REQUIRED PCR DOCUMENTATION FOR ADVANCED AIRWAY MANAGEMENT: DATA ELEMENTS AND DEFINITIONS
(revised November 2, 2008)

The following data elements must be submitted for all patients who undergo attempts at advanced airway management by an EMS agency. Data must be submitted using the "Idaho EMS Airway Management Reporting Sheet" or may be submitted electronically (see the EMSPC website for electronic submission instructions and for the latest reporting sheet). Definitions, variables (possible values) and rationale for each data element are provided below.

Data elements should be submitted once by the EMS agency that attempts advanced airway management whether the intervention is successful or not. Interventions that require data submission include bag-valve-mask (BVM) ventilation, needle jet ventilation, cricothyrotomy, CPAP, BiPAP, and insertion of a Combitube, King airway or laryngeal mask airway (LMA).

In cases where patient care is transferred to another EMS agency, the receiving agency must also submit data if they attempt any additional advanced airway management procedures. This can include initiating advanced airway management where none is in place or replacing/redoing existing advanced airway management adjuncts. Data does not need to be submitted when the patient is received by certified providers with patent advanced airway adjuncts and managed without complications.

These data elements are based on Wang et al. Out-of-Hospital Airway Management with the inclusion of Idaho specific data elements. [1]

DATA ELEMENTS

1a and 1b. Indications for invasive airway management (check all that apply)

a. *Definition:* This data element documents the clinical indication for performing invasive airway management.

b. *Variables (possible values)*
   1. Apnea or agonal respirations
   2. Airway reflexes compromised (ventilatory effort adequate, e.g., unconscious without a gag reflex)
   3. Ventilatory effort compromised (airway reflexes adequate, e.g., pulmonary edema)
   4. Injury/illness directly involving the airway
   5. Adequate airway reflexes and ventilatory effort, but potential for future airway or ventilatory compromise as a result of course of illness, injury (head or other), or medical treatment
   6. Other

   Advanced EMTs, use these Variables:
   1. Unconscious with ineffective respiration
   2. Cardiac arrest
   3. Apnea or agonal respirations
   4. Other

c. *Rationale:* ETI can result in morbidity if injudiciously applied. There are currently no validated indications for the decision to intubate. The recommended values reflect generally accepted criteria for performing ETI. The possible values ''airway reflexes compromised (ventilatory effort adequate)'' and ''ventilatory effort compromised (airway reflexes adequate)'' represent commonly encountered clinical scenarios that merit distinct classification.

2. Endotracheal intubation attempted

a. *Definition:* This data element documents if ETI was attempted.

b. *Variables (possible values)*
   1. Yes
   2. No

c. *Rationale:* Although the primary goal of these standards is to evaluate ETI, there may be instances in which ETI is not (or cannot be) attempted and when invasive airway management is performed using another method. Future developments in technology and clinical protocols may increase the use of non- ETI methods as the primary means of airway management.

3. Endotracheal intubation not attempted; alternate method of airway support

a. *Definition:* This data element documents the primary airway management method utilized if ETI was not attempted. This does not pertain to secondary (rescue, contingency, or salvage) airway management in the event of failed ETI attempts.

b. *Variables (possible values)*
   1. Bag–valve–mask (BVM) ventilation (with or without oral or nasal airway)
   2. Combitube or King LT
   3. Needle jet ventilation
   4. Open cricothyroidotomy
   5. Other cricothyroidotomy
   6. Continuous positive airway pressure (CPAP) or bilevel positive airway pressure (Bi- PAP)
   7. Laryngeal mask airway (LMA)
   8. Other
   9. Not applicable; ETI attempted

c. *Rationale:* The possible values reflect alternative airway and ventilatory management approaches that may be implemented as an alternative to ETI.

CPAP, BiPAP, and LMAs are currently not part of standard paramedic scope of practice in the United States, but their application in the prehospital setting have been explored and/or demonstrated in pilot studies.

4. Heart rate before intubation

   a. *Definition:* This data element documents heart rate obtained within 5 minutes before initial ETI attempts determined by pulse check or electrocardiographic (ECG) monitoring.

   b. *Variables (possible values)*
      1. Heart rate (beats/min)
      2. Not obtained

   c. *Rationale:* Attempted ETI can be physiologically stressful to the patient. Assessment of baseline and post-procedure physiologic parameters provide one method for evaluating the effects of the procedure and concurrent therapy (such as facilitating drugs) on the patient. Given the time-dependent nature of resuscitation, vital signs probably cannot be obtained sooner than five minutes before ETI attempts. However, there may be instances when obtaining vital signs may need to be deferred; rescuers should recognize the obvious priority for executing airway interventions and not delay airway management interventions solely to obtain formal vital signs.

5. Systolic blood pressure before intubation

   a. *Definition:* This data element documents systolic blood pressure obtained within 5 minutes before initial ETI attempts determined by auscultation, palpation, or automated blood pressure cuff.

   b. *Variables (possible values)*
      1. Systolic blood pressure (mm Hg)
      2. Not obtained

   c. *Rationale:* See rationale for data element ‘‘heart rate before intubation.’’

6. Diastolic blood pressure before intubation

   a. *Definition:* This data element documents diastolic blood pressure obtained within 5 minutes before initial ETI attempts determined by auscultation or automated blood pressure cuff.

   b. *Variables (possible values)*
      1. Diastolic blood pressure (mm Hg)
      2. Not obtained

   c. *Rationale:* See rationale for data element ‘‘heart rate before intubation.’’ Diastolic blood pressure will not be available if blood pressure is measure by palpation.

7. Spontaneous respiratory rate before intubation

   a. *Definition:* This data element documents spontaneous (unsupported) respiratory rate obtained within 5 minutes before initial ETI attempts determined by observation without ventilatory assistance.

   b. *Variables (possible values)*
      1. Spontaneous respiratory rate (breaths/min)
      2. Not obtained

   c. *Rationale:* See rationale for data element ‘‘heart rate before intubation.’’

8. Oxygen saturation before intubation

   a. *Definition:* This data element documents oxygen saturation obtained within 5 minutes before initial ETI attempts determined by pulseoximetry.

   b. *Variables (possible values)*
      1. Oxygen saturation (SaO_2%)
      2. Not obtained (device not applied or device applied but measurement not obtainable)

   c. *Rationale:* This data element is recommended because of the emergence of oxygen saturation as an accepted vital sign for both emergency medicine and EMS practice, particularly in instances of potential airway compromise. Many in-hospital and out-of-hospital providers routinely monitor oxygen saturation during ETI efforts. Oxygen saturation is also often used to guide the intubation procedure. For example, decreasing oxygen saturation may indicate the need to discontinue ETI attempts and to provide more basic ventilation procedures to improve oxygenation before subsequent attempts. Oxygen saturation may also be used as an important factor in the decision to provide a definitive airway.

9. Eye Glasgow Coma Scale (GCS) before intubation

   a. *Definition:* This data element documents the eye portion of the GCS obtained within 5 minutes before initial ETI attempts

   b. *Variables (possible values)*
      1. 1—no eye opening
      2. 2—eye opening to pain
      3. 3—eye opening to verbal command
      4. 4—eyes open spontaneously
      5. Not obtained

   c. *Rationale:* Glasgow Coma Scale is used by some systems as an indication for definitive airway

management in selected patient subsets. There are currently no other accepted or validated scales for quantifying level of consciousness. The rationale for separating the components of the GCS is that certain GCS elements may have stronger predictive value for selected aspects of airway management.

10. Verbal Glasgow Coma Scale before intubation

    a. *Definition:* This data element documents the verbal portion of the GCS obtained within 5 minutes before initial ETI attempts.

    b. *Variables (possible values)*
        1. 1—no verbal response
        2. 2—incomprehensible sounds
        3. 3—inappropriate words
        4. 4—confused
        5. 5—oriented
        6. Not obtained

    c. *Rationale:* See rationale for data element ''eye Glasgow Coma Scale before intubation.''

11. Motor Glasgow Coma Scale before intubation

    a. *Definition:* This data element documents the motor portion of the GCS obtained within 5 minutes before initial ETI attempts.

    b. *Variables (possible values)*
        1. 1—no motor response
        2. 2—extension to pain
        3. 3—flexion to pain
        4. 4—withdraws from pain
        5. 5—localizing pain
        6. 6—obeys Commands
        7. Not obtained

    c. *Rationale:* See rationale for data element ''eye Glasgow Coma Scale before intubation.''

12. Level of training of each rescuer attempting endotracheal intubation

    a. *Definition:* This data element documents the level of training of the individual attempting ETI for each ETI attempt. This data element is repeated for each rescuer who attempts ETI.

    b. *Variables (possible values)*
        1. Paramedic
        2. Advanced EMT
        3. Medic student (paramedic or Advanced EMT)
        4. Prehospital nurse
        5. Physician assistant or nurse practitioner
        6. Physician (resident level)
        7. Physician (attending or fellow level)
        8. Other

    c. *Rationale:* Many different levels of providers perform ETI in the out-of-hospital setting. This data element facilitates identification of the level of training for each rescuer who attempted ETI.

13. Endotracheal intubation method

    a. *Definition:* This data element documents the method used to accomplish ETI for each ''attempt.'' This data element is repeated for each ETI ''attempt.'' ''Attempt'' is defined as:
        1. Insertion of laryngoscope blade into mouth (for orotracheal methods)
        2. Insertion of tube through nares of nose (for nasotracheal methods)

    b. *Variables (possible values)*
        1. Nasotracheal intubation, no medications given (conventional nasotracheal intubation): ETI via the nasal route without the use of facilitating sedative or paralytic agents; includes both blind and visualized techniques
        2. Orotracheal intubation, no medications given (conventional orotracheal intubation): ETI via the oral route using a laryngoscope without the use of facilitating sedative or paralytic agents.
        3. Orotracheal intubation, sedation-facilitated: The use of intravenous or intramuscular sedative and/or analgesic agents to facilitate ETI; includes benzodiazepines (midazolam, valium, etc.), narcotics (fentanyl, morphine, etc.), and induction agents (etomidate, pentathol, etc.); does not include the use of neuromuscularblocking agents
        4. Orotracheal intubation, rapid-sequence intubation (RSI): The use of a neuromuscular-blocking agent (with or without the use of adjunct drugs) to facilitate ETI

    c. *Rationale:* There are many different techniques for accomplishing ETI. The majority of ETI performed in the prehospital setting occur in patients in cardiac arrest; patients in cardiac arrest are generally flaccid and can usually be intubated using conventional orotracheal methods. In patients with a perfusing rhythm (nonarrest), however, inadequate jaw relaxation can complicate ETI efforts. Although some of these patients can be intubated by conventional orotracheal methods, alternative intubating methods may be used, such as nasotracheal intubation, sedation-facilitated intubation, and rapid-sequence intubation.

    The success rates for different ETI methods are distinctly different because of different patient conditions and the effects of different drugs. Because of this variability, it is important to stratify ETI success rates according to the method of ETI that is used.

The definition of ETI attempt varies widely according to medical specialty and clinical convention. Many EMS services define ‘‘attempt’’ as insertion of the endotracheal tube. However, anesthesiologists and emergency physicians typically define ‘‘attempt’’ as insertion of the laryngoscope blade.

The intention in tracking the number of ‘‘attempts’’ is to provide an estimate of the magnitude of effort needed to intubate a patient. The ‘‘insertion of blade’’ definition for attempt is preferred because each attempt to enter the oropharynx and visualize the vocal cords potentially results in deprivation of ventilation and oxygenation. A definition of ‘‘attempt’’ that is limited to tube insertion biases the clinical picture. For example, a patient that underwent four laryngoscopies but no attempts at tube insertion would be inappropriately described as having had ‘‘zero’’ attempts at ETI.

The use of the ‘‘insertion of blade’’ definition also facilitates comparison between prehospital providers and emergency physicians and anesthesiologists, an important analysis that has not been possible to make as a result of the inconsistent definition of ‘‘attempt.’’ Therefore, the definition of ‘‘attempt’’ as ‘‘insertion of laryngoscope blade’’ is recommended.

For nasotracheal intubation, ‘‘attempt’’ should be defined as insertion of the endotracheal tube through the nares of the nose.

The ETI method should be reported for each ‘‘attempt’’; this approach is recommended because different methods may be used during the course of a patient encounter. For example, a patient may fail sedation-facilitated intubation on the first two attempts, prompting the use of rapid-sequence intubation for the third attempt.

14. Who attempted

    a. *Definition:* Based on the level of rescuer training documented in data element 12, this data element documents the individual attempting ETI for each ETI attempt. This data element is repeated for each ETI attempt.

    b. *Variables (possible values)*
        1. A
        2. B
        3. C

    c. *Rationale:* Many different levels of providers perform ETI in the out-of-hospital setting. This data element facilitates identification of the level of training for each rescuer who attempted ETI.

15. Intubation success for each attempt

    a. *Definition:* This data element documents success of ETI for each ETI ‘‘attempt,’’ defined as intratracheal tube placement as determined by the rescuer using clinical examination and conventional endotracheal tube placement verification methods. This data element is repeated for each ETI attempt.

    b. *Variables (possible values)*
        1. Yes (successful)
        2. No (unsuccessful)

    c. *Rationale:* The success for each ETI attempt is recommended as a measured intermediate outcome because the uncontrolled nature of the field environment can result in tube dislodgement and reintubation may be necessary. In addition, the number of laryngoscopies needed to facilitate ETI is considered by many clinicians to provide an important measure of ETI performance; the success of each attempt provides additional insight for this measure. If the rescuer inserted the laryngoscope blade but did not attempt to pass the tube, this situation should be recorded as an unsuccessful attempt.

16. Indicate drugs given to facilitate intubation

    a. *Definition:* This data element documents the medications that are used during ETI as well as their respective dosages.

    b. *Variables (possible values)*
        1. Midazolam (mg)
        2. Diazepam (mg)
        3. Lidocaine (mg)
        4. Morphine (mg)
        5. Etomidate (mg)
        6. Succinylcholine (mg)
        7. Atropine (mg)
        8. Topical spray
        9. Other (mg)

    c. *Rationale:* Certain medications can facilitate successful ETI. Other medications may help prevent complications associated with direct laryngoscopy such as bradycardia, aspiration or cerebral herniation. Therefore, it is important to stratify ETI attempts and success rates according to the medications used.

17. Endotracheal tube placement verification by auscultation

    a. *Definition:* This data element documents the findings when auscultation of lung fields and epigastrium are performed to verify the location of endotracheal tube after the final ETI attempt.

b. *Variables (possible values)*
   1. Breath sounds present in both lung fields and absent from epigastrium; suggests tube correctly placed (tracheal placement)
   2. Breath sounds absent from both lung fields and/or present over epigastrium; suggests tube incorrectly placed (esophageal placement)
   3. Indeterminate; lung fields and epigastrium auscultated but tube position could not be determined
   4. Not applicable; tube placed but breath sounds not assessed
   5. Not applicable; unable to place tube

c. *Rationale:* Identification and confirmation of correct endotracheal tube placement is difficult in the uncontrolled field environment. Existing standards call for the use of multiple techniques or devices to confirm correct tube placement. The current recommendation is to report only the outcome of the final ETI attempt in order to reduce data collection requirements. Data elements 17-21 reflect the techniques most commonly used in clinical pre-hospital practice.

   The purpose of data elements 17-21 is to reinforce the need for redundant ET tube confirmation, to emphasize the use of adjunct technology to verify ET tube placement, and to document how these different techniques are generally applied. Although there are other potential methods for confirming ET tube placement, those approaches are generally used on only rare instances or are not supported by scientific evidence or widespread clinical practice. For example, direct visualization and revisualization of the endotracheal tube have been recommended in response to the Katz and Falk report of misplaced prehospital ET tubes. However, these methods of tube confirmation have not been standardized, formally validated, or widely implemented in clinical protocols.

18. Endotracheal tube placement verification by bulb or syringe aspiration device

    a. *Definition:* This data element documents the findings when a bulb or syringe aspiration device is used after final ETI attempt to verify the location of endotracheal tube.

    b. *Variables (possible values)*
       1. Bulb inflated immediately or easy syringe aspiration; suggests tube is correctly placed (tracheal placement)
       2. Delayed bulb inflation or difficult syringe aspiration; suggests tube is incorrectly placed (esophageal placement)
       3. Indeterminate; used bulb or syringe aspiration device but tube position could not be determined
       4. Not applicable; tube placed but bulb or syringe aspiration device not used
       5. Not applicable; unable to place tube

    c. *Rationale:* See rationale for ‘‘endotracheal tube placement verification by auscultation.’’

19. Endotracheal tube placement verification by colorimetric endtidal carbon dioxide detector device

    a. *Definition:* This data element documents the findings when a colorimetric end-tidal carbon dioxide detection device is used after final ETI attempt to verify the location of endotracheal tube.

    b. *Variables (possible values)*
       1. Color change present; suggests tube correctly placed (tracheal placement)
       2. No color change present; suggests tube incorrectly placed (esophageal placement)
       3. Indeterminate; used colorimetric end-tidal carbon dioxide detector device but tube position could not be determined
       4. Not applicable; tube placed but colorimetric end-tidal carbon dioxide detector device not used
       5. Not applicable; unable to place tube

    c. *Rationale:* See rationale for ‘‘Endotracheal tube placement verification by auscultation.’’

20. Endotracheal tube placement verification by digital end-tidal carbon dioxide detector device

    a. *Definition:* This data element documents the findings when a digital end-tidal carbon dioxide detector device is used after final ETI attempt to verify the location of endotracheal tube

    b. *Variables (possible values)*
       1. Elevated end-tidal values present; suggests tube correctly placed (tracheal placement)
       2. Elevated end-tidal values not present; suggests tube incorrectly placed (esophageal placement)
       3. Indeterminate; used digital end-tidal carbon dioxide detector device but tube position could not be determined
       4. Not applicable; tube placed but digital end-tidal carbon dioxide detector device not used
       5. Not applicable; unable to place tube

    c. *Rationale:* See rationale for ‘‘endotracheal tube placement verification by auscultation.’’

21. Endotracheal tube placement verification by waveform end-tidal carbon dioxide detector device

    a. *Definition:* This data element documents the findings when a waveform end-tidal carbon dioxide

detector device is used after final ETI attempt to verify the location of endotracheal tube.

b. *Variables (possible values)*
   1. End-tidal waveform present; suggests tube correctly placed (tracheal placement)
   2. End-tidal waveform not present; suggests tube incorrectly placed (esophageal placement)
   3. Indeterminate; used waveform end-tidal carbon dioxide detector device but tube position could not be determined
   4. Not applicable; tube placed but waveform end-tidal carbon dioxide detector device not used
   5. Not applicable; unable to place tube

c. *Rationale:* See rationale for ‘‘endotracheal tube placement verification by auscultation.’’

22. Peak end-tidal carbon dioxide value

a. *Definition:* This data element documents the peak end-tidal carbon dioxide value indicated by digital or waveform end-tidal carbon dioxide detector device; reflects peak value within first minute after tube placement; does not apply to colorimetric devices.

b. *Variables (possible values)*
   1. End-tidal carbon dioxide ($ETCO_2$, mm Hg)
   2. Indeterminate (used endtidal carbon dioxide detector device but could not determine peak value)

c. *Rationale:* There are no current data to indicate the minimum end-tidal carbon dioxide levels that should be used to define intratracheal placement. This data element permits more precise identification of the endpoints of end-tidal capnometry when used for ET tube confirmation.

23. Intubation success for overall patient encounter

a. *Definition:* This data element documents if the endotracheal tube was properly placed on transfer of care to the receiving facility or another EMS agency (e.g., air medical transport) ; determined by the receiving provider when possible.

b. *Variables (possible values)*
   1. Yes (successful)
   2. No (unsuccessful)

c. *Rationale:* This data element documents ETI success for the overall patient encounter and is defined as ET tube location on transfer of care to the receiving facility or another EMS agency.. Although the result of the last ETI attempt may be used to identify overall ETI success, there are data suggesting that patients often arrive at the receiving medical facility with an incorrectly placed endotracheal tube. From the perspective of the patient’s overall course, ET tube misplacement or dislodgement should be considered unsuccessful airway management because it necessitates initiation of ETI efforts by the receiving facility or EMS agency.

From a medical quality point of view, the overall outcome of the patient at the end of the prehospital course is more pertinent than provisional outcomes measured at intermediate points in the course of patient care. Furthermore, successful out-of-hospital airway management involves not just proper tube placement, but also maintenance of proper tube placement. More so than in the in-hospital setting, endotracheal tubes in the field setting are prone to dislodgement and the frequent reconfirmation of tube placement is a mandatory task in the prehospital management of patients.

There are currently no data regarding methods that should be used by the receiving provider to verify ET tube placement.

If this data element is “no”, skip to data element 30.

24. Person determining intubation success for overall patient encounter (check all that apply)

a. *Definition:* This data element documents the individual(s) determining overall ETI success for the patient encounter.

b. *Variables (possible values)*
   1. Rescuer who performed intubation
   2. Another rescuer on the same team
   3. Receiving helicopter team
   4. Receiving hospital team
   5. Other

c. *Rationale:* This data element is an important component in better defining overall ETI outcome and identifying how that outcome was determined. Many clinicians believe that identification of the final ET tube location should be performed by a person other than the rescuer performing ETI. Although it is expected that the receiving hospital team will make the final determination of tube location in most cases, multiple possible values are listed because the provider receiving an intubated patient may not necessarily be in a receiving medical facility (for example, when care of a patient is transferred from a ground EMS unit to an air medical team).

25. Heart rate after intubation

a. *Definition:* This data element documents heart rate obtained within 5 minutes after final ETI attempt (successful or unsuccessful).

b. *Variables (possible values)*
   1. Heart rate (beats/min)
   2. Not obtained

c. *Rationale:* See rationale for data element ‘‘heart rate before intubation.’’ Postintubation vital signs are important because they facilitate measurement of the physiological effect of ETI and medications administered to facilitate ETI.

26. Systolic blood pressure after intubation

a. *Definition:* This data element documents systolic blood pressure obtained within 5 minutes after final ETI attempt (successful or unsuccessful); determined by auscultation, palpation, or automated blood pressure device.

b. *Variables (possible values)*
   1. Systolic blood pressure (mm Hg)
   2. Not obtained

c. *Rationale:* See rationale for data element ‘‘systolic blood pressure before intubation.’’

27. Diastolic blood pressure after intubation

a. *Definition:* This data element documents diastolic blood pressure obtained within 5 minutes after final ETI attempt (successful or unsuccessful); determined by auscultation or automated blood pressure device.

b. *Variables (possible values)*
   1. Diastolic blood pressure (mm Hg)
   2. Not obtained.

c. *Rationale:* See rationale for data element ‘‘diastolic blood pressure before intubation.’’

28. Spontaneous respiratory rate after intubation

a. *Definition:* This data element documents spontaneous respiratory rate obtained within 5 minutes after final ETI attempts; determined by observation without ventilatory assistance.

b. *Variables (possible values)*
   1. Spontaneous respiratory rate (breaths/min)
   2. Not applicable; patient successfully intubated
   3. Not applicable; Secondary airway inserted
   4. Not obtained

c. *Rationale:* See rationale for data element ‘‘spontaneous respiratory rate before intubation.’’ This data element provides a measure of the effect of ETI efforts and facilitating medications on spontaneous respiratory drive.

29. Oxygen saturation after intubation

a. *Definition:* This data element documents oxygen saturation obtained within 5 minutes after final ETI attempt (successful or unsuccessful), as determined by pulseoximetry.

b. *Variables (possible values)*
   1. Oxygen saturation (SaO_2%)
   2. Not measurable (device applied but measurement not obtainable)
   3. Not obtained (device not applied)

c. *Rationale:* See rationale for data element ‘‘oxygen saturation before intubation.’’

30 Critical complications encountered during airway management (check all that apply)

a. *Definition:* This data element documents airway management complications that have strong potential to result in adverse patient outcomes (multiple choices possible).

b. *Variables (possible values)*
   1. Failure to successfully perform ETI
   2. Injury or trauma to patient from airway management
   3. Adverse event from drugs administered to facilitate airway management (for example, hypotension or cardiac arrest)
   4. Esophageal intubation, delayed detection (detected after securing of tube)
   5. Esophageal intubation, unrecognized (detected by receiving health care facility or receiving EMS agency)
   6. Tube dislodgement during transport or care
   7. Other
   8. No critical complications resulting from airway management

c. *Rationale:* Ensuring patient safety is an important element of quality medical care. Managing the airway of critical patients generally should not result in adverse effects. Tracking and reporting critical complications are important elements of ensuring quality airway management.

Of the many potential complications and difficulties associated with airway management, the recommended values primarily reflect complications that (1) can adversely affect the patient, and (2) are direct results of care delivered by the prehospital team. There are currently data not validating or quantifying the magnitude of effect of any of these complications, and no data suggesting that these are the only complications with potential to cause adverse outcome.

31. Suspected reasons for failed intubation (check all that apply)

    a. *Definition:* If all attempts at ETI are unsuccessful, this data element documents the reasons for ETI failure (multiple choices possible).

    b. *Variables (possible values)*
        1. Inadequate patient relaxation
        2. Inability to expose vocal cords during laryngoscopy
        3. Difficult patient anatomy
        4. Orofacial trauma
        5. Blood, vomitus, or secretions obscuring view of vocal cords
        6. Inability to access patient to perform intubation
        7. ETI attempts initiated, but arrived at destination facility before successful intubation
        8. Equipment failure
        9. Other
        10. Not applicable (successful intubation)

    c. *Rationale:* There are only limited data describing the factors associated with ETI failure. Identification of the factors underlying failed ETI is an important component of monitoring airway management quality. These factors may reflect the clinical condition and the anatomy of the patient, the skill of the rescuer, or logistic barriers. Only a limited set of options has been provided; individual services may track additional elements.

32. Secondary airway management method (check all that apply)

    a. *Definition:* This data element documents the secondary (''contingency,'' ''rescue,'' or ''salvage'') method used for airway management (multiple choices possible).

    b. *Variables (possible values)*
        1. Bag–valve–mask ventilation with or without oral or nasal airway
        2. Combitube or King
        3. Laryngeal mask airway
        4. Needle jet ventilation
        5. Open cricothyrotomy
        6. Other cricothyrotomy (for example, Melker cricothyrotomy kit)
        7. Other (retrograde intubation, etc.)
        8. Not applicable (successful intubation)

    c. *Rationale:* Loss of airway control can result in morbidity or mortality. All services should have contingency or rescue airway measures available in the event of inability to perform ETI. There are only limited data regarding the frequency of rescue airway use. The recommended data elements only reflect commonly used rescue airway methods; other methods of rescue airway management are available.

33. Secondary airway management resulted in satisfactory ventilation

    a. *Definition:* This data element documents if secondary (contingency, rescue, or salvage) airway management method resulted in satisfactory ventilation.

    b. *Variables (possible values)*
        1. Yes
        2. No
        3. Not applicable (successful intubation)

    c. *Rationale:* Only limited data exists regarding the actual effectiveness of rescue airway devices in clinical application. This data element helps to evaluate whether the rescue airway was effectively applied. There are currently no data or standards for ''satisfactory ventilation'' using rescue airways; the assumption is that providers will attempt to ventilate to the same standards used for intubated patients.

34. Time of successful intubation

    a. *Definition:* This data element documents the time of the first successful ETI attempt.

    b. *Variables (possible values)*
        1. Time of successful intubation (24-hour format)
        2. Unknown
        3. Not applicable; unsuccessful intubation

    c. *Rationale:* See rationale for data element, ''time of decision to intubate.''

35. Endotracheal tube size used

    a. *Definition:* This data element documents the size of the endotracheal tube that was successfully inserted.

    b. *Variables (possible values)*
        1. Endotracheal tube size (mm)
        2. Unknown
        3. Not applicable; unsuccessful intubation

    c. *Rationale:* Selection of the appropriate endotracheal tube size is consistent with quality medical care. Inappropriate size may result in airway trauma, aspiration, inability to ventilate with adequate positive pressure and difficulty weaning from mechanical ventilation. Appropriate tube size can be estimated by age or anatomical considerations (eg. diameter of nares or 5^{th}/little finger).

36. Endotracheal tube depth

a. *Definition:* This data element documents the insertion depth of a successfully-placed endotracheal tube, as measured at the lateral corner of the mouth.

b. *Variables (possible values)*
   1. Tube depth (cm, at lateral corner of mouth)
   2. Not known
   3. Not applicable; unsuccessful intubation

c. *Rationale:* Documentation of endotracheal tube depth may prevent inadvertent mainstem intubation. Appropriate tube depth can be estimated by the patient's age. Serial checks of tube depth may facilitate earlier identification of inadvertent tube migration or dislodgement.

37. Endotracheal tube secured with tape or device

a. *Definition:* This data element documents how a successfully-placed endotracheal tube is secured.

b. *Variables (possible values)*
   1. Adhesive tape
   2. Umbilical/cloth tape
   3. Proprietary (commercial) endotracheal tube holder
   4. Other
   5. Not known
   6. Not applicable; unsuccessful intubation

c. *Rationale:* Unrecognized endotracheal tube migration and dislodgement can result in significant morbidity and mortality. Securing the endotracheal tube properly can help prevent migration and dislodgement.

38. Endotracheal tube placement reassessed after patient movement

a. *Definition:* This data element documents the reassessment of endotracheal tube position after movement of the patient.

b. *Variables (possible values)*
   1. Yes
   2. No
   3. Not known
   4. Not applicable; unsuccessful intubation

c. *Rationale:* Unrecognized endotracheal tube migration and dislodgement can result in significant morbidity and mortality. Movement of the patient (eg, ground to gurney or gurney to ambulance) is known to be associated with loss of medical device integrity. Reassessment of endotracheal tube position after movement of the patient should facilitate earlier recognition of tube migration and dislodgement.

39. Endotracheal tube placement reassessed after patient transfer of care

a. *Definition:* This data element documents the reassessment of endotracheal tube position when the responsibility for patient care is transferred to another EMS agency or the receiving facililty.

b. *Variables (possible values)*
   1. Yes
   2. No
   3. Not known
   4. Not applicable; unsuccessful intubation

c, *Rationale:* Unrecognized endotracheal tube migration and dislodgement can result in significant morbidity and mortality and creates significant liability for the provider who is responsible for maintenance of the airway. Reassessment of endotracheal tube position after the transfer or care should facilitate earlier recognition of tube migration and dislodgement and will assist in determining when an endotracheal tube has moved.

40. Lowest O2 saturation during intubation

a. *Definition:* This data element documents the lowest oxygen saturation obtained during successful and unsuccessful intubation attempts.

b. *Variables (possible values)*
   1. Oxygen saturation (SaO_2%)
   2. Not measurable (device applied but measurement not obtainable)
   3. Not obtained (device not applied)

c. *Rationale:* Data suggests an association between hypoxia during prehospital intubation and adverse patient outcome.

41. Lowest heart rate during intubation

a. *Definition:* This data element documents the lowest heart rate obtained during successful and unsuccessful intubation attempts.

b. *Variables (possible values)*
   1. Heart rate (beats/min)
   2. Not obtained

c. *Rationale:* Data suggests an association between severe hypoxia & bradycardia during prehospital intubation and adverse patient outcome.

REFERENCES:
1. Wang HE, Domeier RM, Kupas DF, Greenwood MJ, O'Connor RE. Recommended Guidelines for Uniform Reporting of Data from Out-of-Hospital Airway Management: Position Statement of the National Association of EMS Physicians. Prehospital Emergency Care. January/March2004; Vol. 18/ Number 1; 58-72.