on or after their 1st birthday, (b) physician-diagnosed measles, or (c) laboratory evidence of immunity; vaccine should be considered for all personnel, including those born before 1957, who have no proof of immunity	Pregnancy; immunocompromised* state; (including HIV-infected persons with severe immunosuppression) history of anaphylactic reactions after gelatin ingestion or receipt of neomycin; or recent receipt of immune globulin	MMR is the vaccine of choice if recipients are also likely to be susceptible to rubella and/or mumps; persons vaccinated between 1963 and 1967 with (a) a killed measles vaccine alone, (b) killed vaccine followed by live vaccine, or (c) a vaccine of unknown type should be revaccinated with two doses of live measles vaccine
Mumps live-virus vaccine	One dose SC; no booster	Health care personnel believed to be susceptible can be vaccinated; adults born before 1957 can be considered immune	Pregnancy; immunocompromised* state; history of anaphylactic reaction after gelatin ingestion or receipt of neomycin	MMR is the vaccine of choice if recipients are also likely to be susceptible to measles and rubella
Rubella live-virus vaccine	One dose SC; no booster	Health care personnel, both male and female, who lack documentation of receipt of live vaccine on or after their 1st birthday, or of laboratory evidence of immunity; adults born before 1957 can be considered immune, except women of childbearing age	Pregnancy; immunocompromised* state; history of anaphylactic reaction after receipt of neomycin	Women pregnant when vaccinated or who become pregnant within 3 mo of vaccination should be counseled on the theoretic risks to the fetus, the risk of rubella vaccine-associated malformations in these women is negligible; MMR is the vaccine of choice if recipients are also likely to be susceptible to measles or mumps
Varicella-zoster live-virus vaccine	Two 0.5 ml doses SC, 4-8 wk apart if ≥13 yr	Health care personnel without reliable history of varicella or laboratory evidence of varicella immunity	Pregnancy, immunocompromised* state, history of anaphylactic reaction after receipt of neomycin or gelatin; salicylate use should be avoided for 6 wk after vaccination	Because 71%-93% of persons without a history of varicella are immune, serologic testing before vaccination may be cost-effective

IM, intramuscularly; *SC*, subcutaneously.

*Persons immunocompromised because of immune deficiencies, HIV infection, leukemia, lymphoma, generalized malignancy, or immunosuppressive therapy with corticosteroids, alkylating drugs, antimetabolites, or radiation.

Table 1B. Immunobiologics and schedules for health care personnel (modified from ACIP recommendations[9]): Other immunizing agents available for health care personnel in special circumstances

Generic name	Primary/booster dose schedule	Indications	Major precautions and contraindications	Special considerations
BCG vaccine (for tuberculosis)	One percutaneous dose of 0.3 ml; no booster dose recommended	Health care personnel in communities where (a) MDR-TB is prevalent, (b) strong likelihood of infection exists, and (c) full implementation of TB infection control precautions has been inadequate in controlling the spread of infection *(NOTE: BCG should be used after consultation with local and/or state health department)*	Immunocompromised* state and pregnancy	In the United States, TB control efforts are directed toward early identification and treatment of cases of active TB and toward preventive therapy with isoniazid for PPD converters
Hepatitis A vaccine	Two doses of vaccine IM, either (HAVRIX™) 6-12 mo apart or (VAQTA™) 6 mo apart	Not routinely indicated for U.S. health care personnel; persons who work with HAV-infected primates or with HAV in a laboratory setting should be vaccinated	History of anaphylactic reaction to alum or the preservative 2-phenoxy ethanol; vaccine safety in pregnant women has not been evaluated, risk to fetus is likely low and should be weighed against the risk of hepatitis A in women at high risk	Health care personnel who travel internationally to endemic areas should be evaluated for vaccination
Meningococcal polysaccharide (quadrivalent A, C, W135, and Y) vaccine	One dose in volume and by route specified by manufacturer; need for boosters is unknown	Not routinely indicated for health care workers in the United States	Vaccine safety in pregnant women has not been evaluated; vaccine should not be given during pregnancy unless risk of infection is high	May be useful in certain outbreak situations (see text)
Polio vaccine	IPV, two doses SC given 4-8 wk apart followed by 3rd dose 6-12 mo after 2nd dose; booster doses may be IPV or OPV	Health care personnel in close contact with persons who may be excreting wild virus and laboratory personnel handling specimens that may contain wild poliovirus	History of anaphylactic reaction after receipt of streptomycin or neomycin; because safety of vaccine has not been evaluated in pregnant woman, it should not be given during pregnancy	Use only IPV for immunosuppressed persons or personnel who care for immunosuppressed patients; if immediate protection against poliomyelitis is needed, OPV should be used.
Rabies vaccine	Primary, HDCV or RVA, IM, 1.0 ml (deltoid area) one each on days 0, 7, 21, or 28, or HDCV, ID, 1.0 ml, one each on days 0, 7, 21, and 28; booster, HDCV or RVA, IM, 0.1 ml (deltoid area), day 0 only, or HDCV, ID, 0.1 ml, day 0 only	Personnel who work with rabies virus or infected animals in diagnostic or research activities		The frequency of booster doses should be based on frequency of exposure. See CDC reference for Rabies Prevention for postexposure recommendations.[22]
Tetanus and diphtheria (Td)	Two doses IM 4 wk apart, 3rd dose 6-12 mo after 2nd dose; booster every 10 yr	All adults; tetanus prophylaxis in wound management	First trimester of pregnancy; history of a neurologic reaction or immediate hypersensitivity reaction; individuals with severe local (Arthus-type) reaction after previous dose of Td vaccine should not be given further routine or emergency doses of Td for 10 yr	

Continued

HDCV, Human diploid cell rabies vaccine; *RVA*, rabies vaccine absorbed; *IPV*, inactivated poliovirus vaccine; *OPV*, oral poliovirus vaccine; *ID*, intradermally.
*Persons immunocompromised because of immune deficiencies, HIV infection, leukemia, lymphoma, generalized malignancy, or immunosuppressive therapy with corticosteroids, alkylating drugs, antimetabolites, or radiation.

Table 1B. Continued

Generic name	Primary/booster dose schedule	Indications	Major precautions and contraindications	Special considerations
Typhoid vaccines: IM, SC, and oral	One 0.5 ml dose IM, booster doses of 0.5 ml every 2 yr; (Vi capsular polysaccharide) or two 0.5 ml doses SC, 4 or more wk apart; boosters of 0.5 ml SC or 0.1 ml ID every 3 yr if exposure continues or four oral doses on alternate days; (Ty21a) vaccine manufacturer's recommendation is revaccination with the entire four-dose series every 5 yr	Personnel in laboratories who frequently work with *Salmonella typhi*	History of severe local or systemic reaction to a previous dose of typhoid vaccine; Ty21a vaccine should not be given to immunocompromised* personnel	Vaccination should not be considered as an alternative to the use of proper procedures when handling specimens and cultures in the laboratory
Vaccinia vaccine (smallpox)	One dose administered with a bifurcated needle; boosters every 10 yr	Personnel who directly handle cultures of or animals contaminated with recombinant vaccinia viruses or orthopox viruses (monkeypox, cowpox, vaccinia, etc.) that infect human beings	Pregnancy, presence or history of eczema, or immunocompromised* status in potential vaccinees or in their household contacts	Vaccination may be considered for health care personnel who have direct contact with contaminated dressings or other infectious material from volunteers in clinical studies involving recombinant vaccinia virus

language of the employee. The training should comply with existing federal, state, and local regulations regarding requirements for employee education and training. All health care personnel need to be educated about the organization's infection control policies and procedures.

4. Immunization programs

Ensuring that personnel are immune to vaccine-preventable diseases is an essential part of successful personnel health programs. Optimal use of vaccines can prevent transmission of vaccine-preventable diseases and eliminate unnecessary work restriction. Prevention of illness through comprehensive personnel immunization programs is far more cost-effective than case management and outbreak control. Mandatory immunization programs, which include both newly hired and currently employed persons, are more effective than voluntary programs in ensuring that susceptible persons are vaccinated.[7]

National guidelines for immunization of and postexposure prophylaxis for health care personnel are provided by the U.S. Public Health Service's Advisory Committee on Immunization Practices (ACIP; Table 1).[8,9] ACIP guidelines also contain (a) detailed information on the epidemiology of vaccine-preventable diseases, (b) data on the safety and efficacy of vaccines and immune globulin preparations,[8-22] and (c) recommendations for immunization of immunocompromised persons* (Table 2).[16,23] The recommendations in this guideline have been adapted from the ACIP recommendations.[9] In addition, individual states and professional organizations have regulations or recommendations on the vaccination of health care personnel.[24]

Decisions about which vaccines to include in immunization programs have been made by considering (a) the likelihood of personnel exposure to vaccine-preventable diseases and the potential consequences of not vaccinating personnel, (b) the nature of employment (type of contact with patients and their environment), and (c) the characteristics of the patient population within the health care organization. Immunization of personnel before they enter high-risk situations is the most efficient and effective use of vaccines in health care settings.

Screening tests are available to determine susceptibility to certain vaccine-preventable diseases

*The term immunocompromised includes: persons who are immunocompromised from immune deficiency diseases, HIV infection, leukemia, lymphoma, or generalized malignancy, or immunosuppressed as a result of therapy with corticosteroids, alkylating drugs, antimetabolites, or radiation.

Table 1C. Immunobiologics and schedules for health care personnel (modified from ACIP recommendations[9]): Diseases for which postexposure prophylaxis may be indicated for health care personnel

Disease	Prophylaxis	Indications	Major precautions and contraindications	Special considerations
Diphtheria	Benzathine penicillin, 1.2 mU IM, single dose, or erythromycin (1 gm/day) PO × 7 days	For health care personnel exposed to diphtheria or identified as carriers		Also administer one dose Td to previously immunized if no Td has been given in ≥5 yr
Hepatitis A	One IM dose IG 0.02 ml/kg given within 2 wk of exposure in large muscle mass (deltoid, gluteal)	May be indicated for health care personnel exposed to feces of infected persons during outbreaks	Persons with IgA deficiency; do not administer within 2 wk after MMR or within 3 wk after varicella vaccine	
Hepatitis B	HBIG 0.06 ml/kg IM as soon as possible (and within 7 days) after exposure (with dose 1 of hepatitis B vaccine given at different body site); if hepatitis B series has not been started, 2nd dose of HBIG should be given 1 mo after 1st	HBV-susceptible health care personnel with percutaneous or mucous-membrane exposure to blood known to be HBsAg seropositive (see Table 5)		
Meningococcal disease	Rifampin, 600 mg PO every 12 hours for 2 days, or ceftriaxone, 250 mg IM, single dose, or ciprofloxacin, 500 mg PO, single dose	Personnel with direct contact with respiratory secretions from infected persons without the use of proper precautions (e.g., mouth-to-mouth resuscitation, endotracheal intubation, endotracheal tube management, or close examination of oropharynx)	Rifampin and ciprofloxacin not recommended during pregnancy	
Pertussis	Erythromycin, 500 mg qid PO, or trimethoprim-sulfamethoxazole, 1 tablet bid PO, for 14 days after exposure	Personnel with direct contact with respiratory secretions or large aerosol droplets from respiratory tract of infected persons.		
Rabies	For those never vaccinated: HRIG 20 IU/kg, half infiltrated around wound, and HDCV or RVA vaccine, 1.0 ml, IM (deltoid area), 1 each on days 0, 3, 7, 14, and 28	Personnel who have been bitten by human being or animal with rabies or have had scratches, abrasions, open wounds, or mucous membranes contaminated with saliva or other potentially infective material (e.g., brain tissue)		Personnel who have previously been vaccinated, give HDCV or RVA vaccine, 1.0 ml, IM, on days 0 and 3; no HRIG is necessary
Varicella-zoster virus	VZIG for persons ≤50 kg: 125 U/10kg IM; for persons >50 kg: 625 U†	Personnel known or likely to be susceptible to varicella and who have close and prolonged exposure to an infectious health care worker or patient, particularly those at high risk for complications, such as pregnant or immunocompromised persons		Serologic testing may help in assessing whether to administer VZIG; if varicella is prevented by the use of VZIG, vaccine should be offered later

PO, Orally; *Td*, tetanus-diphtheria toxoid; *IG*, immune globulin; *IgA*, immunoglobulin A; *qid*, four times daily; *bid*, twice daily; *HRIG*, human rabies immunoglobulin; *HDCV*, human diploid cell rabies vaccine; *RVA*, rabies vaccine absorbed.
*Persons immunocompromised because of immune deficiencies, HIV infection, leukemia, lymphoma, generalized malignancy, or immunosuppressive therapy with corticosteroids, alkylating drugs, antimetabolites, or radiation.
†Some persons have recommended 125 U/10 kg regardless of total body weight.

Table 2. Summary of ACIP recommendations on immunization of health care workers with special conditions (modified from ACIP recommendations[9])

Vaccine	Pregnancy	HIV infection	Severe immunosuppression*	Asplenia	Renal failure	Diabetes	Alcoholism & alcoholic cirrhosis
BCG	UI	C	C	UI	UI	UI	UI
Hepatitis A	UI	UI	UI	UI	UI	UI	R†
Hepatitis B	R	R	R	R	R	R	R
Influenza	R‡	R	R	R	R	R	R
Measles, mumps, rubella	C	R§	C	R	R	R	R
Meningococcus	UI	UI	UI	R†	UI	UI	UI
Polio, IPV ‖	UI	UI	UI	UI	UI	UI	UI
Polio, OPV ‖	UI	C	C	UI	UI	UI	UI
Pneumococcus†	UI	R	R	R	R	R	R
Rabies	UI	UI	UI	UI	UI	UI	UI
Tetanus/diphtheria†	R	R	R	R	R	R	R
Typhoid, inactivated & V_i	UI	UI	UI	UI	UI	UI	UI
Typhoid, Ty21a	UI	C	C	UI	UI	UI	UI
Varicella	C	C	C	R	R	R	R
Vaccinia	UI	C	C	UI	UI	UI	UI

UI, Use if indicated; *C*, contraindicated; *R*, recommended.
*Severe immunosuppression can be the result of congenital immunodeficiency, leukemia, lymphoma, generalized malignancy or therapy with alkylating agents, antimetabolites, radiation, or large amounts of corticosteroids.
†Recommendation is based on the person's underlying condition rather than occupation.
‡Women who will be in the second or third trimester of pregnancy during influenza season.
§Contraindicated in persons with HIV infection and severe immunosuppression; see text.
‖ Vaccination is recommended for unvaccinated health care workers who have close contact with patients who may be excreting wild polioviruses. Primary vaccination with IPV is recommended because the risk for vaccine-associated paralysis after administration of OPV is higher among adults than among children. Health care workers who have had a primary series of OPV or IPV who are directly involved with the provision of care to patients who may be excreting poliovirus may receive another dose of either IPV or OPV. Any suspected case of poliomyelitis should be investigated immediately. If evidence suggests transmission of wild poliovirus, control measures to contain further transmission should be instituted immediately, including an OPV vaccination campaign.

(e.g., hepatitis B, measles, mumps, rubella, and varicella). Such screening programs need to be combined with tracking systems to ensure accurate maintenance of personnel immunization records. Accurate immunization records ensure that susceptible personnel are promptly identified and appropriately vaccinated.

5. Management of job-related illnesses and exposures

Primary functions of the personnel health service are to arrange for prompt diagnosis and management of job-related illnesses and to provide appropriate postexposure prophylaxis after job-related exposures.

It is the responsibility of the health care organization to implement measures to prevent further transmission of infection, which sometimes warrants exclusion of personnel from work or patient contact.[25] Decisions on work restrictions are based on the mode of transmission and the epidemiology of the disease (Table 3). The term *exclude from duty* in this document should be interpreted as exclusion from the health care facility and from health care activities outside the facility. Personnel who are excluded should avoid contact with susceptible persons both in the facility and in the community. Exclusion policies should include a statement of authority defining who may exclude personnel. The policies also need to be designed to encourage personnel to report their illnesses or exposures and not to penalize them with loss of wages, benefits, or job status. Workers' compensation laws do not cover exclusion from duty for exposures to infectious diseases; policies therefore should include a method for providing wages during the period that personnel are not able to work. In addition, exclusion policies must be enforceable and all personnel, especially department heads, supervisors, and nurse managers, should know which infections may warrant exclusion and where to report the illnesses 24 hours a day. Health care personnel who have contact with infectious patients outside of hospitals also need to be included in the postexposure program and encouraged to report any suspected or known exposures promptly. Notification of emergency-response personnel possibly exposed to selected infectious disease is mandatory (1990 Ryan White Act, Subtitle B, 42 USC 300ff-80).

Table 3. Summary of suggested work restrictions for health care personnel exposed to or infected with infectious diseases of importance in health care settings, in the absence of state and local regulations (modified from ACIP recommendations[9])

Disease/problem	Work restriction	Duration	Category
Conjunctivitis	Restrict from patient contact and contact with the patient's environment	Until discharge ceases	II
Cytomegalovirus infections	No restriction		II
Diarrheal diseases			
Acute stage (diarrhea with other symptoms)	Restrict from patient contact, contact with the patient's environment, or food handling	Until symptoms resolve	IB
Convalescent stage, *Salmonella* spp.	Restrict from care of high-risk patients	Until symptoms resolve; consult with local and state health authorities regarding need for negative stool cultures	IB
Diphtheria	Exclude from duty	Until antimicrobial therapy completed and 2 cultures obtained ≥24 hours apart are negative	IB
Enteroviral infections	Restrict from care of infants, neonates, and immunocompromised patients and their environments	Until symptoms resolve	II
Hepatitis A	Restrict from patient contact, contact with patient's environment, and food handling	Until 7 days after onset of jaundice	IB
Hepatitis B			
Personnel with acute or chronic hepatitis B surface antigemia who do not perform exposure-prone procedures	No restriction*; refer to state regulations; standard precautions should always be observed		II
Personnel with acute or chronic hepatitis B e antigenemia who perform exposure-prone procedures	Do not perform exposure-prone invasive procedures until counsel from an expert review panel has been sought; panel should review and recommend procedures the worker can perform, taking into account specific procedure as well as skill and technique of worker; refer to state regulations	Until hepatitis B e antigen is negative	II
Hepatitis C	No recommendation		Unresolved issue
Herpes simplex			
Genital	No restriction		II
Hands (herpetic whitlow)	Restrict from patient contact and contact with the patient's environment	Until lesions heal	IA
Orofacial	Evaluate for need to restrict from care of high-risk patients		II
Human immunodeficiency virus	Do not perform exposure-prone invasive procedures until counsel from an expert review panel has been sought; panel should review and recommend procedures the worker can perform, taking into account specific procedure as well as skill and technique of the worker; standard precautions should always be observed; refer to state regulations		II

Continued

*Unless epidemiologically linked to transmission of infection
† Those susceptible to varicella and who are at increased risk of complications of varicella, such as neonates and immunocompromised persons of any age.
‡ High-risk patients as defined by the ACIP for complications of influenza.

Table 3. Continued

Disease/problem	Work restriction	Duration	Category
Measles			
Active	Exclude from duty	Until 7 days after the rash appears	IA
Postexposure (susceptible personnel)	Exclude from duty	From 5th day after 1st exposure through 21st day after last exposure and/or 4 days after rash appears	IB
Meningococcal infections	Exclude from duty	Until 24 hours after start of effective therapy	IA
Mumps			
Active	Exclude from duty	Until 9 days after onset of parotitis	IB
Postexposure (susceptible personnel)	Exclude from duty	From 12th day after 1st exposure through 26th day after last exposure or until 9 days after onset of parotitis	II
Pediculosis	Restrict from patient contact	Until treated and observed to be free of adult and immature lice	IB
Pertussis			
Active	Exclude from duty	From beginning of catarrhal stage through 3rd wk after onset of paroxysms or until 5 days after start of effective antimicrobial therapy	IB
Postexposure (asymptomatic personnel)	No restriction, prophylaxis recommended		II
Postexposure (symptomatic personnel)	Exclude from duty	Until 5 days after start of effective antimicrobial therapy	IB
Rubella			
Active	Exclude from duty	Until 5 days after rash appears	IA
Postexposure (susceptible personnel)	Exclude from duty	From 7th day after 1st exposure through 21st day after last exposure	IB
Scabies	Restrict from patient contact	Until cleared by medical evaluation	IB
Staphylococcus aureus infection			
Active, draining skin lesions	Restrict from contact with patients and patient's environment or food handling	Until lesions have resolved	IB
Carrier state	No restriction, unless personnel are epidemiologically linked to transmission of the organism		IB
Streptococcal infection, group A	Restrict from patient care, contact with patient's environment, or food handling	Until 24 hours after adequate treatment started	IB
Tuberculosis			
Active disease	Exclude from duty	Until proved noninfectious	IA
PPD converter	No restriction		IA

Continued

Table 3. Continued

Disease/problem	Work restriction	Duration	Category
Varicella			
Active	Exclude from duty	Until all lesions dry and crust	IA
Postexposure (susceptible personnel)	Exclude from duty	From 10th day after 1st exposure through 21st day (28th day if VZIG given) after last exposure	IA
Zoster			
Localized, in healthy person	Cover lesions; restrict from care of high-risk patients†	Until all lesions dry and crust	II
Generalized or localized in immunosuppressed person	Restrict from patient contact	Until all lesions dry and crust	IB
Postexposure (Susceptible personnel)	Restrict from patient contact	From 10th day after 1st exposure through 21st day (28th day if VZIG given) after last exposure or, if varicella occurs, until all lesions dry and crust	IA
Viral respiratory infections, acute febrile	Consider excluding from the care of high risk patients‡ or contact with their environment during community outbreak of RSV and influenza	Until acute symptoms resolve	IB

6. Health counseling

Access to adequate health counseling for personnel is another crucial element of an effective personnel health service. Health counseling allows personnel to receive individually targeted information regarding (a) the risk and prevention of occupationally acquired infections, (b) the risk of illness or other adverse outcome after exposures, (c) management of exposures, including the risks and benefits of postexposure prophylaxis regimens, and (d) the potential consequences of exposures or communicable diseases for family members, patients, or other personnel, both inside and outside the health care facility.

7. Maintenance of records, data management, and confidentiality

Maintenance of records on medical evaluations, immunizations, exposures, postexposure prophylaxis, and screening tests in a retrievable, preferably computerized, database allows efficient monitoring of the health status of personnel. Such record keeping also helps to ensure that the organization will provide consistent and appropriate services to health care personnel.

Individual records for all personnel should be maintained in accordance with the Occupational Safety and Health Administration (OSHA) medical records standard, which requires the employer to retain records, maintain employee confidentiality, and provide records to employees when they ask to review them.[26] In addition, the 1991 OSHA "Occupational Exposure to Bloodborne Pathogens; Final Rule"[27] requires employers, including health care facilities, to establish and maintain an accurate record for each employee with occupational exposure to bloodborne pathogens. The standard also requires that each employer ensure that the employee medical records are (a) kept confidential, (b) not disclosed or reported without the employee's express written consent to any person within or outside the workplace, except as required by law, and (c) maintained by the employer for at least the duration of the worker's employment plus 30 years.

OSHA's record keeping regulation also requires employers to record work-related injuries and illnesses on the OSHA 200 log and the OSHA 101 form. The records include all occupational fatalities, all occupational illnesses, and occupational injuries that result in loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment beyond first aid. Infectious diseases are recordable if they are work related and result in illness.[28]

More recently, OSHA developed policies that require the recording of positive tuberculin skin-test results.[29] It would be beneficial to health care organizations and personnel if the principles of record keeping and confidentiality mandated by OSHA were to be expanded to other work-related exposures and incidents, immunizations, TB screening, and investigation and management of nosocomial outbreaks.

E. EPIDEMIOLOGY AND CONTROL OF SELECTED INFECTIONS TRANSMITTED AMONG HEALTH CARE PERSONNEL AND PATIENTS

Almost any transmissible infection may occur in the community at large or within health care organizations and can affect both personnel and patients. Only those infectious diseases that occur frequently in the health care setting or are most important to personnel are discussed here.

1. Bloodborne pathogens

a. Overview

Assessment of the risk and prevention of transmission of bloodborne pathogens, such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV), in health care settings are based on information from a variety of sources, including surveillance and investigation of suspected cases of transmission to health care personnel and patients, seroprevalence surveys of health care personnel and patients, and studies of the risk of seroconversion after exposure to blood or other body fluids from infected persons. In this document, the emphasis of the discussion of bloodborne pathogens will be on patient-to-personnel transmission.

The CDC has periodically issued and updated recommendations for prevention of transmission of bloodborne pathogens in health care settings; these provide detailed information and guidance.[30-40] Also, in 1991 OSHA published a bloodborne pathogen standard that was based on the concept of universal precautions to prevent occupational exposure to bloodborne pathogens.[27] The use of standard precautions (which incorporates universal precautions), including appropriate handwashing and barrier precautions, will reduce contact with blood and body fluids.[3,30,31,41] The use of engineering controls (e.g., safety devices) and changes in work practices (e.g., techniques to reduce handling of sharp instruments) can reduce the frequency of percutaneous injuries.[41,42] In settings such as the operating room, changes in instrument design and techniques for performing surgical procedures and modified personal barriers have been shown to reduce blood contacts.[43,44] Despite adherence to standard precautions and implementation of some new techniques and devices, percutaneous injuries continue to occur. This is of concern because percutaneous injuries represent the greatest risk of transmission of bloodborne pathogens to health care personnel.[45] Only a few studies evaluating a limited number of safety devices have demonstrated a reduction in percutaneous injuries among health care workers.[46,47] This document will not address the use of safety devices, because the Public Health Service is assessing the need for further guidance on selection, implementation, and evaluation of such devices in health care settings.

The risk posed to patients by health care personnel infected with bloodborne pathogens such as HBV and HIV has been the subject of much concern and debate. There are no data to indicate that infected workers who do not perform invasive procedures pose a risk to patients. Consequently, work restrictions for these workers are not appropriate. However, the extent to which infected workers who perform certain types of invasive procedures pose a risk to patients and the restrictions that should be imposed on these workers have been much more controversial. In 1991, CDC recommendations on this issue were published.[48] Subsequently, Congress mandated that each state implement the CDC guidelines or equivalent as a condition for continued federal public health funding to that state. Although all states have complied with this mandate, there is a fair degree of state-to-state variation regarding specific provisions. Local or state public health officials should be contacted to determine the regulations or recommendations applicable in a given area. CDC is currently in the process of reviewing relevant data regarding health care personnel–to–patient transmission of bloodborne pathogens.

b. Hepatitis B

Nosocomial transmission of HBV is a serious risk for health care personnel.[49-53] Approximately 1000 health care personnel were estimated to have become infected with HBV in 1994. This 90% decline since 1985 is attributable to the use of vaccine and adherence to other preventive measures (e.g., standard precautions).[54] During the past decade, an estimated 100 to 200 health care personnel annually have died of occupationally acquired HBV infection.[54] The risk of acquiring

Table 4. Recommendation for postexposure prophylaxis for percutaneous or permucosal exposure to hepatitis B virus, United States

Vaccination and antibody status of exposed person	HBsAg seropositive	Treatment when source is HBsAg negative	Treatment when source is not tested or status is unknown
Unvaccinated	HBIG* × 1 and initiate HB vaccine series	Initiate HB vaccine series	Initiate HB
Previously vaccinated			
Known responder†	No treatment	No treatment	
Known nonresponder	HBIG* × 2 or HBIG* × 1 and initiate revaccination	No treatment	If known high-risk source, treat as if source were HBsAg positive
Antibody response unknown	Test exposed person for anti-HBs: (1) if adequate,† no treatment; (2) if inadequate,† HBIG × 1 and vaccine booster	No treatment	Test exposed person for anti-HBs: (1) if adequate,† no treatment; (2) if inadequate,† initiate revaccination

HBsAg, Hepatitis B surface antigen; *HBIG*, hepatitis B immune globulin; *HB*, hepatitis vaccine; *anti-HBs*, antibody to hepatitis B surface antigen.
*Dose 0.06 mg/kg IM.
†Responder is defined as a person with adequate serum levels of anti-HBs (≥10 mIU/ml); inadequate vaccination defined as serum anti-HBs <10 mIU/ml.

HBV infection from occupational exposure is dependent on the nature and frequency of exposure to blood or to body fluids containing blood.[49,53] The risk of infection is at least 30% after a percutaneous exposure to blood from a hepatitis B e antigen–seropositive source.[54]

HBV is transmitted by percutaneous or mucosal exposure to blood and serum-derived body fluids from persons who have either acute or chronic HBV infection. The incubation period is 45 to 180 days (average 60 to 90 days). Any person seropositive for hepatitis B surface antigen (HBsAg) is potentially infectious.

Hepatitis B vaccination of health care personnel who have contact with blood and body fluids can prevent transmission of HBV and is strongly recommended.[9,10,40] The OSHA bloodborne pathogen standard mandates that hepatitis B vaccine be made available, at the employer's expense, to all health care personnel with occupational exposure to blood or other potentially infectious materials.[27] Provision of vaccine during training of health care professionals before such blood exposure occurs may both increase the vaccination rates among personnel and prevent infection among trainees, who are at increased risk for unintentional injuries while they are learning techniques.

Prevaccination serologic screening for susceptibility to HBV infection is not indicated for persons being vaccinated, unless the health care organization considers such screening to be cost-effective. Postvaccination screening for antibody to HBsAg (anti-HBs) is advised for personnel at ongoing risk for blood exposure to determine whether response to vaccinations has occurred and to aid in determining the appropriate postexposure prophylaxis or the need for revaccination. Personnel who do not respond to or do not complete the primary vaccination series should be revaccinated with a second three-dose vaccine series or evaluated to determine whether they are HBsAg seropositive. Revaccinated persons should be tested for anti-HBs at the completion of the second vaccine series.[9] If they do not respond, no further vaccination series should be given and they should be evaluated for the presence of HBsAg (possible chronic HBV infection). No specific work restrictions are recommended for nonresponders; in the event of percutaneous exposure to blood or body fluids, however, they should see their health care providers as soon as possible to evaluate the need for postexposure prophylaxis. Personnel in chronic dialysis centers who do not respond to vaccine need to be screened for HBsAg and anti-HBs every 6 months.[55]

Vaccine-induced antibodies decline gradually with time, and as many as 60% of those who initially respond to vaccination will lose detectable anti-HBs by 8 years.[56] Booster doses of vaccine are not routinely recommended, because persons who respond to the initial vaccine series remain protected against clinical hepatitis and chronic infection even when their anti-HBs levels become low or undetectable.[57]

The need for postexposure prophylaxis, vaccination, or both depends on the HBsAg status of the source of the exposure as well as the immunization status of the person exposed (Table 4).[40]

Vaccine should be offered after any exposure in an unvaccinated person; if the source is known to be HBsAg seropositive, hepatitis B immune globulin (HBIG) should be given, preferably within 24 hours. The effectiveness of HBIG given later than 7 days after HBV exposure is unknown.[8,10,40] If the source is HBsAg seropositive and the exposed person is known not to have responded to a three-dose vaccine series, a single dose of HBIG and a dose of hepatitis B vaccine need to be given as soon as possible after the exposure with subsequent vaccine doses given at 1 month and 6 months after the initial dose. If the exposed person is known not to have responded to a three-dose vaccine series and to revaccination, two doses of HBIG need to be given, one dose as soon as possible after exposure and the second dose 1 month later.

c. Hepatitis C

HCV is the etiologic agent in most cases of parenterally transmitted non-A, non-B hepatitis in the United States.[58,59] During the past decade, the annual number of newly acquired HCV infections has ranged from an estimated 180,000 in 1984 to an estimated 28,000 in 1995. Of these, an estimated 2% to 4% occurred among health care personnel who were occupationally exposed to blood.[59]

A case-control study of patients with acute non-A, non-B hepatitis, conducted before the identification of HCV, showed a significant association between acquisition of disease and health care employment, specifically patient care or laboratory work.[60] Seroprevalence studies among hospital-based health care personnel have shown seroprevalence rates of antibody to HCV (anti-HCV) ranging from 1% to 2%.[61-64] In a study that assessed risk factors for infection in health care personnel, a history of accidental needlesticks was independently associated with anti-HCV seropositivity.[61]

Several case reports have documented transmission of HCV infection from anti-HCV–seropositive patients to health care personnel as a result of accidental needlesticks or cuts with sharp instruments.[65,66] In follow-up studies of health care personnel who sustained percutaneous exposures to blood from anti-HCV–seropositive patients, the rate of anti-HCV seroconversion averaged 1.8% (range 0% to 7%).[67-70] In a study in which HCV RNA polymerase chain reaction methods were used to measure HCV infection, the rate of HCV transmission was 10%.[70]

The incubation period for hepatitis C is 6 to 7 weeks, and nearly all persons with acute infection will have chronic HCV infection occur with persistent viremia and the potential for transmission of HCV to others.

Serologic assays to detect anti-HCV are commercially available. The interpretation of anti-HCV test results is limited by several factors: (a) these assays will not detect anti-HCV in approximately 5% of persons infected with HCV; (b) these assays do not distinguish between acute, chronic, and past infection; (c) there may be a prolonged interval between the onset of acute illness with HCV and seroconversion; and (d) when the assays are used in populations with a low prevalence of HCV infection, commercial screening assays for anti-HCV yield a high proportion (as great as 50%) of false-positive results.[34,59] Although no true confirmatory test has been developed, supplemental tests for specificity are available and should be used to judge the validity of repeatedly reactive results by screening assays.

Although the value of immune globulin for postexposure prophylaxis after occupational exposure to HCV has been difficult to assess,[71-73] postexposure prophylaxis with immune globulin does not appear to be effective in preventing HCV infection. Current immune globulin preparations are manufactured from plasma that has been screened for HCV antibody; positive lots are excluded from use. An experimental study in chimpanzees found that administration 1 hour after exposure to HCV of immune globulin manufactured from anti-HCV–screened plasma did not prevent infection or disease.[74] Thus, available data do not support the use of immune globulin for postexposure prophylaxis against hepatitis C, and its use is not recommended. There is no information regarding the use of antiviral agents, such as interferon alfa, in the postexposure setting, and such prophylaxis is not recommended.[37]

Health care institutions should consider implementing recommended policies and procedures for follow-up for HCV infection after percutaneous or mucosal exposures to blood. At a minimum, such policies can include (1) baseline testing of the source for anti-HCV, (2) baseline and follow-up testing (e.g., 6 months) for anti-HCV and alanine aminotransferase activity of the person exposed to an anti-HCV seropositive source, (3) confirmation by supplemental anti-HCV testing of all anti-HCV results reported as repeatedly active by enzyme immunoassay, (4) recommendation against postexposure prophylaxis with immune globulin or antiviral agents (e.g., interferon), and (5) education of health care personnel

about the risk for and prevention of bloodborne infections, including HCV, in occupational settings, with the information routinely updated to ensure accuracy.[37] Among health care personnel in the postexposure period, onset of HCV infection may be detected earlier by measuring HCV RNA with polymerase chain reaction rather than by measuring anti-HCV with enzyme immunoassay. However, polymerase chain reaction is not a licensed assay, and the accuracy of the results are highly variable.[37]

d. Human immunodeficiency virus

Nosocomial transmission of human immunodeficiency virus (HIV) infection from patients to health care personnel may occur after percutaneous or, infrequently, mucocutaneous exposure to blood or body fluids containing blood. According to prospective studies of health care personnel percutaneously exposed to HIV-infected blood, the average risk for HIV infection has been estimated to be 0.3%.[45,75-78] A retrospective case-control study to identify risk factors for HIV seroconversion among health care personnel after a percutaneous exposure to HIV-infected blood found that they were more likely to become infected if they were exposed to a larger quantity of blood, represented in the study as (1) presence of visible blood on the device before injury, (2) a procedure that involved a needle placed directly in the patient's vein or artery, or (3) deep injury.[45] Transmission of HIV infection also was associated with injuries in which the source patient was terminally ill with AIDS; this may be attributable to the increased titer of HIV in blood that is known to accompany late stages of illness or possibly to other factors, such as the presence of syncytia-inducing strains of HIV in these patients. In addition, the findings of this study suggested that the postexposure use of zidovudine may be protective for health care personnel.[45]

Factors that determine health care personnel's risk of infection with HIV include the prevalence of infection among patients, the risk of infection transmission after an exposure, and the frequency and nature of exposures.[79] Most personnel who acquire infection after percutaneous exposure have HIV antibody develop within 6 months of exposure. HIV-infected persons are likely to transmit virus from the time of early infection throughout life.

In 1990, CDC published guidelines for postexposure management of occupational exposure to HIV,[33] and provisional recommendations for postexposure chemoprophylaxis were published in 1996.[80] In 1998, both of these documents were updated and consolidated to reflect current scientific knowledge on the efficacy of postexposure prophylaxis and the use of antiretroviral therapies.[81] The U.S. Public Health Service will periodically review scientific information on antiretroviral therapies and publish updated recommendations for their use as postexposure prophylaxis as necessary.

2. Conjunctivitis

Although conjunctivitis can be caused by a variety of bacteria and viruses, adenovirus has been the primary cause of nosocomial outbreaks of conjunctivitis. Nosocomial outbreaks of conjunctivitis caused by other pathogens are rare.

Adenoviruses, which can cause respiratory, ocular, genitourinary, and gastrointestinal infections, are a major cause of epidemic keratoconjunctivitis in the community and health care settings. Nosocomial outbreaks have primarily occurred in eye clinics or offices but have also been reported in neonatal intensive care units and long-term care facilities.[82-86] Patients and health care personnel have acquired and transmitted epidemic keratoconjunctivitis during these outbreaks. The incubation period ranges from 5 to 12 days, and shedding of virus occurs from late in the incubation period to as long as 14 days after onset of disease.[83] Adenovirus survives for long periods on environmental surfaces; ophthalmologic instruments and equipment can become contaminated and transmit infection. Contaminated hands are also a major source of person-to-person transmission of adenovirus, both from patients to health care personnel and from health care personnel to patients. Handwashing, glove use, and disinfection of instruments can prevent the transmission of adenovirus.[82,83]

Infected personnel should not provide patient care for the duration of symptoms after onset of epidemic keratoconjunctivitis[82,83] or purulent conjunctivitis caused by other pathogens.

3. Cytomegalovirus

There are two principal reservoirs of cytomegalovirus (CMV) in health care institutions: (a) infants and young children infected with CMV and (b) immunocompromised patients, such as those undergoing solid-organ or bone-marrow transplantation or those with AIDS.[87-94] However, personnel who provide care to such high-risk patients have a rate of primary CMV infection that

is no higher than that among personnel without such patient contact (3% vs 2%).[95-101] In areas where there are patient populations with a high prevalence of CMV, seroprevalence studies and epidemiologic investigations have also demonstrated that personnel who care for patients have no greater risk of acquiring CMV than do personnel who have no patient contact.[92,95-98,100,102-107] In addition, epidemiologic studies that included DNA testing of viral strains have demonstrated that personnel who acquired CMV infections while providing care to CMV-infected infants had not acquired their infections from the CMV-infected patients.[88,92,96,108-110]

CMV transmission appears to occur directly either through close, intimate contact with an excreter of CMV or through contact with contaminated secretions or excretions, especially saliva or urine.[101,111-114] Transmission by the hands of personnel or infected persons has also been suggested.[92,115] The incubation period for person-to-person transmission is not known. Although CMV can survive on environmental surfaces and other objects for short periods,[116] there is no evidence that the environment plays a role in the transmission of infection.[92]

Because infection with CMV during pregnancy may have adverse effects on the fetus, women of childbearing age need to be counseled regarding the risks and prevention of transmission of CMV in both nonoccupational and occupational settings.[117] Although most fetal infections follow primary maternal infection, fetal infection may follow maternal reinfection or reactivation.[118,119] There are no studies that clearly indicate that seronegative personnel may be protected from infection by transfer to areas with less contact with patients likely to be reservoirs for CMV infection.[88,92,95-97,102,105,106,119,120]

Serologic or virologic screening programs to identify CMV-infected patients or seronegative female personnel of childbearing age are impractical and costly for the following reasons: (a) the virus can be intermittently shed,[121] and repeated screening tests may be needed to identify shedders; (b) seropositivity for CMV does not offer complete protection against maternal reinfection or reactivation and subsequent fetal infection[118,119]; and (c) no currently available vaccines[122-125] or prophylactic therapy[90,126-129] can provide protection against primary infection.

Work restrictions for personnel who contract CMV illnesses are not necessary. The risk of transmission of CMV can be reduced by careful adherence to handwashing and standard precautions.[3,119,130]

4. Diphtheria

Nosocomial transmission of diphtheria among patients and personnel has been reported.[131-133] Diphtheria is currently a rare disease in the United States. During 1980 through 1994, only 41 diphtheria cases were reported[134]; however, community outbreaks of diphtheria have occurred in the past,[135] and clusters of infection may occur in communities where diphtheria was previously endemic.[136] In addition, diphtheria epidemics have been occurring since 1990 in the new independent states of the former Soviet Union[137-139] and in Thailand.[140] At least 20 imported cases of diphtheria have been reported in countries in Europe,[139,141] and two cases occurred in U.S. citizens visiting or working in the Russian Federation and Ukraine.[142] Health care personnel are not at substantially higher risk than the general adult population for acquiring diphtheria; however, there is a potential for sporadic or imported cases to require medical care in the United States.

Diphtheria, caused by *Corynebacterium diphtheriae*, is transmitted by contact with respiratory droplets or contact with skin lesions of infected patients. The incubation period is usually 2 to 5 days. Patients with diphtheria are usually infectious for 2 weeks or less, but communicability can persist for several months.[143] Droplet precautions are recommended for patients with pharyngeal symptoms, and contact precautions are recommended for patients with cutaneous lesions. Precautions need to be maintained until antibiotic therapy is completed and results of two cultures taken at least 24 hours apart are negative.[3]

Limited serosurveys conducted since 1977 in the United States indicate that 22% to 62% of adults 18 to 39 years old may lack protective diphtheria antibody levels.[144-148] Prevention of diphtheria is best accomplished by maintaining high levels of diphtheria immunity among children and adults.[19,137,138] Immunization with tetanus and diphtheria toxoid (Td) is recommended every 10 years for all adults who have completed the primary immunization series (Table 1).[9,19] Health care personnel need to consider obtaining Td immunization from their health care providers.[9]

To determine whether health care personnel directly exposed to oral secretions of patients infected with toxigenic strains of *C. diphtheriae* are carriers, cultures of the nasopharynx may be obtained. Exposed personnel need to be evaluated for evidence of disease daily for 1 week.[149] Although the efficacy of antimicrobial prophylaxis in preventing secondary disease has not been proved, prophylaxis with either a single intramuscular

Table 5. Selected reported etiologic agents causing community-acquired or nosocomially acquired gastrointestinal infections in developed countries

Agent	Community-acquired, patients	Nosocomially acquired, patients	Nosocomially acquired, health care personnel
Bacterial			
Bacillus cereus	++	0	0
Campylobacter species	++++	+	0
Clostridium difficile	+	++++	+
Clostridium perfringens	+	+	0
Diarrheogenic *Escherichia coli*	++++	++	+
Salmonella species	+++	++	+
Shigella species	++	+	+
S. aureus, toxigenic	+++	+++	0
Yersinia enterocolitica	+	+	+
Viral			
Adenovirus	++	+	+
Astrovirus	*	*	?
Calicivirus (Norwalk and Norwalk-like viruses or SRSVs)	*	*	*
Coxsackievirus	++	+	+
Rotavirus	++++	++++	++
Fungal			
Candida species	+	+	0
Cryptococcus neoformans	++	+	0
Parasitic			
Cryptosporidium	++	+	+
Cyclospora	++	0	0
Entamoeba histolytica	++	+	0
Giardia lamblia	++	+	0
Isospora belli	+	0	0
Strongyloides	+	0	0

++++, Most frequently reported; +++, reported often; ++, occasionally reported; +, rarely reported; *0*, never reported; *, common but rarely reported because of limited availability of diagnostic assays; *?*, unknown; *SRSV*, small round-structured viruses.

injection of benzathine penicillin (1.2 mouse units) or oral erythromycin (1 gm/day) for 7 days has been recommended.[19] Follow-up nasopharyngeal cultures for *C. diphtheriae* need to be obtained at least 2 weeks after antimicrobial therapy is completed. If the organism has not been eradicated, a 10-day course of erythromycin needs to be given.[149] In addition, previously immunized exposed personnel need to receive a dose of Td if they have not been vaccinated within the previous 5 years.[19]

Exclusion from duty is indicated for personnel with *C. diphtheriae* infection or those determined to be asymptomatic carriers until antimicrobial therapy is completed and nasopharyngeal culture results are negative.

5. Gastrointestinal infections, acute

Gastrointestinal infections may be caused by a variety of agents, including bacteria, viruses, and protozoa. However, only a few agents have been documented in nosocomial transmission (Table 5).[150-168] Nosocomial transmission of agents that cause gastrointestinal infections usually results from contact with infected individuals,[150,161,163,169] from consumption of contaminated food, water, or other beverages,[150,166,169,170] or from exposure to contaminated objects or environmental surfaces.[152,153,171] Airborne transmission of small round-structured viruses (Norwalk-like viruses) has been postulated but not proved.[164,165,172-175] Inadequate handwashing by health care personnel[176] and inadequate sterilization or disinfection of patient-care equipment and environmental surfaces increase the likelihood of transmission of agents that cause gastrointestinal infections. Generally, adherence to good personal hygiene by personnel before and after all contacts with patients or food and to either standard or contact precautions[3] will minimize the risk of transmitting enteric pathogens.[167,177]

Laboratory personnel who handle infectious materials also may be at risk for occupational acquisition of gastrointestinal infections, most commonly with *Salmonella typhi*. Although the incidence of laboratory-acquired *S. typhi* infection has decreased substantially since 1955,

infections continue to occur among laboratory workers, particularly those performing proficiency exercises or research tests.[151,162] Several typhoid vaccines are available for use in laboratory workers who regularly work with cultures or clinical materials containing *S. typhi*.[178] The oral live-attenuated Ty21a vaccine, the intramuscular Vi capsular polysaccharide vaccine, or the subcutaneous inactivated vaccine may be given (Table 1).[178] Booster doses of vaccine are required at 2- to 5-year intervals, depending on the preparation used. The live-attenuated Ty21a vaccine should not be used for immunocompromised persons, including those known to be infected with HIV.[178]

Personnel who acquire an acute gastrointestinal illness (defined as vomiting, diarrhea, or both, with or without associated symptoms such as fever, nausea, and abdominal pain) are likely to have high concentrations of the infecting agent in their feces (bacteria, viruses, and parasites) or vomitus (viruses and parasites).[165,179,180] It is important to determine the etiology of gastrointestinal illness in health care personnel who care for patients at high risk for severe disease (e.g., neonates, elderly persons, and immunocompromised patients). The initial evaluation of personnel with gastroenteritis needs to include a thorough history and determination of the need for specific laboratory tests, such as stool or blood cultures, staining procedures, and serologic or antigen-antibody tests.[162,171,181,182]

After resolution of some acute bacterial gastrointestinal illnesses, some personnel may have persistent carriage of the infectious agent. Once the person has clinically recovered and is having formed stools, however, the risk of transmission of enteric pathogens is minimized by adherence to standard precautions.[3,167] In addition, appropriate antimicrobial therapy may eradicate fecal carriage of *Shigella*[183] or *Campylobacter*.[184] In contrast, antimicrobial or antiparasitic therapy may not eliminate carriage of *Salmonella*[185] or *Cryptosporidium*. Moreover, antimicrobials may prolong excretion of *Salmonella*[186] and lead to emergence of resistant strains.[187] However, transmission of *Salmonella* to patients from personnel who are asymptomatic carriers of *Salmonella* has not been well documented.[167] In general, antimicrobial therapy is not recommended, unless the person is at high risk for severe disease.[188] When antibiotics are given, stool cultures should be obtained at least 48 hours after completion of antibiotic therapy.

Restriction from patient care and the patient's environment or from food handling is indicated for personnel with diarrhea or acute gastrointestinal symptoms, regardless of the causative agent.[3,171] Some local and state agencies have regulations that require work exclusion for health care personnel, food handlers, or both who have gastrointestinal infections caused by *Salmonella* or *Shigella*. These regulations may require such personnel to be restricted from duty until results of at least two consecutive stool cultures obtained at least 24 hours apart are negative.

6. Hepatitis A

Nosocomial hepatitis A occurs infrequently, and transmission to personnel usually occurs when the source patient has unrecognized hepatitis and is fecally incontinent or has diarrhea.[189-198] Other risk factors for hepatitis A virus (HAV) transmission to personnel include activities that increase the risk of fecal-oral contamination such as (a) eating or drinking in patient care areas,[189,191,193,199] (b) not washing hands after handling an infected infant,[191,199,200] and (c) sharing food, beverages, or cigarettes with patients, their families, or other staff members.[189,191]

HAV is transmitted primarily by the fecal-oral route. It has not been reported to occur after inadvertent needlesticks or other contact with blood, but it has rarely been reported to be transmitted by transfusion of blood products.[193,201,202] The incubation period for HAV is 15 to 50 days. Fecal excretion of HAV is greatest during the incubation period of disease before the onset of jaundice.[203] Once disease is clinically obvious, the risk of transmitting infection is decreased. However, some patients admitted to the hospital with HAV, particularly immunocompromised patients, may still be shedding virus because of prolonged or relapsing disease, and such patients are potentially infective.[190,203] Fecal shedding of HAV, formerly believed to continue only as long as 2 weeks after onset of dark urine,[203] has been shown to occur as late as 6 months after diagnosis of infection in premature infants.[189] Anicteric infection is typical in young children and infants.[204]

Personnel can protect themselves and others from infection with HAV by adhering to standard precautions.[3] Food-borne transmission of

hepatitis A is not discussed in this guideline, but it has occurred in health care settings.[205,206]

Two inactivated hepatitis A vaccines are now available and provide long-term preexposure protection against clinical infection with greater than 94% efficacy.[204] Serologic surveys among health care personnel have not shown greater prevalence of HAV infection than in control populations[52,192,207,208]; therefore, routine administration of vaccine in health care personnel is not recommended. Vaccine may be useful for personnel working or living in areas where HAV is highly endemic and is indicated for personnel who handle HAV-infected primates or are exposed to HAV in a research laboratory. The role of hepatitis A vaccine in controlling outbreaks has not been adequately investigated.[9] Immune globulin given within 2 weeks after an HAV exposure is more than 85% effective in preventing HAV infection[204] and may be advisable in some outbreak situations.[9,204]

Restriction from patient care areas or food handling is indicated for personnel with HAV infection. They may return to regular duties 1 week after onset of illness.[9]

7. Herpes simplex

Nosocomial transmission of herpes simplex virus (HSV) is rare. Nosocomial transmission has been reported in nurseries[209-211] and intensive care units[212,213] where high-risk patients (e.g., neonates, patients with severe malnutrition, patients with severe burns or eczema, and immunocompromised patients) are located. Nosocomial transmission of HSV occurs primarily through contact either with primary or recurrent lesions or with virus-containing secretions, such as saliva, vaginal secretions, or amniotic fluid.[210,212,214] Exposed areas of skin are the most likely sites of nosocomial infection, particularly when minor cuts, abrasions, or other skin lesions are present.[213] The incubation period of HSV is 2 to 14 days.[215] The duration of viral shedding has not been well defined.[216]

Personnel may acquire a herpetic infection of the fingers (herpetic whitlow or paronychia) from exposure to contaminated oral secretions.[213,214] Such exposures are a distinct hazard for nurses, anesthesiologists, dentists, respiratory care personnel, and other personnel who have direct (usually hand) contact with either oral lesions or respiratory secretions from patients.[213] Less frequently, personnel may acquire mucocutaneous infection on other body sites from contact with infectious body secretions.[217]

Personnel with active infection of the hands (herpetic whitlow) can potentially transmit HSV infection to patients with whom they have contact.[214] Transmission of HSV from personnel with orofacial HSV infection to patients has also been infrequently documented[209]; however, the magnitude of this risk is unknown.[211,218] Although asymptomatic infected persons can shed the virus, they are less infectious than persons with active lesions.[216,219]

Personnel can protect themselves from acquiring HSV by adhering to standard precautions.[3] The risk of transmission of HSV from personnel with orofacial infections to patients can be reduced by handwashing before all patient care and by the use of appropriate barriers, such as a mask or gauze dressing, to prevent hand contact with the lesion.

Because personnel with orofacial lesions may touch their lesions and potentially transmit infections, they should be evaluated to determine their potential for transmitting herpes simplex to patients at high risk for serious disease (e.g., neonates, patients with severe malnutrition, patients with severe burns or eczema, and immunocompromised patients) and excluded from the care of such patients as indicated. The evaluation should consider the extent of the lesion and the severity of illness in the patient population that personnel will contact. Personnel with HSV infections of the fingers or hands can more easily transmit infection and therefore need to be excluded from patient care until their lesions have crusted. In addition, herpetic lesions may be secondarily infected by *Staphylococcus* and *Streptococcus*, and personnel with such infections should be evaluated to determine whether they need to be excluded from patient contact until the secondary infection has resolved. There have been no reports that personnel with genital HSV infections have transmitted HSV to patients; therefore, work restrictions for personnel with genital herpes are not indicated.

8. Measles

Nosocomial transmission of measles virus (sporadic and epidemic) has been well described.[220-229] From 1985 through 1991, approximately 3000 (4%) of all reported episodes of measles in the United States were probably acquired in a medical facility; of these, more than 700 (25%) occurred in health care personnel, many of whom were not vaccinated.[9] Data have suggested that health care personnel have a risk of measles 13-fold that of the general population.[9]

Of the 2765 episodes of measles reported during 1992 through 1995, 385 (13.9%) occurred in health care settings.[221,230]

Measles is transmitted both by large droplets during close contact between infected and susceptible persons and by the airborne route.[229,231] Measles is highly transmissible and frequently misdiagnosed during the prodromal stage. The incubation period for measles is 5 to 21 days. Immunocompetent persons with measles shed the virus from the nasopharynx, beginning with the prodrome until 3 to 4 days after rash onset; immunocompromised persons with measles may shed virus for extended periods.[232]

Strategies to prevent nosocomial transmission of measles include (a) documentation of measles immunity in health care personnel, (b) prompt identification and isolation of persons with fever and rash, and (c) adherence to airborne precautions for suspected and proven cases of measles.[3]

It is essential that all personnel have documentation of measles immunity, regardless of their length of employment or whether they are involved in patient care. Further, some states have regulations requiring measles immunity for health care personnel. Although persons born before 1957 are generally considered to be immune to measles, serologic studies indicate that 5% to 9% of health care personnel born before 1957 may not be immune.[9,233,234] Furthermore, during 1985 through 1989, 29% of all measles cases in U.S. health care personnel occurred in those born before 1957.[221] Consideration should be given to recommending a dose of measles-mumps-rubella trivalent vaccine (MMR) to personnel born before 1957 who are unvaccinated and who lack (a) a history of previous measles disease, (b) documentation of receipt of one dose of live-measles vaccine, and (c) serologic evidence of measles immunity.[9] Health care personnel born during or after 1957 should be considered immune to measles when they have (a) documentation of physician-diagnosed measles, (b) documentation of two doses of live measles vaccine on or after their first birthday, or (c) serologic evidence of measles immunity (persons with an "indeterminate" level of immunity on testing should be considered susceptible). Persons born between 1957 and 1984 who received childhood measles immunization were given only one dose of vaccine during infancy and may require a second dose of vaccine.[8]

Serologic screening for measles immunity is not necessary before administration of measles vaccine, unless the medical facility considers it cost-effective or the person to be vaccinated requests it.[235-238] When serologic screening before vaccination is done, tracking systems are needed to ensure that those identified as susceptible are subsequently vaccinated in a timely manner.[237] During measles outbreaks, serologic screening before vaccination is not necessary. In outbreak situations, prompt administration of vaccine is necessary to halt disease transmission.

Work restrictions are necessary for personnel who acquire measles; they need to be excluded from duty for 7 days after the rash appears. Likewise, personnel not immune to measles need to be excluded from duty from 5 days after the first exposure to 21 days after the last exposure to measles.

9. Meningococcal disease

Community-acquired meningococcal disease is typically caused by a variety of serogroups of *Neisseria meningitidis*; serogroups B and C cause 46% and 45% of the endemic cases, respectively. Serogroups A, Y, and W-135 account for nearly all the remaining endemic cases.[15] In contrast, epidemic meningococcal disease has, since the early 1990s, been caused increasingly by serogroup C.[15,239,240]

Nosocomial transmission of *N. meningitidis* is uncommon. In rare instances, when proper precautions were not used, *N. meningitidis* has been transmitted from patient to personnel, through contact with the respiratory secretions of patients with meningococcemia or meningococcal meningitis,[241-243] or through handling laboratory specimens.[241] Lower respiratory tract infections caused by *N. meningitidis* may present a greater risk of transmission than either meningococcemia or meningitis,[243,244] especially if the patient has an active, productive cough.[244] The risk of personnel acquisition of meningococcal disease from casual contact (e.g., cleaning rooms or delivering food trays) appears to be negligible.[244]

N. meningitidis infection is probably transmitted by large droplets; the incubation period is from 2 to 10 days, and patients infected with *N. meningitidis* are rendered noninfectious by 24 hours of effective therapy. Personnel who care for patients with suspected *N. meningitidis* infection can decrease their risk of infection by adhering to droplet precautions.[3]

Postexposure prophylaxis is advised for persons who have had intensive, unprotected contact (i.e., without wearing a mask) with infected patients (e.g., mouth-to-mouth resuscitation, endotracheal intubation, endotracheal tube management, or close examination of the oropharynx of patients).[15] Antimicrobial prophylaxis can eradicate carriage of *N. meningitidis* and prevent infections in personnel who have unprotected exposure to patients with meningococcal infections.[245,246]

Because secondary cases of *N. meningitidis* occur rapidly (within the first week) after exposure to persons with meningococcal disease,[247] it is important to begin prophylactic therapy immediately after an intensive, unprotected exposure, often before results of antimicrobial testing are available. Prophylaxis administered later than 14 days after exposure is probably of limited or no value.[15] Rifampin (600 mg orally every 12 hours for 2 days) is effective in eradicating nasopharyngeal carriage of *N. meningitidis*.[245] Ciprofloxacin (500 mg orally) and ceftriaxone (250 mg intramuscularly) in single-dose regimens are also effective in reducing nasopharyngeal carriage of *N. meningitidis* and are reasonable alternatives to the multidose rifampin regimen.[15,246] These antimicrobials may be useful when infections are caused by rifampin-resistant meningococci or rifampin is contraindicated. Rifampin and ciprofloxacin are not recommended for pregnant women.[15,106,248,249]

The quadrivalent A,C,Y,W-135 polysaccharide vaccine has been used successfully to control community outbreaks caused by serogroup C,[15,239,240,248] but its use is not recommended for postexposure prophylaxis in health care settings.[15] However, preexposure vaccination may be considered for laboratory personnel who routinely handle soluble preparations of *N. meningitidis*.[15,241]

Healthy persons may have nasopharyngeal carriage of *N. meningitidis*.[245,250-252] Nosocomial transmission from carriers to personnel has not been reported. In the absence of exposures to patients with *N. meningitidis* infection, personnel who are asymptomatic carriers need not be identified, treated, or removed from patient care activities. However, personnel with meningococcal infection need to be excluded from duty until 24 hours after the start of effective therapy.

10. Mumps

Mumps transmission has occurred in hospitals and long-term care facilities housing adolescents and young adults.[253,254] Most cases of mumps in health care personnel have been community acquired.

Mumps is transmitted by contact with virus-containing respiratory secretions, including saliva; the portals of entry are the nose and mouth. The incubation period varies from 12 to 25 days and is usually 16 to 18 days. The virus may be present in saliva for 6 to 7 days before parotitis and may persist for as long as 9 days after onset of disease. Exposed personnel may be infectious for 12 to 25 days after their exposure, and many infected persons remain asymptomatic.[255] Droplet precautions are recommended for patients with mumps; such precautions should be continued for 9 days after the onset of parotitis.[3]

An effective vaccination program is the best approach to prevention of nosocomial mumps transmission.[12] Vaccination with mumps virus vaccine is recommended, unless otherwise contraindicated, for all those who are susceptible to mumps;[12,256] combined MMR is the vaccine of choice,[257] especially when the recipient also is likely to be susceptible to measles, rubella, or both.

Personnel should be considered immune to mumps if they have (a) documentation of physician-diagnosed mumps, (b) documentation of receipt of one dose of live mumps vaccine on or after their first birthday, or (c) serologic evidence of immunity (individuals who have an "indeterminate" antibody level should be considered susceptible).[12] Most persons born before 1957 are likely to have been infected naturally and may be considered to be immune, even though they may not have had clinically recognized mumps. Outbreaks among highly vaccinated populations have occurred and have been attributed to primary vaccine failure.[258]

Work restrictions are necessary for personnel who acquire mumps; such restrictions should be imposed for 9 days after the onset of parotitis. Likewise, susceptible personnel who are exposed to mumps need to be excluded from duty from the 12th day after the first exposure until the 26th day after the last exposure.[9,255]

11. Parvovirus

Human parvovirus B19 (B19) is the cause of erythema infectiosum (fifth disease), a common rash illness that is usually acquired in childhood. Immunocompetent persons infected with B19 may have an acute, self-limited arthropathy, with or without a rash or anemia of short duration. However, patients with preexisting anemia (e.g., patients with sickle-cell anemia or thalassemia)

may have aplastic crisis occur. Immunodeficient patients (e.g., patients with leukemia or AIDS) may become chronically infected with B19 and have chronic anemia.[259,260]

Transmission of B19 to health care personnel from infected patients appears to be rare but has been reported.[261-265] In two investigations of health care personnel exposures to B19, the rate of infection among exposed nurses was not higher than the rate among unexposed control subjects.[266,267] In another investigation of health care personnel exposed to a patient with undetected chronic B19 infection, none of the susceptible employees became infected.[268] Personnel have acquired infection while working in laboratories or during the care of patients with B19-associated sickle-cell aplastic crises.[263-265,269-271]

B19 may be transmitted through contact with infected persons, fomites, or large droplets.[266,272,273] The incubation period is variable, depending on the clinical manifestation of disease, and ranges from 6 to 10 days.[260] The period of infectivity also varies, depending on the clinical presentation or stage of disease. Persons with erythema infectiosum are infectious before the appearance of the rash, those with infection and aplastic crises for as long as 7 days after onset of illness, and persons with chronic infection for years.

Pregnant personnel are at no greater risk of acquiring B19 infection than are nonpregnant personnel; however, if a pregnant woman does acquire B19 infection during the first half of pregnancy, the risk of fetal death (fetal hydrops, spontaneous abortion, and stillbirth) is increased.[274,275] Because of the serious nature of the consequences for the fetus, female personnel of childbearing age need to be counseled regarding the risk of transmission of B19 and appropriate infection control precautions.[3]

Isolation precautions are not indicated for most patients with erythema infectiosum because they are past their period of infectiousness at the time of clinical illness.[271,274] However, patients in aplastic crisis from B19 or patients with chronic B19 infection may transmit the virus to susceptible health care personnel or other patients; therefore, patients with preexisting anemia who are admitted to the hospital with febrile illness and transient aplastic crises should remain on droplet precautions for 7 days and patients with known or suspected chronic infection with B19 should be placed on droplet precautions on admission and for the duration of hospitalization.[3,263] Work restrictions are not necessary for personnel exposed to B19.

12. Pertussis

Nosocomial transmission of *Bordetella pertussis* has involved both patients and personnel; nonimmunized children are at greatest risk.[276-280] Serologic studies of health care personnel indicate that personnel may be exposed to and infected with pertussis much more frequently than indicated by the occurrence of recognized clinical illness.[277,279,281,282] In one such study, the level of pertussis agglutination antibodies was found to correlate with the degree of patient contact; the prevalence of such antibody was highest in pediatric house staff (82%) and ward nurses (71%) and lowest in nurses with administrative responsibilities (35%).[277]

Pertussis is highly contagious; secondary attack rates exceed 80% in susceptible household contacts.[283-285] *B. pertussis* transmission occurs by contact with respiratory secretions or large aerosol droplets from the respiratory tracts of infected persons. The incubation period is usually 7 to 10 days. The period of communicability starts at the onset of the catarrhal stage and extends into the paroxysmal stage up to 3 weeks after onset of symptoms. Prevention of secondary transmission of pertussis is especially difficult during the early stages of the disease because pertussis is highly communicable in the catarrhal stage, when the symptoms are nonspecific and the diagnosis is uncertain.

During nosocomial pertussis outbreaks, the risk of acquiring infection among patients or personnel is often difficult to quantify because exposure is not easily determined. Furthermore, clinical symptoms in adults are less severe than in children and may not be recognized as pertussis. Pertussis should be considered for any person seeking treatment with an acute cough lasting at least 7 days, particularly if accompanied by paroxysms of coughing, inspiratory whoop, or posttussive vomiting.[280,281]

Prevention of transmission of *B. pertussis* in health care settings involves (a) early diagnosis and treatment of patients with clinical infection, (b) implementation of droplet precautions for infectious patients,[3] (c) exclusion of infectious personnel from work, and (d) administration of postexposure prophylaxis to persons exposed to infectious patients.[279] Patients with suspected or confirmed pertussis who are admitted to the hospital need to be placed on droplet precautions until they have clinical improvement and have received antimicrobial therapy for at least 5 days.

Vaccination of adolescents and adults with whole-cell *B. pertussis* vaccine is not recommended[19] because local and systemic reactions have

been observed more frequently in these groups than in children. Acellular pertussis vaccine is immunogenic in adults and carries a lower risk of adverse events than does whole-cell vaccine.[280,286] However, the acellular vaccine has not been licensed for use in persons 7 years old or older. Because immunity among vaccine recipients wanes 5 to 10 years after the last vaccine dose (usually given at 4 to 6 years of age), personnel may play an important role in transmitting pertussis to susceptible infants. However, additional studies are needed to assess whether booster doses of acellular vaccines are indicated for adults.

Postexposure prophylaxis is indicated for personnel exposed to pertussis; a 14-day course of either erythromycin (500 mg orally four times daily) or trimethoprim-sulfamethoxazole (one tablet twice daily) has been used for this purpose. The efficacy of such prophylaxis has not been well documented, but studies suggest that it may minimize transmission.[19,279,287,288] There are no data on the efficacy of newer macrolides (clarithromycin or azithromycin) for prophylaxis in persons exposed to pertussis.

Restriction from duty is indicated for personnel with pertussis from the beginning of the catarrhal stage through the third week after onset of paroxysms, or until 5 days after the start of effective antimicrobial therapy. Exposed personnel do not need to be excluded from duty.

13. Poliomyelitis

The last cases of indigenously acquired wild-virus poliomyelitis occurred in the United States in 1979.[289] Since then, all cases of endemic poliomyelitis reported in the United States (5 to 10 endemic cases/year) have been related to the administration of oral polio vaccine (OPV).[21] Although the risk of transmission of poliovirus in the United States is very low, wild poliovirus may potentially be introduced into susceptible populations with low immunization levels.

Poliovirus is transmitted through contact with feces or urine of infected persons but can be spread by contact with respiratory secretions and, in rare instances, through items contaminated with feces. The incubation period for nonparalytic poliomyelitis is 3 to 6 days, but is usually 7 to 21 days for paralytic polio.[290] Communicability is greatest immediately before and after the onset of symptoms, when the virus is in the throat and excreted in high concentration in feces. The virus can be recovered from the throat for 1 week and from feces for several weeks to months after onset of symptoms.

Vaccine-associated poliomyelitis may occur in the recipient (7 to 21 days after vaccine administration) or susceptible contacts of the vaccine recipient (20 to 29 days after vaccine administration).[289] Adults have a slightly increased risk of vaccine-associated paralytic poliomyelitis after receipt of OPV; therefore, inactivated poliovirus vaccine (IPV) should be used when adult immunization is warranted.[8,16,21] Also, because immunocompromised persons may be at greater risk for development of poliomyelitis after exposure to vaccine virus, IPV rather than OPV is recommended when vaccinating pregnant or immunocompromised personnel, or personnel who may have contact with immunocompromised patients.[8,16,21,290]

Health care personnel who may have contact with patients excreting wild virus (e.g., imported poliomyelitis case) and laboratory personnel handling specimens containing poliovirus or performing cultures to amplify virus should receive a complete series of polio vaccine; if previously vaccinated, they may require a booster dose of either IPV or OPV.[8,21] For situations where immediate protection is necessary (e.g., an imported case of wild-virus poliomyelitis requiring care), additional doses of OPV should be given to adults who have previously completed a polio vaccine series.[21]

14. Rabies

Human rabies cases occur primarily from exposure to rabid animals. Cases of human rabies have increased in the United States during the 1990s.[291] Laboratory and animal care personnel who are exposed to infected animals, their tissues, and their excretions are at risk for the disease. Also, rabies transmission to laboratory personnel has been reported in vaccine production and research facilities after exposure to high-titered infectious aerosols.[292,293] Theoretically, rabies may be transmitted to health care personnel from exposures (bite and nonbite) to saliva from infected patients, but no cases have been documented after these types of exposures.[294]

It is also possible for rabies to be transmitted when other potentially infectious material (such as brain tissue) comes into contact with nonintact skin or mucous membranes.[22,294] Bites that penetrate the skin, especially bites to the face and hands, pose the greatest risk of transmission of rabies virus from animals to human beings.[22] The incubation period for rabies is usually 1 to 3 months, but longer periods have been reported.[295]

Exposures to rabies can be minimized by adhering to standard precautions when caring for persons with suspected or confirmed rabies[3] and by

using proper biosafety precautions in laboratories.[5] Preexposure vaccination has been recommended for all personnel who (a) work with rabies virus or infected animals or (b) engage in diagnostic, production, or research activities with rabies virus.[5,22] Consideration also may be given to providing preexposure vaccination to animal handlers when research animals are obtained from the wild, rather than from a known supplier that breeds the animals.

Postexposure prophylaxis has been administered to health care personnel after exposures to patients with rabies (Table 1),[295-297] but decisions regarding postexposure prophylaxis should be made on a case-by-case basis after discussion with public health authorities.[22]

15. Rubella

Nosocomial transmission of rubella has occurred from both male and female personnel to other susceptible personnel and patients, as well as from patients to susceptible personnel and other patients.[298-305]

Rubella is transmitted by contact with nasopharyngeal droplets from infected persons. The incubation period is variable but may range from 12 to 23 days; most persons have the rash 14 to 16 days after exposure. The disease is most contagious when the rash is erupting, but virus may be shed from 1 week before to 5 to 7 days after the onset of the rash.[306] Rubella in adults is usually a mild disease, lasting only a few days; 30% to 50% of cases may be subclinical or inapparent.

Droplet precautions are used to prevent transmission of rubella. Infants with congenital rubella may excrete virus for months to years; when caring for such patients, it is therefore advisable to use contact precautions for the first year of life, unless nasopharyngeal and urine culture results are negative for rubella virus after 3 months of age.[3]

Ensuring immunity among all health care personnel (male and female) is the most effective way to eliminate nosocomial transmission of rubella.[8,9,14,256,307] Persons should be considered susceptible to rubella if they lack (a) documentation of one dose of live rubella vaccine on or after their first birthday and (b) laboratory evidence of immunity (persons with indeterminate levels are considered susceptible). A history of previous rubella infection is unreliable and should not be considered indicative of immunity to rubella. Although birth before 1957 is generally considered acceptable evidence of rubella immunity, a dose of MMR has been recommended for those health care personnel that do not have laboratory evidence of immunity.[9] In addition, birth before 1957 is not considered acceptable evidence of rubella immunity for women of childbearing age; history of vaccination or laboratory evidence of rubella immunity is particularly important for women who may become pregnant.[9] Voluntary immunization programs are usually inadequate to ensure personnel protection.[7,308] Because many health departments mandate rubella immunity for health care personnel, personnel health programs should consult with their local or state health departments before establishing policies for their facilities.

Serologic screening of personnel for immunity to rubella need not be done before vaccinating against rubella, unless the medical facility considers it cost-effective or the person getting vaccinated requests it.[7,235-237] When serologic screening before vaccination is done, tracking systems are needed to ensure that those identified as susceptible are subsequently vaccinated in a timely manner.[237] Likewise, during rubella outbreaks, serologic screening is not necessary. Pregnant women who are already immune to rubella are not at increased risk for adverse advents.[309] However, for theoretic reasons, a risk to the fetus from administration of live-virus vaccines cannot be excluded. Women should be counseled to avoid pregnancy for 30 days after administration of MMR or other rubella-containing vaccines. Routine precautions for vaccinating postpubertal women include (a) asking whether they are or may be pregnant, (b) not vaccinating those who say they are or may be pregnant, and (c) vaccinating those who state they are not pregnant after the potential risk to the fetus has been explained. If a pregnant woman is vaccinated or a woman becomes pregnant within 3 months after vaccination, she should be counseled about the theoretic basis of concern for the fetus, but MMR vaccination during pregnancy should not ordinarily be a reason to consider termination of pregnancy. Rubella-susceptible women who are not vaccinated because of pregnancy should be counseled about the importance of being vaccinated as soon as they are no longer pregnant.[9] MMR is the vaccine of choice for rubella, especially when the recipient also is likely to be susceptible to measles, mumps, or both (Table 2).

Work restrictions are necessary for personnel who acquire rubella; ill personnel need to be excluded from duty for 5 days after the rash appears. Likewise, personnel susceptible to rubella require exclusion from duty from the seventh

day after the first exposure through the 21st day after the last exposure (Table 3).

16. Scabies and pediculosis

a. Scabies

Scabies is caused by infestation with the mite *Sarcoptes scabiei*. The conventional (typical) clinical presentation of scabies includes intense pruritus and cutaneous tracks, where mites have burrowed into the skin. Crusted or "Norwegian" scabies may develop among immunocompromised and elderly individuals in which their skin may become hyperkeratotic; pruritus may not be present, which also makes diagnosis difficult. In conventional scabies, 10 to 15 mites are present, whereas in crusted scabies, thousands of mites are harbored in the skin, increasing the potential for transmission.[310,311]

Nosocomial outbreaks of scabies have occurred in a variety of health care settings, including intensive care units,[312] rehabilitation centers,[313] long-term care facilities,[314,315] hospital wards,[316] a dialysis unit,[317] and a health care laundry.[318] In recent years there has been an increase in the occurrence of crusted scabies among immunocompromised patients, particularly persons with HIV, which has led to the transmission of scabies among personnel, patients, and their families.[310,312-316,319-321]

Nosocomial transmission of scabies occurs primarily through prolonged skin-to-skin contact with an infested person who has conventional scabies.[310,322] Shorter periods of skin-to-skin contact with persons who have crusted scabies may result in transmission of scabies.[323] Personnel have acquired scabies while performing patient care duties such as sponge bathing, lifting, or applying body lotions.[310,311,319,324] Transmission by casual contact, such as by holding hands, or through inanimate objects, such as infested bedding, clothes, or other fomites, has been reported infrequently.[317,318]

The use of contact precautions when taking care of infested patients before application of scabicides can decrease the risk of transmission to personnel.[3,311] Routine cleaning of the environment of patients with typical scabies, especially bed linens and upholstered furniture, will aid in eliminating the mites. Additional environmental cleaning procedures may be warranted for crusted scabies.[310,311,32[illegible]]

Recommendations for treatment and control of scabies in health care institutions have been published previously.[310,311,327-331] The recommended topical scabicides include permethrin cream (5%), crotamiton (10%), and lindane (1%) lotion; resistance to and adverse effects from lindane have been reported.[329] Single-dose oral ivermectin has recently been shown to be an effective therapy for scabies[323,330,332] but has not received Food and Drug Administration (FDA) approval for this purpose.

Most infested health care workers have typical scabies with low mite loads[333]; a single correct application of a scabicide is adequate and immediately decreases the risk of transmission.[25,315-317,319,322,324,334] There are no controlled evaluations of the efficacy of prophylactic scabicide therapy among health care personnel, and some experts recommend two applications of scabicide for all infested personnel.[311,315,321] If personnel continue to have symptoms after initial treatment, another application of scabicide may be needed. Persistent symptoms likely represent newly hatched mites rather than new infestation; however, pruritus after scabies infestation and treatment may persist for as long as 2 weeks, even without infestation.[25] Patients with crusted scabies may require repeated treatments and should be observed for recurrence of the mite infestation.[310,311,314,326] Personnel who are exposed to scabies but lack signs of infestation do not usually require prophylactic treatment with scabicides. In outbreak situations where transmission continues to occur, prophylaxis may be warranted for both patients and exposed health care personnel.[311,313]

Restrictions from patient care are indicated for personnel infested with scabies until after they receive initial treatment and have been medically evaluated and determined to be free of infestation. They should be advised to report for further evaluation if symptoms do not subside.

b. Pediculosis

Pediculosis is caused by infestation with any of three species of lice: *Pediculus humanus capitus* (human head louse), *Pediculus humanus corporis* (human body louse), and *Phthirus pubis* (pubic or crab louse).

Head lice are transmitted by head-to-head contact or by contact with infested fomites such as hats, combs, or brushes. Nosocomial transmission, although not common, has occurred.[310]

Body lice are usually associated with poor hygiene and overcrowded conditions. Transmission occurs by contact with the skin or clothing of an infested person. Nosocomial transmission is unlikely.

Pubic lice are primarily found in the pubic hair but can be found in the axilla, eyelashes, or eyebrows. Transmission occurs primarily through intimate physical or sexual contact. Transmission by fomites, such as toilet seats or bedding, is uncommon. Nosocomial transmission is very unlikely.

Recommendations for control of pediculosis have been published previously.[310,327,335] The drugs recommended for treatment include permethrin cream 1%, pyrethrins with piperonyl butoxide, malathion 0.5%, and lindane 1%.[328-330,335] Resistance to various drugs has been reported. Local health departments may have information about drugs that are effective in their areas. Health care personnel exposed to patients with pediculosis do not require treatment, unless they show evidence of infestation.

Restriction from patient care is indicated for personnel with pediculosis until after they receive initial treatment and are found to be free of adult and immature lice. If symptoms do not subside after initial treatment, they should be advised to report for further evaluation.

17. *Staphylococcus aureus* infection and carriage

Staphylococcal infection and carriage occur frequently in human beings. In hospitals, the most important sources of *S. aureus* are infected and colonized patients. Previously, methicillin-susceptible (but penicillin-resistant) *S. aureus* accounted for most staphylococcal infections. In recent years, however, methicillin-resistant *S. aureus* has accounted for approximately 80% of all *S. aureus* isolates reported to the National Nosocomial Infections Surveillance System.[336,337] The epidemiology of methicillin-resistant *S. aureus* does not appear to differ from that of methicillin-susceptible, penicillin-resistant *S. aureus*, except that outbreaks of methicillin-resistant *S. aureus* tend to occur more frequently among elderly or immunocompromised patients or among patients with severe underlying conditions.[338,339]

Nosocomial transmission of *S. aureus* occurs primarily by the hands of personnel, which can become contaminated by contact with the colonized or infected body sites of patients.[339,340] Hospital personnel who are infected or colonized with *S. aureus* also can serve as reservoirs and disseminators of *S. aureus*,[341-344] and infected dietary personnel have been implicated in staphylococcal food poisoning.[345] The role of contaminated environmental surfaces in transmission of *S. aureus* has rarely been well documented[346] and remains controversial, although heavy contamination of fomites may facilitate transmission to patients by hands of personnel.[339]

The incubation period for *S. aureus* infections varies by type of disease. For food-borne illness it is 30 minutes to 6 hours, for bullous impetigo it is 1 to 10 days, for toxic shock syndrome it is usually 2 days, and for other types of infection it is variable.[347]

Carriage of *S. aureus* is most common in the anterior nares, but other sites, such as the hands, axilla, perineum, nasopharynx, and oropharynx, may also be involved.[339] The frequency of nasal carriage of *S. aureus* among health care personnel ranges between 20% and 90%, but fewer than 10% of healthy nasal carriers disperse the organisms into the air.[342] Nasal carriers with upper respiratory symptoms can disseminate the organism more effectively.[342] Carriage of *S. aureus* in the nares has been shown to correspond to hand carriage,[336] and persons with skin lesions caused by *S. aureus* are more likely than asymptomatic nasal carriers to disseminate the organism.

Culture surveys of personnel can detect carriers of *S. aureus* but do not indicate which carriers are likely to disseminate organisms. Thus, such surveys are not cost-effective and may subject personnel with positive culture results to unnecessary treatment and removal from duty. A more reasonable approach is to conduct active surveillance for nosocomial *S. aureus* infections. Culture surveys may be indicated if, after a thorough epidemiologic investigation, personnel are linked to infections. Such implicated personnel can then be removed from clinical duties until carriage has been eradicated.[339,341,348-350]

Several antimicrobial regimens have been used successfully to eradicate staphylococcal carriage in health care personnel. These regimens include orally administered antimicrobial agents (e.g., rifampin, clindamycin, or ciprofloxacin) alone or in combination with another oral (e.g., trimethoprim-sulfamethoxazole) or topical (mupirocin) antimicrobial.[349,351-363] Resistant *S. aureus* strains have emerged after the use of these oral or topical antimicrobial agents for eradication of *S. aureus* colonization.[18,210,349,353,364-366] Thus, antimicrobial treatment to eradicate carriage may be best if limited to personnel who are carriers epidemiologically linked to disease transmission. Nosocomial transmission of *S. aureus* can be prevented by adherence to standard precautions and other forms of transmission-based precautions as needed.[3]

Restriction from patient-care activities or food handling is indicated for personnel who have draining skin lesions that are infected with *S. aureus* until they have received appropriate therapy and the infection has resolved. No work restrictions are necessary for personnel who are colonized with *S. aureus*, unless they have been epidemiologically implicated in *S. aureus* transmission within the facility.

18. *Streptococcus*, group A infection

Group A *Streptococcus* (GAS) has been transmitted from infected patients to health care personnel after contact with infected secretions,[367-369] and the infected personnel have subsequently acquired a variety of GAS-related illnesses (e.g., toxic shock–like syndrome, cellulitis, lymphangitis, and pharyngitis). Health care personnel who were GAS carriers have infrequently been linked to sporadic outbreaks of surgical site, postpartum, or burn wound infections[370-376] and to food-borne transmission of GAS causing pharyngitis.[377] In these outbreaks, GAS carriage was documented in the pharynx,[369,372,378] the skin,[369,370] the rectum,[369,375] and the female genital tract of the infected personnel.[369,374,379]

The incubation period for GAS pharyngitis is 2 to 5 days, but for impetigo is 7 to 10 days. The incubation period is variable for other GAS infections.[380]

Culture surveys to detect GAS carriage among personnel are not warranted, unless personnel are epidemiologically linked to cases of nosocomial infection.[378] In instances where thorough epidemiologic investigation has implicated personnel in nosocomial transmission, cultures may be obtained from skin lesions, pharynx, rectum, and vagina; GAS isolates obtained from personnel and patients can be serotyped to determine strain relatedness.[373] Treatment of personnel carriers needs to be individually determined because (a) experience is limited regarding the treatment of personnel carriers implicated in GAS outbreaks and (b) carriage of the organism by personnel may be recurrent through long periods.[369-371,374] Contact is the major mode of transmission of GAS in these health care settings. Airborne transmission during outbreaks has been suggested by several investigators, and some have demonstrated that exercising and changing of clothing can lead to airborne dissemination of GAS from rectal and vaginal carriage.[369,374,375,379] Nosocomial transmission of GAS to personnel can be prevented by adherence to standard precautions or other transmission-based precautions as needed.[3]

Restriction from patient care activities and food handling is indicated for personnel with GAS infections until 24 hours after they have received appropriate therapy. However, no work restrictions are necessary for personnel who are colonized with GAS, unless they have been epidemiologically linked to transmission of infection within the facility.

19. Tuberculosis

Nosocomial transmission of tuberculosis (TB) is well documented, but such transmission in the United States is generally low. However, the risk may be increased in health care facilities located in communities with (a) high rates of HIV, (b) high numbers of persons from TB-endemic countries, and (c) communities with a high prevalence of TB infection.[381,382] In some areas in the United States, the incidence and prevalence of multidrug-resistant *Mycobacterium tuberculosis* (MDR-TB) have also increased, and nosocomial MDR-TB outbreaks have occurred.[383-391] The increased risk of occupational acquisition of TB by health care personnel has been reported for decades, and it dramatically decreased after the introduction of effective antituberculous drugs.[392,393] Skin-test conversion rates among health care personnel after routine skin testing have ranged from 0.11% to 10%.[394] Among health care personnel with known exposure to an infectious patient with TB or involved in prolonged nosocomial outbreaks of TB, the skin-test conversion rates have ranged from 18% to 55%.[383-385,388,389,393,395-401] Health care personnel with severely compromised immune systems, especially those infected with HIV[381,402] and including those with malignancies or receiving immunosuppressive therapy, are at high risk for development of active disease after acquisition of tuberculous infection. It has been estimated that persons infected with *M. tuberculosis* and coinfected with HIV have an 8% to 10% risk per year for development of active TB, whereas immunocompetent persons infected with TB have a 10% lifetime risk for active disease.[403]

The transmission of TB in health care facilities has been primarily caused by incomplete implementation of recommended TB infection control measures.[396] In 1994, the CDC published detailed recommendations for the prevention of transmission of TB in health care settings, "Guidelines for Preventing the Transmission of *M. tuberculosis* in Health Care Facilities, 1994."[382] A summary of the recommendations pertaining to personnel health follows.

a. Strategies for prevention of transmission of TB

The risk of transmission of TB to or from personnel in a health care facility varies according to the type and size of the facility, the prevalence of TB in the community, the patient population served by the facility, the occupational group the person represents, the area of the facility where the person works, and the effectiveness of the facility's TB control program. A detailed risk assessment is essential in identifying the nature of TB control measures that are appropriate for a particular facility, as well as for specific areas and occupational groups within a facility.[382,404] A risk assessment should include the following: (a) review of the community TB profile, (b) review of the number of patients with TB who were treated in each area of the facility, (c) review of the drug-susceptibility patterns of TB isolates from patients treated in the facility, (d) an analysis of purified protein derivative (PPD) skin-test results of health care personnel by work area or occupational group, (e) an evaluation of infection control parameters, including isolation policies, laboratory diagnostic capabilities, and antituberculous therapy regimens, (f) an observational review of TB infection control practices, and (g) evaluation of the function and maintenance of environmental controls.[382]

Transmission of TB can be minimized by developing and implementing an effective TB control program that is based on a hierarchy of controls: (a) administrative controls, (b) engineering controls, and (c) personal respiratory protection.[367,384,386,393,396,404,405]

b. TB screening program

A TB screening program for personnel is an integral part of a health care facility's comprehensive TB control program. The screening program should be based on the facility-specific risk assessment. It may be advisable to screen immunocompromised personnel every 6 months.[382]

Baseline PPD testing of all personnel (including personnel with a history of bacille Calmette-Guérin [BCG] vaccination) during their preemployment physical examination or their application for hospital privileges will identify personnel who have been previously infected. For the baseline testing, a two-step procedure for personnel without a PPD test in the past 12 months can be used to minimize the likelihood of confusing reactivity from an old infection (boosting) with reactivity from a recent infection (conversion). Decisions concerning the use of the two-step procedure for baseline testing in a particular facility should be based on the frequency of boosting in that facility. Criteria used for interpretation of a PPD-test reaction may vary depending on (a) the purpose (diagnostic or epidemiologic) of the test, (b) the prevalence of TB infection in the population being tested, (c) the immune status of the host, and (d) any previous receipt of BCG immunization. Detailed recommendations for performing and interpreting skin tests have been published.[382,406-408]

c. Follow-up evaluation

The risk assessment will show which health care personnel have the potential for exposure to *M. tuberculosis* and determine how frequently they should receive PPD testing. At a minimum, annual PPD testing is indicated for personnel with the potential for exposure to TB.

It is also important to obtain an initial chest radiograph for personnel with positive PPD-test reactions, documented PPD-test conversions, or pulmonary symptoms suggestive of TB. There are no data to support the use of routine chest radiographic examinations for asymptomatic PPD-negative personnel. In addition, personnel who have positive PPD-test reactions but also received adequate preventive treatment do not need repeat chest films, unless they have pulmonary symptoms suggestive of TB. Repeat chest radiographic examinations of such persons have not been shown to be beneficial or cost-effective in monitoring persons for development of disease. However, more frequent monitoring for symptoms of TB may be considered for personnel who had recent conversion of their PPD test and those persons who, if infected, are at increased risk for development of active TB (e.g., HIV-infected or otherwise severely immunocompromised persons).[382] Routine anergy testing of HIV-seropositive individuals is limited in its usefulness; however, anergy testing may be useful in guiding individual decisions regarding preventive therapy in selected situations.[408]

d. Management of personnel after exposure to TB

It is important to administer PPD tests to personnel as soon as possible after TB exposures are recognized. Such immediate PPD testing establishes a baseline with which subsequent PPD tests can be compared. A PPD test performed 12 weeks after the last exposure will indicate whether infection has occurred. Persons already known to have reactive PPD tests need not be retested. Personnel with evidence of new infection (i.e., PPD-test conversions) need to be evalu-

ated for active TB. If active TB is not diagnosed, preventive therapy should be considered.[382]

e. Preventive therapy

For workers with positive PPD-test results who were probably exposed to drug-susceptible TB, preventive therapy with isoniazid is indicated, unless there are contraindications to such therapy.[382,407] Alternative preventive regimens have been proposed for persons who have positive PPD-test results after exposure to drug-resistant TB.[409]

f. Work restrictions

Personnel with active pulmonary or laryngeal TB may be highly infectious; exclusion from duty is indicated until they are noninfectious. If personnel are excluded from duty because of active TB, the facility should have documentation from their health care providers that personnel are noninfectious before they are allowed to return to duty. The documentation needs to include evidence that (a) adequate therapy is being received, (b) the cough has resolved, and (c) results of three consecutive sputum acid-fast bacilli (AFB) smears collected on different days are negative. After personnel resume duty and while they remain on anti-TB therapy, periodic documentation from their health care providers is needed to show that effective drug therapy is being maintained for the recommended period and that their sputum AFB smear results continue to be negative. If personnel discontinue their treatment, they need to be evaluated for active TB; directly observed therapy may be considered.

Work restrictions are not necessary for personnel receiving preventive treatment for latent TB (positive PPD-test result without active disease) or for personnel with latent TB who do not accept preventive therapy. However, these personnel should be instructed to seek evaluation promptly if symptoms suggestive of TB develop.

g. Considerations for BCG vaccine

BCG has not been routinely used in the United States to protect health care personnel. Nevertheless, because of the resurgence of TB in the United States and new information about the protective effect of BCG,[410,411] the role of BCG vaccination in the prevention and control of TB in the country has been reevaluated.[412] The following is a summary of the joint statement by the Advisory Council for the Elimination of Tuberculosis and ACIP regarding the use of BCG in health care personnel.

Two recent metaanalyses of 18[410] and 26[411] BCG studies, respectively, indicate that the efficacy of BCG vaccine in preventing serious TB is high (>80%) in children and suggest 50% efficacy in adults. However, the protective efficacy of the vaccine in adolescents and adults, including health care personnel and HIV-infected children and adults, has not been determined.[412]

BCG vaccination should not be used as a primary TB control strategy because (a) the protective efficacy of the vaccine in health care personnel is uncertain and (b) even if vaccination is effective in an individual, other persons in the health care facility are not protected against possible exposure to and infection with drug-resistant strains of *M. tuberculosis*. However, BCG vaccination may be indicated for health care personnel in a few geographic areas where the prevalence of MDR-TB is high, transmission of TB is likely, and TB infection control measures have been implemented but have not been successful in controlling nosocomial transmission.[412] Consultation with local and state health departments is advisable when determining whether to provide BCG vaccination to health care personnel.

BCG vaccination often results in local adverse effects (such as muscular soreness, erythema, purulent drainage, and axillary or cervical lymphadenopathy) for as long as 3 months after vaccination; serious long-term complications (such as musculoskeletal lesions, multiple lymphadenitis, and disseminated BCG disease) are infrequent.[413-415] The safety of BCG vaccination in immunocompromised populations (i.e., immunocompromised from immune deficiency diseases, HIV infection, leukemia, lymphoma, or generalized malignancy, or immunosuppressed as a result of therapy with corticosteroids, alkylating drugs, antimetabolites, or radiation) has not been determined by adequate epidemiologic studies. However, because of the possibility of disseminated BCG infection in such persons,[416-419] BCG vaccination is not recommended for immunocompromised personnel.[412] The safety of BCG vaccination in pregnant women has also not been evaluated; therefore, it is not recommended for pregnant personnel.[412]

PPD testing is not contraindicated for persons who have received BCG vaccine and can be used to support or exclude the diagnosis of infection with *M. tuberculosis*.[412] PPD-test reactivity caused by BCG vaccination wanes with time[420-422] and is unlikely to persist longer than 10 years after vaccination in the absence of infection with *M. tuberculosis*.[420,421] After a person has been vaccinated with BCG, the presence or size of a PPD-test reaction cannot be used to predict whether BCG will provide any protection against TB disease[423,424] or to determine whether the reaction is caused by *M. tuberculosis* infection or the previous BCG

vaccination.[425] However, a BCG-vaccinated person who has a PPD-test reaction of ≥ 10 mm induration should be considered infected with TB, especially if the vaccinee (a) is a contact of a person with infectious TB, particularly if the infectious person has transmitted *M. tuberculosis* to others, (b) is from a country with high prevalence of TB, or (c) is continually exposed to populations in which the prevalence of TB is high.[412]

20. Vaccinia (smallpox)

Through aggressive surveillance for smallpox combined with the effective use of smallpox vaccine (vaccinia virus vaccine), the World Health Organization was able to declare the world free of smallpox in 1980. The smallpox vaccine licensed for use in the United States is derived from infectious vaccinia virus. After vaccination, the virus can be cultured from the vaccination site until the scab has separated from the skin (2 to 21 days after vaccination); thus, susceptible persons may acquire vaccinia from a recently vaccinated person.[426-429] Covering the vaccination site and washing hands after contact with the vaccination site (including bandages) will prevent transmission. Recently, recombinant vaccinia viruses have been engineered to express immunizing agents of several viruses (e.g., herpesvirus, HBV, influenza). There is a theoretic risk that transmission could occur from contact with contaminated dressings or by contact with recombinant vaccine, but no such transmission has been reported among personnel who provide care to recipients of the recombinant vaccine. Infections also have been reported among laboratory personnel who handle viral cultures or materials contaminated with vaccinia or recombinant viruses.[18,362]

Smallpox vaccination (every 10 years) is indicated for personnel who work directly with orthopox viruses (e.g., monkeypox, vaccinia, variola) or in animal care areas where orthopox viruses are studied. In selected instances, vaccination may be considered for personnel who provide care to recipients of recombinant vaccinia vaccine.[9,18] Personnel who receive the vaccine may continue to have contact with patients if the vaccination site is covered and handwashing is strictly observed.[18] Vaccine is not recommended for personnel with immunosuppression or eczema or for personnel who are pregnant.

21. Varicella

Nosocomial transmission of varicella-zoster virus (VZV) is well recognized.[430-441] Sources for nosocomial exposures have included patients, health care personnel, and visitors (including the children of personnel) with either varicella or herpes zoster.

All susceptible adults in health care settings are at risk for varicella and its complications. During 1990 through 1994, fewer than 5% of varicella cases occurred among adults older than 20 years, but they accounted for 55% of varicella-related deaths. Certain persons are at higher risk for severe disease and secondary complications: pregnant women, premature infants born to varicella-susceptible mothers, infants born at less than 28 weeks' gestation or weighing ≤ 1000 gm (regardless of maternal immune status), and immunocompromised patients.[13]

The incubation period for varicella is usually 14 to 16 days but may be from 10 to 21 days after exposure, although the incubation period may be shorter in immunocompromised persons.[442] In persons who receive postexposure VZV immune globulin, the incubation period may be as long as 28 days after exposure. Transmission of infection may occur from 2 days before onset of rash and usually as long as 5 days after rash onset.[442]

VZV is transmitted by the contact with infected lesions and, in hospitals, airborne transmission has occurred from patients with varicella or zoster to susceptible persons who had no direct contact with the infected patient.[443-447] Adherence to airborne and contact precautions when caring for patients with known or suspected VZV infection can reduce the risk of transmission to personnel.[3]

It is generally advisable to allow only personnel who are immune to varicella to take care of patients with VZV. Because of the possibility of transmission to and development of severe illness in high-risk patients, personnel with localized zoster should not take care of such patients until all lesions are dry and crusted.[13,447] Personnel with localized zoster are not likely to transmit infection to immunocompetent patients if their lesions can be covered. However, some institutions may exclude personnel with zoster from work until their lesions dry and crust.[439]

a. Varicella screening and vaccination

Serologic tests have been used to assess the accuracy of reported histories of chickenpox.[440,448-450] In adults, a history of varicella is highly predictive of serologic immunity (97% to 99% seropositive). Most adults who have negative or uncertain histories of varicella are also seropositive (71% to 93%). In health care institutions, serologic screening of personnel who have negative or uncertain histories is

likely to be cost-effective, depending on the relative costs of the test and vaccine.[9,13]

A variety of methods have been used for detecting varicella antibody, but a commercially available latex agglutination test provides prompt, sensitive, and specific serologic results at a reasonable cost. The latex agglutination test may not detect low levels of protective antibody that can occur after vaccination; however, a test with increased sensitivity and specificity is currently under development. Routine testing for varicella immunity after vaccination is not necessary, because 99% of persons are seropositive after the second dose. Moreover, seroconversion does not always result in full protection against disease. However, testing vaccinees after exposures may be warranted. In addition, vaccinated persons who are exposed to varicella but lack antibody may be retested in 5 to 6 days to determine whether they are antibody seropositive after the second test and therefore unlikely to acquire varicella.[13]

In March 1995, a live-attenuated varicella vaccine was licensed for use in the United States. Administration of varicella vaccine is recommended for all susceptible health care personnel, especially those who will have close contact with persons at high risk for serious complications.[9,13,451,452] Effective varicella vaccination programs require two doses of vaccine to achieve high seroconversion rates in adults;[451] the need for and response to booster doses of vaccine are unknown. Vaccination provides approximately 70% protection against infection and 95% protection against severe disease in follow-up from 7 to 10 years after vaccination.[13] Cases of varicella have occurred among vaccinees after exposure to wild-type virus ("breakthrough infection"). Data from vaccine trials in which vaccinees of all ages were followed up for as long as 9 years indicate that 1% to 4% of vaccine recipients per year acquire varicella, depending on the vaccine lot and interval after vaccination.[9,13] However, vaccinated persons have milder disease (e.g., afebrile, a mean of 50 skin lesions that are often not vesicular, and shorter duration of illness) than do unvaccinated individuals (e.g., febrile with several hundred vesicular lesions)[453,454] and are less likely to transmit disease than unvaccinated persons.

The rate of transmission of disease from vaccinees who contract varicella is low for vaccinated children but has not been studied in adults. Active surveillance for 1 to 8 years after vaccination of 2141 children between 1981 and 1989 in 10 different trials[9] resulted in reports of breakthrough infections in 78 children, which further resulted in secondary cases in 12.2% (11/90) of vaccinated siblings. Illness was mild in both index and secondary cases. There also has been a report of transmission from a vaccinated child in whom breakthrough disease occurred to a susceptible mother.[9]

All information currently available on vaccine efficacy and the persistence of antibody in vaccinees is based on research conducted in settings where infection is highly prevalent and not affected by the wide use of vaccine. Thus, the extent to which the protection provided by vaccination has been increased by boosting from exposure to natural virus and whether longer term immunity may wane as the prevalence of natural VZV decreases are unknown.

b. Transmission of vaccine virus

In clinical trials, 3.8% of children and 5.5% of adolescents and adults acquired a nonlocalized rash (median five lesions) after the first injection, and 0.9% of adolescents and adults acquired a nonlocalized rash after the second injection. Available data suggest that healthy children have limited potential to transmit vaccine virus to susceptible contacts (estimated to be <1%) but that the risk of transmission from immunocompromised vaccinees is higher.[13,455,456] Tertiary transmission of vaccine virus to a second healthy sibling of a vaccinated leukemic child has also occurred.[456] These data suggest that healthy, vaccinated individuals have a very small risk of transmitting vaccine virus to their contacts; this risk may be higher in those who acquire a varicella-like rash after vaccination.

Although the risk of transmission of vaccine virus from vaccinees is not known, the risk if any appears to be very low, and the benefits of vaccinating susceptible health care personnel clearly outweigh this potential risk. As a safeguard, institutions may wish to consider precautions for vaccinated personnel who acquire a rash or who will have contact with susceptible persons at high risk for serious complications.

c. Management of health care personnel exposed to varicella

When unvaccinated susceptible personnel are exposed to varicella, they are potentially infectious 10 to 21 days after exposure, and exclusion from duty is indicated from the tenth day after the first exposure through the 21st day after the last exposure, or until all lesions are dry and crusted if varicella occurs (Table 3).[256]

Table 6. Pregnant health care personnel: Pertinent facts to guide management of occupational exposures to infectious agents

Agent	Potential effect on fetus	Rate of perinatal transmission	Maternal Screening	Prevention
1. Cytomegalovirus	Hearing loss; congenital syndrome*	15% after primary maternal infection; symptomatic 5%	Antibody provides some but not complete protection against clinical disease; routine screening not recommended	Standard precautions
2. Hepatitis B	Hepatitis; development of chronic infection in infant	HBeAg seropositive 90%; HBeAg negative 0-25%	HBsAg routine screening recommended	Vaccine and HBIG to infant; standard precautions
3. Hepatitis C	Hepatitis	2%-5%	Anti-HCV; HCV RNA in reference labs; routine screening not recommended	Standard precautions
4. Herpes simplex	Mucocutaneous lesions, sepsis, encephalitis; congenital malformations (rare)	Unlikely from nosocomial exposure; primary 33%-50%, recurrent 4%	Antibody testing not useful; inspection for lesions at delivery	Standard precautions
5. Human immunodeficiency virus	AIDS by 2-3 yr	8%-30%	Antibody by enzyme immunoassay, Western blot	Avoid high-risk behaviors; consider postexposure prophylaxis after high-risk needlestick exposure; intrapartum and postnatal zidovudine for HIV-seropositive mothers and their babies; standard precautions
6. Influenza	Inconsistent	Rare	None	Vaccine (safe during pregnancy); droplet precautions
7. Measles	Prematurity; abortion	Rare	History, antibody	Vaccine†; airborne precautions
8. Parvovirus B19	Hydrops, stillbirth	Rare, 3%-9% maximum adverse outcome	IgM and IgG antibody prepregnancy; antibody protective	Droplet precautions
9. Rubella	Congenital syndrome*	45%-50% overall; 90% in 1st 12 wk	Antibody	Vaccine†, droplet precautions for acute infection; contact precautions for congenital rubella
10. Tuberculosis	Hepatomegaly, pulmonary, CNS	Rare	Skin test	Isoniazid ± ethambutol for disease; airborne precautions
11. Varicella-zoster	Malformations (skin, limb, CNS, eye); chickenpox	Total 25%; congenital syndrome (0-4%)	Antibody	Vaccine†; VZIG within 96 hours of exposure if susceptible; airborne and contact precautions

Modified from Siegel JD. Risk and exposure for the pregnant health-care worker. In: Olmstead RN, editor. APIC infection control and applied epidemiology: principles and practices. St Louis: Mosby; 1996. p. 22-2-22-3 (table 22-1). *HBeAg*, Hepatitis B e antigen; *CNS*, central nervous system.
*Congenital syndrome: varying combinations of jaundice, hepatosplenomegaly, microcephaly, CNS abnormalities, thrombocytopenia, anemia, retinopathy, and skin and bone lesions.
†Live virus vaccines are given routinely before pregnancy.

If vaccinated health care personnel are exposed to varicella, they may be serotested immediately after exposure to assess the presence of antibody.[452] If they are seronegative, they may be excluded from duty or monitored daily for development of symptoms. Exclusion from duty is indicated if symptoms (fever, upper respiratory tract symptoms, or rash) develop.

Vaccination should be considered for exposed unvaccinated health care personnel without documented immunity.[441,452] Because the efficacy of postexposure vaccination is unknown, however, persons vaccinated after an exposure should be managed as previously recommended for unvaccinated persons.

The routine postexposure use of VZV immune globulin (VZIG) is not recommended among immunocompetent health care personnel.[13] VZIG can be costly, does not necessarily prevent varicella, and may prolong the incubation period by a week or more, thus extending the time that personnel will be restricted from duty. The use of VZIG may be considered for immunocompromised (e.g., HIV infected) or pregnant health care personnel.[13,457] Postexposure use of acyclovir may be effective and less costly than the use of VZIG in some susceptible persons.[457] However, additional data concerning the efficacy of acyclovir for postexposure prophylaxis are needed before such use can be recommended.[9,13,441,458]

22. Viral respiratory infections

Viral respiratory infections are common problems in health care settings. Nosocomial respiratory infections can be caused by a number of viruses, including adenoviruses, influenza virus, parainfluenza viruses, respiratory syncytial virus (RSV), and rhinoviruses. Because influenza and RSV substantially contribute to the morbidity and mortality associated with viral pneumonia and both have been well studied epidemiologically, this section focuses on prevention of these two viral infections among personnel. Additional information on influenza and RSV can be found in the "Guideline for Prevention of Nosocomial Pneumonia."[459]

a. Influenza

Nosocomial transmission of influenza has been reported in acute and long-term care facilities.[460-465] Transmission has occurred from patients to health care personnel,[462,464] from health care personnel to patients,[466] and among health care personnel.[465,467-472]

Influenza is believed to be transmitted from person to person by direct deposition of virus-laden large droplets onto the mucosal surfaces of the upper respiratory tract of an individual during close contact with an infected person, as well as by droplet nuclei or small-particle aerosols.[21,290,473] Although the extent of transmission by virus-contaminated hands or fomites is not known, it is not the primary mode of transmission.[473]

The incubation period of influenza is usually 1 to 5 days, and the period of greatest communicability is during the first 3 days of illness. However, virus can be shed before the onset of symptoms and as long as 7 days after illness onset.[474-476] Persons at greatest risk for influenza-related complications include (a) persons older than 65 years, (b) residents of nursing homes and other chronic care facilities, (c) persons with chronic pulmonary or cardiovascular conditions, and (d) persons with diabetes mellitus.[17] Adherence to droplet precautions may prevent nosocomial transmission.[3]

Administration of influenza vaccine to health care personnel, including pregnant women,[9] before the beginning of each influenza season can help to (a) reduce the risk to health care personnel of influenza infection, (b) prevent transmission of influenza from personnel to persons at high risk for complications, and (c) reduce personnel absenteeism during community outbreaks. Innovative methods may be needed to increase influenza immunization rates among health care personnel.[477] Immunization rates may also be increased by providing data to health care personnel on the low rates of systemic reactions to influenza vaccine among healthy adults.[478]

During institutional outbreaks of influenza, prophylactic antiviral agents (e.g., amantadine and rimantadine) may be used in conjunction with influenza vaccine to reduce the severity and duration of illness among unvaccinated health care personnel. Amantadine and rimantadine may be administered for 2 weeks after personnel vaccination or, in unvaccinated personnel, for the duration of influenza activity in the community.[17,459,465,479]

b. Respiratory syncytial virus

Nosocomial transmission of respiratory syncytial virus (RSV) is greatest during the early winter when community RSV outbreaks occur; patients, visitors, and health care personnel may transmit the virus in the health care setting. RSV infection is most common among infants and children, who are likely to acquire more severe disease. Because RSV infection can also occur simultaneously with other respiratory viruses, it may go unrecog-

nized.[480,481] Nosocomial transmission has been reported most frequently among newborn and pediatric patients,[482,483] but outbreaks associated with substantial morbidity and mortality have been reported among adults in bone-marrow transplant centers,[484] intensive care units,[485] and long-term care facilities.[486,487]

RSV is present in large numbers in the respiratory secretions of persons symptomatically infected with the virus and can be transmitted directly through large droplets during close contact with such persons or indirectly by hands or fomites that are contaminated with RSV. Hands can become contaminated through handling of infected persons' respiratory secretions or contaminated fomites and can transmit RSV by touching the eyes or nose.[459] The incubation period ranges from 2 to 8 days; 4 to 6 days is most common. In general, infected persons shed the virus for 3 to 8 days, but young infants may shed virus for as long as 3 to 4 weeks. Adherence to contact precautions effectively prevents nosocomial transmission.

c. Work restrictions

Because large numbers of personnel may have viral respiratory illnesses during the winter, it may not be possible to restrict infected personnel from all patient care duties. Nevertheless, it may be prudent to restrict personnel with acute viral respiratory infections from the care of high-risk patients during community outbreaks of RSV and influenza.[488]

F. PREGNANT PERSONNEL

Immunologic changes occur during pregnancy, primarily depression of certain aspects of cell-mediated immunity such as decreased levels of helper T cells. These changes permit fetal development without rejection but generally do not increase maternal susceptibility to infectious diseases. Occupational acquisition of infections is of special concern to female health care personnel of childbearing age for several reasons. Some infections, such as varicella, may be more severe during pregnancy. Transplacental infections with viruses such as parvovirus, varicella, and rubella have been associated with abortion, congenital anomaly, and mental retardation. Other diseases in which the infectious agent may be transmitted to the fetus include CMV, hepatitis B, herpes simplex, influenza, and measles. In addition, certain drugs used to treat or prevent some infections, for example tuberculosis, may be contraindicated during pregnancy.

In general, pregnant health care personnel do not have an increased risk for acquiring infections in the workplace. The risks to pregnant personnel and methods for prevention are discussed in the various sections of this document and are summarized in Table 6. Female personnel of childbearing age should be strongly encouraged to receive immunizations for vaccine-preventable diseases before pregnancy. Such personnel may also decrease their risk of acquiring infection by adhering to appropriate infection control practices, including standard precautions when caring for all patients. Additional information on occupational risks for pregnant health care personnel has been published elsewhere.[489-491]

G. LABORATORY PERSONNEL

Despite the availability of improved engineering controls, work practices, and personal protective equipment, laboratory personnel remain at risk for occupational acquisition of infectious agents.[5,18,53,151,162,241,492,493] Furthermore, newer technologies that require the use of large or concentrated specimens may further increase the risk of occupationally acquired infections among laboratory personnel.[494]

In a review of laboratory-acquired infections from 1950 through 1974, more than 4000 laboratory-associated infections were documented in the United States[492]; the 10 most commonly reported infections were brucellosis, Q fever, hepatitis (especially hepatitis B), typhoid fever, tularemia, tuberculosis, dermatomycosis, venezuelan equine encephalitis, psittacosis, and coccidioidomycosis. However, laboratory-associated infections also have been caused by a wide variety of other pathogens.[162,492,493] More recently, viral agents have accounted for a larger proportion of laboratory-associated infections than have bacterial agents.[493-498]

Laboratory personnel may acquire infection by aerosolization of specimens, mouth pipetting, or percutaneous injury. Information on the risks of laboratory-associated infections and appropriate biosafety procedures and precautions for laboratories have been published.[5,6,494,499,500]

In addition to biosafety precautions, preventive measures (e.g., immunizations and postexposure prophylaxis) may also be indicated for laboratory personnel who handle infectious agents. In this document, disease-specific information and guidance are provided for prevention of laboratory-associated infections and for management of laboratory personnel exposed to infectious agents. Health care institutions need to ensure that laboratory personnel who may be exposed to infectious

agents are well informed about the risks of acquiring infections and about biosafety procedures to prevent transmission of infectious agents.

H. EMERGENCY-RESPONSE PERSONNEL

Emergency medical technicians, firefighters, policemen, and others who attend to and transport patients to the hospital may be exposed to recognized or undiagnosed transmissible infectious diseases in the patients with whom they come in contact. Subtitle B (42 USC 300ff-80) of the 1990 Ryan White Comprehensive AIDS Resources Emergency Act requires the establishment of notification systems in each state to ensure that emergency-response employees (including emergency medical technicians, firefighters, and the like) are informed when they have been exposed to an emergency medical patient with an infectious, potentially fatal disease such as HIV or meningococcemia. CDC published a list of diseases for which emergency-response employees must be informed of an exposure.[501]

I. LATEX HYPERSENSITIVITY

Since the introduction of universal precautions, the use of latex gloves has become commonplace in health care settings.[31,502] The increased use of latex gloves has been accompanied by increasing reports of allergic reactions to natural rubber latex among health care personnel.[503-508]

Natural rubber latex is a combination of heat- and water-soluble proteins derived from the tree *Hevea braziliensis*. Reactions to latex gloves may be localized or systemic and include dermatitis, conjunctivitis, rhinitis, urticaria, angioedema, asthma, and anaphylaxis.[509-523] Most local reactions associated with latex glove use are not immunologically mediated and result from chemicals (e.g., thiurams, carbamates, mercaptobenzothiazole, phenylenediamine), accelerants or antioxidants added to gloves during manufacturing.[502, 507, 513-515] It may be clinically difficult to differentiate irritant reactions from allergic contact dermatitis reactions; both may be manifested by itching, dryness, erythema, bleeding, or scaling of the hands. Nevertheless, neither of the types of local reactions to latex gloves are good predictors of latex allergy[503, 516]; only a subset of health care personnel reporting glove-associated skin irritation will have immunoglobulin E (IgE) antibodies specific for latex.[513, 517-519]

In contrast, systemic reactions to natural rubber latex, including urticaria, are mediated by antilatex IgE antibodies[509,520,521] and may result from direct skin contact or from exposure to airborne latex allergen adsorbed to glove powder. Occupational asthma from latex is becoming increasingly recognized.[520,522-524] Asthmatic responses to latex may occur early (<8 hours) or late (>8 hours) after exposure.[525-527]

Local reactions (i.e., irritant or allergic contact dermatitis) to latex gloves account for most reported reactions among health care personnel.[503,506] The risk of progression from localized to systemic reactions is unknown.

Latex gloves may vary considerably in total protein content from brand to brand and from lot to lot within brands.[528,529] However, the total protein concentrations and allergenicity of latex gloves are not always directly correlated,[528] suggesting that total protein concentrations are not necessarily a measure of the allergenic properties of latex gloves. Currently, the amount of latex allergen exposure required to produce sensitization or to elicit reactions in previously sensitized persons is unknown. The FDA has mandated labeling of all medical devices that contain natural rubber latex.[530]

Another recognized contributor to latex sensitization and reactions is the powder or cornstarch used as a lubricant for gloves. Levels of extractable protein and allergen in a given glove have been shown to be correlated with the presence of powder. Also, investigators have demonstrated that latex proteins adhere to the powder on gloves and that aerosolized latex protein-powder particles can provoke allergic respiratory symptoms if inhaled by a latex-sensitive individual[531]; similar adherence has not been detected with powdered vinyl gloves. In one study, personnel wearing powdered latex gloves had a significantly higher rate of reaction than did workers who wore washed latex gloves, from which the powder had been removed (60% vs 28%); none of these workers had positive skin-test reactions to industrial or commercial cornstarch or powder.[504] Although many health care personnel or clinicians may implicate the powder or cornstarch on gloves as the cause of their reactions, documented reactions to cornstarch powder are rare.

a. Prevalence and risk factors

In studies of health care personnel, the reported prevalence of IgE-mediated allergy to latex varies considerably, ranging from 2.9% to 17%. The broad range of prevalence rates reported likely represent differences in the personnel groups studied and the methods used for estimating sensitization or allergy.[518,519,522,532,533] The prevalence

detected in some studies also has been biased by enrollment or testing of only personnel with symptoms.[504,508] However, it is estimated that a minority of health care personnel seek medical evaluation or treatment for latex-allergic conditions, even if they have symptoms. Thus, the true prevalence of these reactions among health care personnel is unknown.

The prevalence of sensitization to latex among health care personnel has been shown to vary by job category and by location within a facility.[506,533] In one study of 224 health care personnel, the overall prevalence of skin-prick reactivity to latex was 17% but ranged from 0% (0/17) among housekeepers and clerical workers to 38% (5/13) among dental residents and assistants.[506] In another survey of 512 health care personnel, the prevalence among physicians (6.5%, 7/108) was greater than that among nurses (2.2%, 7/325) or other hospital personnel (1.3%, 1/79). Also, operating room personnel (6.2%, 9/145) were significantly more likely to be sensitized than were personnel assigned to general wards or laboratories (1.6%, 6/367); operating room nurses had fourfold the prevalence of general ward nurses (5.6% vs 1.2%).[533] Measurable levels of latex aeroallergen have been detected in the breathing zones of operating room personnel and may vary as much as 100-fold, depending on the invasiveness of the procedure and frequency of glove changes.[534]

Several factors have been linked with latex sensitization among health care personnel, including the presence of other allergic conditions (e.g., asthma, eczema, hay fever),[503,516,518,519,522,532,533] nonwhite ethnicity,[519,532] elevated total IgE levels,[519] allergy to cosmetic powders or foods,[535] years or status (full-time vs part-time) of employment, and frequency or duration of glove use.[503,516,522,533] Coexistent allergy to certain fruits (e.g., bananas,[536,537] avocados,[538,539] and chestnuts[540]) also has been described in latex-allergic health care personnel.

Skin irritation and eczematous dermatitis[516,533] (conditions that may allow passage of latex proteins through the skin) and use of other latex products (e.g., condoms, diaphragms) have not been consistently linked to latex sensitization in health care personnel.

b. Diagnosis and identification

Diagnosis of latex allergy in personnel relies largely on a clinical history of symptoms elicited by exposure to latex products (e.g., balloons, gloves). Clinical symptoms, such as urticaria, may be good predictors of IgE-medicated allergy.[516,519]

A variety of methods have been used to aid in the identification of latex-allergic persons; most are experimental and have not been approved for clinical use. Skin-prick testing may be the most sensitive method for diagnosis of IgE-mediated allergy, but no standardized FDA-approved antigen is currently available in the United States for detection of latex-specific IgE antibodies. Moreover, the use of some skin-test reagents in highly sensitized persons has been associated with adverse outcomes,[541] suggesting that these nonstandardized reagents may not be safe for routine use. In Europe, where a standardized testing antigen has been developed, skin-prick testing has been used successfully.

FDA-approved immunoassays are available for detection of latex-specific IgE antibodies in blood. The FDA has recommended that these assays be used as confirmatory tests, rather than screening tests, for persons in whom latex allergy is suspected on the basis of clinical history and findings. Levels of detectable antibody appear to be associated with symptoms,[504,519] but, as with other allergens, the correlation between serum concentrations of latex-specific IgE antibodies and symptom severity may not be predictable.[312,504,516]

c. Prevention strategies

Avoiding latex products remains the cornerstone of preventing sensitization (primary prevention) and reactions (secondary prevention) to natural rubber latex products. Proposed strategies to reduce the risk of reactions to natural rubber latex have included the use of the following: (a) nonlatex (e.g., vinyl) products alone or in combination with latex gloves, (b) powder-free latex gloves, (c) powdered latex gloves washed to remove powder, and (d) "low-protein" latex gloves. However, none of these interventions has been prospectively studied in controlled trials to assess cost-effectiveness or efficacy in preventing sensitization or reactions.

Because latex proteins can be aerosolized when powdered gloves are donned or removed, systemic symptoms caused by latex aeroallergens may not be alleviated by simply avoiding latex products, particularly if coworkers of the affected worker continue to use powdered latex gloves. Although the risk of a worker's exposure is greatest when gloves are donned or removed, allergenic proteins also may settle on environmental surfaces, surgical gowns, or other clothing and become resuspended. The use of powder-free or low-protein gloves appears more effective and less costly than either laminar-flow or high-efficiency particulate air-filtered glove-changing stations in reducing

latex aeroallergens.[534] For personnel with systemic manifestations of latex allergy, workplace restriction or reassignment may be necessary.

J. THE AMERICANS WITH DISABILITIES ACT

The Americans With Disabilities Act provides guidelines for hiring and placing employees with disabilities, as defined in the Act.[542-545] In general, employers must assess applicants for their qualifications to perform the tasks inherent to the job for which the employee is being considered. Applicants may be asked about their ability to perform specific job functions but may not be asked about the existence, nature, or severity of a disability. Employers must make a "reasonable accommodation" to allow an individual to perform the essential functions of a job, unless the employer can prove that this would create undue hardship because of significant difficulty or expense.

The provisions of the Americans With Disabilities Act need to be incorporated into infection control policies for health care personnel. For example, applicants with a communicable disease spread by aerosol could justifiably be denied employment (until they are no longer infectious) because they could pose a direct threat to others. On the other hand, applicants who are immunocompromised may not necessarily be excluded because of an increased risk for acquiring an infection in the hospital if the employer can make reasonable accommodations that prevent exposure. Health care personnel who are known to be immunocompromised need to be referred to personnel health professionals who can individually counsel the employees on their risk for infection. At the request of the immunocompromised health care personnel, employers should offer but not compel a work setting in which health care personnel would have the lowest possible risk for occupational exposure to infectious agents. Evaluation of individual situations also needs to include consideration of the provisions of other applicable federal, state, and local laws.

Part II. Recommendations for prevention of infections in health care personnel

The Hospital Infection Control Practices Advisory Committee
Centers for Disease Control and Prevention
Public Health Service
U.S. Department of Health and Human Services

A. INTRODUCTION

In this document, the term *health care personnel* refers to all paid and unpaid persons working in health care settings who have the potential for exposure to infectious materials including body substances, contaminated medical supplies and equipment, contaminated environmental surfaces, or contaminated air. These personnel may include but are not limited to physicians, nurses, technicians, therapists, pharmacists, nursing assistants, laboratory personnel, autopsy personnel, emergency medical service personnel, dental personnel, students and trainees, contractual staff not employed by the health care facility, and persons not directly involved in patient care but potentially exposed to infectious agents (e.g., volunteer, dietary, housekeeping, maintenance, and clerical personnel).

As in previous CDC guidelines, each recommendation is categorized on the basis of existing scientific data, theoretic rationale, applicability, and potential economic impact. The system for categorizing recommendations is as follows:

Category IA

Strongly recommended for all hospitals and strongly supported by well-designed experimental or epidemiologic studies.

Category IB

Strongly recommended for all hospitals and reviewed as effective by experts in the field and a consensus of Hospital Infection Control Practices Advisory Committee members on the basis of strong rationale and suggestive evidence, even though definitive scientific studies have not been done.

Category II

Suggested for implementation in many hospitals. Recommendations may be supported by suggestive clinical or epidemiologic studies, a strong theoretic rationale, or definitive studies applicable to some but not all hospitals.

No recommendation; unresolved issue

Practices for which insufficient evidence or consensus regarding efficacy exists.

B. ELEMENTS OF A PERSONNEL HEALTH SERVICE FOR INFECTION CONTROL

1. Coordinated planning and administration

a. Coordinate policy making and planning for the personnel health service among the hospital administration, personnel health service, infection control personnel clinical services, pharmacy personnel, various other hospital departments, and relevant external agencies. Include paid and nonpaid personnel (e.g., volunteers, trainees, physicians, out-of-hospital and contractual personnel, and emergency responders) in the plan. ***Category IB***

b. Establish an active system and develop a written policy for notifying infection control personnel of (1) infections in personnel (including volunteers, trainees, contractual personnel, and out-of-hospital personnel) that require work restrictions or exclusion from work, (2) clearance for work after an infectious illness that required work restrictions or exclusion, (3) work-related infections and exposures, and when appropriate (4) results of epidemiologic investigations. ***Category IB***

c. Develop protocols to ensure coordination between the personnel health program, the infection control program, and other relevant departments of the facility. ***Category IB***

2. Placement evaluation

a. Before personnel begin duty or are given a new work assignment, conduct health inventories. The inventories should include the following: (1) immunization status or history of vaccine-preventable diseases (e.g., chickenpox, measles, mumps, rubella, hepatitis B) and (2) history of any conditions that may predispose personnel toward acquiring or transmitting infectious diseases. ***Category IB***

b. Perform directed physical and laboratory examinations on personnel, as indicated by the results of the health inventory. Include examinations to detect conditions that might

increase the likelihood of transmitting disease to patients or cause unusual susceptibility to infection, and examinations to serve as a baseline for determining whether any future problems are work related. Category IB

c. Conduct personnel health assessments other than placement evaluations on an as-needed basis, for example, as required to evaluate work-related illness or exposures to infectious diseases. Category IB

d. Do not perform routine cultures on personnel (e.g., cultures of the nose, throat, or stool) as part of the placement evaluation.170 Category IB

e. Conduct routine screening for TB by using the intradermal (Mantoux), intermediate-strength (5 tuberculin units) PPD test on personnel who have potential for exposure to TB. Category II

f. Conduct routine serologic screening for some vaccine-preventable diseases, such as hepatitis B, measles, mumps, rubella, or varicella, if deemed to be cost-effective to the hospital and beneficial to the health care personnel. Category II

3. Personnel health and safety education

a. Provide personnel, annually and whenever the need arises, with in-service training and education on infection control appropriate and specific for their work assignments, so that personnel can maintain accurate and up-to-date knowledge about the essential elements of infection control. Ensure that the following topics are included in the initial training on infection control: (1) handwashing; (2) modes of transmission of infection and importance of complying with standard and transmission-based precautions; (3) importance of reporting certain illnesses or conditions (whether work related or acquired outside the hospital), such as generalized rash or skin lesions that are vesicular, pustular, or weeping, jaundice, illnesses that do not resolve within a designated period (e.g., a cough that persists for >2 weeks, gastrointestinal illness, or febrile illness with fever of >103° F lasting >2 days), and hospitalizations resulting from febrile or other contagious diseases; (4) tuberculosis control; (5) importance of complying with standard precautions and reporting exposure to blood and body fluids to prevent transmission of bloodborne pathogens; (6) importance of cooperating with infection control personnel during outbreak investigations; and (7) importance of personnel screening and immunization programs. ***Category IB***

b. Ensure that all personnel know whether they have medical conditions or receive medical treatment that renders them more susceptible to or more likely to transmit infections, so that they can follow recommendations to greatly reduce their risk of transmitting or acquiring infections (e.g., request for work reassignment). ***Category IB***

c. Make specific written policies and procedures for control of infections in health care personnel readily available to all personnel. ***Category IB***

d. Provide educational information appropriate, in content and vocabulary, to the educational level, literacy, and language of the employee. ***Category IB***

4. Job-related illnesses and exposures

a. Maintain a record on health care personnel that includes information obtained during the medical evaluation, immunization records, results of tests obtained in any screening or control programs, and reports of work-related illnesses or exposures in accordance with state and federal regulatory requirements.

b. Establish a readily available mechanism for personnel to obtain advice about illnesses they may acquire from or transmit to patients. ***Category IB***

c. Develop written protocols for handling job-related and community-acquired infectious diseases or important exposures. Record the occurrences of job-related infectious diseases or important exposures in the person's record and when applicable notify appropriate infection control personnel and members of the personnel health service. ***Category IB***

5. Record keeping, data management, and confidentiality

a. Establish and keep an updated record for all personnel and maintain the confidentiality of their records while ensuring that they receive appropriate management for occupational illnesses or exposures. Ensure that individual records for volunteers, trainees, contractual personnel, and personnel who provide care outside of hospitals are similarly kept and maintained. ***Category IB***

b. Ensure that when data on personnel health are made public, the individual's confidentiality is maintained, for example, by releasing only aggregate numbers. ***Category IB***

c. Maintain a personnel database, preferably computerized, that allows tracking of personnel immunizations, screening tests, and assessment of trends of infections and diseases in personnel. Copies of their individual records are to be available to personnel. ***Category IB***
d. Periodically review and assess aggregate data gathered on personnel health (e.g., rates of PPD-test conversion) to determine the need for action. ***Category IB***
e. Ensure that all federal, state, local, and community standards on medical record keeping and confidentiality are met.[26,27] ***Category IB***

C. PROTECTION OF PERSONNEL AND OTHER PATIENTS FROM PATIENTS WITH INFECTIONS

Apply precautions described in the current "Guideline for Isolation Precautions in Hospitals"[3] and other guidelines.[382] ***Category IB***

D. IMMUNIZATION OF HEALTH CARE PERSONNEL, GENERAL RECOMMENDATIONS

1. Formulate a written comprehensive policy on immunizing health care personnel. ***Category IB***
2. Ensure that persons administering immunizing agents are (a) familiar with ACIP recommendations,[8,9] (b) well informed about indications, storage, dosage, preparation, side effects, and contraindications for each of the vaccines, toxoids, and immune globulins used,[8,9,24] and (c) kept updated on national and local recommendations regarding vaccination of health care personnel (Tables 1 and 2). ***Category IB***
3. Ensure that immunization product information is available at all times and that a pertinent health history, especially a history of allergy and potential vaccine contraindications, is obtained from each person before an agent is given (Table 2). ***Category IB***
4. Develop a list of needed immunizations for each employee during screening and an individual plan to provide the necessary vaccines. ***Category IB***
5. In the absence of a known occupational exposure, provide personnel with on-site immunizations or refer personnel to their own health care providers for routine non–occupation-related immunizations against diphtheria, pneumococcal disease, hepatitis A, or tetanus (Table 1). ***Category IB***
6. Provide vaccine to personnel who may have occupational exposure to uncommon diseases such as plague, typhus, or yellow fever, or refer them to their own health care providers. ***Category IB***

E. PROPHYLAXIS AND FOLLOW-UP AFTER EXPOSURE, GENERAL RECOMMENDATIONS

1. Ensure that when personnel are offered necessary prophylactic treatment with drugs, vaccines, or immune globulins, they are informed of (a) options for prophylaxis, (b) the risk (if known) of infection when treatment is not accepted, (c) the degree of protection provided by the therapy, and (d) the potential side effects of the therapy. ***Category IB***
2. Ensure that when personnel are exposed to particular infectious agents, they are informed of (a) the recommended postexposure management that is based on current knowledge about the epidemiology of the infection, (b) the risk (if known) of transmitting the infection to patients, other personnel, or other contacts, and (c) the methods of preventing transmission of the infection to other persons. ***Category IB***

F. PERSONNEL RESTRICTION BECAUSE OF INFECTIOUS ILLNESSES OR SPECIAL CONDITIONS, GENERAL RECOMMENDATIONS

1. Develop well-defined policies concerning contact of personnel with patients when personnel have potentially transmissible conditions. These policies should govern (a) personnel responsibility in using the health service and reporting illness, (b) work restrictions, and (c) clearance for work after an illness that required work restriction. ***Category IB***
2. Identify the persons with authority to relieve personnel of duties. ***Category IB***
3. Develop work-exclusion policies that encourage personnel to report their illnesses or exposures and that do not penalize them with loss of wages, benefits, or job status. ***Category IB***
4. Educate and encourage personnel who have signs and symptoms of a transmissible infectious disease to report their condition promptly to their supervisor and occupational health. ***Category IB***
5. Provide appropriate education for personnel on the importance of good hygienic practices, especially handwashing and covering the nose and mouth when coughing and sneezing. ***Category IB***

G. PREVENTION OF NOSOCOMIAL TRANSMISSION OF SELECTED INFECTIONS

1. Bloodborne pathogens, general recommendation

Ensure that health care personnel are familiar with precautions to prevent occupational transmission of bloodborne pathogens.[3,6,30,31,39] ***Category IA***

Follow state and federal guidelines and strategies for determining the need for work restrictions for health care personnel infected with bloodborne pathogens.[48] ***Category IB***

a. Hepatitis B

1) Administer hepatitis B vaccine to personnel who perform tasks involving routine and inadvertent (e.g., as with housekeepers) contact with blood, other body fluids (including blood-contaminated fluids), and sharp medical instruments or other sharp objects.[9,10,40] ***Category IA***
2) Before vaccinating personnel, do not routinely perform serologic screening for hepatitis B, unless the health care organization considers screening cost-effective or the potential vaccinee requests it.[9] ***Category IA***
3) Conduct postvaccination screening for immunity to hepatitis B within 1 to 2 months after the administration of the third vaccine dose to personnel who perform tasks involving contact with blood, other body fluids (including blood-contaminated fluids), and sharp medical instruments or other sharp objects. ***Category IA***
4) Revaccinate persons not found to have an antibody response after the initial hepatitis B vaccine series with a second three-dose vaccine series. If persons still do not respond after revaccination, refer them for evaluation for lack of response, (e.g., possible chronic HBV infection; Tables 1 and 4).[9] ***Category IB***
5) Semiannually test for HBsAg and anti-HBs staff in chronic dialysis centers who do not respond to the hepatitis B vaccine.[55] ***Category IA***
6) Use both passive immunization with hepatitis B immune globulin and active immunization with hepatitis B vaccine for postexposure prophylaxis in susceptible personnel who have had a needlestick, percutaneous, or mucous membrane exposure to blood known or suspected to be at high risk for being HBsAg seropositive (Table 6). ***Category IA***
7) Follow current recommendations for postexposure prophylaxis after percutaneous or mucous membrane exposure to blood and body fluids that is known or suspected to be at high risk for being HBsAg seropositive (Table 4).[40] ***Category IA***

b. Hepatitis C

1) Do not administer immune globulin to personnel who have exposure to blood or body fluids positive for antibody to HCV.[37] ***Category IB***
2) Consider implementing policies for postexposure follow-up at baseline and 6 months for health care personnel who have had a percutaneous or mucosal exposure to blood containing antibody to HCV.[37] ***Category IB***

c. Human immunodeficiency virus

Follow current recommendations for postexposure prophylaxis after percutaneous or mucocutaneous exposure to blood or body fluids containing blood from a source suspected or known to be HIV-infected.[33,80] ***Category IB***

2. Conjunctivitis

Restrict personnel with epidemic keratoconjunctivitis or purulent conjunctivitis caused by other microorganisms from patient care and the patient's environment for the duration of symptoms. If symptoms persist longer than 5 to 7 days, refer personnel to an ophthalmologist for evaluation of continued infectiousness. ***Category IB***

3. Cytomegalovirus

a. Do not restrict personnel from work who contract CMV-related illnesses.119 ***Category IB***
b. Ensure that pregnant personnel are aware of the risks associated with CMV infection and infection control procedures to prevent transmission when working with high-risk patient groups (Table 6).[3,117] ***Category IA***
c. Do not routinely use workplace reassignment as a method to reduce CMV exposures among seronegative pregnant personnel.[88,92,95-97,102,105,106,119,120] ***Category IA***

4. Diphtheria

a. Encourage vaccination with Td every 10 years for health care personnel (Table 1).[9,19] ***Category IB***

b. Obtain nasopharyngeal cultures from exposed personnel and monitor for signs and symptoms of diphtheria for 7 days after exposure.[149] ***Category IB***
c. Administer antimicrobial prophylaxis to personnel who have contact with respiratory droplets or cutaneous lesions of patients infected with diphtheria. Also administer a dose of Td to previously immunized exposed personnel who have not been vaccinated within the previous 5 years (Table 1).[19,149] ***Category IB***
d. Repeat nasopharyngeal cultures of personnel found to have positive cultures at least 2 weeks after completion of antimicrobial therapy. Repeat antimicrobial therapy if personnel remain culture positive.[149] ***Category IB***
e. Exclude exposed personnel and those identified as asymptomatic carriers from duty until antimicrobial therapy is completed and results of two nasopharyngeal cultures obtained at least 24 hours apart are negative (Table 3).[149] ***Category IB***

5. Gastroenteritis

a. Vaccinate microbiology laboratory personnel who work with S. typhi on a regular basis, according to published guidelines.[151,162] ***Category II***
b. Pending their evaluation, exclude personnel with acute gastrointestinal illnesses (vomiting or diarrhea, with or without other symptoms such as nausea, fever, or abdominal pain) from contact with patients and their environment or from food handling (Table 3).[3,171] ***Category IB***
c. Consult local and state health authorities regarding work restrictions for patient care personnel or food handlers with enteric infections. ***Category IB***
d. Determine the etiology of gastrointestinal illness among personnel who care for patients at high risk for severe disease. ***Category IB***
e. Allow personnel infected with enteric pathogens to return to work after their symptoms resolve, unless local regulations require exclusion from duty. ***Category II***
f. Ensure that personnel returning to work after a gastrointestinal illness practice good hygienic practices, especially handwashing, to reduce or eliminate the risk of transmission of the infecting agents.[167] ***Category IB***
g. Do not routinely perform follow-up cultures or examinations of stool for enteric pathogens other than Salmonella to determine when the stool is free of the infecting organism, unless local regulations require such procedures. ***Category IB***
h. Do not perform routine stool cultures on asymptomatic health care personnel, unless required by state and local regulations. ***Category IB***

6. Hepatitis A virus

a. Do not routinely administer inactivated hepatitis A vaccine to health care personnel. Susceptible personnel living in areas where hepatitis A is highly endemic should be vaccinated to prevent acquisition of community-acquired infection.[9,204] ***Category IB***
b. Do not routinely administer immune globulin as prophylaxis for personnel providing care or who are exposed to a patient with hepatitis A.[204] ***Category IB***
c. Administer immune globulin (0.02 ml/kg) to personnel who have had oral exposure to fecal excretions from a person acutely infected with HAV (Table 1).[204] ***Category IA***
d. In documented outbreaks involving transmission of HAV from patient to patient or from patient to health care worker, use of immune globulin may be indicated in persons with close contact with infected persons. Contact the local health department regarding control measures (Table 1). ***Category IB***
e. Exclude personnel who have acute hepatitis A from duty until 1 week after the onset of jaundice (Table 3). ***Category IA***

7. Herpes simplex virus

a. Evaluate personnel with primary or recurrent orofacial herpes simplex infections on a case-by-case basis to assess the potential for transmission to high-risk patients (e.g., neonates, intensive care unit patients, patients with severe burns or eczema, and severely immunocompromised patients) and the need for exclusion from the care of such patients (Table 3).[209,218] ***Category IB***
b. Counsel personnel with orofacial herpes simplex to cover and not touch the infected lesions, to observe handwashing policies, and not to allow the lesions to touch patients with dermatitis.[215] ***Category IB***
c. Exclude personnel with herpes simplex infections of the fingers or hands (herpetic

whitlow) from contact with patients until their lesions are healed.[213,214] ***Category IB***

8. Measles

a. Ensure that all personnel have documented immunity to measles.
   1) Administer measles vaccine* to persons born in 1957 or later, unless they have evidence of measles immunity.[9] ***Category IA***
   2) Administer measles vaccine* to personnel born before 1957 if they do not have evidence of measles immunity and are at risk for occupational exposure to measles (Table 1).[8,221,233,234] ***Category IA***
   3) Do not routinely perform serologic screening for measles before administering measles vaccine* to personnel, unless the health care employer considers screening cost-effective or the potential vaccinee requests it.[8,11,235-238] ***Category IA***
   4) Administer postexposure measles vaccine* to measles-susceptible personnel who have contact with persons with measles within 72 hours after the exposure (Tables 1 through 3).[8] ***Category IA***
b. Exclude exposed personnel who do not have documented immunity to measles from duty from the fifth day after the first exposure until the 21st day after the last exposure to measles, regardless of whether they receive postexposure vaccine (Table 3).[11,237] ***Category IB***
c. Exclude personnel who acquire measles from duty for 7 days after rash develops or for the duration of their acute illness, whichever is longer (Table 3).[9] ***Category IB***

9. Meningococcal disease

a. Do not routinely administer meningococcal vaccine to health care personnel.[15] ***Category IB***
b. Consider vaccination of laboratory personnel who are routinely exposed to N. meningitidis in solutions that may be aerosolized (Table 1).[15] ***Category IB***
c. Immediately offer antimicrobial prophylaxis to personnel who have had intensive close contact (e.g., mouth-to-mouth resuscitation, endotracheal intubation, endotracheal tube management) with a patient with meningococcal disease before administration of antibiotics without the use of proper precautions (Table 1).[15] ***Category IB***
d. Do not routinely give quadrivalent A,C,Y,W-135 meningococcal vaccines for postexposure prophylaxis (Table 1).[15] ***Category II***
e. Administer meningococcal vaccine to personnel (and other persons likely to have contact with infected persons) to control serogroup C outbreaks after consultation with public health authorities.[15] ***Category IB***
f. Consider preexposure vaccination of laboratory personnel who routinely handle soluble preparations of N. meningitidis.[15] ***Category II***
g. Exclude personnel with N. meningitidis infections from duty until 24 hours after the start of effective therapy. Do not routinely exclude personnel from duty who only have nasopharyngeal carriage of N. meningitidis. ***Category IA***

10. Mumps

a. Administer mumps vaccine* to all personnel without documented evidence of mumps immunity, unless otherwise contraindicated (Table 1).[9,258] ***Category IA***
b. Before vaccinating personnel with mumps vaccine,* do not routinely perform serologic screening for mumps, unless the health care employer considers screening cost-effective or it is requested by the potential vaccinee.[12] ***Category IB***
c. Exclude susceptible personnel who are exposed to mumps from duty from the 12th day after the first exposure through the 26th day after the last exposure or, if symptoms develop, until 9 days after the onset of parotitis (Table 3).[9,255] ***Category IB***

11. Parvovirus

a. Ensure that pregnant personnel are aware of the risks associated with parvovirus infection and of infection control procedures to prevent transmission when working with high-risk patient groups (Table 6).[274,275] ***Category IB***
b. Do not routinely exclude pregnant personnel from caring for patients with B19. ***Category IB***

12. Pertussis

a. Do not administer whole-cell pertussis vaccine to personnel (Table 1).[9] ***Category IB***
b. NO RECOMMENDATION for routine administration of an acellular pertussis vaccine to health care personnel. UNRESOLVED ISSUE

*MMR is the vaccine of choice. If the recipient is known to be immune to one or more of the components, monovalent or bivalent vaccines may be used.

c. Immediately offer antimicrobial prophylaxis against pertussis to personnel who have had unprotected (i.e., without the use of proper precautions), intensive (i.e., close, face-to-face) contact with a patient who has a clinical syndrome highly suggestive of pertussis and whose cultures are pending; discontinue prophylaxis if results of cultures or other tests are negative for pertussis and the clinical course is suggestive of an alternate diagnosis (Table 1).[287,288] ***Category II***

d. Exclude personnel in whom symptoms develop (e.g., cough ≥7 days, particularly if accompanied by paroxysms of coughing, inspiratory whoop, or posttussive vomiting) after known exposure to pertussis from patient care areas until 5 days after the start of appropriate therapy (Table 3).[9] ***Category IB***

13. Poliomyelitis

a. Determine whether the following personnel have completed a primary vaccination series: (1) persons who may have contact with patients or the secretions of patients who may be excreting wild polioviruses and (2) laboratory personnel who handle specimens that might contain wild polioviruses or who do cultures to amplify virus (Table 1).[21] ***Category IA***

b. For above personnel, including pregnant personnel or personnel with an immunodeficiency, who have no proof of having completed a primary series of polio immunization, administer the enhanced inactivated poliovirus vaccine rather than oral poliovirus vaccine for completion of the series (Table 1).[21] ***Category IB***

c. When a case of wild-type poliomyelitis infection is detected or an outbreak of poliomyelitis occurs, contact the CDC through the state health department. ***Category IB***

14. Rabies

a. Provide preexposure vaccination to personnel who work with rabies virus or infected animals in rabies diagnostic or research activities (Table 1).[5,22] ***Category IA***

b. After consultation with public health authorities, give a full course of antirabies treatment to personnel who either have been bitten by a human being with rabies or have scratches, abrasions, open wounds, or mucous membranes contaminated with saliva or other potentially infective material from a human being with rabies. In previously vaccinated individuals, postexposure therapy is abbreviated to include only a single dose of vaccine on day 0 and one on day 3 (Table 1).[295-297] ***Category IB***

15. Rubella

a. Vaccinate all personnel without documented immunity to rubella with rubella vaccine* (Table 1).[9,309] ***Category IA***

b. Consult local and state health departments regarding regulations for rubella immunity in health care personnel. ***Category IA***

c. Do not perform serologic screening for rubella before vaccinating personnel with rubella vaccine,* unless the health care employer considers it cost-effective or the potential vaccinee requests it.[237] ***Category IB***

d. Do not administer rubella vaccine* to susceptible personnel who are pregnant or might become pregnant within 3 months of vaccination (Table 1).[9] ***Category IA***

e. Administer rubella vaccine* in the postpartum period to female personnel not known to be immune. ***Category IA***

f. Exclude susceptible personnel who are exposed to rubella from duty from the seventh day after the first exposure through the 21st day after the last exposure (Table 3).[9] ***Category IB***

g. Exclude personnel who acquire rubella from duty until 7 days after the beginning of the rash (Table 3).[9] ***Category IB***

16. Scabies and pediculosis

a. Evaluate exposed personnel for signs and symptoms of mite infestation and provide appropriate therapy for confirmed or suspected scabies.[311] ***Category IA***

b. Evaluate exposed personnel for louse infestation and provide appropriate therapy for confirmed pediculosis.[330] ***Category IA***

c. Do not routinely provide prophylactic scabicide treatment to personnel who have had skin-to-skin contact with patients or other persons with scabies (Table 1).[310,311,316,326] ***Category II***

d. Consider providing prophylactic scabicide treatment to personnel who have skin-to-

*MMR is the vaccine of choice. If the recipient is known to be immune to one or more of the components, monovalent or bivalent vaccines may be used.

skin contact with patients or other persons with scabies in situations where transmission has occurred.[311,331] ***Category II***

e. Do not routinely provide prophylactic pediculicide treatment to personnel who have had contact with patients or other persons with pediculosis, unless they have evidence of infestation. ***Category II***

f. Exclude personnel with confirmed scabies from the care of patients until they have received appropriate treatment and have been shown, by medical evaluation, to have been effectively treated.[311] ***Category II***

g. Exclude personnel with confirmed or suspected louse infestation from contact with patients until after they receive appropriate initial treatment and are found to be free of adult and immature lice (Table 3).[335] ***Category IB***

17. Staphylococcal infection or carriage

a. Obtain appropriate cultures and exclude personnel from patient care or food handling if they have a draining lesion suspected to be caused by S. aureus, until the infections have been ruled out or personnel have received adequate therapy and their infections have resolved (Table 3).[340] ***Category IB***

b. Do not routinely exclude personnel with suspected or confirmed carriage of S. aureus (on nose, hand, or other body site) from patient care or food handling unless it is shown epidemiologically that they are responsible for disseminating the organism in the health care setting (Table 3).[340,342,343,350] ***Category IB***

18. Group A Streptococcus infections

a. Obtain appropriate cultures and exclude personnel from patient care or food handling if they have draining lesions that are suspected to be caused by Streptococcus. Work restrictions should be maintained until streptococcal infection has been ruled out or personnel have received adequate therapy for 24 hours (Table 3).[369-371,374] ***Category IB***

b. Do not routinely exclude personnel with suspected or confirmed carriage of group A Streptococcus from patient care or food handling unless it is shown epidemiologically that they are responsible for disseminating the organism in the health care setting (Table 3).[369,373,378] ***Category IB***

19. Tuberculosis

a. General recommendations

1) Educate all health care personnel regarding the recognition, transmission, and prevention of TB. ***Category IB***

2) Follow current recommendations outlined in the "Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Facilities, 1994."[382] ***Category IB***

b. TB screening program

1) Include all health care personnel who have potential for exposure to M. tuberculosis in a PPD skin-test program.[382] ***Category IA***

2) Administer PPD tests by using the intracutaneous (Mantoux) method of administration of 5 tuberculin units (0.1 ml) PPD.[382,406-408] ***Category IB***

3) Do not routinely test personnel known to have conditions that cause severe suppression of cell-mediated immunity (such as HIV-infected persons with lowered CD4+ counts and organ-transplant recipients receiving immunosuppressive therapy) for cutaneous anergy at the time of PPD testing.[408] ***Category IB***

4) Ensure that the administration, reading, and interpretation of PPD tests are performed by specified, trained personnel.[382] ***Category IA***

c. Baseline PPD

1) Perform baseline PPD tests on health care personnel who are new to a facility and who have potential for exposure to M. tuberculosis, including those with a history of BCG vaccination.[382] ***Category IB***

2) Perform two-step, baseline PPD tests on newly employed health care personnel who have negative results of initial PPD testing and have not had a documented negative PPD-test result during the preceding 12 months, unless the institution has determined that two-step testing is not warranted in its facility.[382] ***Category II***

3) Interpret baseline PPD-test results as outlined in the "Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Facilities, 1994."[382] **Category IB**

d. Follow-up (repeat) PPD

1) Perform periodic follow-up PPD tests on all health care personnel with negative baseline PPD-test results who have the

potential for exposure to M. tuberculosis.[382] ***Category IA***

2) Base the frequency of repeat PPD testing on the hospital's risk assessment, as described in the "Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Facilities, 1994" and as provided by federal, state, and local regulations.[382] ***Category IB***
3) Exempt from follow-up PPD tests personnel with documented history of positive baseline PPD-test result or adequate treatment for TB.[382] ***Category IB***
4) Consider retesting immunocompromised health care personnel who have potential for exposure to M. tuberculosis at least every 6 months.[382] ***Category II***
5) Interpret follow-up-PPD test results as outlined in the "Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Facilities, 1994."[382] ***Category IB***
6) Management of PPD-positive personnel
   a) Promptly evaluate personnel with positive PPD-test results for active disease and obtain an adequate history on TB exposure to help determine whether the infection is occupational or community acquired.[382] ***Category IB***
   b) Perform chest radiographic examinations on personnel with a positive PPD-test result as part of the evaluation for active TB. If results of the initial chest radiographic examination are negative, do not repeat chest radiograph unless symptoms suggestive of TB develop.[382] ***Category IB***
   c) Periodically remind all personnel, especially those with positive PPD-test results, about the symptoms of TB and the need for prompt evaluation of any pulmonary symptoms suggestive of TB.[382] ***Category IB***
   d) Do not require routine chest radiographs for asymptomatic, PPD-negative workers.[382] ***Category IB***

e. Preventive therapy

1) Offer preventive therapy to the following personnel, regardless of age, who have conversion of their PPD test: (a) recent converters, (b) close contacts of persons with active TB, (c) those with medical conditions that increase their risk for active TB, (d) those with HIV infection, and (e) injecting-drug users.[382,407] ***Category IB***
2) Offer preventive therapy to all other personnel (i.e., who do not have the above risk factors) with positive PPD reactions if they are younger than 35 years.[407] ***Category IA***
3) Provide preventive therapy to personnel through the occupational health program or refer them to the health department or their health care provider, as appropriate. ***Category IB***

f. Postexposure management of personnel

1) As soon as possible after an exposure to TB (i.e., exposure to a person with pulmonary or laryngeal TB for whom proper isolation precautions were not implemented), conduct PPD testing on personnel who are known to have negative PPD-test results. If the initial postexposure PPD-test result is negative, repeat the PPD test 12 weeks after the exposure.[382] ***Category IB***
2) Do not perform PPD tests or chest radiographs on personnel with previous positive PPD-test results, unless they have symptoms suggestive of active TB.[382] ***Category IB***

g. Workplace restrictions

1) Exclude personnel with infectious pulmonary or laryngeal TB from the workplace until the facility has documentation from their health care provider that they are receiving adequate therapy, their coughs have resolved, and that they have had three consecutive sputum smears collected on different days with negative results for AFB. After personnel return to work, obtain periodic documentation from their health care provider that effective drug therapy has been maintained for the recommended period and that sputum smear results remain negative for AFB (Table 3).[382] ***Category IB***
2) Promptly evaluate for infectiousness those personnel with active TB who discontinue treatment before they are cured. Exclude from duty those who are found to remain infectious until (a) treatment is resumed, (b) an adequate response to therapy is documented, and (c) sputum smear results are negative for AFB.[382] ***Category IB***
3) Consider directly observed therapy for personnel with active TB who have not been compliant with drug regimens. ***Category IB***
4) Do not exclude personnel from the workplace who have TB only at sites other than the lung or larynx.[382] ***Category IB***

5) Do not restrict personnel from their usual work activities if they are receiving preventive therapy because of positive PPD-test results, even if they are unable or unwilling to accept or complete a full course of preventive therapy. Instruct them to seek prompt evaluation if symptoms suggestive of TB develop.[382] ***Category IB***

h. Immunocompromised personnel

1) Refer personnel who are known to be immunocompromised to personnel health professionals who can individually counsel them regarding their risk for TB.[382] **Category II**
2) At the request of immunocompromised personnel, offer but do not compel reasonable accommodations for work settings in which they would have the lowest possible risk for occupational exposure to M. tuberculosis. Consider the provisions of the Americans With Disabilities Act of 1990 and other federal, state, and local regulations in evaluating these situations.[382] ***Category II***

i. Bacille Calmette-Guérin vaccination

1) In settings associated with high risk for M. tuberculosis transmission:
   a) Consider BCG vaccination of personnel on an individual basis, and only in settings where (1) a high proportion of isolates of M. tuberculosis are resistant to isoniazid and rifampin, (2) there is a strong likelihood of transmission and infection with such drug-resistant organisms, and (3) comprehensive infection control precautions have been implemented and have failed to halt nosocomial transmission of TB.[412] Consult with the local and state health departments in making this determination. ***Category II***
   b) Do not require BCG vaccination for employment or for assignment of personnel in specific work areas.[412] ***Category II***
2) Counsel health care personnel who are being considered for receipt of BCG vaccination about the risks and benefits of both BCG vaccination and preventive therapy, including (a) the variable data on the efficacy of BCG vaccination, (b) the potentially serious complications of BCG vaccine in immunocompromised individuals, such as those with HIV infection, (c) the lack of information on chemoprophylaxis for MDR-TB infections, (d) the risks of drug toxicity with multidrug prophylactic regimens, and (e) the fact that BCG vaccination interferes with the diagnosis of newly acquired TB infection.[412] ***Category IB***
3) Do not administer BCG vaccine to personnel in settings associated with a low risk for M. tuberculosis transmission. ***Category IB***
4) Do not administer BCG vaccine to pregnant or immunocompromised persons with negative baseline PPD-test results. ***Category II***

20. Vaccinia

a. Ensure that personnel who directly handle cultures of or animals contaminated or infected with vaccinia, recombinant vaccinia viruses, or other orthopox viruses (e.g., monkeypox, cowpox) that infect human beings receive smallpox vaccination every 10 years (Table 1).[9,18] ***Category IB***
b. Consider administering vaccinia vaccine to personnel who provide clinical care to recipients of recombinant vaccinia virus vaccines (Table 1).[9,18] ***Category II***
c. Do not administer vaccinia vaccine to pregnant personnel or personnel with immunosuppression or eczema (Tables 1 and 2). ***Category IB***
d. Do not exclude from duty personnel who receive the vaccine, if they keep the vaccination site covered and adhere to handwashing practices.[18] ***Category IB***

21. Varicella

a. Administer varicella vaccine to susceptible personnel, especially those that will have contact with patients at high risk for serious complications (Table 1).[9,13] ***Category IA***
b. Do not perform serologic screening of persons with negative or uncertain history of varicella before administering varicella vaccine to personnel, unless the institution considers it cost-effective.[9,13] ***Category IB***
c. Do not routinely perform postvaccination testing of personnel for antibodies to varicella.[9] ***Category IB***
d. NO RECOMMENDATION for administering postexposure varicella vaccination for the protection of exposed, susceptible personnel.[9] ***UNRESOLVED ISSUE***
e. Develop guidelines for managing health care personnel who receive varicella vaccine; for example, consider precautions for personnel who acquire a rash after receipt of varicella vaccine and for other health care personnel who

receive varicella vaccine and will have contact with susceptible persons at high risk for serious complications from varicella.[9] ***Category IB***

f. Develop written guidelines for postexposure management of vaccinated or susceptible personnel who are exposed to wild-type varicella.[9] ***Category IB***

g. Exclude personnel from work who have onset of varicella until all lesions have dried and crusted (Table 3).[3] ***Category IB***

h. Exclude from duty after exposure to varicella personnel who are not known to be immune to varicella (by history or serology), beginning on the tenth day after the first exposure until the 21st day after the last exposure (28th day if VZIG was given; Table 3).[9] ***Category IB***

i. Restrict immunocompetent personnel with localized zoster from the care of high-risk patients until lesions are crusted; allow them to care for other patients with lesions covered.[9] ***Category IB***

j. Restrict immunocompromised personnel with zoster from contact with patients until their lesions are crusted (Table 3).[9] ***Category IB***

k. Restrict susceptible personnel exposed to zoster from patient contact from the tenth day after the first exposure through the 21st day after the last exposure (28th day if VZIG was given; Table 3).[9] ***Category IB***

l. Perform serologic screening for immunity to varicella on exposed personnel who have not had varicella or are unvaccinated against varicella.[9,13] ***Category IB***

m. Consider performing serologic screening for immunity to varicella on exposed, vaccinated personnel whose antibody status is not known. If the initial test result is negative, retest 5 to 6 days after exposure to determine whether an immune response occurred. ***Category IB***

n. Consider excluding vaccinated personnel from work beginning on the 10th day after the first exposure through the 21st day after the last exposure if they do not have detectable antibodies to varicella, or screen daily for symptoms of varicella (Table 3).[9] ***Category IB***

o. Do not routinely give VZIG to exposed susceptible personnel, unless immunosuppressed, HIV infected, or pregnant. If VZIG is given, exclude personnel from duty from the 10th day after the first exposure through the 28th day after the last exposure (Tables 1 and 3).[9,13] ***Category IB***

22. Viral respiratory infections

a. Administer influenza vaccine annually to all personnel, including pregnant women, before the influenza season, unless otherwise contraindicated (Table 1).[9,17] ***Category IB***

b. Consider the use of antiviral postexposure prophylaxis for unvaccinated health care personnel during institutional or community outbreaks of influenza for the duration of influenza activity, or consider giving vaccine to unvaccinated personnel and providing them with antiviral postexposure prophylaxis for 2 weeks after vaccination (Table 1).[3,17,459] ***Category IB***

c. Consider excluding personnel with acute febrile respiratory infections or with laboratory evidence of epidemiologically significant viruses from the care of high-risk patients (e.g., neonates, young infants, patients with chronic obstructive lung disease, and immunocompromised patients) during community outbreaks of influenza or RSV infections (Table 3).[3] ***Category IB***

H. SPECIAL ISSUES

1. Pregnancy

a. Counsel pregnant women and women of childbearing age regarding the risk of transmission of particular infectious diseases (e.g., CMV, hepatitis, herpes simplex, HIV, parvovirus, rubella) that, if acquired during pregnancy, may have adverse effects on the fetus, whether the infection is acquired in nonoccupational or occupational environments. Provide such women with information on standard and transmission-based precautions appropriate for each infection (Table 6).[3,489-491] ***Category IB***

b. Do not routinely exclude women only on the basis of their pregnancy or intent to be pregnant from the care of patients with particular infections that have potential to harm the fetus (e.g., CMV, HIV, hepatitis, herpes simplex, parvovirus, rubella, and varicella; Table 6).[489-491] ***Category IB***

2. Emergency-response employees

Ensure that emergency-response employees are routinely notified of infectious diseases in patients they have cared for or transported, in accordance with the mandates of the 1990 Ryan White Comprehensive AIDS Resources Emergency Act (Subtitle B 42 USC 300ff-80). ***Category IA***

3. Personnel linked to outbreaks of bacterial infection

a. Perform cultures and organism typing only on personnel who are linked epidemiologically to an increase in bacterial infections caused by a pathogen associated with a carrier state; if culture results are positive, exclude personnel from patient contact until carriage is eradicated or the risk of disease transmission is eliminated. ***Category IB***

b. Do not perform routine surveillance cultures of health care personnel for bacteria or multidrug-resistant organisms in the absence of a cluster or epidemic of bacterial infections in which personnel are implicated. ***Category IA***

c. Do not exclude personnel from duty who are colonized with bacteria, including multidrug-resistant bacteria, who are not epidemiologically linked to an increase in infections. ***Category IB***

4. Latex hypersensitivity

a. Develop an institutional protocol for (1) evaluating and managing personnel with suspected or known latex allergy, (2) establishing surveillance for latex reactions within the facility, (3) purchasing gloves, and (4) measuring the impact of preventive measures. Educational materials and activities should be provided to inform personnel about appropriate glove use and the manifestations and potential risk of latex allergy.[31,546] ***Category IB***

b. Glove purchasers should review information on the barrier effectiveness of gloves and consider worker acceptance (e.g., comfort and fit) when selecting gloves for use in the health care organization.[31,547-549] ***Category IB***

c. To facilitate the appropriate selection of gloves, the occupational health service should maintain a list of all gloves used the institution according to whether they do or do not contain latex. ***Category II***

d. Evaluate personnel with symptoms suggestive of latex allergy (e.g., localized dermatitis and workplace-related asthma).[522] Use serologic tests only for those who, on the basis of this evaluation, have suspected latex allergy.[504,516] ***Category IB***

e. Avoid the use of all latex products by personnel with a history of systemic reactions to latex.[509-512,520,522-529] ***Category IB***

f. Use nonlatex gloves for personnel with localized reactions to latex.[502,507,513-515] ***Category IB***

g. Target interventions (e.g., substitution of nonlatex gloves and powder-free latex gloves) to areas of the facility where personnel have acquired systemic allergic reaction to latex.[506-533,534] ***Category IB***

h. NO RECOMMENDATION for institution-wide substitution of nonlatex products in health care facilities to prevent sensitization to latex among health care personnel. ***UNRESOLVED ISSUE***

i. NO RECOMMENDATION for the routine use of environmental abatement interventions (such as laminar-flow or high-efficiency particulate air filtration) to reduce latex aeroallergens.[534] ***UNRESOLVED ISSUE***

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Appendix A. Recommended readings for infection control in health care personnel

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Inside: Continuing Education Examination

Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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Contents

Summary 1
Introduction 2
Definition of Health-Care Personnel and Exposure 2
Background 3
Occupational Transmission of HBV 3
Occupational Transmission of HCV 6
Occupational Transmission of HIV 7
Recommendations for the Management of HCP Potentially Exposed to HBV, HCV, or HIV 15
Hepatitis B Vaccination 16
Treatment of an Exposure Site 17
Exposure Report 17
Evaluation of the Exposure and the Exposure Source 17
Management of Exposures to HBV 20
Management of Exposures to HCV 21
Management of Exposures to HIV 23
Recommendations for the Selection of Drugs for HIV PEP 26
Occupational Exposure Management Resources 29
References 33
Appendices 43
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Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis

Summary

This report updates and consolidates all previous U.S. Public Health Service recommendations for the management of health-care personnel (HCP) who have occupational exposure to blood and other body fluids that might contain hepatitis B virus (HBV), hepatitis C virus (HCV), or human immunodeficiency virus (HIV).

Recommendations for HBV postexposure management include initiation of the hepatitis B vaccine series to any susceptible, unvaccinated person who sustains an occupational blood or body fluid exposure. Postexposure prophylaxis (PEP) with hepatitis B immune globulin (HBIG) and/or hepatitis B vaccine series should be considered for occupational exposures after evaluation of the hepatitis B surface antigen status of the source and the vaccination and vaccine-response status of the exposed person. Guidance is provided to clinicians and exposed HCP for selecting the appropriate HBV PEP.

Immune globulin and antiviral agents (e.g., interferon with or without ribavirin) are not recommended for PEP of hepatitis C. For HCV postexposure management, the HCV status of the source and the exposed person should be determined, and for HCP exposed to an HCV positive source, follow-up HCV testing should be performed to determine if infection develops.

Recommendations for HIV PEP include a basic 4-week regimen of two drugs (zidovudine [ZDV] and lamivudine [3TC]; 3TC and stavudine [d4T]; or didanosine [ddI] and d4T) for most HIV exposures and an expanded regimen that includes the addition of a third drug for HIV exposures that pose an increased risk for transmission. When the source person's virus is known or suspected to be resistant to one or more of the drugs considered for the PEP regimen, the selection of drugs to which the source person's virus is unlikely to be resistant is recommended.

In addition, this report outlines several special circumstances (e.g., delayed exposure report, unknown source person, pregnancy in the exposed person, resistance of the source virus to antiretroviral agents, or toxicity of the PEP regimen) when consultation with local experts and/or the National Clinicians' Post-Exposure Prophylaxis Hotline ([PEPline] 1-888-448-4911) is advised.

Occupational exposures should be considered urgent medical concerns to ensure timely postexposure management and administration of HBIG, hepatitis B vaccine, and/or HIV PEP.

INTRODUCTION

Avoiding occupational blood exposures is the primary way to prevent transmission of hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) in health-care settings (*1*). However, hepatitis B immunization and postexposure management are integral components of a complete program to prevent infection following bloodborne pathogen exposure and are important elements of workplace safety (*2*).

The U.S. Public Health Service (PHS) has published previous guidelines for the management of HIV exposures that included considerations for postexposure prophylaxis (PEP) (*3–5*). Since publication of the 1998 HIV exposure guidelines (*5*), several new antiretroviral agents have been approved by the Food and Drug Administration (FDA), and more information is available about the use and safety of HIV PEP (*6–11*). In addition, questions exist regarding considerations about PEP regimens when the source person's virus is known or suspected to be resistant to one or more of the antiretroviral agents that might be used for PEP. Concern also has arisen about the use of PEP when it is not warranted. Data indicate that some health-care personnel (HCP) take a full course of HIV PEP after exposures that do not confer an HIV transmission risk (*10,11*).

In September 1999, a meeting of a PHS interagency working group* and expert consultants was convened by CDC. The PHS working group decided to issue updated recommendations for the management of occupational exposure to HIV. In addition, the report was to include recommendations for the management of occupational HBV and HCV exposures so that a single document could comprehensively address the management of occupational exposures to bloodborne pathogens. This report updates and consolidates the previous PHS guidelines and recommendations for occupational HBV, HCV, and HIV exposure management for HCP. Specific practice recommendations for the management of occupational bloodborne pathogen exposures are outlined to assist health-care institutions with the implementation of these PHS guidelines (Appendices A and B). As relevant information becomes available, updates of these recommendations will be published. Recommendations for nonoccupational (e.g., sexual, pediatric, and perinatal) HBV, HCV, and HIV exposures are not addressed in these guidelines and can be found elsewhere (*12–15*).

Definition of Health-Care Personnel and Exposure

In this report, health-care personnel (HCP) are defined as persons (e.g., employees, students, contractors, attending clinicians, public-safety workers, or volunteers) whose activities involve contact with patients or with blood or other body fluids from patients in a health-care, laboratory, or public-safety setting. The potential exists for blood and body fluid exposure to other workers, and the same principles of exposure management could be applied to other settings.

*This interagency working group comprised representatives of CDC, the Food and Drug Administration (FDA), the Health Resources and Services Administration, and the National Institutes of Health. Information included in these recommendations may not represent FDA approval or approved labeling for the particular product or indications in question. Specifically, the terms "safe" and "effective" may not be synonymous with the FDA-defined legal standards for product approval.

An exposure that might place HCP at risk for HBV, HCV, or HIV infection is defined as a percutaneous injury (e.g., a needlestick or cut with a sharp object) or contact of mucous membrane or nonintact skin (e.g., exposed skin that is chapped, abraded, or afflicted with dermatitis) with blood, tissue, or other body fluids that are potentially infectious (*16,17*).

In addition to blood and body fluids containing visible blood, semen and vaginal secretions also are considered potentially infectious. Although semen and vaginal secretions have been implicated in the sexual transmission of HBV, HCV, and HIV, they have not been implicated in occupational transmission from patients to HCP. The following fluids also are considered potentially infectious: cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, and amniotic fluid. The risk for transmission of HBV, HCV, and HIV infection from these fluids is unknown; the potential risk to HCP from occupational exposures has not been assessed by epidemiologic studies in health-care settings. Feces, nasal secretions, saliva, sputum, sweat, tears, urine, and vomitus are not considered potentially infectious unless they contain blood. The risk for transmission of HBV, HCV, and HIV infection from these fluids and materials is extremely low.

Any direct contact (i.e., contact without barrier protection) to concentrated virus in a research laboratory or production facility is considered an exposure that requires clinical evaluation. For human bites, the clinical evaluation must include the possibility that both the person bitten and the person who inflicted the bite were exposed to bloodborne pathogens. Transmission of HBV or HIV infection only rarely has been reported by this route (*18–20*) (CDC, unpublished data, 1998).

BACKGROUND

This section provides the rationale for the postexposure management and prophylaxis recommendations presented in this report. Additional details concerning the risk for occupational bloodborne pathogen transmission to HCP and management of occupational bloodborne pathogen exposures are available elsewhere (*5,12,13,21-24*).

Occupational Transmission of HBV

Risk for Occupational Transmission of HBV

HBV infection is a well recognized occupational risk for HCP (*25*). The risk of HBV infection is primarily related to the degree of contact with blood in the work place and also to the hepatitis B e antigen (HBeAg) status of the source person. In studies of HCP who sustained injuries from needles contaminated with blood containing HBV, the risk of developing clinical hepatitis if the blood was both hepatitis B surface antigen (HBsAg)- and HBeAg-positive was 22%–31%; the risk of developing serologic evidence of HBV infection was 37%–62%. By comparison, the risk of developing clinical hepatitis from a needle contaminated with HBsAg-positive, HBeAg-negative blood was 1%–6%, and the risk of developing serologic evidence of HBV infection, 23%–37% (*26*).

Although percutaneous injuries are among the most efficient modes of HBV transmission, these exposures probably account for only a minority of HBV infections among HCP. In several investigations of nosocomial hepatitis B outbreaks, most infected HCP could not recall an overt percutaneous injury (*27,28*), although in some studies, up to one third of infected HCP recalled caring for a patient who was HBsAg-positive (*29,30*). In addition, HBV has been demonstrated to survive in dried blood at room temperature on

environmental surfaces for at least 1 week (*31*). Thus, HBV infections that occur in HCP with no history of nonoccupational exposure or occupational percutaneous injury might have resulted from direct or indirect blood or body fluid exposures that inoculated HBV into cutaneous scratches, abrasions, burns, other lesions, or on mucosal surfaces (*32–34*). The potential for HBV transmission through contact with environmental surfaces has been demonstrated in investigations of HBV outbreaks among patients and staff of hemodialysis units (*35–37*).

Blood contains the highest HBV titers of all body fluids and is the most important vehicle of transmission in the health-care setting. HBsAg is also found in several other body fluids, including breast milk, bile, cerebrospinal fluid, feces, nasopharyngeal washings, saliva, semen, sweat, and synovial fluid (*38*). However, the concentration of HBsAg in body fluids can be 100–1000—fold higher than the concentration of infectious HBV particles. Therefore, most body fluids are not efficient vehicles of transmission because they contain low quantities of infectious HBV, despite the presence of HBsAg.

In serologic studies conducted in the United States during the 1970s, HCP had a prevalence of HBV infection approximately 10 times higher than the general population (*39–42*). Because of the high risk of HBV infection among HCP, routine preexposure vaccination of HCP against hepatitis B and the use of standard precautions to prevent exposure to blood and other potentially infectious body fluids have been recommended since the early 1980s (*43*). Regulations issued by the Occupational Safety and Health Administration (OSHA) (*2*) have increased compliance with these recommendations. Since the implementation of these recommendations, a sharp decline has occurred in the incidence of HBV infection among HCP.

PEP for HBV

Efficacy of PEP for HBV. The effectiveness of hepatitis B immune globulin (HBIG) and/or hepatitis B vaccine in various postexposure settings has been evaluated by prospective studies. For perinatal exposure to an HBsAg-, HBeAg-positive mother, a regimen combining HBIG and initiation of the hepatitis B vaccine series at birth is 85%–95% effective in preventing HBV infection (*44,45*). Regimens involving either multiple doses of HBIG alone or the hepatitis B vaccine series alone are 70%–75% effective in preventing HBV infection (*46*). In the occupational setting, multiple doses of HBIG initiated within 1 week following percutaneous exposure to HBsAg-positive blood provides an estimated 75% protection from HBV infection (*47–49*). Although the postexposure efficacy of the combination of HBIG and the hepatitis B vaccine series has not been evaluated in the occupational setting, the increased efficacy of this regimen observed in the perinatal setting, compared with HBIG alone, is presumed to apply to the occupational setting as well. In addition, because persons requiring PEP in the occupational setting are generally at continued risk for HBV exposure, they should receive the hepatitis B vaccine series.

Safety of PEP for HBV. Hepatitis B vaccines have been found to be safe when administered to infants, children, or adults (*12,50*). Through the year 2000, approximately 100 million persons have received hepatitis B vaccine in the United States. The most common side effects from hepatitis B vaccination are pain at the injection site and mild to moderate fever (*50–55*). Studies indicate that these side effects are reported no more frequently among persons vaccinated than among those receiving placebo (*51,52*).

Approximately 45 reports have been received by the Vaccine Adverse Event Reporting System (VAERS) of alopecia (hair loss) in children and adults after administration of

plasma-derived and recombinant hepatitis B vaccine; four persons sustained hair loss following vaccination on more than one occasion (*56*). Hair loss was temporary for approximately two thirds of persons who experienced hair loss. An epidemiologic study conducted in the Vaccine Safety Datalink found no statistical association between alopecia and receipt of hepatitis B vaccine in children (CDC, unpublished data, 1998). A low rate of anaphylaxis has been observed in vaccine recipients based on reports to VAERS; the estimated incidence is 1 in 600,000 vaccine doses distributed. Although none of the persons who developed anaphylaxis died, anaphylactic reactions can be life-threatening; therefore, further vaccination with hepatitis B vaccine is contraindicated in persons with a history of anaphylaxis after a previous dose of vaccine.

Hepatitis B immunization programs conducted on a large scale in Taiwan, Alaska, and New Zealand have observed no association between vaccination and the occurrence of serious adverse events. Furthermore, in the United States, surveillance of adverse events following hepatitis B vaccination has demonstrated no association between hepatitis B vaccine and the occurrence of serious adverse events, including Guillain-Barré syndrome, transverse myelitis, multiple sclerosis, optic neuritis, and seizures (*57–59*) (CDC, unpublished data, 1991). However, several case reports and case series have claimed an association between hepatitis B vaccination and such syndromes and diseases as multiple sclerosis, optic neuritis, rheumatoid arthritis, and other autoimmune diseases (*57,60–66*). Most of these reported adverse events have occurred in adults, and no report has compared the frequency of the purported vaccine-associated syndrome/disease with the frequency in an unvaccinated population. In addition, recent case-control studies have demonstrated no association between hepatitis B vaccination and development or short-term risk of relapse of multiple sclerosis (*67,68*), and reviews by international panels of experts have concluded that available data do not demonstrate a causal association between hepatitis B vaccination and demyelinating diseases, including multiple sclerosis (*69*).

HBIG is prepared from human plasma known to contain a high titer of antibody to HBsAg (anti-HBs). The plasma from which HBIG is prepared is screened for HBsAg and antibodies to HIV and HCV. The process used to prepare HBIG inactivates and eliminates HIV from the final product. Since 1996, the final product has been free of HCV RNA as determined by the polymerase chain reaction (PCR), and, since 1999, all products available in the United States have been manufactured by methods that inactivate HCV and other viruses. No evidence exists that HBV, HCV, or HIV have ever been transmitted by HBIG commercially available in the United States (*70,71*).

Serious adverse effects from HBIG when administered as recommended have been rare. Local pain and tenderness at the injection site, urticaria and angioedema might occur; anaphylactic reactions, although rare, have been reported following the injection of human immune globulin (IG) preparations (*72*). Persons with a history of anaphylactic reaction to IG should not receive HBIG.

PEP for HBV During Pregnancy. No apparent risk exists for adverse effects to developing fetuses when hepatitis B vaccine is administered to pregnant women (CDC, unpublished data, 1990). The vaccine contains noninfectious HBsAg particles and should pose no risk to the fetus. HBV infection during pregnancy might result in severe disease for the mother and chronic infection for the newborn. Therefore, neither pregnancy nor lactation should be considered a contraindication to vaccination of women. HBIG is not contraindicated for pregnant or lactating women.

Occupational Transmission of HCV

Risk for Occupational Transmission of HCV

HCV is not transmitted efficiently through occupational exposures to blood. The average incidence of anti-HCV seroconversion after accidental percutaneous exposure from an HCV-positive source is 1.8% (range: 0%–7%) (*73–76*), with one study indicating that transmission occurred only from hollow-bore needles compared with other sharps (*75*). Transmission rarely occurs from mucous membrane exposures to blood, and no transmission in HCP has been documented from intact or nonintact skin exposures to blood (*77,78*). Data are limited on survival of HCV in the environment. In contrast to HBV, the epidemiologic data for HCV suggest that environmental contamination with blood containing HCV is not a significant risk for transmission in the health-care setting (*79,80*), with the possible exception of the hemodialysis setting where HCV transmission related to environmental contamination and poor infection-control practices have been implicated (*81–84*). The risk for transmission from exposure to fluids or tissues other than HCV-infected blood also has not been quantified but is expected to be low.

Postexposure Management for HCV

In several studies, researchers have attempted to assess the effectiveness of IG following possible exposure to non-A, non-B hepatitis. These studies have been difficult to interpret because they lack uniformity in diagnostic criteria and study design, and, in all but one study, the first dose of IG was administered before potential exposure (*48,85,86*). In an experiment designed to model HCV transmission by needlestick exposure in the health-care setting, high anti-HCV titer IG administered to chimpanzees 1 hour after exposure to HCV-positive blood did not prevent transmission of infection (*87*). In 1994, the Advisory Committee on Immunization Practices (ACIP) reviewed available data regarding the prevention of HCV infection with IG and concluded that using IG as PEP for hepatitis C was not supported (*88*). This conclusion was based on the following facts:

- No protective antibody response has been identified following HCV infection.
- Previous studies of IG use to prevent posttransfusion non-A, non-B hepatitis might not be relevant in making recommendations regarding PEP for hepatitis C.
- Experimental studies in chimpanzees with IG containing anti-HCV failed to prevent transmission of infection after exposure.

No clinical trials have been conducted to assess postexposure use of antiviral agents (e.g., interferon with or without ribavirin) to prevent HCV infection, and antivirals are not FDA-approved for this indication. Available data suggest that an established infection might need to be present before interferon can be an effective treatment. Kinetic studies suggest that the effect of interferon on chronic HCV infection occurs in two phases. During the first phase, interferon blocks the production or release of virus from infected cells. In the second phase, virus is eradicated from the infected cells (*89*); in this later phase, higher pretreatment alanine aminotransferase (ALT) levels correlate with an increasing decline in infected cells, and the rapidity of the decline correlates with viral clearance. In contrast, the effect of antiretrovirals when used for PEP after exposure to HIV is based on inhibition of HIV DNA synthesis early in the retroviral replicative cycle.

In the absence of PEP for HCV, recommendations for postexposure management are intended to achieve early identification of chronic disease and, if present, referral for evaluation of treatment options. However, a theoretical argument is that intervention with antivirals when HCV RNA first becomes detectable might prevent the development of chronic infection. Data from studies conducted outside the United States suggest that a short course of interferon started early in the course of acute hepatitis C is associated with a higher rate of resolved infection than that achieved when therapy is begun after chronic hepatitis C has been well established (*90–92*). These studies used various treatment regimens and included persons with acute disease whose peak ALT levels were 500–1,000 IU/L at the time therapy was initiated (2.6–4 months after exposure).

No studies have evaluated the treatment of acute infection in persons with no evidence of liver disease (i.e., HCV RNA-positive <6 months duration with normal ALT levels); among patients with chronic HCV infection, the efficacy of antivirals has been demonstrated only among patients who also had evidence of chronic liver disease (i.e., abnormal ALT levels). In addition, treatment started early in the course of chronic HCV infection (i.e., 6 months after onset of infection) might be as effective as treatment started during acute infection (*13*). Because 15%–25% of patients with acute HCV infection spontaneously resolve their infection (*93*), treatment of these patients during the acute phase could expose them unnecessarily to the discomfort and side effects of antiviral therapy.

Data upon which to base a recommendation for therapy of acute infection are insufficient because a) no data exist regarding the effect of treating patients with acute infection who have no evidence of disease, b) treatment started early in the course of chronic infection might be just as effective and would eliminate the need to treat persons who will spontaneously resolve their infection, and c) the appropriate regimen is unknown.

Occupational Transmission of HIV

Risk for Occupational Transmission of HIV

In prospective studies of HCP, the average risk of HIV transmission after a percutaneous exposure to HIV-infected blood has been estimated to be approximately 0.3% (95% confidence interval [CI] = 0.2%–0.5%) (*94*) and after a mucous membrane exposure, approximately 0.09% (95% CI = 0.006%–0.5%) (*95*). Although episodes of HIV transmission after nonintact skin exposure have been documented (*96*), the average risk for transmission by this route has not been precisely quantified but is estimated to be less than the risk for mucous membrane exposures (*97*). The risk for transmission after exposure to fluids or tissues other than HIV-infected blood also has not been quantified but is probably considerably lower than for blood exposures (*98*).

As of June 2000, CDC had received voluntary reports of 56 U.S. HCP with documented HIV seroconversion temporally associated with an occupational HIV exposure. An additional 138 episodes in HCP are considered possible occupational HIV transmissions. These workers had a history of occupational exposure to blood, other infectious body fluids, or laboratory solutions containing HIV, and no other risk for HIV infection was identified, but HIV seroconversion after a specific exposure was not documented (*99*).

Epidemiologic and laboratory studies suggest that several factors might affect the risk of HIV transmission after an occupational exposure. In a retrospective case-control study of HCP who had percutaneous exposure to HIV, the risk for HIV infection was found

to be increased with exposure to a larger quantity of blood from the source person as indicated by a) a device visibly contaminated with the patient's blood, b) a procedure that involved a needle being placed directly in a vein or artery, or c) a deep injury (*100*). The risk also was increased for exposure to blood from source persons with terminal illness, possibly reflecting either the higher titer of HIV in blood late in the course of AIDS or other factors (e.g., the presence of syncytia-inducing strains of HIV). A laboratory study that demonstrated that more blood is transferred by deeper injuries and hollow-bore needles lends further support for the observed variation in risk related to blood quantity (*101*).

The use of source person viral load as a surrogate measure of viral titer for assessing transmission risk has not yet been established. Plasma viral load (e.g., HIV RNA) reflects only the level of cell-free virus in the peripheral blood; latently infected cells might transmit infection in the absence of viremia. Although a lower viral load (e.g., <1,500 RNA copies/mL) or one that is below the limits of detection probably indicates a lower titer exposure, it does not rule out the possibility of transmission.

Some evidence exists regarding host defenses possibly influencing the risk for HIV infection. A study of HIV-exposed but uninfected HCP demonstrated an HIV-specific cytotoxic T-lymphocyte (CTL) response when peripheral blood mononuclear cells were stimulated in vitro with HIV-specific antigens (*102*). Similar CTL responses have been observed in other groups who experienced repeated HIV exposure without resulting infection (*103–108*). Among several possible explanations for this observation is that the host immune response sometimes might prevent establishment of HIV infection after a percutaneous exposure; another is that the CTL response simply might be a marker for exposure. In a study of 20 HCP with occupational exposure to HIV, a comparison was made of HCP treated with zidovudine (ZDV) PEP and those not treated. The findings from this study suggest that ZDV blunted the HIV-specific CTL response and that PEP might inhibit early HIV replication (*109*).

Rationale for HIV PEP

Considerations that influence the rationale and recommendations for PEP include

- the pathogenesis of HIV infection, particularly the time course of early infection;
- the biological plausibility that infection can be prevented or ameliorated by using antiretroviral drugs;
- direct or indirect evidence of the efficacy of specific agents used for prophylaxis; and
- the risk and benefit of PEP to exposed HCP.

The following discussion considers each of these concerns.

Role of Pathogenesis in Considering Antiretroviral Prophylaxis. Information about primary HIV infection indicates that systemic infection does not occur immediately, leaving a brief window of opportunity during which postexposure antiretroviral intervention might modify or prevent viral replication. In a primate model of simian immunodeficiency virus (SIV) infection, infection of dendritic-like cells occurred at the site of inoculation during the first 24 hours following mucosal exposure to cell-free virus. Over the subsequent 24–48 hours, migration of these cells to regional lymph nodes occurred, and virus was detectable in the peripheral blood within 5 days (*110*). Theoretically, initiation of antiretroviral PEP soon after exposure might prevent or inhibit systemic infection by limiting the proliferation of virus in the initial target cells or lymph nodes.

Efficacy of Antiretrovirals for PEP in Animal Studies. Data from animal studies have been difficult to interpret, in part, because of problems identifying an animal model that is comparable to humans. In early studies, differences in controlled variables (e.g., choice of viral strain [based on the animal model used], inoculum size, route of inoculation, time of prophylaxis initiation, and drug regimen) made extrapolation of the results to humans difficult. Recently, refinements in methodology have facilitated more relevant studies; in particular, the viral inocula used in animal studies have been reduced to levels more analogous to human exposures but sufficient to cause infection in control animals (*111–113*). These studies provide encouraging evidence of postexposure chemoprophylactic efficacy.

Studies among primates and in murine and feline animal models have demonstrated that larger viral inocula decrease prophylactic efficacy (*114–117*). In addition, delaying initiation, shortening the duration, or decreasing the antiretroviral dose of PEP, individually or in combination, decreased prophylactic efficacy (*113,118–124*). For example, when (R)-9-(2-phosphonylmethoxypropyl) adenine (tenofovir) was administered 48 hours before, 4 hours after, or 24 hours after intravenous SIV inoculation to long-tailed macaques, a 4-week regimen prevented infection in all treated animals (*122*). A subsequent study confirmed the efficacy of tenofovir PEP when administered 24 hours after intravenous inoculation of a dose of SIV that uniformly results in infection in untreated macaques. In the same study, protection was incomplete if the tenofovir administration was delayed to 48 or 72 hours postexposure or if the total duration of treatment was curtailed to 3 or 10 days (*123*).

Efficacy of Antiretrovirals for PEP in Human Studies. Little information exists from which the efficacy of PEP in humans can be assessed. Seroconversion is infrequent following an occupational exposure to HIV-infected blood; therefore, several thousands of exposed HCP would need to enroll in a prospective trial to achieve the statistical power necessary to directly demonstrate PEP efficacy (*125*).

In the retrospective case-control study of HCP, after controlling for other risk factors for HIV transmission, use of ZDV as PEP was associated with a reduction in the risk of HIV infection by approximately 81% (95% CI = 43%–94%) (*100*). Although the results of this study suggest PEP efficacy, its limitations include the small number of cases studied and the use of cases and controls from different cohorts.

In a multicenter trial in which ZDV was administered to HIV-infected pregnant women and their infants, the administration of ZDV during pregnancy, labor, and delivery and to the infant reduced transmission by 67% (*126*). Only part of the protective effect of ZDV was explained by reduction of the HIV viral load in the maternal blood, suggesting that ZDV prophylaxis, in part, involves a mechanism other than the reduction of maternal viral burden (*127,128*). Since 1998, studies have highlighted the importance of PEP for prevention of perinatal HIV transmission. In Africa, the use of ZDV in combination with lamivudine (3TC) decreased perinatal HIV transmission by 50% when administered during pregnancy, labor, and for 1 week postpartum, and by 37% when started at the onset of labor and continued for 1 week postpartum (*129*). Studies in the United States and Uganda also have demonstrated that rates of perinatal HIV transmission have been reduced with the use of abbreviated PEP regimens started intrapartum or during the first 48–72 hours of life (*130–132*).

The limitations of all of these studies with animals and humans must be considered when reviewing evidence of PEP efficacy. The extent to which data from animal studies

can be extrapolated to humans is largely unknown, and the exposure route for mother-to-infant HIV transmission is not similar to occupational exposures; therefore, these findings might not be directly applicable to PEP in HCP.

Reports of Failure of PEP. Failure of PEP to prevent HIV infection in HCP has been reported in at least 21 instances (*78,133–139*). In 16 of the cases, ZDV was used alone as a single agent; in two cases, ZDV and didanosine (ddI) were used in combination (*133,138*); and in three cases, ≥3 drugs were used for PEP (*137–139*). Thirteen of the source persons were known to have been treated with antiretroviral therapy before the exposure. Antiretroviral resistance testing of the virus from the source person was performed in seven instances, and in four, the HIV infection transmitted was found to have decreased sensitivity to ZDV and/or other drugs used for PEP. In addition to possible exposure to an antiretroviral-resistant strain of HIV, other factors that might have contributed to these apparent failures might include a high titer and/or large inoculum exposure, delayed initiation and/or short duration of PEP, and possible factors related to the host (e.g., cellular immune system responsiveness) and/or to the source person's virus (e.g., presence of syncytia-forming strains) (*133*). Details regarding the cases of PEP failure involving combinations of antiretroviral agents are included in this report (Table 1).

Antiretroviral Agents for PEP

Antiretroviral agents from three classes of drugs are available for the treatment of HIV infection. These agents include the nucleoside reverse transcriptase inhibitors (NRTIs), nonnucleoside reverse transcriptase inhibitors (NNRTIs), and protease inhibitors (PIs). Only antiretroviral agents that have been approved by FDA for treatment of HIV infection are discussed in these guidelines.

Determining which agents and how many to use or when to alter a PEP regimen is largely empiric. Guidelines for the treatment of HIV infection, a condition usually involving a high total body burden of HIV, include recommendations for the use of three drugs (*140*); however, the applicability of these recommendations to PEP remains unknown. In HIV-infected patients, combination regimens have proved superior to monotherapy regimens in reducing HIV viral load, reducing the incidence of opportunistic infections and death, and delaying onset of drug resistance (*141,142*). A combination of drugs with activity at different stages in the viral replication cycle (e.g., nucleoside analogues with a PI) theoretically could offer an additional preventive effect in PEP, particularly for occupational exposures that pose an increased risk of transmission. Although the use of a three-drug regimen might be justified for exposures that pose an increased risk of transmission, whether the potential added toxicity of a third drug is justified for lower-risk exposures is uncertain. Therefore, the recommendations at the end of this document provide guidance for two- and three-drug PEP regimens that are based on the level of risk for HIV transmission represented by the exposure.

NRTI combinations that can be considered for PEP include ZDV and 3TC, 3TC and stavudine (d4T), and ddI and d4T. In previous PHS guidelines, a combination of ZDV and 3TC was considered the first choice for PEP regimens (*3*). Because ZDV and 3TC are available in a combination formulation (Combivir™, manufactured by Glaxo Wellcome, Inc., Research Triangle Park, NC), the use of this combination might be more convenient for HCP. However, recent data suggest that mutations associated with ZDV and 3TC resistance might be common in some areas (*143*). Thus, individual clinicians might prefer other NRTIs or combinations based on local knowledge and experience in treating HIV infection and disease.

TABLE 1. Reported instances of failure of combination drug postexposure prophylaxis to prevent HIV infection in health-care personnel exposed to HIV-infected blood

Report no.	Source of injury	Regimen*	Hours to first dose	Days to onset of retroviral illness	Days to seroconversions[1]	Source patient on antiretrovirals
1[§]	Biopsy needle	ZDV, ddI	0.50	23	23	yes
2[¶]	Hollow needle	ZDV, ddI**	1.50	45	97	no
3[¶]	Large-bore hollow needle	3-drugs[††]	1.50	40	55	yes[§§]
4[¶¶]	Hollow needle	ZDV, 3TC ddI, IDV	0.67	70	83	yes***
5[†††]	Unknown sharp	ddI, d4T NVP[§§§]	2.00	42	100	yes***

* ZDV = zidovudine, ddI = didanosine, 3TC = lamivudine, IDV = indinavir, d4T = stavudine, and NVP = nevirapine

[1] By enzyme immunoassay for HIV-1 antibody and Western blot.

[§] Jochimsen EM. Failures of zidovudine postexposure prophylaxis. Am J Med 1997;102(suppl 5B):52–5.

[¶] Lot F, Abiteboul D. Occupational HIV infection in France [Abstract WP-25]. In: Keynote addresses and abstracts of the 4th ICOH International Conference on Occupational Health for Health Care Workers. Montreal, Canada, 1999.

** Report 2: ZDV and ddI taken for 48 hours then changed to ZDV alone.

[††] Report 3: ZDV, 3TC, and IDV taken for 48 hours then changed to d4T, 3TC, and IDV.

[§§] HIV isolate tested and determined to be sensitive to antiretroviral agent(s).

[¶¶] Perdue B, Wolderufael D, Mellors J, Quinn T, Margolick J. HIV-1 transmission by a needlestick injury despite rapid initiation of four-drug postexposure prophylaxis [Abstract 210]. In: Program and abstracts of the 6th Conference on Retroviruses and Opportunistic Infections. Chicago, IL: Foundation for Retrovirology and Human Health in scientific collaboration with the National Institute of Allergy and Infectious Diseases and CDC, 1999:107.

*** HIV isolate tested and determined to be resistant to antiretroviral agent(s).

[†††] Beltrami EM, Luo C-C, Dela Torre N, Cardo DM. HIV transmission after an occupational exposure despite postexposure prophylaxis with a combination drug regimen [Abstract P-S2-62]. In: Program and abstracts of the 4th Decennial International Conference on Nosocomial and Healthcare-Associated Infections in conjunction with the 10th Annual Meeting of SHEA. Atlanta, GA: CDC, 2000:125–6.

[§§§] Report 5: ZDV and 3TC taken for one dose then changed to ddI, d4T, and NVP; ddI was discontinued after 3 days because of severe vomiting.

The addition of a third drug for PEP following high-risk exposures is based on demonstrated effectiveness in reducing viral burden in HIV-infected persons. Previously, indinavir (IDV) or nelfinavir (NFV) were recommended as first-choice agents for inclusion in an expanded PEP regimen (*5*). Since the publication of the 1998 PEP guidelines, efavirenz (EFV), an NNRTI; abacavir (ABC), a potent NRTI; and Kaletra™, a PI, have been approved by FDA. Although side effects might be common with the NNRTIs, EFV might be considered for expanded PEP regimens, especially when resistance to PIs in the source person's virus is known or suspected. ABC has been associated with dangerous hypersensitivity reactions but, with careful monitoring, may be considered as a third drug for PEP. Kaletra, a combination of lopinavir and ritonavir, is a potent HIV inhibitor that, with expert consultation, may be considered in an expanded PEP regimen.

Toxicity and Drug Interactions of Antiretroviral Agents. When administering PEP, an important goal is completion of a 4-week PEP regimen when PEP is indicated. Therefore, the toxicity profile of antiretroviral agents, including the frequency, severity, duration, and reversibility of side effects, is a relevant consideration. All of the antiretroviral agents have been associated with side effects (Table 2). However, studies of adverse events have been conducted primarily with persons who have advanced disease (and longer treatment courses) and who therefore might not reflect the experience in persons who are uninfected (*144*).

Several primary side effects are associated with antiretroviral agents (Table 2). Side effects associated with many of the NRTIs are chiefly gastrointestinal (e.g., nausea or diarrhea); however, ddI has been associated with cases of fatal and nonfatal pancreatitis among HIV-infected patients treated for >4 weeks. The use of PIs has been associated with new onset diabetes mellitus, hyperglycemia, diabetic ketoacidosis, exacerbation of preexisting diabetes mellitus, and dyslipidemia (*145–147*). Nephrolithiasis has been associated with IDV use; however, the incidence of this potential complication might be limited by drinking at least 48 ounces (1.5 L) of fluid per 24-hour period (e.g., six 8- ounce glasses of water throughout the day) (*148*). NFV has been associated with the development of diarrhea; however, this side effect might respond to treatment with antimotility agents that can be prescribed for use, if necessary, at the time the drug is recommended for PEP. The NNRTIs have been associated with severe skin reactions, including life-threatening cases of Stevens-Johnson syndrome and toxic epidermal necrolysis. Hepatotoxicity, including fatal hepatic necrosis, has occurred in patients treated with nevirapine (NVP); some episodes began during the first few weeks of therapy (FDA, unpublished data, 2000). EFV has been associated with central nervous system side effects, including dizziness, somnolence, insomnia, and abnormal dreaming.

All of the approved antiretroviral agents might have potentially serious drug interactions when used with certain other drugs (Appendix C). Careful evaluation of concomitant medications used by an exposed person is required before PEP is prescribed, and close monitoring for toxicity is also needed. Further information about potential drug interactions can be found in the manufacturer's package insert.

Toxicity Associated with PEP. Information from the National Surveillance System for Health Care Workers (NaSH) and the HIV Postexposure Registry indicates that nearly 50% of HCP experience adverse symptoms (e.g., nausea, malaise, headache, anorexia, and headache) while taking PEP and that approximately 33% stop taking PEP because of adverse signs and symptoms (*6,7,10,11*). Some studies have demonstrated that side effects and discontinuation of PEP are more common among HCP taking three-drug

TABLE 2. Primary side effects associated with antiretroviral agents

Antiretroviral class/agent	Primary side effects and toxicities
Nucleoside reverse transcriptase inhibitors (NRTIs)	
Zidovudine (Retrovir™; ZDV; AZT)	anemia, neutropenia, nausea, headache, insomnia, muscle pain, and weakness
Lamivudine (Epivir™; 3TC)	abdominal pain, nausea, diarrhea, rash, and pancreatitis
Stavudine (Zerit™; d4T)	peripheral neuropathy, headache, diarrhea, nausea, insomnia, anorexia, pancreatitis, increased liver function tests (LFTs), anemia, and neutropenia
Didanosine (Videx™; ddI)	pancreatitis, lactic acidosis, neuropathy, diarrhea, abdominal pain, and nausea
Abacavir (Ziagen™; ABC)	nausea, diarrhea, anorexia, abdominal pain, fatigue, headache, insomnia, and hypersensitivity reactions
Nonnucleoside reverse transcriptase inhibitors (NNRTIs)	
Nevirapine (Viramune™; NVP)	rash (including cases of Stevens-Johnson syndrome), fever, nausea, headache, hepatitis, and increased LFTs
Delavirdine (Rescriptor™; DLV)	rash (including cases of Stevens-Johnson syndrome), nausea, diarrhea, headache, fatigue, and increased LFTs
Efavirenz (Sustiva™; EFV)	rash (including cases of Stevens-Johnson syndrome), insomnia, somnolence, dizziness, trouble concentrating, and abnormal dreaming
Protease inhibitors (PIs)	
Indinavir (Crixivan™; IDV)	nausea, abdominal pain, nephrolithiasis, and indirect hyperbilirubinemia
Nelfinavir (Viracept™; NFV)	diarrhea, nausea, abdominal pain, weakness, and rash
Ritonavir (Norvir™; RTV)	weakness, diarrhea, nausea, circumoral paresthesia, taste alteration, and increased cholesterol and triglycerides
Saquinavir (Fortovase™; SQV)	diarrhea, abdominal pain, nausea, hyperglycemia, and increased LFTs
Amprenavir (Agenerase™; AMP)	nausea, diarrhea, rash, circumoral paresthesia, taste alteration, and depression
Lopinavir/Ritonavir (Kaletra™)	diarrhea, fatigue, headache, nausea, and increased cholesterol and triglycerides

combination regimens for PEP compared with HCP taking two-drug combination regimens (*7,10*). Although similar rates of side effects were observed among persons who took PEP after sexual or drug use exposures to HIV in the San Francisco Post-Exposure Prevention Project, 80% completed 4 weeks of therapy (*149*). Participants in the San Francisco Project were followed at 1, 2, 4, 26, and 52 weeks postexposure and received medication adherence counseling; most participants took only two drugs for PEP.

Serious side effects, including nephrolithiasis, hepatitis, and pancytopenia have been reported with the use of combination drugs for PEP (*6,7,150,151*). One case of NVP-associated fulminant liver failure requiring liver transplantation and one case of hypersensitivity syndrome have been reported in HCP taking NVP for HIV PEP (*152*). Including these two cases, from March 1997 through September 2000, FDA received reports of 22 cases of serious adverse events related to NVP taken for PEP (*153*). These events included 12 cases of hepatotoxicity, 14 cases of skin reaction (including one documented and two possible cases of Stevens-Johnson syndrome), and one case of rhabdomyolysis; four cases involved both hepatotoxicty and skin reaction, and one case involved both rhabdomyolysis and skin reaction.

Resistance to Antiretroviral Agents. Known or suspected resistance of the source virus to antiretroviral agents, particularly to agents that might be included in a PEP regimen, is a concern for persons making decisions about PEP. Resistance to HIV infection occurs with all of the available antiretroviral agents, and cross-resistance within drug classes is frequent (*154*). Recent studies have demonstrated an emergence of drug-resistant HIV among source persons for occupational exposures (*143,155*). A study conducted at seven U.S. sites during 1998–1999 found that 16 (39%) of 41 source persons whose virus was sequenced had primary genetic mutations associated with resistance to RTIs, and 4 (10%) had primary mutations associated with resistance to PIs (*143*). In addition, occupational transmission of resistant HIV strains, despite PEP with combination drug regimens, has been reported (*137,139*). In one case, a hospital worker became infected after an HIV exposure despite a PEP regimen that included ddI, d4T, and NVP (*139*). The transmitted HIV contained two primary genetic mutations associated with resistance to NNRTIs (the source person was taking EFV at the time of the exposure). Despite recent studies and case reports, the relevance of exposure to a resistant virus is still not well understood.

Empiric decisions about the presence of antiretroviral drug resistance are often difficult to make because patients generally take more than one antiretroviral agent. Resistance should be suspected in source persons when they are experiencing clinical progression of disease or a persistently increasing viral load, and/or decline in CD4 T-cell count, despite therapy or a lack of virologic response to therapy. However, resistance testing of the source virus at the time of an exposure is not practical because the results will not be available in time to influence the choice of the initial PEP regimen. Furthermore, in this situation, whether modification of the PEP regimen is necessary or will influence the outcome of an occupational exposure is unknown. No data exist to suggest that modification of a PEP regimen after receiving results from resistance testing (usually a minimum of 1–2 weeks) improves efficacy of PEP.

Antiretroviral Drugs During Pregnancy. Data are limited on the potential effects of antiretroviral drugs on the developing fetus or neonate (*156*). Carcinogenicity and/or mutagenicity is evident in several in vitro screening tests for ZDV and all other FDA-licensed NRTIs. The relevance of animal data to humans is unknown; however, because

teratogenic effects were observed in primates at drug exposures similar to those representing human therapeutic exposure, the use of EFV should be avoided in pregnant women (*140*). IDV is associated with infrequent side effects in adults (i.e., hyperbilirubinemia and renal stones) that could be problematic for a newborn. Because the half-life of IDV in adults is short, these concerns might be relevant only if the drug is administered shortly before delivery.

In a recent study in France of perinatal HIV transmission, two cases of progressive neurologic disease and death were reported in uninfected infants exposed to ZDV and 3TC (*157*). Laboratory studies of these children suggested mitochondrial dysfunction. In a careful review of deaths in children followed in U.S. perinatal HIV cohorts, no deaths attributable to mitochondrial disease have been found (*158*).

Recent reports of fatal and nonfatal lactic acidosis in pregnant women treated throughout gestation with a combination of d4T and ddI have prompted warnings about use of these drugs during pregnancy (*159*). Although the case-patients were HIV-infected women taking the drugs for >4 weeks, pregnant women and their providers should be advised to consider d4T and ddI only when the benefits of their use outweigh the risks.

PEP Use in Hospitals in the United States. Analysis of data from NaSH provides information on the use of PEP following occupational exposures in 47 hospitals in the United States. A total of 11,784 exposures to blood and body fluids was reported from June 1996 through November 2000 (CDC, unpublished data, 2001). For all exposures with known sources, 6% were to HIV-positive sources, 74% to HIV-negative sources, and 20% to sources with an unknown HIV status. Sixty-three percent of HCP exposed to a known HIV-positive source started PEP, and 54% of HCP took it for at least 20 days, whereas 14% of HCP exposed to a source person subsequently found to be HIV-negative initiated PEP, and 3% of those took it for at least 20 days. Information recorded about HIV exposures in NaSH indicates that 46% of exposures involving an HIV-positive source warranted only a two-drug PEP regimen (i.e., the exposure was to mucous membranes or skin or was a superficial percutaneous injury and the source person did not have end-stage AIDS or acute HIV illness); however, 53% of these exposed HCP took ≥3 drugs (CDC, unpublished data, 2000). Similarly, the National Clinicians' Post-Exposure Prophylaxis Hotline (PEPline) reported that PEPline staff recommended stopping or not starting PEP for approximately one half of the HCP who consulted them about exposures (D. Bangsberg, San Francisco General Hospital, unpublished data, September 1999). The observation that some HCP exposed to HIV-negative source persons take PEP from several days to weeks following their exposures suggests that strategies be employed such as the use of a rapid HIV antibody assay, which could minimize exposure to unnecessary PEP (*11*). A recent study demonstrated that use of a rapid HIV test for evaluation of source persons after occupational exposures not only resulted in decreased use of PEP, but also was cost-effective compared with use of the standard enzyme immunoassay (EIA) test for source persons subsequently found to be HIV-negative (*160*).

RECOMMENDATIONS FOR THE MANAGEMENT OF HCP POTENTIALLY EXPOSED TO HBV, HCV, or HIV

Exposure prevention remains the primary strategy for reducing occupational bloodborne pathogen infections; however, occupational exposures will continue to occur. Health-care organizations should make available to their personnel a system that includes written protocols for prompt reporting, evaluation, counseling, treatment, and

follow-up of occupational exposures that might place HCP at risk for acquiring a bloodborne infection. HCP should be educated concerning the risk for and prevention of bloodborne infections, including the need to be vaccinated against hepatitis B (*17,21,161–163*). Employers are required to establish exposure-control plans that include postexposure follow-up for their employees and to comply with incident reporting requirements mandated by the 1992 OSHA bloodborne pathogen standard (*2*). Access to clinicians who can provide postexposure care should be available during all working hours, including nights and weekends. HBIG, hepatitis B vaccine, and antiretroviral agents for HIV PEP should be available for timely administration (i.e., either by providing access on-site or by creating linkages with other facilities or providers to make them available off-site). Persons responsible for providing postexposure management should be familiar with evaluation and treatment protocols and the facility's plans for accessing HBIG, hepatitis B vaccine, and antiretroviral drugs for HIV PEP.

HCP should be educated to report occupational exposures immediately after they occur, particularly because HBIG, hepatitis B vaccine, and HIV PEP are most likely to be effective if administered as soon after the exposure as possible. HCP who are at risk for occupational exposure to bloodborne pathogens should be familiarized with the principles of postexposure management as part of job orientation and ongoing job training.

Hepatitis B Vaccination

Any person who performs tasks involving contact with blood, blood-contaminated body fluids, other body fluids, or sharps should be vaccinated against hepatitis B (*2,21*). Prevaccination serologic screening for previous infection is not indicated for persons being vaccinated because of occupational risk, unless the hospital or health-care organization considers screening cost-effective.

Hepatitis B vaccine should always be administered by the intramuscular route in the deltoid muscle with a needle 1–1.5 inches long. Hepatitis B vaccine can be administered at the same time as other vaccines with no interference with antibody response to the other vaccines (*164*). If the vaccination series is interrupted after the first dose, the second dose should be administered as soon as possible. The second and third doses should be separated by an interval of at least 2 months. If only the third dose is delayed, it should be administered when convenient. HCP who have contact with patients or blood and are at ongoing risk for percutaneous injuries should be tested 1–2 months after completion of the 3-dose vaccination series for anti-HBs (*21*). Persons who do not respond to the primary vaccine series (i.e., anti-HBs <10 mIU/mL) should complete a second 3-dose vaccine series or be evaluated to determine if they are HBsAg-positive. Revaccinated persons should be retested at the completion of the second vaccine series. Persons who do not respond to an initial 3-dose vaccine series have a 30%–50% chance of responding to a second 3-dose series (*165*). Persons who prove to be HBsAg-positive should be counseled regarding how to prevent HBV transmission to others and regarding the need for medical evaluation (*12,163,166*). Nonresponders to vaccination who are HBsAg-negative should be considered susceptible to HBV infection and should be counseled regarding precautions to prevent HBV infection and the need to obtain HBIG prophylaxis for any known or probable parenteral exposure to HBsAg-positive blood. Booster doses of hepatitis B vaccine are not necessary, and periodic serologic testing to monitor antibody concentrations after completion of the vaccine series is not recommended. Any blood or body fluid exposure sustained by an unvaccinated, susceptible person should lead to the initiation of the hepatitis B vaccine series.

Treatment of an Exposure Site

Wounds and skin sites that have been in contact with blood or body fluids should be washed with soap and water; mucous membranes should be flushed with water. No evidence exists that using antiseptics for wound care or expressing fluid by squeezing the wound further reduces the risk of bloodborne pathogen transmission; however, the use of antiseptics is not contraindicated. The application of caustic agents (e.g., bleach) or the injection of antiseptics or disinfectants into the wound is not recommended.

Exposure Report

If an occupational exposure occurs, the circumstances and postexposure management should be recorded in the exposed person's confidential medical record (usually on a form the facility designates for this purpose) (Box 1). In addition, employers should follow all federal (including OSHA) and state requirements for recording and reporting occupational injuries and exposures.

BOX 1. Recommendations for the contents of the occupational exposure report

- date and time of exposure;
- details of the procedure being performed, including where and how the exposure occurred; if related to a sharp device, the type and brand of device and how and when in the course of handling the device the exposure occurred;
- details of the exposure, including the type and amount of fluid or material and the severity of the exposure (e.g., for a percutaneous exposure, depth of injury and whether fluid was injected; for a skin or mucous membrane exposure, the estimated volume of material and the condition of the skin [e.g., chapped, abraded, intact]);
- details about the exposure source (e.g., whether the source material contained HBV, HCV, or HIV; if the source is HIV-infected, the stage of disease, history of antiretroviral therapy, viral load, and antiretroviral resistance information, if known);
- details about the exposed person (e.g., hepatitis B vaccination and vaccine-response status); and
- details about counseling, postexposure management, and follow-up.

Evaluation of the Exposure and the Exposure Source

Evaluation of the Exposure

The exposure should be evaluated for the potential to transmit HBV, HCV, and HIV based on the type of body substance involved and the route and severity of the exposure (Box 2). Blood, fluid containing visible blood, or other potentially infectious fluid (including semen; vaginal secretions; and cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluids) or tissue can be infectious for bloodborne viruses. Exposures to

these fluids or tissue through a percutaneous injury (i.e., needlestick or other penetrating sharps-related event) or through contact with a mucous membrane are situations that pose a risk for bloodborne virus transmission and require further evaluation. For HCV and HIV, exposure to a blood-filled hollow needle or visibly bloody device suggests a higher risk exposure than exposure to a needle that was most likely used for giving an injection. In addition, any direct contact (i.e, personal protective equipment either was not present or was ineffective in protecting skin or mucous membranes) with concentrated virus in a research laboratory or production facility is considered an exposure that requires clinical evaluation.

For skin exposure, follow-up is indicated only if it involves exposure to a body fluid previously listed and evidence exists of compromised skin integrity (e.g., dermatitis, abrasion, or open wound). In the clinical evaluation for human bites, possible exposure of both the person bitten and the person who inflicted the bite must be considered. If a bite results in blood exposure to either person involved, postexposure follow-up should be provided.

BOX 2. Factors to consider in assessing the need for follow-up of occupational exposures

- **Type of exposure**
  - Percutaneous injury
  - Mucous membrane exposure
  - Nonintact skin exposure
  - Bites resulting in blood exposure to either person involved
- **Type and amount of fluid/tissue**
  - Blood
  - Fluids containing blood
  - Potentially infectious fluid or tissue (semen; vaginal secretions; and cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluids)
  - Direct contact with concentrated virus
- **Infectious status of source**
  - Presence of HBsAg
  - Presence of HCV antibody
  - Presence of HIV antibody
- **Susceptibility of exposed person**
  - Hepatitis B vaccine and vaccine response status
  - HBV, HCV, and HIV immune status

Evaluation of the Exposure Source

The person whose blood or body fluid is the source of an occupational exposure should be evaluated for HBV, HCV, and HIV infection (Box 3). Information available in the medical record at the time of exposure (e.g., laboratory test results, admitting diagnosis, or previous medical history) or from the source person, might confirm or exclude bloodborne virus infection.

If the HBV, HCV, and/or HIV infection status of the source is unknown, the source person should be informed of the incident and tested for serologic evidence of bloodborne virus infection. Procedures should be followed for testing source persons, including obtaining informed consent, in accordance with applicable state and local laws. Any persons determined to be infected with HBV, HCV, or HIV should be referred for appropriate counseling and treatment. Confidentiality of the source person should be maintained at all times.

Testing to determine the HBV, HCV, and HIV infection status of an exposure source should be performed as soon as possible. Hospitals, clinics and other sites that manage exposed HCP should consult their laboratories regarding the most appropriate test to use to expedite obtaining these results. An FDA-approved rapid HIV-antibody test kit should be considered for use in this situation, particularly if testing by EIA cannot be completed within 24–48 hours. Repeatedly reactive results by EIA or rapid HIV-antibody tests are considered to be highly suggestive of infection, whereas a negative result is an excellent indicator of the absence of HIV antibody. Confirmation of a reactive result by Western blot or immunofluorescent antibody is not necessary to make initial decisions about postexposure management but should be done to complete the testing process and before informing the source person. Repeatedly reactive results by EIA for anti-HCV should be confirmed by a supplemental test (i.e., recombinant immunoblot assay [RIBA™] or HCV PCR). Direct virus assays (e.g., HIV p24 antigen EIA or tests for HIV RNA or HCV RNA) for routine HIV or HCV screening of source persons are not recommended.

If the exposure source is unknown or cannot be tested, information about where and under what circumstances the exposure occurred should be assessed epidemiologically for the likelihood of transmission of HBV, HCV, or HIV. Certain situations as well as the type of exposure might suggest an increased or decreased risk; an important consideration is the prevalence of HBV, HCV, or HIV in the population group (i.e., institution or community) from which the contaminated source material is derived. For example, an exposure that occurs in a geographic area where injection-drug use is prevalent or involves a needle discarded in a drug-treatment facility would be considered epidemiologically to have a higher risk for transmission than an exposure that occurs in a nursing home for the elderly.

Testing of needles or other sharp instruments implicated in an exposure, regardless of whether the source is known or unknown, is not recommended. The reliability and interpretation of findings in such circumstances are unknown, and testing might be hazardous to persons handling the sharp instrument.

Examples of information to consider when evaluating an exposure source for possible HBV, HCV, or HIV infection include laboratory information (e.g., previous HBV, HCV, or HIV test results or results of immunologic testing [e.g., CD4+ T-cell count]) or liver enzymes (e.g., ALT), clinical symptoms (e.g., acute syndrome suggestive of primary HIV infection or undiagnosed immunodeficiency disease), and history of recent (i.e., within 3 months) possible HBV, HCV, or HIV exposures (e.g., injection-drug use or sexual contact

with a known positive partner). Health-care providers should be aware of local and state laws governing the collection and release of HIV serostatus information on a source person, following an occupational exposure.

If the source person is known to have HIV infection, available information about this person's stage of infection (i.e., asymptomatic, symptomatic, or AIDS), CD4+ T-cell count, results of viral load testing, current and previous antiretroviral therapy, and results of any genotypic or phenotypic viral resistance testing should be gathered for consideration in choosing an appropriate PEP regimen. If this information is not immediately available, initiation of PEP, if indicated, should not be delayed; changes in the PEP regimen can be made after PEP has been started, as appropriate. Reevaluation of exposed HCP should be considered within 72 hours postexposure, especially as additional information about the exposure or source person becomes available.

If the source person is HIV seronegative and has no clinical evidence of AIDS or symptoms of HIV infection, no further testing of the person for HIV infection is indicated. The likelihood of the source person being in the "window period" of HIV infection in the absence of symptoms of acute retroviral syndrome is extremely small.

BOX 3. Evaluation of occupational exposure sources

Known sources

- Test known sources for HBsAg, anti-HCV, and HIV antibody
  - Direct virus assays for routine screening of source patients are **not** recommended
  - Consider using a rapid HIV-antibody test
  - If the source person is **not** infected with a bloodborne pathogen, baseline testing or further follow-up of the exposed person is **not** necessary
- For sources whose infection status remains unknown (e.g., the source person refuses testing), consider medical diagnoses, clinical symptoms, and history of risk behaviors
- Do not test discarded needles for bloodborne pathogens

Unknown sources

- For unknown sources, evaluate the likelihood of exposure to a source at high risk for infection
  - Consider likelihood of bloodborne pathogen infection among patients in the exposure setting

Management of Exposures to HBV

For percutaneous or mucosal exposures to blood, several factors must be considered when making a decision to provide prophylaxis, including the HBsAg status of the source and the hepatitis B vaccination and vaccine-response status of the exposed person. Such exposures usually involve persons for whom hepatitis B vaccination is recommended.

Any blood or body fluid exposure to an unvaccinated person should lead to initiation of the hepatitis B vaccine series.

The hepatitis B vaccination status and the vaccine-response status (if known) of the exposed person should be reviewed. A summary of prophylaxis recommendations for percutaneous or mucosal exposure to blood according to the HBsAg status of the exposure source and the vaccination and vaccine-response status of the exposed person is included in this report (Table 3).

When HBIG is indicated, it should be administered as soon as possible after exposure (preferably within 24 hours). The effectiveness of HBIG when administered >7 days after exposure is unknown. When hepatitis B vaccine is indicated, it should also be administered as soon as possible (preferably within 24 hours) and can be administered simultaneously with HBIG at a separate site (vaccine should always be administered in the deltoid muscle).

For exposed persons who are in the process of being vaccinated but have not completed the vaccination series, vaccination should be completed as scheduled, and HBIG should be added as indicated (Table 3). Persons exposed to HBsAg-positive blood or body fluids who are known not to have responded to a primary vaccine series should receive a single dose of HBIG and reinitiate the hepatitis B vaccine series with the first dose of the hepatitis B vaccine as soon as possible after exposure. Alternatively, they should receive two doses of HBIG, one dose as soon as possible after exposure, and the second dose 1 month later. The option of administering one dose of HBIG and reinitiating the vaccine series is preferred for nonresponders who did not complete a second 3-dose vaccine series. For persons who previously completed a second vaccine series but failed to respond, two doses of HBIG are preferred.

Management of Exposures to HCV

Individual institutions should establish policies and procedures for testing HCP for HCV after percutaneous or mucosal exposures to blood and ensure that all personnel are familiar with these policies and procedures. The following are recommendations for follow-up of occupational HCV exposures:

- For the source, perform testing for anti-HCV.
- For the person exposed to an HCV-positive source
  - — perform baseline testing for anti-HCV and ALT activity; and
  - — perform follow-up testing (e.g., at 4–6 months) for anti-HCV and ALT activity (if earlier diagnosis of HCV infection is desired, testing for HCV RNA may be performed at 4–6 weeks).
- Confirm all anti-HCV results reported positive by enzyme immunoassay using supplemental anti-HCV testing (e.g., recombinant immunoblot assay [RIBA™]) (*13*).

Health-care professionals who provide care to persons exposed to HCV in the occupational setting should be knowledgeable regarding the risk for HCV infection and appropriate counseling, testing, and medical follow-up.

IG and antiviral agents are not recommended for PEP after exposure to HCV-positive blood. In addition, no guidelines exist for administration of therapy during the acute

TABLE 3. Recommended postexposure prophylaxis for exposure to hepatitis B virus

Vaccination and antibody response status of exposed workers*	Treatment		
	Source HBsAg† positive	Source HBsAg† negative	Source unknown or not available for testing
Unvaccinated	HBIG§ x 1 and initiate HB vaccine series¶	Initiate HB vaccine series	Initiate HB vaccine series
Previously vaccinated			
Known responder**	No treatment	No treatment	No treatment
Known nonresponder††	HBIG x 1 and initiate revaccination or HBIG x 2§§	No treatment	If known high risk source, treat as if source were HBsAg positive
Antibody response unknown	Test exposed person for anti-HBs¶¶ 1. If adequate,** no treatment is necessary 2. If inadequate,†† administer HBIG x 1 and vaccine booster	No treatment	Test exposed person for anti-HBs 1. If adequate,¶ no treatment is necessary 2. If inadequate,¶ administer vaccine booster and recheck titer in 1–2 months

* Persons who have previously been infected with HBV are immune to reinfection and do not require postexposure prophylaxis.

† Hepatitis B surface antigen.

§ Hepatitis B immune globulin; dose is 0.06 mL/kg intramuscularly.

¶ Hepatitis B vaccine.

** A responder is a person with adequate levels of serum antibody to HBsAg (i.e., anti-HBs ≥10 mIU/mL).

†† A nonresponder is a person with inadequate response to vaccination (i.e., serum anti-HBs < 10 mIU/mL).

§§ The option of giving one dose of HBIG and reinitiating the vaccine series is preferred for nonresponders who have not completed a second 3-dose vaccine series. For persons who previously completed a second vaccine series but failed to respond, two doses of HBIG are preferred.

¶¶ Antibody to HBsAg.

phase of HCV infection. However, limited data indicate that antiviral therapy might be beneficial when started early in the course of HCV infection. When HCV infection is identified early, the person should be referred for medical management to a specialist knowledgeable in this area.

Counseling for HCP Exposed to Viral Hepatitis

HCP exposed to HBV- or HCV-infected blood do not need to take any special precautions to prevent secondary transmission during the follow-up period (*12,13*); however, they should refrain from donating blood, plasma, organs, tissue, or semen. The exposed person does not need to modify sexual practices or refrain from becoming pregnant. If an exposed woman is breast feeding, she does not need to discontinue.

No modifications to an exposed person's patient-care responsibilities are necessary to prevent transmission to patients based solely on exposure to HBV- or HCV-positive blood. If an exposed person becomes acutely infected with HBV, the person should be evaluated according to published recommendations for infected HCP (*165*). No recommendations exist regarding restricting the professional activities of HCP with HCV infection (*13*). As recommended for all HCP, those who are chronically infected with HBV or HCV should follow all recommended infection-control practices, including standard precautions and appropriate use of hand washing, protective barriers, and care in the use and disposal of needles and other sharp instruments (*162*).

Management of Exposures to HIV

Clinical Evaluation and Baseline Testing of Exposed HCP

HCP exposed to HIV should be evaluated within hours (rather than days) after their exposure and should be tested for HIV at baseline (i.e., to establish infection status at the time of exposure). If the source person is seronegative for HIV, baseline testing or further follow-up of the exposed person normally is not necessary. Serologic testing should be made available to all HCP who are concerned that they might have been occupationally infected with HIV. For purposes of considering HIV PEP, the evaluation also should include information about medications the exposed person might be taking and any current or underlying medical conditions or circumstances (i.e., pregnancy, breast feeding, or renal or hepatic disease) that might influence drug selection.

PEP for HIV

The following recommendations (Tables 4 and 5) apply to situations when a person has been exposed to a source person with HIV infection or when information suggests the likelihood that the source person is HIV-infected. These recommendations are based on the risk for HIV infection after different types of exposure and on limited data regarding efficacy and toxicity of PEP. Because most occupational HIV exposures do not result in the transmission of HIV, potential toxicity must be carefully considered when prescribing PEP. To assist with the initial management of an HIV exposure, health-care facilities should have drugs for an initial PEP regimen selected and available for use. When possible, these recommendations should be implemented in consultation with persons who have expertise in antiretroviral therapy and HIV transmission (Box 4).

TABLE 4. Recommended HIV postexposure prophylaxis for percutaneous injuries

	Infection status of source				
Exposure type	HIV-Positive Class 1*	HIV-Positive Class 2*	Source of unknown HIV status†	Unknown source§	HIV-Negative
Less severe¶	Recommend basic 2-drug PEP	Recommend expanded 3-drug PEP	Generally, no PEP warranted; however, consider basic 2-drug PEP** for source with HIV risk factors††	Generally, no PEP warranted; however, consider basic 2-drug PEP** in settings where exposure to HIV-infected persons is likely	No PEP warranted
More severe§§	Recommend expanded 3-drug PEP	Recommend expanded 3-drug PEP	Generally, no PEP warranted; however, consider basic 2-drug PEP** for source with HIV risk factors††	Generally, no PEP warranted; however, consider basic 2-drug PEP** in settings where exposure to HIV-infected persons is likely	No PEP warranted

* HIV-Positive, Class 1 — asymptomatic HIV infection or known low viral load (e.g., <1,500 RNA copies/mL). HIV-Positive, Class 2 — symptomatic HIV infection, AIDS, acute seroconversion, or known high viral load. If drug resistance is a concern, obtain expert consultation. Initiation of postexposure prophylaxis (PEP) should not be delayed pending expert consultation, and, because expert consultation alone cannot substitute for face-to-face counseling, resources should be available to provide immediate evaluation and follow-up care for all exposures.

† Source of unknown HIV status (e.g., deceased source person with no samples available for HIV testing).

§ Unknown source (e.g., a needle from a sharps disposal container).

¶ Less severe (e.g., solid needle and superficial injury).

** The designation "consider PEP" indicates that PEP is optional and should be based on an individualized decision between the exposed person and the treating clinician.

†† If PEP is offered and taken and the source is later determined to be HIV-negative, PEP should be discontinued.

§§ More severe (e.g., large-bore hollow needle, deep puncture, visible blood on device, or needle used in patient's artery or vein).

TABLE 5. Recommended HIV postexposure prophylaxis for mucous membrane exposures and nonintact skin* exposures

	Infection status of source				
Exposure type	HIV-Positive Class 1†	HIV-Positive Class 2†	Source of unknown HIV status§	Unknown source¶	HIV-Negative
Small volume**	Consider basic 2-drug PEP††	Recommend basic 2-drug PEP	Generally, no PEP warranted; however, consider basic 2-drug PEP†† for source with HIV risk factors§§	Generally, no PEP warranted; however, consider basic 2-drug PEP†† in settings where exposure to HIV-infected persons is likely	No PEP warranted
Large volume¶¶	Recommend basic 2-drug PEP	Recommend expanded 3-drug PEP	Generally, no PEP warranted; however, consider basic 2-drug PEP†† for source with HIV risk factors§§	Generally, no PEP warranted; however, consider basic 2-drug PEP†† in settings where exposure to HIV-infected persons is likely	No PEP warranted

* For skin exposures, follow-up is indicated only if there is evidence of compromised skin integrity (e.g., dermatitis, abrasion, or open wound).

† HIV-Positive, Class 1 — asymptomatic HIV infection or known low viral load (e.g., <1,500 RNA copies/mL). HIV-Positive, Class 2 — symptomatic HIV infection, AIDS, acute seroconversion, or known high viral load. If drug resistance is a concern, obtain expert consultation. Initiation of postexposure prophylaxis (PEP) should not be delayed pending expert consultation, and, because expert consultation alone cannot substitute for face-to-face counseling, resources should be available to provide immediate evaluation and follow-up care for all exposures.

§ Source of unknown HIV status (e.g., deceased source person with no samples available for HIV testing).

¶ Unknown source (e.g., splash from inappropriately disposed blood).

** Small volume (i.e., a few drops).

†† The designation, "consider PEP," indicates that PEP is optional and should be based on an individualized decision between the exposed person and the treating clinician.

§§ If PEP is offered and taken and the source is later determined to be HIV-negative, PEP should be discontinued.

¶¶ Large volume (i.e., major blood splash).

Timing and Duration of PEP. PEP should be initiated as soon as possible. The interval within which PEP should be initiated for optimal efficacy is not known. Animal studies have demonstrated the importance of starting PEP soon after an exposure (*111,112,118*). If questions exist about which antiretroviral drugs to use or whether to use a basic or expanded regimen, starting the basic regimen immediately rather than delaying PEP administration is probably better. Although animal studies suggest that PEP probably is substantially less effective when started more than 24–36 hours postexposure (*112,119,122*), the interval after which no benefit is gained from PEP for humans is undefined. Therefore, if appropriate for the exposure, PEP should be started even when the interval since exposure exceeds 36 hours. Initiating therapy after a longer interval (e.g., 1 week) might be considered for exposures that represent an increased risk for transmission. The optimal duration of PEP is unknown. Because 4 weeks of ZDV appeared protective in occupational and animal studies (*100,123*), PEP probably should be administered for 4 weeks, if tolerated.

Use of PEP When HIV Infection Status of Source Person is Unknown. If the source person's HIV infection status is unknown at the time of exposure, use of PEP should be decided on a case-by-case basis, after considering the type of exposure and the clinical and/or epidemiologic likelihood of HIV infection in the source (Tables 4 and 5). If these considerations suggest a possibility for HIV transmission and HIV testing of the source person is pending, initiating a two-drug PEP regimen until laboratory results have been obtained and later modifying or discontinuing the regimen accordingly is reasonable. The following are recommendations regarding HIV postexposure prophylaxis:

- If indicated, start PEP as soon as possible after an exposure.
- Reevaluation of the exposed person should be considered within 72 hours postexposure, especially as additional information about the exposure or source person becomes available.
- Administer PEP for 4 weeks, if tolerated.
- If a source person is determined to be HIV-negative, PEP should be discontinued.

PEP for Pregnant HCP. If the exposed person is pregnant, the evaluation of risk of infection and need for PEP should be approached as with any other person who has had an HIV exposure. However, the decision to use any antiretroviral drug during pregnancy should involve discussion between the woman and her health-care provider(s) regarding the potential benefits and risks to her and her fetus.

Certain drugs should be avoided in pregnant women. Because teratogenic effects were observed in primate studies, EFV is not recommended during pregnancy. Reports of fatal lactic acidosis in pregnant women treated with a combination of d4T and ddI have prompted warnings about these drugs during pregnancy. Because of the risk of hyperbilirubinemia in newborns, IDV should not be administered to pregnant women shortly before delivery.

Recommendations for the Selection of Drugs for HIV PEP

Health-care providers must strive to balance the risk for infection against the potential toxicity of the agent(s) used when selecting a drug regimen for HIV PEP. Because PEP is potentially toxic, its use is not justified for exposures that pose a negligible risk for

transmission (Tables 4 and 5). Also, insufficient evidence exists to support recommending a three-drug regimen for all HIV exposures. Therefore, two regimens for PEP are provided (Appendix C): a "basic" two-drug regimen that should be appropriate for most HIV exposures and an "expanded" three-drug regimen that should be used for exposures that pose an increased risk for transmission (Tables 4 and 5). When possible, the regimens should be implemented in consultation with persons who have expertise in antiretroviral treatment and HIV transmission.

Most HIV exposures will warrant a two-drug regimen using two nucleoside analogues (e.g., ZDV and 3TC; or 3TC and d4T; or d4T and ddI). The addition of a third drug should be considered for exposures that pose an increased risk for transmission. Selection of the PEP regimen should consider the comparative risk represented by the exposure and information about the exposure source, including history of and response to antiretroviral therapy based on clinical response, CD4+ T-cell counts, viral load measurements, and current disease stage. When the source person's virus is known or suspected to be resistant to one or more of the drugs considered for the PEP regimen, the selection of drugs to which the source person's virus is unlikely to be resistant is recommended; expert consultation is advised. If this information is not immediately available, initiation of PEP, if indicated, should not be delayed; changes in the PEP regimen can be made after PEP has been started, as appropriate. Reevaluation of the exposed person should be considered within 72 hours postexposure, especially as additional information about the exposure or source person becomes available.

Follow-up of HCP Exposed to HIV

Postexposure Testing. HCP with occupational exposure to HIV should receive follow-up counseling, postexposure testing, and medical evaluation, regardless of whether they receive PEP. HIV-antibody testing should be performed for at least 6 months postexposure (e.g., at 6 weeks, 12 weeks, and 6 months). Extended HIV follow-up (e.g., for 12 months) is recommended for HCP who become infected with HCV following exposure to a source coinfected with HIV and HCV. Whether extended follow-up is indicated in other circumstances (e.g., exposure to a source coinfected with HIV and HCV in the absence of HCV seroconversion or for exposed persons with a medical history suggesting an impaired ability to develop an antibody response to acute infection) is unclear. Although rare instances of delayed HIV seroconversion have been reported (*167,168*), the infrequency of this occurrence does not warrant adding to the anxiety level of the exposed persons by routinely extending the duration of postexposure follow-up. However, this recommendation should not preclude a decision to extend follow-up in an individual situation based on the clinical judgement of the exposed person's health-care provider. HIV testing should be performed on any exposed person who has an illness that is compatible with an acute retroviral syndrome, regardless of the interval since exposure. When HIV infection is identified, the person should be referred to a specialist knowledgeable in the area of HIV treatment and counseling for medical management.

HIV-antibody testing with EIA should be used to monitor for seroconversion. The routine use of direct virus assays (e.g., HIV p24 antigen EIA or tests for HIV RNA) to detect infection in exposed HCP generally is not recommended (*169*). The high rate of false-positive results of these tests in this setting could lead to unnecessary anxiety and/or treatment (*170,171*). Despite the ability of direct virus assays to detect HIV infection a few days earlier than EIA, the infrequency of occupational seroconversion and increased costs of these tests do not warrant their routine use in this setting.

- HIV-antibody testing should be performed for at least 6 months postexposure.
- Direct virus assays for routine follow-up of HCP are not recommended.
- HIV testing should be performed on any exposed person who has an illness compatible with an acute retroviral syndrome.

Monitoring and Management of PEP Toxicity. If PEP is used, HCP should be monitored for drug toxicity by testing at baseline and again 2 weeks after starting PEP. The scope of testing should be based on medical conditions in the exposed person and the toxicity of drugs included in the PEP regimen. Minimally, lab monitoring for toxicity should include a complete blood count and renal and hepatic function tests. Monitoring for evidence of hyperglycemia should be included for HCP whose regimens include any PI; if the exposed person is receiving IDV, monitoring for crystalluria, hematuria, hemolytic anemia, and hepatitis also should be included. If toxicity is noted, modification of the regimen should be considered after expert consultation; further diagnostic studies may be indicated.

Exposed HCP who choose to take PEP should be advised of the importance of completing the prescribed regimen. Information should be provided to HCP about potential drug interactions and the drugs that should not be taken with PEP, the side effects of the drugs that have been prescribed, measures to minimize these effects, and the methods of clinical monitoring for toxicity during the follow-up period. HCP should be advised that the evaluation of certain symptoms should not be delayed (e.g., rash, fever, back or abdominal pain, pain on urination or blood in the urine, or symptoms of hyperglycemia [increased thirst and/or frequent urination]).

HCP who fail to complete the recommended regimen often do so because of the side effects they experience (e.g., nausea and diarrhea). These symptoms often can be managed with antimotility and antiemetic agents or other medications that target the specific symptoms without changing the regimen. In other situations, modifying the dose interval (i.e., administering a lower dose of drug more frequently throughout the day, as recommended by the manufacturer), might facilitate adherence to the regimen. Serious adverse events should be reported to FDA's MedWatch Program.

Counseling and Education. Although HIV infection following an occupational exposure occurs infrequently, the emotional effect of an exposure often is substantial (*172–174*). In addition, HCP are given seemingly conflicting information. Although HCP are told that a low risk exists for HIV transmission, a 4-week regimen of PEP might be recommended, and they are asked to commit to behavioral measures (e.g., sexual abstinence or condom use) to prevent secondary transmission, all of which influence their lives for several weeks to months (*172*). Therefore, access to persons who are knowledgeable about occupational HIV transmission and who can deal with the many concerns an HIV exposure might generate for the exposed person is an important element of postexposure management. HIV-exposed HCP should be advised to use the following measures to prevent secondary transmission during the follow-up period, especially the first 6–12 weeks after the exposure when most HIV-infected persons are expected to seroconvert: exercise sexual abstinence or use condoms to prevent sexual transmission and to avoid pregnancy; and refrain from donating blood, plasma, organs, tissue, or semen. If an exposed woman is breast feeding, she should be counseled about the risk of HIV transmission through breast milk, and discontinuation of breast feeding should be considered, especially for high-risk exposures. Additionally, NRTIs are known to pass into breast milk, as is NVP; whether this also is true for the other approved antiretroviral drugs is unknown.

The patient-care responsibilities of an exposed person do not need to be modified, based solely on an HIV exposure, to prevent transmission to patients. If HIV seroconversion is detected, the person should be evaluated according to published recommendations for infected HCP (*175*).

Exposed HCP should be advised to seek medical evaluation for any acute illness that occurs during the follow-up period. Such an illness, particularly if characterized by fever, rash, myalgia, fatigue, malaise, or lymphadenopathy, might be indicative of acute HIV infection but also might be indicative of a drug reaction or another medical condition.

For exposures for which PEP is considered appropriate, HCP should be informed that a) knowledge about the efficacy of drugs used for PEP is limited; b) experts recommend combination drug regimens because of increased potency and concerns about drug-resistant virus; c) data regarding toxicity of antiretroviral drugs in persons without HIV infection or in pregnant women are limited; d) although the short-term toxicity of antiretroviral drugs is usually limited, serious adverse events have occurred in persons taking PEP; and e) any or all drugs for PEP may be declined or stopped by the exposed person. HCP who experience HIV occupational exposures for which PEP is not recommended should be informed that the potential side effects and toxicity of taking PEP outweigh the negligible risk of transmission posed by the type of exposure.

Guidelines for counseling and educating HCP with HIV exposure include

- Exposed HCP should be advised to use precautions to prevent secondary transmission during the follow-up period.
- For exposures for which PEP is prescribed, HCP should be informed about possible drug toxicities and the need for monitoring, and possible drug interactions.

Occupational Exposure Management Resources

Several resources are available that provide guidance to HCP regarding the management of occupational exposures. These resources include PEPline; the Needlestick! website; the Hepatitis Hotline; CDC (receives reports of occupationally acquired HIV infections and failures of PEP); the HIV Antiretroviral Pregnancy Registry; FDA (receives reports of unusual or severe toxicity to antiretroviral agents); and the HIV/AIDS Treatment Information Service (Box 5).

BOX 4. Situations for which expert* consultation for HIV postexposure prophylaxis is advised

- Delayed (i.e., later than 24–36 hours) exposure report
  - — the interval after which there is no benefit from postexposure prophylaxis (PEP) is undefined
- Unknown source (e.g., needle in sharps disposal container or laundry)
  - — decide use of PEP on a case-by-case basis
  - — consider the severity of the exposure and the epidemiologic likelihood of HIV exposure
  - — do not test needles or other sharp instruments for HIV
- Known or suspected pregnancy in the exposed person
  - — does not preclude the use of optimal PEP regimens
  - — do not deny PEP solely on the basis of pregnancy
- Resistance of the source virus to antiretroviral agents
  - — influence of drug resistance on transmission risk is unknown
  - — selection of drugs to which the source person's virus is unlikely to be resistant is recommended, if the source person's virus is known or suspected to be resistant to ≥1 of the drugs considered for the PEP regimen
  - — resistance testing of the source person's virus at the time of the exposure is not recommended
- Toxicity of the initial PEP regimen
  - — adverse symptoms, such as nausea and diarrhea are common with PEP
  - — symptoms often can be managed without changing the PEP regimen by prescribing antimotility and/or antiemetic agents
  - — modification of dose intervals (i.e., administering a lower dose of drug more frequently throughout the day, as recommended by the manufacturer), in other situations, might help alleviate symptoms

*Local experts and/or the National Clinicians' Post-Exposure Prophylaxis Hotline (PEPline [1-888-448-4911]).

BOX 5. Occupational exposure management resources

National Clinicians' Postexposure Prophylaxis Hotline (PEPline) Run by University of California–San Francisco/San Francisco General Hospital staff; supported by the Health Resources and Services Administration Ryan White CARE Act, HIV/AIDS Bureau, AIDS Education and Training Centers, and CDC.	Phone: (888) 448-4911 Internet: <http://www.ucsf.edu/hivcntr>
Needlestick! A website to help clinicians manage and document occupational blood and body fluid exposures. Developed and maintained by the University of California, Los Angeles (UCLA), Emergency Medicine Center, UCLA School of Medicine, and funded in party by CDC and the Agency for Healthcare Research and Quality.	Internet: <http://www.needlestick.mednet.ucla.edu>
Hepatitis Hotline.	Phone: (888) 443-7232 Internet: <http://www.cdc.gov/hepatitis>
Reporting to CDC: Occupationally acquired HIV infections and failures of PEP.	Phone: (800) 893-0485
HIV Antiretroviral Pregnancy Registry.	Phone:(800) 258-4263 Fax: (800) 800-1052 Address: 1410 Commonwealth Drive Suite 215 Wilmington, NC 28405 Internet: <http://www.glaxowellcome.com/preg_reg/antiretroviral>

BOX 5. (*Continued*) **Occupational exposure management resources**

Food and Drug Administration Report unusual or severe toxicity to antiretroviral agents.	Phone: (800) 332-1088 Address: MedWatch HF-2, FDA 5600 Fishers Lane Rockville, MD 20857 Internet: <http://www.fda.gov/medwatch>
HIV/AIDS Treatment Information Service.	Internet: <http://www.hivatis.org>

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APPENDIX A.

Practice Recommendations for Health-Care Facilities Implementing the U.S. Public Health Service Guidelines for Management of Occupational Exposures to Bloodborne Pathogens

Practice recommendation	Implementation checklist
Establish a bloodborne pathogen policy.	All institutions where health-care personnel (HCP) might experience exposures should have a written policy for management of exposures. The policy should be based on the U.S. Public Health Service (PHS) guidelines. The policy should be reviewed periodically to ensure that it is consistent with PHS recommendations.
Implement management policies.	Health-care facilities (HCF) should provide appropriate training to all personnel on the prevention of and response to occupational exposures. HCF should establish hepatitis B vaccination programs. HCF should establish exposure-reporting systems. HCF should have personnel who can manage an exposure readily available at all hours of the day. HCF should have ready access to postexposure prophylaxis (PEP) for use by exposed personnel as necessary.
Establish laboratory capacity for bloodborne pathogen testing.	HCF should provide prompt processing of exposed person and source person specimens to guide management of occupational exposures. Testing should be performed with appropriate counseling and consent.

Practice recommendation	Implementation checklist
Select and use appropriate PEP regimens.	HCF should develop a policy for the selection and use of PEP antiretroviral regimens for HIV exposures within their institution. Hepatitis B vaccine and HBIG should be available for timely administration. HCF should have access to resources with expertise in the selection and use of PEP.
Provide access to counseling for exposed HCP.	HCF should provide counseling for HCP who might need help dealing with the emotional effect of an exposure. HCF should provide medication adherence counseling to assist HCP in completing HIV PEP as necessary.
Monitor for adverse effects of PEP.	HCP taking antiretroviral PEP should be monitored periodically for adverse effects of PEP through baseline and testing (every 2 weeks) and clinical evaluation.
Monitor for seroconversion.	HCF should develop a system to encourage exposed HCP to return for follow-up testing. Exposed HCP should be tested for HCV and HIV.
Monitor exposure management programs.	HCF should develop a system to monitor reporting and management of occupational exposures to ensure timely and appropriate response. **Evaluate** • exposure reports for completeness and accuracy, • access to care (i.e., the time of exposure to the time of evaluation), and • laboratory result reporting time. **Review** • exposures to ensure that HCP exposed to sources not infected with bloodborne pathogens do not receive PEP or that PEP is stopped. **Monitor** • completion rates of HBV vaccination and HIV PEP and • completion of exposure follow-up.

APPENDIX B.

Management of Occupational Blood Exposures

Provide immediate care to the exposure site.

- Wash wounds and skin with soap and water.
- Flush mucous membranes with water.

Determine risk associated with exposure by

- type of fluid (e.g., blood, visibly bloody fluid, other potentially infectious fluid or tissue, and concentrated virus) and
- type of exposure (i.e., percutaneous injury, mucous membrane or nonintact skin exposure, and bites resulting in blood exposure).

Evaluate exposure source.

- Assess the risk of infection using available information.
- Test known sources for HBsAg, anti-HCV, and HIV antibody (consider using rapid testing).
- For unknown sources, assess risk of exposure to HBV, HCV, or HIV infection.
- Do not test discarded needles or syringes for virus contamination.

Evaluate the exposed person.

- Assess immune status for HBV infection (i.e., by history of hepatitis B vaccination and vaccine response).

Give PEP for exposures posing risk of infection transmission.

- HBV: See Table 3.
- HCV: PEP not recommended.
- HIV: See Tables 4 and 5.
  - — Initiate PEP as soon as possible, preferably within hours of exposure.
  - — Offer pregnancy testing to all women of childbearing age not known to be pregnant.
  - — Seek expert consultation if viral resistance is suspected.
  - — Administer PEP for 4 weeks if tolerated.

Perform follow-up testing and provide counseling.

- Advise exposed persons to seek medical evaluation for any acute illness occurring during follow-up.

HBV exposures

- Perform follow-up anti-HBs testing in persons who receive hepatitis B vaccine.
  - Test for anti-HBs 1–2 months after last dose of vaccine.
  - Anti-HBs response to vaccine cannot be ascertained if HBIG was received in the previous 3–4 months.

HCV exposures

- Perform baseline and follow-up testing for anti-HCV and alanine aminotransferase (ALT) 4–6 months after exposures.
- Perform HCV RNA at 4–6 weeks if earlier diagnosis of HCV infection desired.
- Confirm repeatedly reactive anti-HCV enzyme immunoassays (EIAs) with supplemental tests.

HIV exposures

- Perform HIV-antibody testing for at least 6 months postexposure (e.g., at baseline, 6 weeks, 3 months, and 6 months).
- Perform HIV antibody testing if illness compatible with an acute retroviral syndrome occurs.
- Advise exposed persons to use precautions to prevent secondary transmission during the follow-up period.
- Evaluate exposed persons taking PEP within 72 hours after exposure and monitor for drug toxicity for at least 2 weeks.

APPENDIX C.

Basic and Expanded HIV Postexposure Prophylaxis Regimens

BASIC REGIMEN

- **Zidovudine (RETROVIR™; ZDV; AZT) + Lamivudine (EPIVIR™; 3TC); available as COMBIVIR™**
  - — ZDV: 600 mg per day, in two or three divided doses, and
  - — 3TC: 150 mg twice daily.

Advantages

- — ZDV is associated with decreased risk of HIV transmission in the CDC case-control study of occupational HIV infection.
- — ZDV has been used more than the other drugs for PEP in HCP.
- — Serious toxicity is rare when used for PEP.
- — Side effects are predictable and manageable with antimotility and antiemetic agents.
- — Probably a safe regimen for pregnant HCP.
- — Can be given as a single tablet (COMBIVIR™) twice daily.

Disadvantages

- — Side effects are common and might result in low adherence.
- — Source patient virus might have resistance to this regimen.
- — Potential for delayed toxicity (oncogenic/teratogenic) is unknown.

ALTERNATE BASIC REGIMENS

- **Lamivudine (3TC) + Stavudine (ZERIT™; d4T)**
  - — 3TC: 150 mg twice daily, and
  - — d4T: 40 mg (if body weight is <60 kg, 30 mg twice daily) twice daily.

Advantages

- — well tolerated in patients with HIV infection, resulting in good adherence,
- — serious toxicity appears to be rare, and
- — twice daily dosing might improve adherence.

Disadvantages

— Source patient virus might be resistant to this regimen.

— Potential for delayed toxicity (oncogenic/teratogenic) is unknown.

- **Didanosine (VIDEX™, chewable/dispersable buffered tablet; VIDEX™ EC, delayed-release capsule; ddI) + Stavudine (d4T)**

— ddI: 400 mg (if body weight is <60 kg, 125 mg twice daily) daily, on an empty stomach.

— d4T: 40 mg (if body weight is <60 kg, 30 mg twice daily) twice daily.

Advantages

— Likely to be effective against HIV strains from source patients who are taking ZDV and 3TC.

Disadvantages

— ddI is difficult to administer and unpalatable.

— Chewable/dispersable buffered tablet formulation of ddI interferes with absorption of some drugs (e.g., quinolone antibiotics, and indinavir).

— Serious toxicity (e.g., neuropathy, pancreatitis, or hepatitis) can occur. Fatal and nonfatal pancreatitis has occurred in HIV-positive, treatment-naive patients. Patients taking ddI and d4T should be carefully assessed and closely monitored for pancreatitis, lactic acidosis, and hepatitis.

— Side effects are common; anticipate diarrhea and low adherence.

— Potential for delayed toxicity (oncogenic/teratogenic) is unknown.

EXPANDED REGIMEN

Basic regimen plus one of the following:

- **Indinavir (CRIXIVAN™; IDV)**

— 800 mg every 8 hours, on an empty stomach.

Advantages

— Potent HIV inhibitor.

Disadvantages

— Serious toxicity (e.g., nephrolithiasis) can occur; must take 8 glasses of fluid per day.

— Hyperbilirubinemia common; must avoid this drug during late pregnancy.

— Requires acid for absorption and cannot be taken simultaneously with ddI in chewable/dispersable buffered tablet formulation (doses must be separated by at least 1 hour).

— Concomitant use of astemizole, terfenadine, dihydroergotamine, ergotamine, ergonovine, methylergonovine, rifampin, cisapride, St. John's Wort, lovastatin, simvastatin, pimozide, midazolam, or triazolam is not recommended.

— Potential for delayed toxicity (oncogenic/teratogenic) is unknown.

- **Nelfinavir (VIRACEPT™; NFV)**

— 750 mg three times daily, with meals or snack, or

— 1250 mg twice daily, with meals or snack.

Advantages

— potent HIV inhibitor, and

— twice dosing per day might improve adherence.

Disadvantages

— Concomitant use of astemizole, terfenadine, dihydroergotamine, ergotamine, ergonovine, methylergonovine, rifampin, cisapride, St. John's Wort, lovastatin, simvastatin, pimozide, midazolam, or triazolam is not recommended.

— Might accelerate the clearance of certain drugs, including oral contraceptives (requiring alternative or additional contraceptive measures for women taking these drugs).

— Potential for delayed toxicity (oncogenic/teratogenic) is unknown.

- **Efavirenz (SUSTIVA™; EFV)**

— 600 mg daily, at bedtime.

Advantages

— Does not require phosphorylation before activation and might be active earlier than other antiretroviral agents (note: this might be only a theoretical advantage of no clinical benefit.)

— One dose daily might improve adherence.

Disadvantages

— Drug is associated with rash (early onset) that can be severe and might rarely progress to Stevens-Johnson syndrome.

— Differentiating between early drug-associated rash and acute seroconversion can be difficult and cause extraordinary concern for the exposed person.

— Nervous system side effects (e.g., dizziness, somnolence, insomnia, and/or abnormal dreaming) are common. Severe psychiatric symptoms are possible (dosing before bedtime might minimize these side effects).

— Should not be used during pregnancy because of concerns about teratogenicity.

— Concomitant use of astemizole, cisapride, midazolam, triazolam, ergot derivatives, or St. John's Wort is not recommended because inhibition of the metabolism of these drugs could create the potential for serious and/or life-threatening adverse events (e.g., cardiac arrhythmias, prolonged sedation, or respiratory depression).

— Potential for oncogenic toxicity is unknown.

- **Abacavir (ZIAGEN™; ABC); available as TRIZIVIR™, a combination of ZDV, 3TC, and ABC**

— 300 mg twice daily.

Advantages

— potent HIV inhibitor, and

— well tolerated in patients with HIV infection.

Disadvantages

— Severe hypersensitivity reactions can occur, usually within the first 6 weeks of treatment.

— Potential for delayed toxicity (oncogenic/teratogenic) is unknown.

ANTIRETROVIRAL AGENTS FOR USE AS PEP ONLY WITH EXPERT CONSULTATION

- **Ritonavir (NORVIR™; RTV)**

Disadvantages

— difficult to take (requires dose escalation),

— poor tolerability, and

— many drug interactions.

- **Saquinavir (FORTOVASE™, soft-gel formulation; SQV)**

Disadvantages

— Bioavailability is relatively poor, even with new formulation.

- **Amprenavir (AGENERASE™; AMP)**

Disadvantages

— Dosage consists of eight large pills taken twice daily.

— Many drug interactions.

- **Delavirdine (RESCRIPTOR™; DLV)**

Disadvantages

— Drug is associated with rash (early onset) that can be severe and progress to Stevens-Johnson syndrome.

— Many drug interactions.

- **Lopinavir/Ritonavir (KALETRA™)**

— 400/100 mg twice daily.

Advantages

— potent HIV inhibitor, and

— well tolerated in patients with HIV infection.

Disadvantages

— Concomitant use of flecainide, propafenone, astemizole, terfenadine, dihydroergotamine, ergotamine, ergonovine, methylergonovine, rifampin, cisapride, St. John's Wort, lovastatin, simvastatin, pimozide, midazolam, or triazolam is not recommended because inhibition of the metabolism of these drugs could create the potential for serious and/or life-threatening adverse events (e.g., cardiac arrhythmias, prolonged sedation, or respiratory depression).

— May accelerate the clearance of certain drugs, including oral contraceptives (requiring alternative or additional contraceptive measures for women taking these drugs).

— Potential for delayed toxicity (oncogenic/teratogenic) is unknown.

ANTIRETROVIRAL AGENTS GENERALLY NOT RECOMMENDED FOR USE AS PEP

- **Nevirapine (VIRAMUNE™; NVP)**

— 200 mg daily for 2 weeks, then 200 mg twice daily.

Disadvantages

- Associated with severe hepatotoxicity (including at least one case of liver failure requiring liver transplantation in an exposed person taking PEP),
- Associated with rash (early onset) that can be severe and progress to Stevens-Johnson syndrome,
- Differentiating between early drug-associated rash and acute seroconversion can be difficult and cause extraordinary concern for the exposed person, and
- Concomitant use of St. John's Wort is not recommended because this might result in suboptimal antiretroviral drug concentrations.

CDC
MMWR
MORBIDITY AND MORTALITY
WEEKLY REPORT

June 29, 2001 / Vol. 50 / No. RR-11

Recommendations and Reports

Continuing Education Activity Sponsored by CDC

Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis

EXPIRATION — June 29, 2002

You must complete and return the response form electronically or by mail by **June 29, 2002,** to receive continuing education credit. If you answer all of the questions, you will receive an award letter for 1.75 hours Continuing Medical Education (CME) credit, .15 hour Continuing Education Units (CEUs), or 2.0 hours Continuing Nursing Education (CNE) credit. If you return the form electronically, you will receive educational credit immediately. If you mail the form, you will receive educational credit in approximately 30 days. No fees are charged for participating in this continuing education activity.

INSTRUCTIONS

By Internet

1. Read this *MMWR* (Vol. 50, RR-11), which contains the correct answers to the questions beginning on the next page.
2. Go to the *MMWR* Continuing Education Internet site at <http://www.cdc.gov/mmwr/cme/conted.html>.
3. Select which exam you want to take and select whether you want to register for CME, CEU, or CNE credit.
4. Fill out and submit the registration form.
5. Select exam questions. To receive continuing education credit, you must answer all of the questions. Questions with more than one correct answer will instruct you to "Indicate all that apply."
6. Submit your answers no later than **June 29, 2002**.
7. Immediately print your Certificate of Completion for your records.

By Mail or Fax

1. Read this *MMWR* (Vol. 50, RR-11), which contains the correct answers to the questions beginning on the next page.
2. Complete all registration information on the response form, including your name, mailing address, phone number, and e-mail address, if available.
3. Indicate whether you are registering for CME, CEU, or CNE credit.
4. Select your answers to the questions, and mark the corresponding letters on the response form. To receive continuing education credit, you must answer all of the questions. Questions with more than one correct answer will instruct you to "Indicate all that apply."
5. Sign and date the response form or a photocopy of the form and send no later than **June 29, 2002**, to
   Fax: 404-639-4198 Mail: MMWR CE Credit
   Office of Scientific and Health Communications
   Epidemiology Program Office, MS C-08
   Centers for Disease Control and Prevention
   1600 Clifton Rd, N.E.
   Atlanta, GA 30333
6. Your Certificate of Completion will be mailed to you within 30 days.

ACCREDITATION

Continuing Medical Education (CME). CDC is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians. CDC designates this educational activity for a maximum of 1.75 hours in category 1 credit toward the AMA Physician's Recognition Award. Each physician should claim only those hours of credit that he/she actually spent in the educational activity.

Continuing Education Unit (CEU). CDC has been approved as an authorized provider of continuing education and training programs by the International Association for Continuing Education and Training and awards .15 hour Continuing Education Units (CEUs).

Continuing Nursing Education (CNE). This activity for 2.0 contact hours is provided by CDC, which is accredited as a provider of continuing education in nursing by the American Nurses Credentialing Center's Commission on Accreditation.

GOALS and OBJECTIVES:

The *MMWR* provides recommendations regarding the guidance of clinical practice and policy development related to the management of occupational exposures to blood and bloodborne pathogens, including the appropriate use of postexposure prophylaxis (PEP). Upon completion of this educational activity, the reader should be able to a) describe the management process following an occupational exposure to blood; b) describe the evaluation of the exposure and assessment of the risk for bloodborne pathogen transmission; c) describe appropriate laboratory evaluation of the exposed worker and source person; d) describe appropriate selection and use of PEP; and e) describe the follow-up evaluation and counseling of exposed health-care personnel (HCP).

To receive continuing education credit, please answer all of the following questions.

1. **Factors to consider in assessing the need for follow-up after an occupational exposure include**
   - A. The type of exposure.
   - B. The type of fluid.
   - C. The bloodborne pathogen infection status of the source.
   - D. The susceptibility of the exposed.
   - E. All of the above.
   - F. None of the above.

2. **Which of the following exposures pose a risk for bloodborne pathogen infection?**
   - A. A nurse sustains a needlestick while drawing up insulin to administer to a patient with diabetes.
   - B. A lab worker is splashed in the eye with urine from a patient with HIV.
   - C. An operating room technician with chapped and abraded hands notices blood under his/her gloves after assisting in a surgery on a patient with hepatitis C infection.
   - D. While cleaning the bathroom, a housekeeper's intact skin has contact with feces.

3. **Which lab tests should be completed for the exposed person to determine his/her susceptibility to a bloodborne pathogen infection?**
   - A. HBsAg.
   - B. HIV p24 antigen.
   - C. HCV RNA.
   - D. All of the above.
   - E. None of the above.

4. **Following a percutaneous exposure to HCV-infected blood, what action(s) is/are recommended?**
   A. Test the exposed person for antibody to HCV and alanine aminotransferase (ALT) at the time of the exposure and 4–6 months postexposure.
   B. Administer one dose of immune globulin within 7 days of the exposure.
   C. Immediately start PEP with interferon and ribavirin.
   D. All of the above.
   E. None of the above.

5. **After completing the initial 3-dose vaccine series against HBV, HCP who will have contact with patients or blood and are at ongoing risk for percutaneous injuries should have anti-HBs testing completed**
   A. Every year.
   B. After any blood exposure.
   C. 1–2 months after the completion of the vaccine series.
   D. All of the above.
   E. None of the above.

6. **The type of occupational exposure to HIV-infected blood that poses the greatest risk for infection transmission is**
   A. A percutaneous injury.
   B. A mucous membrane exposure.
   C. A bite.
   D. Skin contact with HIV-infected blood.

7. **For which of the following exposures would the use of HIV PEP be recommended?**
   A. A housekeeper sustains a percutaneous injury while emptying a needle box on a pediatric ward with no known cases of HIV infection.
   B. A nurse has a urine splash to the eye while emptying an AIDS patient's urinal.
   C. A resident, after assisting with an emergency insertion of a central venous line into an HIV-infected patient, notices a small tear in his/her glove but does not observe any blood on his/her skin.
   D. A phlebotomist sustains a percutaneous injury while performing phlebotomy on an HIV-infected patient.
   E. All of the above.

8. Following an exposure to a bloodborne pathogen, what information would be included as part of the postexposure counseling? (Indicate all that apply.)

A. HCP exposed to HBV and HCV do not need to take any special precautions to prevent secondary transmission during the follow-up period.

B. Modifying an exposed person's patient care responsibilities is not necessary to prevent transmission to patients after an exposure to HBV, HCV, or HIV.

C. HCP who have an HIV exposure for which PEP is not recommended should be informed that the potential side effects and toxicity of taking PEP outweigh the risk of transmission posed by the type of exposure.

D. HCP should seek medical evaluation for any acute illness that occurs during the follow-up period.

9. Indicate your work setting.

A. State/local health department.

B. Other public health setting.

C. Hospital clinic/private practice.

D. Managed care organization.

E. Academic institution.

F. Other.

10. Which best describes your professional activities?

A. Patient care—emergency/urgent care department.

B. Patient care—inpatient.

C. Patient care—primary-care clinic or office.

D. Laboratory/pharmacy.

E. Public health.

F. Other.

11. I plan to use these recommendations as the basis for ... (*Indicate all that apply.*)

A. Health-education materials.

B. Insurance reimbursement policies.

C. Local practice guidelines.

D. Public policy.

E. Other.

12. Each month, approximately how many patients do you see with occupational exposure?

A. None.

B. 1–5.

C. 6–0.

D. 21–50.

E. 51–100.

F. >100.

13. How much time did you spend reading this report and completing the exam?

A. 1–1.5 hours.
B. More than 1.5 hours but fewer than 2 hours.
C. 2–2.5 hours.
D. More than 2.5 hours.

14. After reading this report, I am confident that I can describe the management process following an occupational exposure to blood.

A. Strongly agree.
B. Agree.
C. Neither agree nor disagree.
D. Disagree.
E. Strongly disagree.

15. After reading this report, I am confident that I can describe the evaluation of the exposure and assessment of the risk for bloodborne pathogen transmission.

A. Strongly agree.
B. Agree.
C. Neither agree nor disagree.
D. Disagree.
E. Strongly disagree.

16. After reading this report, I am confident that I can describe appropriate laboratory evaluation of the exposed worker and source person.

A. Strongly agree.
B. Agree.
C. Neither agree nor disagree.
D. Disagree.
E. Strongly disagree.

17. After reading this report, I am confident that I can describe appropriate selection and use of PEP.

A. Strongly agree.
B. Agree.
C. Neither agree nor disagree.
D. Disagree.
E. Strongly disagree.

18. After this report, I am confident that I can describe the follow-up evaluation and counseling of an exposed worker.

A. Strongly agree.
B. Agree.
C. Neither agree nor disagree.
D. Disagree.
E. Strongly disagree.

19. The objectives are relevant to the goal of this report.

A. Strongly agree.
B. Agree.
C. Neither agree nor disagree.
D. Disagree.
E. Strongly disagree.

20. The tables, boxes, and appendices are useful.

A. Strongly agree.
B. Agree.
C. Neither agree nor disagree.
D. Disagree.
E. Strongly disagree.

21. Overall, the presentation of the report enhanced my ability to understand the material.

A. Strongly agree.
B. Agree.
C. Neither agree nor disagree.
D. Disagree.
E. Strongly disagree.

22. These recommendations will affect my practice.

A. Strongly agree.
B. Agree.
C. Neither agree nor disagree.
D. Disagree.
E. Strongly disagree.

23. How did you learn about this continuing education activity?

A. Internet.
B. Advertisement (e.g., fact sheet, *MMWR* cover, newsletter, or journal).
C. Coworker/supervisor.
D. Conference presentation.
E. *MMWR* subscription.
F. Other.

Correct answers for questions 1–8.

1. E; 2. C; 3. E; 4. A; 5. C; 6. A; 7. D; 8. A, B, C, D.

MMWR Response Form for Continuing Education Credit
June 29, 2001/Vol. 50/No. RR-11

Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis

To receive continuing education credit, you must
1. *provide your contact information;*
2. *indicate your choice of CME, CEU, or CNE credit;*
3. *answer all of the test questions;*
4. *sign and date this form or a photocopy;*
5. *submit your answer form by June 29, 2002.*

Failure to complete these items can result in a delay or rejection of your application for continuing education credit.

Detach or photocopy.

Last Name *First Name*

Street Address or P.O. Box

Apartment or Suite

City *State* *ZIP Code*

Phone Number *Fax Number*

E-Mail Address

Check One
- ☐ *CME Credit*
- ☐ *CEU Credit*
- ☐ *CNE Credit*

Fill in the appropriate blocks to indicate your answers. Remember, you must answer all of the questions to receive continuing education credit!

1. [ ] A [ ] B [ ] C [ ] D [ ] E [ ] F
2. [ ] A [ ] B [ ] C [ ] D
3. [ ] A [ ] B [ ] C [ ] D [ ] E
4. [ ] A [ ] B [ ] C [ ] D [ ] E
5. [ ] A [ ] B [ ] C [ ] D [ ] E
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11. [ ] A [ ] B [ ] C [ ] D [ ] E
12. [ ] A [ ] B [ ] C [ ] D [ ] E [ ] F
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20. [ ] A [ ] B [ ] C [ ] D [ ] E
21. [ ] A [ ] B [ ] C [ ] D [ ] E
22. [ ] A [ ] B [ ] C [ ] D [ ] E
23. [ ] A [ ] B [ ] C [ ] D [ ] E [ ] F

Signature *Date Completed Exam*

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MMWR

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Occupational Safety & Health Administration

- **Part Number:** 1910
- **Part Title:** Occupational Safety and Health Standards
- **Subpart:** Z
- **Subpart Title:** Toxic and Hazardous Substances
- **Standard Number:** 1910.1020
- **Title:** Access to employee exposure and medical records

- **Appendix:** A, B

(a) **Purpose.**
The purpose of this section is to provide employees and their designated representatives a right of access to relevant exposure and medical records; and to provide representatives of the Assistant Secretary a right of access to these records in order to fulfill responsibilities under the Occupational Safety and Health Act. Access by employees, their representatives, and the Assistant Secretary is necessary to yield both direct and indirect improvements in the detection, treatment, and prevention of occupational disease. Each employer is responsible for assuring compliance with this section, but the activities involved in complying with the access to medical records provisions can be carried out, on behalf of the employer, by the physician or other health care personnel in charge of employee medical records. Except as expressly provided, nothing in this section is intended to affect existing legal and ethical obligations concerning the maintenance and confidentiality of employee medical information, the duty to disclose information to a patient/employee or any other aspect of the medical-care relationship, or affect existing legal obligations concerning the protection of trade secret information.

(b) **Scope and application.**
(1) This section applies to each general industry, maritime, and construction employer who makes, maintains, contracts for, or has access to employee exposure or medical records, or analyses thereof, pertaining to employees exposed to toxic substances or harmful physical agents.
(2) This section applies to all employee exposure and medical records, and analyses thereof, of such employees, whether or not the records are mandated by specific occupational safety and health standards.
(3) This section applies to all employee exposure and medical records, and analyses thereof, made or maintained in any manner, including on an in-house or contractual (e.g., fee-for-service) basis. Each employer shall assure that the preservation and access requirements of this section are complied with regardless of the manner in which records are made or maintained.

(c) **Definitions.**
(1)"Access" means the right and opportunity to examine and copy.
(2) "Analysis using exposure or medical records" means any compilation of data or any statistical study based at least in part on information collected from individual employee exposure or medical records or information collected from health insurance claims records, provided that either the analysis has been reported to

the employer or no further work is currently being done by the person responsible for preparing the analysis.

(3) "Designated representative" means any individual or organization to whom an employee gives written authorization to exercise a right of access. For the purposes of access to employee exposure records and analyses using exposure or medical records, a recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.

(4) "Employee" means a current employee, a former employee, or an employee being assigned or transferred to work where there will be exposure to toxic substances or harmful physical agents. In the case of a deceased or legally incapacitated employee, the employee's legal representative may directly exercise all the employee's rights under this section.

(5) "Employee exposure record" means a record containing any of the following kinds of information:

i. Environmental (workplace) monitoring or measuring of a toxic substance or harmful physical agent, including personal, area, grab, wipe, or other form of sampling, as well as related collection and analytical methodologies, calculations, and other background data relevant to interpretation of the results obtained;

ii. Biological monitoring results which directly assess the absorption of a toxic substance or harmful physical agent by body systems (e.g., the level of a chemical in the blood, urine, breath, hair, fingernails, etc.) but not including results which assess the biological effect of a substance or agent or which assess an employee's use of alcohol or drugs;

iii. Material safety data sheets indicating that the material may pose a hazard to human health; or

iv. In the absence of the above, a chemical inventory or any other record which reveals where and when used and the identity (e.g., chemical, common, or trade name) of a toxic substance or harmful physical agent.

(6) i. "Employee medical record" means a record concerning the health status of an employee which is made or maintained by a physician, nurse, or other health care personnel, or

(A) Medical and employment questionnaires or histories (including job description and occupational exposures),

(B) The results of medical examinations (pre-employment, pre-assignment, periodic, or episodic) and laboratory tests (including chest and other X-ray examinations taken for the purpose of establishing a base-line or detecting occupational illnesses and all biological monitoring not defined as an "employee exposure record"),

(C) Medical opinions, diagnoses, progress notes, and recommendations,

(D) First aid records,

(E) Descriptions of treatments and prescriptions, and

(F) Employee medical complaints.

ii. "Employee medical record" does not include medical information in the form of:

(A) Physical specimens (e.g., blood or urine samples) which are routinely discarded as a part of normal medical practice, or
(B) Records concerning health insurance claims if maintained separately from the employer's medical program and its records, and not accessible to the employer by employee name or other direct personal identifier (e.g., social security number, payroll number, etc.), or
(C) Records created solely in preparation for litigation which are privileged from discovery under the applicable rules of procedure or evidence; or
(D) Records concerning voluntary employee assistance programs (alcohol, drug abuse, or personal counseling programs) if maintained separately from the employer's medical program and its records.

(7) "Employer" means a current employer, a former employer, or a successor employer.

(8) "Exposure" or "exposed" means that an employee is subjected to a toxic substance or harmful physical agent in the course of employment through any route of entry (inhalation, ingestion, skin contact or absorption, etc.), and includes past exposure and potential (e.g., accidental or possible) exposure, but does not include situations where the employer can demonstrate that the toxic substance or harmful physical agent is not used, handled, stored, generated, or present in the workplace in any manner different from typical non-occupational situations.

(9) "Health Professional" means a physician, occupational health nurse, industrial hygienist, toxicologist, or epidemiologist, providing medical or other occupational health services to exposed employees.

(10) "Record" means any item, collection, or grouping of information regardless of the form or process by which it is maintained (e.g., paper document, microfiche, microfilm, X-ray film, or automated data processing).

(11) "Specific chemical identity" means a chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.

(12) i."Specific written consent" means a written authorization containing the following:
(A) The name and signature of the employee authorizing the release of medical information,
(B) The date of the written authorization,
(C) The name of the individual or organization that is authorized to release the medical information,
(D) The name of the designated representative (individual or organization) that is authorized to receive the released information,
(E) General description of the medical information that is authorized to be released,
(F) A general description of the purpose for the release of the medical information, and
(G) A date or condition upon which the written authorization will expire (if less than one year).

ii. A written authorization does not operate to authorize the release of medical information not in existence on the date of written authorization, unless the

release of future information is expressly authorized, and does not operate for more than one year from the date of written authorization.

iii. A written authorization may be revoked in writing prospectively at any time.

(13) "Toxic substance or harmful physical agent" means any chemical substance, biological agent (bacteria, virus, fungus, etc.), or physical stress (noise, heat, cold, vibration, repetitive motion, ionizing and non-ionizing radiation, hypo - or hyperbaric pressure, etc.) which:

i. Is listed in the latest printed edition of the National Institute for Occupational Safety and Health (NIOSH) Registry of Toxic Effects of Chemical Substances (RTECS) which is incorporated by reference as specified in Sec. 1910.6; or

ii. Has yielded positive evidence of an acute or chronic health hazard in testing conducted by, or known to, the employer; or

iii. Is the subject of a material safety data sheet kept by or known to the employer indicating that the material may pose a hazard to human health.

(14) "Trade secret" means any confidential formula, pattern, process, device, or information or compilation of information that is used in an employer's business and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it.

(d) **Preservation of records.**

(1) Unless a specific occupational safety and health standard provides a different period of time, each employer shall assure the preservation and retention of records as follows:

i. "Employee medical records." The medical record for each employee shall be preserved and maintained for at least the duration of employment plus thirty (30) years, except that the following types of records need not be retained for any specified period:

(A) Health insurance claims records maintained separately from the employer's medical program and its records,

(B) First aid records (not including medical histories) of one-time treatment and subsequent observation of minor scratches, cuts, burns, splinters, and the like which do not involve medical treatment, loss of consciousness, restriction of work or motion, or transfer to another job, if made on-site by a non-physician and if maintained separately from the employer's medical program and its records, and

(C) The medical records of employees who have worked for less than (1) year for the employer need not be retained beyond the term of employment if they are provided to the employee upon the termination of employment.

ii. "Employee exposure records." Each employee exposure record shall be preserved and maintained for at least thirty (30) years, except that:

(A) Background data to environmental (workplace) monitoring or measuring, such as laboratory reports and worksheets, need only be retained for one (1) year so long as the sampling results, the

collection methodology (sampling plan), a description of the analytical and mathematical methods used, and a summary of other background data relevant to interpretation of the results obtained, are retained for at least thirty (30) years; and

(B) Material safety data sheets and paragraph (c)(5)(iv) records concerning the identity of a substance or agent need not be retained for any specified period as long as some record of the identity (chemical name if known) of the substance or agent, where it was used, and when it was used is retained for at least thirty (30) years(1); and

(C) Biological monitoring results designated as exposure records by specific occupational safety and health standards shall be preserved and maintained as required by the specific standard.

iii. "Analyses using exposure or medical records." Each analysis using exposure or medical records shall be preserved and maintained for at least thirty (30) years.

(2) Nothing in this section is intended to mandate the form, manner, or process by which an employer preserves a record so long as the information contained in the record is preserved and retrievable, except that chest X-ray films shall be preserved in their original state

(e) **Access to records**

(1) General.

(i) Whenever an employee or designated representative requests access to a record, the employer shall assure that access is provided in a reasonable time, place, and manner. If the employer cannot reasonably provide access to the record within fifteen (15) working days, the employer shall within the fifteen (15) working days apprise the employee or designated representative requesting the record of the reason for the delay and the earliest date when the record can be made available.

(ii) The employer may require of the requester only such information as should be readily known to the requester and which may be necessary to locate or identify the records being requested (e.g. dates and locations where the employee worked during the time period in question).

(iii) Whenever an employee or designated representative requests a copy of a record, the employer shall assure that either:

(A) A copy of the record is provided without cost to the employee or representative,

(B) The necessary mechanical copying facilities (e.g., photocopying) are made available without cost to the employee or representative for copying the record, or

(C) The record is loaned to the employee or representative for a reasonable time to enable a copy to be made.

(iv) In the case of an original X-ray, the employer may restrict access to on-site examination or make other suitable arrangements for the temporary loan of the X-ray.

(v) Whenever a record has been previously provided without cost to an employee or designated representative, the employer may charge reasonable, non-discriminatory administrative costs (i.e., search and copying expenses but not including overhead expenses) for a request by the employee or designated representative for additional copies of the record, except that

(A) An employer shall not charge for an initial request for a copy of new information that has been added to a record which was previously provided; and

(B) An employer shall not charge for an initial request by a recognized or certified collective bargaining agent for a copy of an employee exposure record or an analysis using exposure or medical records.

(vi) Nothing in this section is intended to preclude employees and collective bargaining agents from collectively bargaining to obtain access to information in addition to that available under this section.

(2) "Employee and designated representative access" -

(i) "Employee exposure records."

(A) Except as limited by paragraph (f) of this section, each employer shall, upon request, assure the access to each employee and designated representative to employee exposure records relevant to the employee. For the purpose of this section, an exposure record relevant to the employee consists of:

{1} A record which measures or monitors the amount of a toxic substance or harmful physical agent to which the employee is or has been exposed;

{2} In the absence of such directly relevant records, such records of other employees with past or present job duties or working conditions related to or similar to those of the employee to the extent necessary to reasonably indicate the amount and nature of the toxic substances or harmful physical agents to which the employee is or has been subjected, and

{3} Exposure records to the extent necessary to reasonably indicate the amount and nature of the toxic substances or harmful physical agents at workplaces or under working conditions to which the employee is being assigned or transferred.

(B) Requests by designated representatives for unconsented access to employee exposure records shall be in writing and shall specify with reasonable particularity:

{1} The record requested to be disclosed; and

{2} The occupational health need for gaining access to these records.

(ii) "Employee medical records."

(A) Each employer shall, upon request, assure the access of each employee to employee medical records of which the employee is the subject, except as provided in paragraph (e)(2)(ii)(D) of this section.

(B) Each employer shall, upon request, assure the access of each designated representative to the employee medical records of any employee who has given the designated representative specific written consent. Appendix A to

this section contains a sample form which may be used to establish specific written consent for access to employee medical records.

(C) Whenever access to employee medical records is requested, a physician representing the employer may recommend that the employee or designated representative:

{1} Consult with the physician for the purposes of reviewing and discussing the records requested,

{2} Accept a summary of material facts and opinions in lieu of the records requested, or

{3} Accept release of the requested records only to a physician or other designated representative.

(D) Whenever an employee requests access to his or her employee medical records, and a physician representing the employer believes that direct employee access to information contained in the records regarding a specific diagnosis of a terminal illness or a psychiatric condition could be detrimental to the employee's health, the employer may inform the employee that access will only be provided to a designated representative of the employee having specific written consent, and deny the employee's request for direct access to this information only. Where a designated representative with specific written consent requests access to information so withheld, the employer shall assure the access of the designated representative to this information, even when it is known that the designated representative will give the information to the employee.

(E) A physician, nurse, or other responsible health care personnel maintaining employee medical records may delete from requested medical records the identity of a family member, personal friend, or fellow employee who has provided confidential information concerning an employee's health status.

(iii) Analyses using exposure or medical records.

(A) Each employer shall, upon request, assure the access of each employee and designated representative to each analysis using exposure or medical records concerning the employee's working conditions or workplace.

(B) Whenever access is requested to an analysis which reports the contents of employee medical records by either direct identifier (name, address, social security number, payroll number, etc.) or by information which could reasonably be used under the circumstances indirectly to identify specific employees (exact age, height, weight, race, sex, date of initial employment, job title, etc.), the employer shall assure that personal identifiers are removed before access is provided. If the employer can demonstrate that removal of personal identifiers from an analysis is not feasible, access to the personally identifiable portions of the analysis need not be provided.

(3) "OSHA access."

(i) Each employer shall, upon request, and without derogation of any rights under the Constitution or the Occupational Safety and Health Act of 1970, 29 U.S.C. 651 "et seq.," that the employer chooses to exercise, assure the prompt access of representatives of the Assistant Secretary of Labor for Occupational Safety and Health to employee exposure and medical records and to analyses using

exposure or medical records. Rules of agency practice and procedure governing OSHA access to employee medical records are contained in 29 CFR 1913.10.

(ii) Whenever OSHA seeks access to personally identifiable employee medical information by presenting to the employer a written access order pursuant to 29 CFR 1913.10(d), the employer shall prominently post a copy of the written access order and its accompanying cover letter for at least fifteen (15) working days.

(f) **Trade secrets.**

(1) Except as provided in paragraph (f)(2) of this section, nothing in this section precludes an employer from deleting from records requested by a health professional, employee, or designated representative any trade secret data which discloses manufacturing processes, or discloses the percentage of a chemical substance in mixture, as long as the health professional, employee, or designated representative is notified that information has been deleted. Whenever deletion of trade secret information substantially impairs evaluation of the place where or the time when exposure to a toxic substance or harmful physical agent occurred, the employer shall provide alternative information which is sufficient to permit the requesting party to identify where and when exposure occurred.

(2)The employer may withhold the specific chemical identity, including the chemical name and other specific identification of a toxic substance from a disclosable record provided that:

i. The claim that the information withheld is a trade secret can be supported;

ii. All other available information on the properties and effects of the toxic substance is disclosed;

iii. The employer informs the requesting party that the specific chemical identity is being withheld as a trade secret; and

iv. specific chemical identity is made available to health professionals, employees and designated representatives in accordance with the specific applicable provisions of this paragraph.

(3)Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity of a toxic substance is necessary for emergency or first-aid treatment, the employer shall immediately disclose the specific chemical identity of a trade secret chemical to the treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement. The employer may require a written statement of need and confidentiality agreement, in accordance with the provisions of paragraphs (f)(4) and (f)(5), as soon as circumstances permit.

(4) In non-emergency situations, an employer shall, upon request, disclose a specific chemical identity, otherwise permitted to be withheld under paragraph (f)(2) of this section, to a health professional, employee, or designated representative if:

(i) The request is in writing;

(ii) The request describes with reasonable detail one or more of the following occupational health needs for the information:

(A) To assess the hazards of the chemicals to which employees will be exposed;

(B) To conduct or assess sampling of the workplace atmosphere to determine employee exposure levels;

(C) To conduct pre-assignment or periodic medical surveillance of exposed employees;

(D) To provide medical treatment to exposed employees;

(E) To select or assess appropriate personal protective equipment for exposed employees;

(F) To design or assess engineering controls or other protective measures for exposed employees; and

(G) To conduct studies to determine the health effects of exposure.

(iii) The request explains in detail why the disclosure of the specific chemical identity is essential and that, in lieu thereof, the disclosure of the following information would not enable the health professional, employee or designated representative to provide the occupational health services described in paragraph (f)(4)(ii) of this section;

(A) The properties and effects of the chemical;

(B) Measures for controlling workers' exposure to the chemical;

(C) Methods of monitoring and analyzing worker exposure to the chemical; and

(D) Methods of diagnosing and treating harmful exposures to the chemical;

(iv) The request includes a description of the procedures to be used to maintain the confidentiality of the disclosed information; and

(v) The health professional, employee, or designated representative and the employer or contractor of the services of the health professional or designated representative agree in a written confidentiality agreement that the health professional, employee or designated representative will not use the trade secret information for any purpose other than the health need(s) asserted and agree not to release the information under any circumstances other than to OSHA, as provided in paragraph (f)(9) of this section, except as authorized by the terms of the agreement or by the employer.

(5) The confidentiality agreement authorized by paragraph (f)(4)(iv) of this section:

(i) May restrict the use of the information to the health purposes indicated in the written statement of need;

(ii) May provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages; and,

(iii) May not include requirements for the posting of a penalty bond.

(6) Nothing in this section is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.

(7) If the health professional, employee or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the employer who provided the information shall be informed by the health professional prior to, or at the same time as, such disclosure.

(8)If the employer denies a written request for disclosure of a specific chemical identity, the denial must:

(i) Be provided to the health professional, employee or designated representative within thirty days of the request;

(ii) Be in writing;

(iii) Include evidence to support the claim that the specific chemical identity is a trade secret;

(iv) State the specific reasons why the request is being denied; and,

(v) Explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the specific chemical identity.

(9) The health professional, employee, or designated representative whose request for information is denied under paragraph (f)(4) of this section may refer the request and the written denial of the request to OSHA for consideration.

(10) When a health professional, employee, or designated representative refers a denial to OSHA under paragraph (f)(9) of this section, OSHA shall consider the evidence to determine if:

(i) The employer has supported the claim that the specific chemical identity is a trade secret;

(ii) The health professional employee, or designated representative has supported the claim that there is a medical or occupational health need for the information; and

(iii) The health professional, employee or designated representative has demonstrated adequate means to protect the confidentiality.

(11)(i) If OSHA determines that the specific chemical identity requested under paragraph (f)(4) of this section is not a "bona fide" trade secret, or that it is a trade secret but the requesting health professional, employee or designated representatives has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means for complying with the terms of such agreement, the employer will be subject to citation by OSHA.

(ii)If an employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret specific chemical identity, the Assistant Secretary may issue such orders or impose such additional limitations or conditions upon the disclosure of the requested chemical information as may be appropriate to assure that the occupational health needs are met without an undue risk of harm to the employer.

(12)Notwithstanding the existence of a trade secret claim, an employer shall, upon request, disclose to the Assistant Secretary any information which this section requires the employer to make available. Where there is a trade secret claim, such claim shall be made no later than at the time the information is provided to the Assistant Secretary so that suitable determinations of trade secret status can be made and the necessary protections can be implemented.

(13)Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process or percentage of mixture information which is a trade secret.

(g) **Employee information.**

(1) Upon an employee's first entering into employment, and at least annually thereafter, each employer shall inform current employees covered by this section of the following:

(i) The existence, location, and availability of any records covered by this section;

(ii) The person responsible for maintaining and providing access to records; and

(iii) Each employee's rights of access to these records.

(2)Each employer shall keep a copy of this section and its appendices, and make copies readily available, upon request, to employees. The employer shall also distribute to current employees any informational materials concerning this section which are made available to the employer by the Assistant Secretary of Labor for Occupational Safety and Health.

(h) **Transfer of records.**

(1) Whenever an employer is ceasing to do business, the employer shall transfer all records subject to this section to the successor employer. The successor employer shall receive and maintain these records.

(2)Whenever an employer is ceasing to do business and there is no successor employer to receive and maintain the records subject to this standard, the employer shall notify affected current employees of their rights of access to records at least three (3) months prior to the cessation of the employer's business.

(3)Whenever an employer either is ceasing to do business and there is no successor employer to receive and maintain the records, or intends to dispose of any records required to be preserved for at least thirty (30) years, the employer shall:

(i) Transfer the records to the Director of the National Institute for Occupational Safety and Health (NIOSH) if so required by a specific occupational safety and health standard; or

(ii) Notify the Director of NIOSH in writing of the impending disposal of records at least three (3) months prior to the disposal of the records.

(4)Where an employer regularly disposes of records required to be preserved for at least thirty (30) years, the employer may, with at least (3) months notice, notify the Director of NIOSH on an annual basis of the records intended to be disposed of in the coming year.

(i)Appendices. The information contained in appendices A and B to this section is not intended, by itself, to create any additional obligations not otherwise imposed by this section nor detract from any existing obligation.

[61 FR 5507, Feb. 13, 1996; 61 FR 9227, March 7, 1996; 61 FR 31427, June 20, 1996]

Resources

Useful Sources of Information

March 2005

Post Exposure Prophalaxis
PEPline – free consultation 24 hours a day with experts on PEP
1-888-448-4911
www.ucsf.edu/hivcntr

Offices and Organizations
Idaho Emergency Medical Services Bureau
Department of Health
590 W. Washington St.
Boise, ID 83702
1-208-334-4000
www.idahoems.org

World Wide Web Sites
Centers for Disease Control and Prevention (CDC) – the lead federal agency on the subject of infection diseases.
http://www.cdc.gov

Morbidity & Mortality Weekly Reports (MMWR) – a free journal describing infection diseases in the U.S.; you can subscribe to receive the table of contents in an email message every week.
http://www.cdc.gov/mmwr/

The National Institute for Safety and Health (NIOSH) - **NIOSH** is responsible for conducting research and making recommendations for the prevention of work-related illnesses and injuries.
http://www.cdc.gov/niosh/homepage.html

The Occupational Safety and Health Administration (OSHA) - The department of the US government with the responsibility to ensure safety and healthful work environments.
http://www.osha.gov

State of Idaho Reportable Diseases Rules and Regulations (complete version)
http://www2.state.id.us/adm/adminrules/rules/idapa16/0210.pdf

State of Idaho Reportable Disease List and Contact Information
http://www.healthandwelfare.idaho.gov/_Rainbow/Documents/health/REPORTDisease%20Poster%20Oct%202004.pdf

Idaho Department of Health and Welfare - Our mission is to promote and protect the health and safety of all Idahoans.
http://www.healthandwelfare.idaho.gov

Reporting Numbers for District Health Departments

REPORTING SUSPECTED CASES*

To provide emergency notification or immediate reports of reportable diseases or conditions:

After Hours

Call Idaho State Communications, **1-800-632-8000**, and a public health official will be paged.

During Business Hours

Call your district health department or the Idaho Department of Health and Welfare, Office of Epidemiology and Food Protection.

	Health Department	Phone
1	Panhandle Health District	208-666-9269
2	North Central District Health Department	208-799-3100
3	Southwest District Health	208-455-5442
4	Central District Health Department	208-327-8625
5	South Central District Health	208-734-5900
6	Southeastern District Health Department	208-239-5231 208-478-6321
7	District 7 Health Department	208-522-0310
State	IDHW Office of Epidemiology and Food Protection	208-334-5939

**All reports are confidential and must include:*

- *Disease or condition reported*
- *Patient's name, age, sex, address (including city and county), phone number*
- *Physician's name, address, phone number*

IDAHO REPORTABLE DISEASE LIST

Health care providers, laboratorians, and hospital administrators are required, according to the Rules and Regulations Governing Idaho Reportable Diseases (IDAPA 16.02.10), to report the following communicable diseases and conditions to their local health district or the state Office of Epidemiology and Food Protection. Reports must be made within three (3) working days of identification or diagnosis unless otherwise noted below.
Rules link: www2.state.id.us/adm/adminrules/rules/idapa16/16index.htm

Bacterial Diseases

- Anthrax [immediately]
- Botulism: foodborne, infant, other [immediately]
  Brucellosis [24 hours]
  Campylobacteriosis
  Chancroid
  Chlamydia trachomatis
- Cholera [24 hours]
- Diphtheria [immediately]
  E. coli O157:H7, other toxigenic non-O157 strains [24 hours]
  Gonorrhea (*Neisseria gonorrhoeae*)
  Haemophilus influenzae, invasive disease [24 hours]
  Legionellosis/Legionnaire's disease
  Leprosy
  Leptospirosis
  Listeriosis
  Lyme disease
  Neisseria meningitidis, invasive [24 hours]
- Pertussis [24 hours]
- Plague [immediately]
  Psittacosis
  Relapsing fever (tick and louse-borne)
  Salmonellosis (including typhoid fever) [24 hours]
  Shigellosis (all species)
  Streptococcus, group A, invasive
  Streptococcus pneumoniae (pneumococcus), < 18y
- Syphilis
  Tetanus
- Tuberculosis
  Tularemia [24 hours]
  Yersiniosis (all spp.)

Rickettsia and Parasites

Amebiasis
Cryptosporidiosis
Giardiasis
Malaria
Pneumocystis carinii pneumonia (PCP)
Q-fever [24 hours]
Rocky Mountain spotted fever
Trichinosis

Other

- Cancer (report to Cancer Data Registry, 338-5100)
- Extraordinary occurrence of illness including syndromic clusters with or without an etiologic agent [24 hours]
- Foodborne illness/food poisoning [24 hours]
  HUS (hemolytic uremic syndrome) [24 hours]
  Lead ≥ 10 ug/dl whole blood
  Newborn screening abnormal findings: [24 hours]
    Biotinidase deficiency
    Congenital hypothyroidism
    Maple syrup urine disease
    Galactosemia
    Phenylketonuria
  Reye's syndrome
  Rheumatic fever, acute
- Severe or unusual reactions to any immunization [24 hours]
- Transmissible spongiform encephalopathies (TSEs) including CJD and vCJD
  TSS (toxic shock syndrome)
- Waterborne illness [24 hours]

Viral Diseases

- Encephalitis, viral or aseptic
  Hantavirus pulmonary syndrome [24 hours]
- Hepatitis A [24 hours]
  Hepatitis B [24 hours]
  Hepatitis C
  HIV/AIDS: positive tests (HIV antibody, HIV antigen & other HIV isolations, CD4 count < 200 cells/mm^3 blood or ≤ 14%)
  HTLV (human T-lymphotrophic virus)
- Measles (rubeola) [24 hours]
  Meningitis, viral or aseptic
  Mumps
- Myocarditis, viral
- Poliomyelitis [24 hours]
- Rabies: human [immediately], animal [24 hours]
  Rabies post-exposure prophylaxis
- Rubella, including congenital rubella syndrome [24 hours]
- SARS [24 hours]
- Smallpox [immediately]
  West Nile virus infections

- Suspected cases also reportable

Reporting a Case

All reports are confidential and must include:

- Disease or condition reported
- Patient's name, age, sex, address (including city and county), phone #
- Physician's name, address, phone #

Immediate Reports / Emergency Notification
Business hours: call your local health district or the Office of Epidemiology and Food Protection at **1-208-334-5939**
After hours: Call the State Communications public health paging system: **1-800-632-8000**.
Public health will be paged immediately.

24-hour reports (report within 1 working day)
Business hours: call your local health district.
After hours: If the reporting period falls on a weekend or holiday, report the next state working day.

Routine reports (report within 3 working days)
Routine 3-day reports may be mailed.
Business hours: Call your local health district.
After hours: Call the Office of Epidemiology and Food Protection automated reporting line: **1-800-632-5927**
THIS IS NOT AN EMERGENCY HOTLINE

PROTOCOL FOR REVIEWING AND RESPONDING TO APPLICATIONS FOR SUSPECTED SIGNIFICANT EXPOSURES DURING EMERGENCY MEDICAL ASSISTANCE TO PERSONS WITH POSSIBLE HIV/AIDS AND/OR HEPATITIS B INFECTIONS

Petitioner Responsibilities

1. The applicant must send or deliver the Significant Exposure Report form to the Idaho Epidemiology Services Program, Bureau of Clinical and Preventive Services, 450 West State Street, 4th Floor, P.O. Box 83720, Boise, ID 83720-0036. The form may also be faxed to the Bureau at (208) 332-7346.

Bureau of Clinical and Preventive Services Responsibilities

1. When the form is received, it will immediately be date stamped and passed on to the Epidemiology Services Program for consideration under the Idaho Significant Exposure statute. The State Epidemiologist or in his/her absence the Bureau Chief will provide the initial review to determine if the application falls under the purview of this law and has been filed within the 14 day limit after exposure as specified in the regulations.

2. The Bureau secretary will keep a log of the application to include: name of petitioner, potential infection type, date application received, district, disposition of the application with date processed or returned.

3. If the application is not appropriate to the Significant Exposure Law or has been filed after the 14 day limit, a form letter will be sent by the Epidemiology Services Program back to the applicant and the district along with copies of the application.

4. OEFP staff will be responsible for conducting the significant exposure investigation on applications screened by the State Epidemiologist.

5. If the application is approved for processing, the investigator will:

   a. Review the Hepatitis B Registry for the named source person;

   b. Review the Acquired Immune Deficiency Syndrome (AIDS) Case Registry for the named source person; and

   c. Review the Human Immunodeficiency Virus (HIV) Registry for the named source person.

6. If the review of the registries fails to find the named source person, the **Significant Exposure Disposition** form will be marked "No information on HIV or Hepatitis B is available" and will be forwarded to the respective district health department.

7. If the review of the registries finds the named source person, the investigator shall confirm that the individual claiming a significant exposure was present at the incident which led to the claimed exposure. This will be accomplished by a review of the emergency vehicle run report(s), hospital emergency room report(s), police unit report(s), or other reports which are accessible either by

telephone or in person. The determination shall be made where possible within two working days, and in 95% of requests, within 14 days.

8. The investigator may contact the applicant or petitioner for more information on the incident, if additional information appears needed to evaluate the significance of the exposure.

9. The investigator will then decide, based on the composite information available, whether an incident did occur, the petitioner was present, and that a significant exposure to blood or body fluids did or did not occur.

10. If the investigator decides that a significant exposure may have occurred, the investigator will:

    a. Immediately contact the district health department staff designated as the blood-borne disease investigator for the geographic area of the exposure or district in which the applicant's work or residence is located to inform the district health department of the conclusion of the review that a significant exposure has occurred based on the information submitted and acquired;

    b. Send a confidential copy of the **Significant Exposure Disposition** form containing the information, or lack of information, on the named source of exposure to the district health department staff designated as the blood-borne disease investigator.

11. If the investigator decides that no significant exposure occurred, the investigator will:

    a. Inform the district staff that the request for information is disapproved based on the insignificance of the exposure, inability to confirm the incident (e.g., accident) occurred, or inability to place the applicant at the scene;

    b. Mark the **Significant Exposure Information Request** form *"disapproved;"*

    c. Send a confidential copy of the form to the district.

12. OEFP will maintain the files for three years from the date of disposition.

District Responsibilities

1. The district health department designated staff shall contact the applicant and inform him/her that no information is available, or that they may have had an exposure, and counsel them appropriately. **Applicants who may have had an exposure should be notified immediately by the district health department designated staff.**

    As described in *Idaho Code* chapter 2, 39-610, "The significantly exposed person shall be informed only that he may have been exposed to HIV or HBV, as the case may be, and thereafter advised of whatever prophylactic and testing procedures are appropriate. The significantly exposed person shall not be informed of the name of the infected patient or deceased person."

Effective Date: January 1, 1998
Modified: March 7, 2005

IDAHO DEPARTMENT OF HEALTH AND WELFARE
SIGNIFICANT EXPOSURE INFORMATION REQUEST

This form is to be used ONLY for potential exposure to AIDS, HIV, and/or Hepatitis B.

(Completed and signed by person providing emergency or medical services.)
Must be received within 14 days of incident.

Please Print:

Name_____ Phone (Home)_____ (Work)_____

Home Address_____
Street City State Zip Code

Your Occupation_____

Emergency Service Affiliation_____

Emergency Service Report Number_____

Incident: Date_____ Time_____ A.M./P.M. Place_____ Type_____
(e.g., auto accident, etc.)

Have you received hepatitis B vaccine? Yes___ No___

Exposure Description: (Check all applicable responses.)

- ☐ Blood or body fluids into natural body openings (nose, mouth, eye)
- ☐ Blood or body fluids into cut or wound
- ☐ Needle stick with contaminated needle
- ☐ Mouth-to-mouth resuscitation
- ☐ Resuscitation using device without backflow guard

Please describe how you think you were exposed to blood or body fluid of the person(s) you attended to:_____

_____

_____

_____

Source of Exposure:

Patient's name_____ Sex: M_____ F_____

Health care facility receiving patient_____

Additional Information:

Describe any action taken in response to the exposure to remove the contamination (e.g., hand washing):_____

_____

_____

_____

What protective measures were being taken at the time of exposure (e.g., wearing gloves, goggles):_____

_____

I hereby consent to the release of this medical record to the Idaho Department of Health and Welfare and the local district health department and agree to hold in confidence information regarding this report.

Signature_____ Date_____

Please mail in envelope stamped "Confidential" to:
Office of Epidemiology and Food Protection
Idaho Department of Health and Welfare
P.O. Box 83720
Boise, ID 83720-0036
Fax: 208-332-7307

DHW USE ONLY

Request approved for processing: No ☐

_____
Signature of DHW Official

_____
Date

Revised: 2/2005

Idaho Hospital Infection Control Representative Contact Information

March 2005

Infection Control Representative	Contact Phone	Hospital	Address	City	ST	ZIP
Heather Roy	2263203 ext 202	HARMS MEMORIAL HOSPITAL	PO BOX 420	AMERICAN FALLS	ID	83211
Mary Sayer	5278206 ext 3031	LOST RIVERS DISTRICT HOSPITAL	PO BOX 145	ARCO	ID	83213
Margene Heson	208-785-3857	BINGHAM MEMORIAL HOSPITAL	98 POPLAR ST	BLACKFOOT	ID	83221
Elaine Hendra	489-4716	IDAHO ELKS REHAB HOSPITAL	PO BOX 1100	BOISE	ID	83701
Jeff Morrell	377-8400 ext 254	INTERMOUNTAIN HOSPITAL OF BOISE	303 N ALLUMBAUGH ST	BOISE	ID	83704
Christine Dent	367-6628	ST ALPHONSUS REGIONAL MEDICAL CENTER	1055 N CURTIS RD	BOISE	ID	83706
Aimee Barns	1-208-381-2147	ST LUKE'S REGIONAL MEDICAL CENTER	190 E BANNOCK ST	BOISE	ID	83712
Ileene Wardel						
Luann Fife						
Cathy Wolf						
Christa Burnam						
Nursing Super (after Hours)	1-208-381-2222					
Janis Kerby	1-208-267-3141	BOUNDARY COMMUNITY HOSPITAL	6640 KANIKSU ST	BONNERS FERRY	ID	83805
Roxanne Olason	1-208-677-6471	CASSIA REGIONAL MEDICAL CENTER	1501 HILAND AVE	BURLEY	ID	83318
Dr. Jole Swanson	1-208-459-4667	WEST VALLEY MEDICAL CENTER	1717 ARLINGTON AVE	CALDWELL	ID	83605
Teri Coombs RN	1-208-382-4242	CASCADE MEDICAL CENTER	PO BOX 1330	CASCADE	ID	83611
Dr. Lee Lindquist	1-208-664-8944	KOOTENAI MEDICAL CENTER	2003 LINCOLN WAY	COEUR D'ALENE	ID	83814
Cathy Hylton	1-208-962-3251	ST MARY'S HOSPITAL	PO BOX 137	COTTONWOOD	ID	83522
Bonnie Burlage	1-208-354-2383	TETON VALLEY HOSPITAL & SURGICENTER	120 E HOWARD	DRIGGS	ID	83422
Gretchen Downer	1-208-365-3561 ext 3316	WALTER KNOX MEMORIAL HOSPITAL	1202 E LOCUST ST	EMMETT	ID	83617
Judy Stockham	1-208-934-4433 ext 173	GOODING COUNTY MEMORIAL HOSPITAL	PO BOX 418	GOODING	ID	83330
Georgia Lance	1-208-983-8587	SYRINGA GENERAL HOSPITAL	607 W MAIN	GRANGEVILLE	ID	83530
Fran Pertersen	1-208-529-7392	EASTERN IDAHO REGIONAL MEDICAL CENTER	PO BOX 2077	IDAHO FALLS	ID	83403
Helen Smith RN	1-208-324-1122 ext 3280	ST BENEDICTS FAMILY MEDICAL CENTER	709 N LINCOLN ST	JEROME	ID	83338
Carol McCluskey	1-208-784-7017 ext 337	SHOSHONE MEDICAL CENTER	3 JACOB'S GULCH RD	KELLOGG	ID	83837
Joe Dee Alverson	1-208-727-8475	ST LUKE'S WOOD RIVER MEDICAL CENTER	PO BOX 100	KETCHUM	ID	83340
Barbara Boland	1-208-799-5228	ST JOSEPH REGIONAL MEDICAL CENTER	PO BOX 816	LEWISTON	ID	83501
Colleen Montgomery	1-208-766-2231	ONEIDA COUNTY HOSPITAL	PO BOX 126	MALAD CITY	ID	83252
Linda Pierson	1-208-634-2221	MCCALL MEMORIAL HOSPITAL	1000 STATE ST	MCCALL	ID	83638
Janet Skinner RN	1-208-847-4439	BEAR LAKE MEMORIAL HOSPITAL	164 S FIFTH ST	MONTPELIER	ID	83254
Sue Rand	1-208-883-6250	GRITMAN MEDICAL CENTER	700 S MAIN ST	MOSCOW	ID	83843
Emily Kerr	1-208-587-8401 ext 162	ELMORE MEDICAL CENTER	PO BOX 1270	MOUNTAIN HOME	ID	83647
Karen Otter	1-208-463-5540	MERCY MEDICAL CENTER	1512 - 12TH AVE RD	NAMPA	ID	83686
Jane Albers	1-208-476-4555 ext 074	CLEARWATER VALLEY HOSPITAL & CLINICS	301 CEDAR	OROFINO	ID	83544
Christy Sabel	1-208-229-1115	PORTNEUF MEDICAL CENTER	651 MEMORIAL DR	POCATELLO	ID	83201
Joyce Winter	1-208-852-4124	FRANKLIN COUNTY MEDICAL CENTER	44 N FIRST EAST ST	PRESTON	ID	83263
Teri Conrad RN	1-208-359-6711	MADISON MEMORIAL HOSPITAL	PO BOX 310	REXBURG	ID	83440
RoZan Egan RN	1-208-436-0481	MINIDOKA MEMORIAL HOSPITAL	1224 - 8TH ST	RUPERT	ID	83350
Marie Ross	1-208-245-5551 ext 290	BENEWAH COMMUNITY HOSPITAL	229 S SEVENTH ST	ST MARIES	ID	83861
Linda Astalos	1-208-756-5682 ext 5682	STEELE MEMORIAL HOSPITAL	PO BOX 700	SALMON	ID	83467
Mary Reiter	1-208-265-3399	BONNER GENERAL HOSPITAL	PO BOX 1448	SANDPOINT	ID	83864
Brenda Bergholm	1-208-547-3341 ext 270	CARIBOU MEMORIAL HOSPITAL	300 S THIRD W	SODA SPRINGS	ID	83276
Patricia Heath RN	1-208-737-2594	MAGIC VALLEY REGIONAL MEDICAL CENTER	PO BOX 409	TWIN FALLS	ID	83303
Joel Swanson	1-208-459-4667	WEISER MEMORIAL HOSPITAL	645 E FIFTH	WEISER	ID	83672
Pamela G. Lewis RN MHS, CIC	1-208-422-1000 ext 7190	VETERANS AFFAIRS MEDICAL CENTER	500 W FORT ST	BOISE	ID	83702

Vermont Emergency Medical Services

SAMPLE JOB DESCRIPTION:
DESIGNATED OFFICER FOR INFECTION CONTROL
6/14/04

PREREQUISITES: interest in infection control
trained in the provision of health care
employed by or member of the EMS agency

COMMITMENT: Will require 24-hour availability and involve professional responsibilities in the following areas:

- Notification
- Reporting
- Documentation
- Evaluation
- Inspection
- Interpretation
- Education
- Consultation
- Research

MAJOR RESPONSIBLITIES:

1) Assures quality care of patients and department members with respect to infection control
2) Teaches pertinent infection control measures to personnel or insures that this teaching is conducted
3) Provides oversight of a program for exposure notification and medical follow up
4) Monitors compliance with department infection control policies and procedures
5) Serves as a liaison to medical facilities and the public health officer
6) Improves department infection control activities
7) Works with Administration, Risk Management and Safety on infection control related issues

SPECIFIC TASKS:

1) Establishes and maintains confidential records on employee exposure, medical follow up and personal illness
2) Reports regularly to safety officer and to Risk Management
3) Prepares regular reports (at least yearly) on infection control issues
4) Ensures reporting and documentation of member exposure, follow up and maintenance of confidentiality
5) Works with the education and training office to insure required infection control programs are conducted
6) Identifies education & training needs through compliance monitoring and exposure reporting
7) Reviews current literature on infection control relative to EMS and shares with Administration and Education and Training
8) Provides, or has another qualified person provide, formal and informal training upon request
9) Works with Administration, Risk Management, Safety, and Education & Training to develop, update and review department infection control activities

10) Assists medical facilities in notification and reporting activities
11) Interviews and refers exposed members and others as deemed appropriate
12) Maintains communication with hospitals/medical facilities and other agencies to improve interagency relations
13) Assists in the evaluation of new products and equipment relating to infection control
14) Develops and maintains infection control policies and procedures for the department
15) Monitors the development and revision of the department's infection control program

I. General Considerations

A. Responsibility

Although employers bear some of the responsibility for prevention of spread of disease, each EMS provider must take the responsibility to safeguard his or her own health and safety. This includes using the personal protective equipment (PPE) appropriate for a particular situation. Although this protocol describes many of the elements of an exposure control plan, it is not an exposure control plan.

B. Risks of Disease Transmission

The risk for transmission of most serious infectious diseases is low, e.g., the human immunodeficiency virus (HIV), which causes AIDS. If an EMS provider is stuck by a needle containing HIV-positive blood, the chance of becoming HIV-positive is approximately 0.3% (less than 1 in 300). This risk can be reduced even further by taking a few precautions.

Hepatitis B, on the other hand, is much easier to contract; there is a 15% - 30% chance of an unvaccinated person becoming infected after being stuck by a needle containing blood with hepatitis B virus (HBV).

Disease can be passed by fluids other than blood. Other potentially infectious materials are semen, vaginal secretions, cerebrospinal fluid, synovial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood and all body fluids in situations where it is difficult or impossible to differentiate between body fluids. It is frequently not possible for EMS providers to know whether a patient has an infectious disease.

C. Preventing the Spread of Disease

1. The easiest and most effective way to prevent spread of disease is handwashing. The preferred agent to use for cleaning unsoiled hands is an alcohol-based hand rub. Clean soiled hands with soap and water. Either plain (non-antimicrobial) or antimicrobial soap is acceptable. Hands are soiled if they are visibly dirty, contaminated with proteinaceous material, or soiled with blood or other body fluids. They are also considered soiled after the healthcare worker has used a restroom or if the healthcare worker has had either suspected or proven exposure to Bacillus anthracis, the bacterium that causes anthrax.
2. Another way to prevent spread of disease is to use standard precautions, which combine the major features of universal (or blood and body fluid) precautions and body substance isolation (BSI) and applies them to all patients. Standard precautions apply to 1) blood; 2) all body fluids, secretions, and excretions except sweat, regardless of whether or not they contain visible blood; 3) nonintact skin; and 4) mucous membranes.
3. EMS providers should not recap, bend or break needles or other sharps. Recapping is permitted only when no alternative is feasible or it is required for a specific medical procedure. When it is done, the provider should use a mechanical device or one-handed technique.
4. EMS providers should dispose of contaminated needles and sharps as soon as possible in appropriate sharps containers.
5. The spread of airborne diseases can also be limited by a few simple precautions. Patients who are at risk for infection with an airborne disease include those who have a persistent cough (more than three weeks), bloody sputum, night sweats, weight loss, anorexia or fever. If the patient is not in acute respiratory distress and has no other indications for oxygen, have the patient wear a surgical mask if he will tolerate it. The EMS provider should be qualified for and wear an N-95 mask or other respirator rated at N-95 or higher. Additionally, EMS providers should avoid aerosol-generating procedures or anything that might provoke coughing by the patient. As circumstances allow, keep windows open and set heating and air conditioning systems on a nonrecirculating cycle. If the ambulance is equipped with HEPA (high efficiency particulate air) filtration, this should be used.

   As circumstances allow, limit the number of providers in close contact with the patient. Whenever possible, use a pocket mask, bag valve mask or other device to ventilate a patient rather than perform mouth-to-mouth. This is true for all patients.

D. Exposure Control Plan

Each EMS agency should have an exposure control plan that is reviewed and updated at least annually. It should include:

- a general explanation of the modes of transmission, epidemiology and symptoms of bloodborne and airborne diseases;
- a description of engineering controls and work practice controls (equipment and procedures) that instructs providers in the means to prevent exposure;
- information on the hepatitis B vaccine and how to obtain it free of charge;
- the procedure for vaccination against hepatitis B;
- a description of types, selection, proper use, location, removal, handling, decontamination and disposal of PPE;
- the procedure to follow when a potential exposure occurs, including the actions to take and the person to contact;
- how a provider should get evaluation and follow-up after an exposure;
- a description of how hazards are communicated;
- record keeping standards; and
- documentation of the agency's compliance with the requirement for annual consideration of new technology that reduces exposure to bloodbome pathogens (as required by the revisions made in 29 CFR 1910.1030 after passage of the Needlestick Safety and Prevention Act of 2000).

Each agency should also have a respiratory protection program that is reviewed and updated at least annually. This may be included as part of the exposure control plan. Elements of such a program include:

- procedures for selecting respirators for use in the workplace;
- medical evaluations of employees required to use respirators; a physician or other licensed health care professional shall perform medical evaluations using a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire; the employer shall provide a follow-up medical examination to any employee who gives a positive response to certain questions on the questionnaire;
- fit testing procedures for tight-fitting respirators; fit testing must be repeated annually and whenever there is a change in the respirator facepiece provided by the employer and whenever there is a change in the employee's physical condition that could affect respirator fit;
- procedures for proper use of respirators in routine and reasonably foreseeable emergency situations;
- procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding and otherwise maintaining respirators;
- training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations;
- training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance; and
- procedures for regularly evaluating the effectiveness of the program.

E. Immunization

Each EMS agency should provide hepatitis B vaccinations free of charge to EMS providers who may in the course of their EMS duties have occupational exposure, i.e., they may reasonably be expected to come into contact with blood or other body fluids. Agencies should also assure that providers are immune to or up to date in their vaccinations against measles, mumps, rubella, tetanus and pertussis.

F. Personal Protective Equipment (PPE)

PPE consists of gloves, eye protection, masks and respirators, gowns, pocket masks and other ventilation devices that the EMS agency furnishes to providers at no charge. They should be used as appropriate to prevent contact with blood and other body fluids. See Appendix 1,

"Examples of Recommended Personal Protection for Worker Protection Against HIV and HBV Transmission in Prehospital Settings." The provider may briefly and temporarily decline to use PPE when, under rare and extraordinary circumstances, the provider decides that the use of PPE would prevent the delivery of health care or would pose an increased hazard to the safety of the responder.

G. Housekeeping

All equipment and environmental working surfaces should be cleaned and decontaminated after contact with blood or other potentially infectious materials. See Appendix 2, "Reprocessing Methods for Equipment used in the Prehospital Health-Care Setting" and Appendix 3, "Recommendations for Decontamination and Cleaning of Rescue Vehicles."

H. Hazard Communication

Containers with blood or other potentially infectious materials should have the fluorescent orange or orange-red biohazard label on them. There are two major exceptions to this. First, red bags or containers may be substituted for the labels. Second, containers of blood for clinical use (e.g., blood drawing tubes) do not have to be labeled.

I. Training

An EMS agency should provide information and training on bloodborne and airborne diseases before an EMS provider begins providing patient care. The agency should provide annual refresher training to providers. The refresher training should include, among other things, a description of any changes in tasks or procedures that affect the provider's occupational exposure.

Initial training should include:

- a description of OSHA's requirements;
- a description of the EMS agency's exposure control plan;
- a general explanation of the modes of transmission, epidemiology and symptoms of bloodborne and airborne diseases;
- a description of engineering controls and work practice controls (equipment and procedures) that assist providers in avoiding exposure;
- information on the hepatitis B vaccine;
- the procedure for vaccination against hepatitis B;
- a description of types, selection, proper use, location, removal, handling, decontamination and disposal of PPE;
- the procedure to follow when a potential exposure occurs, including the actions to take and the person to contact;
- how a provider should get evaluation and follow-up after an exposure;
- a description of how hazards are communicated; and
- an opportunity to get answers to providers' questions.

J. Record Keeping

Each EMS agency should establish and maintain an accurate, confidential medical record for each EMS provider with occupational exposure, i.e., the provider may reasonably be expected to come into contact with blood or other body fluids. The record should include:

- the provider's name;
- a copy of the provider's hepatitis B vaccination status;
- a copy of all results of examinations, medical tests and follow-up procedures for the provider;
- the agency's copy of the healthcare professional's written opinions on the desirability of hepatitis B vaccination and post-exposure evaluation and follow-up;
- for an exposure, the information provided to the healthcare professional who evaluated the provider (description of the provider's duties as they relate to the exposure incident, documentation of the route(s) of exposure and circumstances under which the exposure occurred and results of the source

individual's blood testing, if available).

Each EMS agency should have training records. The records should be maintained for at least three years from the date the training occurred. The training records should include:

- dates of training sessions;
- contents or a summary of the training sessions;
- names and qualifications of the person(s) conducting the training;
- names and job titles of the person(s) conducting the training.

K. Occupational Safety and Health Administration (OSHA)

OSHA has rules pertaining to bloodborne pathogens (29 CFR 1910.1030) and tuberculosis (29 CFR 1910.134, the Respiratory Protection Standard, and OSHA Instruction CPL 2.106, Enforcement Procedures and Scheduling for Occupational Exposure to Tuberculosis (TB)).

L. Ryan White Comprehensive AIDS Resources Emergency Act

The Ryan White CARE Act is a federal law that gives emergency response employees certain rights and obligations when they are exposed to certain potentially life-threatening diseases during the course of an emergency. The potentially life threatening diseases include certain airborne diseases (infectious pulmonary tuberculosis), bloodborne diseases (hepatitis B and human immunodeficiency virus infection, including AIDS) and uncommon or rare diseases (diphtheria, meningococcal disease, plague, hemorrhagic fevers and rabies). The law requires that each emergency response agency have a designated officer (DO) for infection control who coordinates information gathering and communication. The Ryan White law specifically includes not just employees, but also "other persons (including employees of legally organized and recognized volunteer organizations, without regard to whether such employees receive nominal compensation) who, in the course of professional duties, respond to emergencies in the geographic area involved."

M. Emerging Infectious Diseases

The 2002-2003 outbreak of Severe Acute Respiratory Syndrome (SARS) demonstrated very effectively that new infectious diseases can and will occur. It is not possible to predict the location, form or virulence of such a disease, so EMS providers and agencies will need to be vigilant. Providers can rely on the Vermont Department of Health and the Centers for Disease Control and Prevention to be reliable and timely sources of information and advice when these outbreaks occur.

II. Procedures

A. Exposure to Bloodborne Disease

1. An exposure has occurred when there is eye, mouth, other mucous membrane, non-intact skin or parenteral contact between an EMS provider and blood or other potentially infectious material as a result of the EMS provider's duties. Non-intact skin includes weeping wounds, rashes and open wounds less than one hour old.
2. As soon as possible after an exposure, the EMS provider should wash with soap and water any skin that was involved. Flush exposed mucous membranes with water.
3. The EMS provider should contact the agency's designated officer (DO) for infection control and document the route of exposure and the circumstances under which the incident occurred.
4. The designated officer should collect the facts relating to the circumstances of the incident and determine whether the responder could have been exposed to hepatitis B or HIV (assuming the source patient had either or both of those diseases).
5. If the DO determines that the responder could have been exposed to a bloodborne disease, then the DO should submit to the hospital to which the patient was transported a written request for a determination of exposure.
6. The hospital should evaluate the facts and, if the source patient can be identified, review the patient's medical records for results of tests for hepatitis B, HIV infection, and infectious pulmonary tuberculosis (TB) and for signs and symptoms compatible with

these diseases.

7. Federal law requires the hospital , within 48 hours, to submit one of three written responses:
   a. there was no exposure;
   b. there is insufficient information to determine whether there was an exposure; or
   c. there was an exposure.
8. If the hospital notifies the DO that there was an exposure, the notification shall include the name of the infectious disease involved and the date the source patient was transported.
9. The DO shall notify providers who responded to the incident and who may have been exposed:
   a. that they may have been exposed;
   b. of the name of the disease involved;
   c. of any actions the provider should take;
   d. if medically appropriate, of the date of the incident.
10. The EMS agency should cooperate with the receiving hospital in seeing that HBV and HIV testing is performed on the source patient when the patient's HBV and HIV status is unknown and the patient has given consent. The agency and hospital should make the source individual's test results available to the provider in accordance with federal and state laws and regulations.
11. The EMS agency should arrange for the responder's blood to be tested for HBV and HIV as soon as feasible after consent is obtained.
12. The agency should provide post-exposure prophylaxis when medically indicated. Free consultation with experienced experts is available from the National Clinicians' Post-Exposure Prophylaxis Hotline (PEP Line). This is a 24-hour emergency hotline that provides immediate information to clinicians regarding the management of an employee who has experienced an occupational exposure to blood. The toll-free number is (888) 448-4911.
13. The EMS agency should also provide counseling to the provider as needed. This is especially important with regard to HIV exposure.
14. If the provider reports an illness that may have resulted from the exposure, the EMS agency should arrange for medical evaluation.

B. Exposure to Airborne Disease

1. An exposure may occur when a provider shares air space with a patient who has an infectious disease caused by an airborne pathogen. Vermont has one of the lowest TB case loads in the country. There were seven cases of infectious pulmonary TB in the entire state in 2001, 4 cases in 2000 and 3 in 1999. Similarly, suspected cases of Severe Acute Respiratory Syndrome (SARS) have been uncommon, but not unheard of, in Vermont. This knowledge must be balanced with an awareness that people diagnosed in another state may visit Vermont.
2. If a hospital determines that a patient transported by ambulance has infectious pulmonary TB, federal law requires the hospital to notify the DO for the service within 48 hours of making the diagnosis.
3. An EMS provider may request a determination by the agency's DO if the provider believes he or she may have been exposed to infectious pulmonary tuberculosis. The procedure is the same as for bloodborne diseases.

C. Exposure to Uncommon or Rare Diseases

1. An EMS provider may request a determination by the agency's DO if there is reason to believe he or she may have been exposed to an uncommon disease like meningococcal disease. The procedure is the same as for bloodborne diseases.

III. Appendices

Appendix 1 Examples of Recommended Personal Protection for Worker Protection Against HIV and HBV Transmission in Prehospital Settings

Appendix 2 Reprocessing Methods for Equipment used in the Prehospital Health-Care Setting

Appendix 3 Recommendations for Decontamination and Cleaning of Rescue Vehicles

DHD Administration / Epidemiology Program Roster (November, 2004)

DHD 1
Panhandle District Health Department
2195 Ironwood Court
Coeur d' Alene, ID 83814

DHD 1 (Panhandle District Health Dept.)	Program Responsibilities	Telephone Number	Fax Number	E-Mail Address
Jeanne Bock, Director		(208)415-5100	(208)415-5101	jbock@phd1.state.id.us
Jim Fenton, Fiscal Officer		(208) 415-5100	(208)415-5101	jfenton@phd1.state.id.us
Epis:	Inf.Ctrl Staff Cell of the day (208) 667-3481			
Randi Lustig, Epidemiologist, Family and Community Health	TB, Pertussis, N. Meningitis, Hepatitis A, B, and C,	(208)415-5260	(866)716-2599	rrusso@phd1.state.id.us
Mary Roos, RN (EPI)	and VPDs	(208)415-5295		mroos@phd1.state.id.us
(Supervisor: Lora Whalen)		(208)415-5240	(866)716-2599	lwhalen@phd1.state.id.us
HOTLINE: 208-771-0271				
Jeff Lee, Epidemiologist, PHP/BT (Supervisor: Dale Peck)	Smallpox	(208) 415-5262	(866)716-2599	jlee@phd1.state.id.us
Dave Hylsky, Epidemiologist, Environmental Health (Supervisor: Ken Babin)	Enterics (food and water borne) and Zoonotics (Rabies, Hanta virus, WNV, Relapsing Fever)	(208) 415-5263	(866)716-2599	dhylsky@phd1.state.id.us
Ken Lustig, Environmental Health Director		(208) 415-5200	(208) 664-8736	klustig@phd1.state.id.us

DHD 2
North Central District Health Department
215 10th Street
Lewiston, ID 83501

DHD 2 (North Central District Health Dept.)	Program Responsibilities	Telephone Number	Fax Number	E-Mail Address
Carol Moehrle, Director		(208) 799-3100	(208) 799-0349	cmoehrle@phd2.state.id.us
Bonnie Konrad, Fiscal Officer		(208) 799-3100	(208) 799-0349	bkonrad@phd2.state.id.us
Epis:				
Donna Anderson, Epidemiologist, Community Health (Supervisor: Sonja Schriever)	PHP activities, active surveillance projects, Epi investigations, Rabies (human), Food and Water, Hep A, B, and C, Community Ed, Infection Control Mtgs, WNV, Lead	(208) 799-0381	(208) 799-0349	danders@phd2.state.id.us
Laura Rogers, Epidemiologist, Community Health (Supervisor: Sonja Schriever)	STD (CT, GC, Syphilis), HIV, TB, Employee Health, OSHA, Clinic, Immunizations	(208) 799-3100	(208) 799-0349	lrogers@phd2.state.id.us
Sonja Schriever, Community Health Director	Oversight, management and supervision, Epidemiology, PHP, Health Promotion programs	(208) 799-3100	(208) 799-0349	sschriev@phd2.state.id.us
Paul Guenther, Environmental Health Director	Oversight, management and supervision, Environmental Health Programs, Food, water, sewage & vector, Rabies (animal), WNV	(208) 799-0356	(208) 799-0349	pguenthe@phd2.state.id.us

NOTE: North Central District Health Department also utilizes an "epi team" to handle all major investigations and/or outbreaks. The team is comprised of staff from each office, the administrative team and epi staff.

DHD Administration / Epidemiology Program Roster (November, 2004)

DHD3

DHD 3
Southwest District Health Department
920 Main Street
Caldwell, ID 83605

DHD 3 (Southwest District Health Dept.)	Program Responsibilities	Telephone Number	Fax Number	E-Mail Address
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Leon Hansen, Fiscal Officer		(208) 455-5301	(208) 454-7722	lhansen@phd3.state.id.us
Jan Edmonds, FHS Division Administrator	Note: Supervises Pat Harris	(208) 455-5392	(208) 454-7722	jedmonds@phd3.state.id.us
Jacque Walker , Epidemiology Supervisor	Epi Investigation	(208) 455-5447		
Elaine Young, Administrative Assistant Caldwell	CD Reporting Line	(208) 455-5442	(208) 455-5350	
Jacque Walker, Epidemiologist Caldwell	Staff Epidemiologist for Public Health Preparedness		(208) 455-5350	jwalker@phd3.state.id.us
Jennifer Tripp, Epidemiologist Caldwell	General Epidemiology and Public Health Preparedness	(208) 455-5362	(208) 455-5350	jtripp@phd3.state.id.us
Lesli Scharbrough, CD / EPI Nurse (Weiser/Payette)	General Epidemiology	(208) 549-2370		lscharbrough@phd3.state.id.us
C.J. Soltis, EH Specialist	Foodborne	(208) 455-5404		csoltis@phd3.state.id.us
Jami Delmore, EH Specialist	Waterborne, WNV	(208) 455-5403		jdelmore@phd3.state.id.us

DHD4

DHD 4
Central District Health Department
707 N. Armstrong Place
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DHD 4 (Central District Health Dept.)	Program Responsibilities	Telephone Number	Fax Number	E-Mail Address
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Cindy Trail, Supervisor, Epidemiology Program		(208) 327-8625 (208) 327-8550(direct)	(208) 327-8554	ctrail@cdhd.idaho.gov
Connie Merrill, Epidemiologist	General Epidemiology, TB, DOT, Refugees	(208) 327-8601	(208) 327-8554	cmerrill@cdhd.idaho.gov
Harry Ezell, Epidemiologist	General Epidemiology, Hepatitis C	(208) 327-8622	(208) 327-8554	hezell@cdhd.idaho.gov
Gladys Goodman, Epidemiologist	General Epidemiology, STD / HIV	(208) 327-8630	(208) 327-8554	ggoodman@cdhd.idaho.gov
Bill Tramontin, Epidemiologist	General Epidemiology	(208) 327-8624	(208) 327-8554	btramont@cdhd.idaho.gov
Dawn Irons, Administrative Assistant	Gen. Epidemilogy	(208) 327-8625	(208) 327-8554	dirons@cdhd.idaho.gov
Tom Turco, Environmental Health Director		(208) 327-8520	(208) 327-8500	tturco@cdhd.idaho.gov
Tom Schmalz, Food Program Supervisor		(208) 327-8532	(208) 327-8500	tschmalz@cdhd.idaho.gov
Bob Jue, EH Epidemiologist	Foodborne, Vectors, Animal Issues	(208) 327-8523	(208) 327-8500	rjue@cdhd.idaho.gov

DHD Administration / Epidemiology Program Roster (November, 2004)

DHD5

DHD 5
South Central District Health Department
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Twin Falls, ID 83301

DHD 5 (South Central District Health Dept.)	Program Responsibilities	Telephone Number	Fax Number	E-Mail Address
Cheryl Juntunen, Director		(208) 734-5900	(208) 734-9502	cheryl-j@phd5.state.id.us
Bonnie Spencer, Fiscal Officer		(208) 734-5900	(208) 734-9502	bonnie-s@phd5.state.id.us
Epis:		Note: CB direct 737-5936		
Cheryle Becker, Epidemiologist (Supervisor: Tom Machala)	General Epidemiology, TB, Hepatitis C, HIV, STD, Foodborne, PHP	(208) 734-5900, x.236	208-736-3009	c-becker@phd5.state.id.us
Karin Frodin, Epidemiologist (Supervisor: Tom Machala)	General Epidemiology, TB, Hepatitis C, HIV, STD, Foodborne, PHP, WNV	(208) 734-5900, x.274	208-736-3009	kfrodin@phd5.state.id.us
Lisa Klamm, Epidemiologist (Minidoka / Cassia Counties) (Supervisor: Tom Machala)	General Epidemiology, TB, Hepatitis C, STD, Foodborne	(208) 436-7185		lklamm@phd5.state.id.us
Vacant, Environmental Health Epidemiologist (Supervisor: Tom Machala)	General Epidemiology, WNV, Foodborne, PHP	(208) 734-5900, x.247	208-736-3009	wlane@phd5.state.id.us
Dan Kriz, Environmental Health Director	General Epidemiology, WNV, Foodborne	(208) 734-5900	(208) 734-9502	dan-k@phd5.state.id.us

DHD6

DHD 6
Southeastern District Health Department
1901 Alvin Ricken Drive
Pocatello, ID 83201

DHD 6 (Southeastern District Health Department)	Program Responsibilities	Telephone Number	Fax Number	E-Mail Address
Ed Marugg, Director		(208) 233-9080	(208) 234-7169	emarugg@phd6.state.id.us
Kim Gaskill, Fiscal Officer		(208) 233-9080	(208) 234-7169	kgaskill@phd6.state.id.us
Maggie Mann	Epi Supervisor	(208) 233-9080 x 258		mmann@phd6.state.id.us
Kathy Reynolds, Epidemiologist (Supervisor: Maggie Mann)	STDs (including HIV), Hepatitis B and C, Tuberculosis	(208) 233-9080 x 231 (208) 239-5231 (direct)	(208) 233-1916	kreynold@phd6.state.id.us
Wendi Lane, Health Educator/Epidemiologist (Supervisor: Maggie Mann)		(208) 233-9080 x 303	(208) 233-1916	
Jeff Doerr, Epidemiologist (Supervisor: Maggie Mann)	WNV, PHP, Rabies, Food and water-borne illnesses	(208) 478-6321 (208) 233-9080 x 258	(208) 233-1916	jdoerr@phd6.state.id.us
Steve Pew, Environmental Health Director		(208) 239-5272	(208) 234-7169	spew@phd6.state.id.us

DHD Administration / Epidemiology Program Roster (November, 2004)

DHD 7
District Seven Health Department
254 E Street
Idaho Falls, ID 83402-7063

DHD 7 (District 7 Health Dept.)	Program Responsibilities	Telephone Number	Fax Number	E-Mail Address
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Steve Thomas, Fiscal Officer		(208) 522-0310	(208) 525-7063	sthomas@phd7.state.id.us
Epis:				
Ken Anderson, Epidemiologist	Primary General Epidemiology, TB Program Coordinator	(208) 522-0310, x.140	(208) 525-7063	kanderso@phd7.state.id.us
Holly Peterson, Surveillance Epidemiologist	Surveillance Epidemiology, General Epidemiology, TB, PHP	(208) 522-0310, x.212	(208) 525-7063	hpeterso@phd7.state.id.us
Supervisor: Tammy Cox		(208) 522-0310, x.144	(208) 525-7063	tcox@phd7.state.id.us
Sherry Long, STD Nurse	HIV, Hepatitis B, Other STDs	(208) 522-0310, x.137	(208) 525-7063	slong@phd7.state.id.us
Dorothy Hansen, STD Nurse	Hepatitis C, Other STDs	(208) 522-0310, x.136	(208) 525-7063	dhansen@phd7.state.id.us