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IDAHO DISEASE Bulletin

IDAHO DEPARTMENT OF HEALTH & WELFARE

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Mercury Spills in Schools Lead to Physician Referrals

On January 27, 2009 the Idaho State Communications Center was notified of an elemental mercury spill that occurred in a high school. Interviews of students revealed that a mercury-containing thermometer had broken in one classroom the previous week and some mercury that had been recovered and kept in a container spilled in a different classroom on the day of the call. One student had carried the container in a backpack and pants pocket during the week between the classroom spills and also spilled mercury at home. Students were reported to have sniffed the open container of mercury to see what it smelled like (it's odorless). Several pregnant women and one younger child were potentially exposed. Regional hazardous materials response teams and the local public health district responded, with support from several state agencies, the Environmental Protection Agency (EPA), and the Agency for Toxic Substances and Disease Registry (ATSDR).

The affected classrooms were evacuated. First responders surveyed the classrooms and the student's home with a portable mercury vapor analyzer. Typical levels of mercury detected in the classroom were 2–3 μg/m^3 of air, with a maximum of 11 μg/m^3 above the spill site. Mercury levels in the student's home ranged from 1–3 μg/m^3. The family was advised to evacuate the residence until the home could be properly cleaned.

ATSDR guidelines (see Table) for re-occupancy after mercury contamination are ≤1 μg/m^3 and no mercury beads present for residences, and ≤3 μg/m^3 and no beads present for workplaces and schools.[1] Recommended follow-up activities included testing of students' shoes and clothing for mercury and removal of contaminated, porous material from the school and home. Potentially exposed persons were referred to their physicians for evaluation and counseling.

Patient evaluation

Mercury has three forms: elemental (Hg^0), organic (*e.g.*, methylmercury), and inorganic (mercuric salts). Common routes of exposure and toxic effects differ for each. Mercury exposure from thermometer breakage is primarily through inhalation of elemental mercury vapor. Virtually none (<0.1%) of ingested elemental mercury is absorbed. Dermal reactions associated with elemental mercury liquid or vapor contact are rare.

Patients with symptoms of acute mercury toxicity should be referred to emergency care. Symptoms of acute toxicity following high-level exposure (>1 mg/m^3) to mercury vapor occur within hours of the exposure. Respiratory symptoms include corrosive bronchitis with fever, chills, and dyspnea, which can progress to pulmonary edema or fibrosis. Children may be at increased risk for pulmonary toxicity and are more likely to develop respiratory failure. Abdominal cramps, diarrhea, renal dysfunction, visual disturbances, and central nervous system damage leading to neuropsychiatric disturbances and intention tremors may also occur.

Asymptomatic patients or those with mild symptoms may present for exposure evaluation. Acute exposures to elemental mercury can be detected by blood test for a few days; after two days, urine is a better indicator of elemental mercury exposure. The normal whole blood mercury level (without occupational exposure) is <2 μg/dL and normal urinary mercury

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concentration is <10 µg/L. There is no fixed correlation between blood or urine mercury levels and degree of mercury toxicity; rather, levels are compared to those of the general population (from the National Health and Nutrition Examination Survey[2]) and individuals at the 95th percentile or above are screened for intervention. Urine mercury levels ≤20 µg/L have not been reported to be associated with clinical or subclinical toxic effects. Urine mercury levels 21–39 µg/L may be associated with toxicity in some individuals; levels >40 µg/L are associated with toxicity.[3] Hair is often preferred for evaluation of chronic mercury exposure. Such exposure is most often due to methylmercury in the diet, not inhalation. The Idaho Bureau of Laboratories can perform mercury testing in blood samples (not urine or hair) and provide reference ranges for comparison and screening purposes. Sample submission information can be found at: **http://www.healthandwelfare.idaho.gov/site/3579/default.aspx** or obtained by calling 334-2235 x 269.

Mercury can cross the blood-brain and placental barriers and is also excreted in breast milk. Fetotoxic or significant developmental effects have been observed in animals. Limited human studies have also detected behavioral effects in children exposed *in utero*.

Antidotes and chelation therapy should be considered for any symptomatic patient with a clear history of acute elemental mercury exposure; however, consultation with professionals experienced in the use of chelation (*e.g.*, regional poison center) is advised.

Mercury in Idaho schools

In addition to causing potentially harmful exposures to people and attendant health care costs, mercury spills in schools result in considerable disruption and expense for schools. Classrooms or entire schools may need to be evacuated and subsequently closed during remediation. Idaho hazardous materials teams responded to more than five mercury spills last year alone and remediation costs of $18,000 per day have been reported in Idaho incidents. The Idaho Department of Health and Welfare is seeking EPA funding to begin helping schools locate and remove mercury from their buildings. Many schools believe they are mercury-free when, in fact, they are not.

Mercury in clinics

Common sources of mercury spills in clinics include broken thermometers (including thermometers in laboratory equipment), sphygmomanometers, and fluorescent and high-intensity lamps. Costs of mercury clean-up can range from $1,000–$10,000 or more for a single broken instrument. Mercury sphygmomanometers can be replaced with aneroid units, and mercury thermometers can be replaced with mercury-free digital or non-toxic liquid thermometers. See the EPA healthcare providers' website in the resource list for links to product lists of mercury-free alternatives.

RESOURCES

- Idaho Poison Center: 1-800-860-0620
- ATSDR website: http://www.atsdr.cdc.gov/. Follow mercury links to information on medical management guidelines and contaminant fact sheets.
- EPA: "Schools and Mercury" webpage: http://www.epa.gov/mercury/schools.htm
- Mercury in Treasure Valley Schools: "Evaluation of risk for students/staff exposed to elemental mercury at two schools" http://www.atsdr.cdc.gov/HAC/pha/TreasureValleySchools/MercurySchools08_LHC7-08SIGNED.pdf
- EPA: "Information for Health Care Providers." Follow links to best management practices for health care facilities. http://www.epa.gov/mercury/healthcare.htm#facilities

Table. Environmental Limits for Airborne Mercury Exposure (Source: http://www.atsdr.cdc.gov/HAC/PHA/MadisonMetropolitanSchoolMercury/MadisonMetroHC.pdf)

AGENCY	Exposure Limit per µg/m³	COMMENTS
National Institute of Occupational Safety and Health (NIOSH)	10,000 µg/m³	Immediately Dangerous to Life or Health (IDLH) value allowable for a maximum of 30 minutes in emergency situations only
Occupational Safety and Health Administration (OSHA)	100 µg/m³	Enforce able workplace standard, assuming 8hours/day, 40 hours/week
NIOSH	50 µg/m³	Workplace recommendation, assuming 8 hours/day, 40 hours/week
American Conference of Governmental Industrial Hygienists (ACGIH)	25 µg/m³	Workplace recommendation, assuming 8 hours/day, 40 hours/week
Agency for Toxic Substances and Disease Registry (ATSDR)	10 µg/m³	Level at which residents are advised to not occupy the affected area. Also a screening level for bagged clothes
ATSDR	3 µg/m³	Target cleanup level for commercial environments
ATSDR	1 ug/m³	Target cleanup level for residential environments
ATSDR	0.20 µg/m³	Chronic level of exposure at which adverse effects would not be expected. Assumes exposure time of 24 hours/day for 30 years
None	0.01 µg/m³	Typical background level

REFERENCES

[1] ATSDR. Attachment 2. ATSDR Suggested Action Levels for Indoor Mercury Vapors in Homes or Businesses with Indoor Gas Regulators. Dec. 2000. In ATSDR, Health Consultation: Residential mercury spills from gas regulators in Illinois. http://www.atsdr.cdc.gov/hac/pha/resmerc/nic_p1.html#att2

[2] CDC. Blood mercury levels in young children and childbearing-aged women—United States, 1999–2002. *MMWR.* 2004;53(43):1018–1020.

[3] ATSDR. ToxFAQs™ Chemical Agent Briefing Sheets (CABS): Mercury. http://www.atsdr.cdc.gov/cabs/mercury/index.html. Accessed on 3/17/2009.

Federal Food Safety

Foodborne outbreaks and poisonings associated with widely distributed food products have caused morbidity and mortality in residents of Idaho and the United States. In the last couple of years, breaches in food safety have led to *E. coli* in spinach[1], *Salmonella* in poultry pot pies[2] and peanut butter[3], and melamine in infant formula and pet food. These high-profile outbreaks have fueled public concern over the state of our current federal food safety network.

Food from domestic and international sources may be monitored for the presence of contaminants (*e.g.*, infectious agents, foreign materials, chemicals) at any point along the farm-to-fork continuum. Monitoring practices and the level of federal oversight vary widely, depending on the food product. The Food and Drug Administration (FDA) regulates many foods except for meat, poultry, and processed egg products, which are regulated by the United States Department of Agriculture (USDA).

FDA and USDA also oversee hazard analysis and critical control point (HACCP) programs which are mandatory for juice and seafood, meat, and poultry, and voluntary for specified milk and milk products, and retail and food service establishments. HACCP programs involve seven principles such as analyzing potential hazards and determining points during harvesting and processing where they can be controlled and establishing procedures to monitor and correct control measures. For products not covered by HACCP programs, post-production spot checking for evidence of contamination is a common food industry practice. This is often carried out by producers themselves, who may or may not voluntarily adopt food safety practices from product-specific, non-binding federal guidelines, such as Good Manufacturing Practices issued by FDA.

The Centers for Disease Control and Prevention (CDC) is not a regulatory agency, but plays an important role by collaborating with state and local health departments to investigate reported foodborne illnesses and identify their source.

Peanut problems and the FDA

The most recent nationwide outbreak associated with peanuts and peanut products processed by the Peanut Corporation of America (PCA) started in September 2008. A nationwide voluntary class 1 recall was initiated, which as of March 2009, includes over 2,800 potentially contaminated products. A Class 1 recall is defined as a recall initiated in a situation in which there is a reasonable probability that the use of or exposure to a violative product will cause serious adverse health consequences or death.

An FDA inspection of PCA's Georgia and Texas plants, in response to this outbreak, revealed contaminated product. FDA also discovered documentation that the company detected *Salmonella* in product through in-house testing, yet continued selling product. The Federal Bureau of Investigation is conducting a criminal investigation into PCA's practices.

As of March 1, 2009, 677 human infections of *Salmonella* Typhimurium associated with the outbreak and nine deaths nationwide have been reported to the CDC. In Idaho, 17 outbreak-associated cases in residents have been reported, including 1 death.

Changes may be coming

The U.S. food supply is considered one of the cleanest in the world; however, current food safety practices do not adequately prevent some contaminated food products, such as the recently recalled peanut products, from reaching the consumer. Discussion is occurring at the federal level on how to improve federal food safety oversight. Increasing criticism, specifically of FDA's food safety oversight practices, has kept FDA in the limelight for several years. Proposed new authorities for the FDA include the ability to require mandatory food recalls, establish strict federal standards on cleanliness, and create an advanced product tracking system to quickly remove suspect product from the food supply. The new FDA commissioner, Margaret Hamburg, was chosen in part due to her background in public health.

In late 2007, in response to a series of incidents involving contaminated domestic and imported foods and prior to the current peanut-associated outbreak, FDA initiated steps to improve food safety oversight by developing their Food Protection Plan (FPP). This plan was designed to protect the nation's food supply from both unintentional contamination and deliberate attack by addressing the core elements of contamination prevention: early intervention and rapid response. An official review of the progress of the FPP over the first year of implementation was published in December 2008 and can be found at **http://www.fda.gov/oc/initiatives/advance/food.html**. Ongoing workgroups with food safety partners will help further develop implementation of the FPP to enhance food protection in the United States.

REFERENCES

[1] Ongoing Multistate Outbreak of *Escherichia coli* serotype O157:H7 Infections Associated with Consumption of Fresh Spinach — United States, September 2006 *MMWR* September 29, 2006 / 55(38);1045-1046 http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5538a4.htm

[2] Multistate Outbreak of *Salmonella* Infections Associated with Frozen Pot Pies — United States, 2007 *MMWR* November 28, 2008 / 57(47);1277-1280 http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5747a3.htm

[3] Multistate Outbreak of *Salmonella* Serotype Tennessee Infections Associated with Peanut Butter — United States, 2006–2007 *MMWR* June 1, 2007 / 56(21);521-524 http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5621a1.htm

[4] Melamine contamination in China. FDA January 5, 2009 update. http://www.fda.gov/oc/opacom/hottopics/melamine.html

Recent Perinatal HIV Infections in South Dakota Underscore the Significance of Screening for HIV During the Prenatal Period

According to the South Dakota Department of Health, two infants were born with HIV in South Dakota in 2008. These infections, in a state with very low reported HIV/AIDS rates, serve to highlight the importance of prenatal care and prenatal HIV testing of pregnant women, even in low-morbidity areas such as Idaho. Although pediatric HIV/AIDS has been reported in Idaho, no perinatally infected children have been born in Idaho hospitals.

According to the Centers for Disease Control and Prevention (CDC), testing pregnant women based only on patient-acknowledged or perceived risk factors has been shown to be less effective than screening for maternal HIV infection and subsequently preventing perinatal transmission. CDC recommends HIV testing be part of the routine panel of screening tests for pregnant women with an 'opt out' option.

Most medical and health care providers should be aware that HIV screening should be a routine component of prenatal care and should be offered early in the prenatal period, but there is always room for improvement. In Idaho, most (81%) of women recalled discussing HIV testing with their doctors but less than half (49%) recalled having a blood test for HIV during their most recent pregnancy. Discussion of HIV testing was lower among married women and women with parity of two or more.

Repeat HIV testing is recommended in the third trimester for women at high risk for HIV infection (*i.e.,* injection-drug users and their sex partners, women who exchange sex for money or drugs, women who are sex partners of HIV-infected persons, and women who have had a new or more than one sex partner during the pregnancy).

Women in labor who do not have documentation of results from an HIV test during pregnancy are recommended to have a rapid HIV test and the appropriate antiretroviral prophylaxis initiated on the basis of a reactive result, without awaiting the result of confirmatory testing.

When the mother's HIV status is unknown postpartum, rapid testing of the newborn as soon as possible after birth is recommended so antiretroviral prophylaxis can be administered to HIV-exposed infants. The benefits of neonatal antiretroviral prophylaxis are best realized when initiated 12 hours after birth or earlier.

For additional recommendations and background on HIV testing in healthcare settings, see CDC recommendations at http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5514a1.htm.

ROUTINE 24-Hour Disease Reporting Line
1.800.632.5927

EMERGENCY 24-Hour Reporting Line
1.800.632.8000

An electronic version of the Rules and Regulations Governing Idaho Reportable Diseases may be found at http://adm.idaho.gov/adminrules/rules/idapa16/0210.pdf.

Current and past issues are archived online at www.epi.idaho.gov.

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