Florida Regional Common

EMS Protocols

Section 3

Pediatric Protocols

Revised, June 1, 2013
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## 3.1 Pediatric Initial Assessment Management

### General Guidelines

The protocols in Section 3.1 are designed to guide the EMT or paramedic in his or her initial approach to assessment and management of pediatric patients. The Level 1 care is specified as either EMT and Paramedic (BLS) or Paramedic Only (ALS).

Protocol 3.1.1 should be used on all pediatric patients for initial assessment. During this assessment, if the paramedic determines that there is a need for airway management, Protocol 3.1.2 should be used for the management of the pediatric airway. These protocols are frequently referred to by other protocols, which may or may not override them in recommending more specific therapy.

Protocol 3.1.3 presents the basic components of preparation for transport of medical patients. Due to the significant differences in priorities and packaging in the prehospital care of trauma and hypovolemic cases, a separate Trauma Supportive Care protocol has been developed. After following Protocol 3.1.1, this Medical Supportive Care protocol may be the only protocol used in medical emergency situations where a specific diagnostic impression and choice of additional protocol(s) cannot be made. Judgment must be used in determining whether patients require ALS or BLS level care. Protocol 3.1.3 is frequently referred to by other protocols, which may or may not override it in recommending more specific therapy.

Protocol 3.1.4 presents the basic components of preparation for transport of trauma patients. Due to the significant differences in priorities and packaging in the prehospital care of medical cases, a separate Medical Supportive Care protocol has been developed. After following Protocol 3.1.1, this Trauma Supportive Care protocol may be the only protocol used in trauma or hypovolemic situations where a specific diagnostic impression and choice of additional protocol(s) cannot be made. Judgment must be used in determining whether patients require ALS or BLS level care.

This protocol is frequently referred to by other protocols, which may or may not override it in recommending more specific therapy.

Paramedics only should use Protocol 3.1.5 for pain management.

### References:


### General Guidelines

The initial assessment of the pediatric patient will vary with the age of the patient. Nevertheless, some initial components of assessment remain consistent for all patients, regardless of their age. The paramedic or EMT should follow the appropriate approach to patient assessment with respect to the patient’s age. In addition to addressing the patient, the responder may need to interview the parents or caregiver to gain information needed for a complete assessment of the patient.

A five-step, systematic approach should be used when assessing the child:

1. **Scene size-up**
2. **General assessment (pediatric assessment triangle [PAT]).**
   - Appearance
   - Work of breathing
   - Circulation
3. **Primary assessment**
   - ABCDE
   - Cardiopulmonary function
   - Neurological function
   - Vital signs
4. **Secondary assessment**
   - SAMPLE
   - Head-to-toe survey
5. **Ongoing assessment**

### EMT AND PARAMEDIC

**I. Scene Size-up.**

A. Review the dispatch information.
B. Assess the need for body substance isolation.
C. Assess scene safety.
D. Determine the mechanism of injury.
E. Determine the number and location of patients.
F. Determine the need for additional resources.
G. Observe the environment of the pediatric patient.

**II. Pediatric Assessment Triangle: Rapid Cardiopulmonary Assessment.**

The PAT has three major components: appearance, work of breathing, and circulation to the skin.

A. **Appearance.** The appearance is assessed by considering the following clinical signs: tone, interactiveness, consolability, look or gaze, and speech or cry (Table 3-1). This particular component is influenced by developmental issues and must be applied with knowledge of normal childhood development.
### 3.1.1 Pediatric Assessment (continued)

**GENERAL GUIDELINES**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Features to Look For</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tone</strong></td>
<td>Is the infant/child moving or resisting examination vigorously? (Normal) Does the infant/child have good muscle tone? (Normal) Or is the infant/child limp, listless, or flaccid? (Abnormal)</td>
</tr>
<tr>
<td><strong>Interactivities</strong></td>
<td>How alert is the infant/child? (Alert is normal) How readily does a person, object, or sound distract/draw the infant/child’s attention? (Distract or draw attention is normal) Will the infant/child reach for, grasp, and play with a toy or exam instrument, such as a penlight or tongue blade? (Reaching is normal) Or is the infant/child uninterested in playing or interacting with the caregiver or prehospital professional? (Abnormal)</td>
</tr>
<tr>
<td><strong>Consolability</strong></td>
<td>Can the infant/child be consoled or comforted by the caregiver or by the prehospital professional? (Normal) Or is the infant/child’s crying or agitation unrelieved by gentle reassurance? (Abnormal)</td>
</tr>
<tr>
<td><strong>Look/gaze</strong></td>
<td>Does the infant/child make eye contact with you? (Normal) Or is there a “nobody home,” glassy-eyed stare? (Abnormal)</td>
</tr>
<tr>
<td><strong>Speech/cry</strong></td>
<td>Is the infant/child’s cry strong and spontaneous? (Normal) Or is the cry weak or high-pitched? (Abnormal) Or is the content of speech age appropriate? (Normal) Or is the content confused or garbled? (Abnormal)</td>
</tr>
</tbody>
</table>

**B. Work of Breathing.** The work of breathing reflects a child’s respiratory status - specifically, the degree of respiratory effort needed to oxygenate and ventilate the child’s body. As work of breathing increases, physical signs appear to alert the prehospital provider to an underlying illness or injury. Table 3-2 outlines the clinical signs associated with increased work of breathing. The presence of any of these features indicates abnormal work of breathing; the presence of specific signs may further delineate the category of disease process as upper or lower airway obstruction, disease of the lungs, or disorders of breathing.
3.1.1 Pediatric Assessment (continued)

### Table 3-2 Characteristics of Work of Breathing

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Abnormal Features to Look For</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal airway</td>
<td>Snoring, muffled or hoarse speech, stridor, grunting, wheezing</td>
</tr>
<tr>
<td>positioning</td>
<td>Supraclavicular, intercostal, or substernal retractions of the chest wall; head bobbing in infants</td>
</tr>
<tr>
<td>Retractions</td>
<td></td>
</tr>
<tr>
<td>Flaring</td>
<td>Flaring of the nares on inspiration</td>
</tr>
</tbody>
</table>

C. Circulation to Skin. Circulation to the skin is assessed by looking at the overall skin color and color pattern. A child’s appearance will reflect inadequacies in brain perfusion, but altered appearance may be caused by a number of other conditions, including overdose/intoxication, metabolic disease, primary injury, and hypoxia. As a consequence, the addition of skin and mucous membrane color/perfusion changes to the PAT adds to the evaluation of core perfusion (Table 3-3). When faced with fluid or blood loss or changes in venous capacitance, the body will preserve perfusion to vital organs (heart and brain) through increased systemic vascular resistance (decreasing skin perfusion) and increases in heart rate; thus changes in skin color and skin perfusion are important early signs of shock in children.

### Table 3-3 Characteristics of Circulation to Skin

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Abnormal Features to Look For</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pallor</td>
<td>White or pale skin or mucous membrane coloration from inadequate blood flow</td>
</tr>
<tr>
<td>Mottling</td>
<td>Patchy skin discoloration due to vasoconstriction/vasodilation</td>
</tr>
<tr>
<td>Cyanosis</td>
<td>Bluish discoloration of skin and mucous membranes</td>
</tr>
</tbody>
</table>

D. Each component of the PAT is evaluated separately, utilizing specific predefined physical findings as outlined in Tables 3-1, 3-2, and 3-3. If an abnormal physical finding is noted, the corresponding component is, by definition, abnormal. Abnormalities in the three components can then be combined to form a general impression (Table 3-4).

### Table 3-4 Components of the PAT and the General Impression

<table>
<thead>
<tr>
<th>Component</th>
<th>Stable</th>
<th>Respiratory Distress</th>
<th>Respiratory Failure</th>
<th>Shock</th>
<th>CNS/ Metabolic</th>
<th>Cardiopulmonary Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Normal</td>
<td>Normal</td>
<td>Abnormal</td>
<td>Normal/ Abnormal</td>
<td>Abnormal</td>
<td>Abnormal</td>
</tr>
<tr>
<td>Work of Breathing</td>
<td>Normal</td>
<td>Abnormal</td>
<td>Abnormal</td>
<td>Normal</td>
<td>Normal</td>
<td>Abnormal</td>
</tr>
<tr>
<td>Circulation to the skin</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal/ Abnormal</td>
<td>Abnormal</td>
<td>Normal</td>
<td>Abnormal</td>
</tr>
</tbody>
</table>
III. Primary Assessment.
   A. Assess airway, c-spine, and initial level of consciousness (AVPU: Alert, responds to Verbal stimuli, responds to Pain, Unresponsive).
   B. Assess breathing.
   C. Assess circulation and presence of hemorrhage.
   D. Assess disability - movement of extremities.
   E. Expose and examine the patient’s head, neck, chest, abdomen, and pelvis (check the back when the patient is rolled on his/her side).
   F. Identify priority patients.
   G. Assess the vital signs:
      1. Blood pressure
      2. ECG
      3. SpO₂

IV. Initial Management. (See Pediatric Protocol 3.1.3, Medical Supportive Care, or Pediatric Protocol 3.1.4, Trauma Supportive Care.)
   A. Life-threatening (urgent)
   B. Non-life-threatening (not urgent)

V. Secondary Assessment.
   A. Conduct a toe-to-head survey.
   B. Neurological assessment.
      1. Pupillary response.
      2. Pediatric Glasgow Coma Scale (GCS) score. (See Appendix 6.8.2)
   C. Repeat-PAT and rapid cardiopulmonary assessment.
   D. Obtain a medical history.
      1. S - Symptoms; assessment of chief complaint.
      4. P - Past medical history.
      5. L - Last oral intake.
      6. E - Events leading to illness or injury.

VI. Ongoing Assessment. Reassess the patient every fifteen (15) minutes, or for critical patients every five (5) minutes.
   A. Continually monitor:
      1. Respiratory effort
      2. Skin color
      3. Mental status
      4. Temperature
      5. Pulse oximetry (see Medical Procedure 4.22)
   B. Reevaluate vital signs and compare with baseline vital signs.

VII. Other Assessment Techniques.
   A. Glucose determination (see Medical Procedure 4.17).
   B. Capnography (see Medical 4.10).
   C. Dealing with the autistic patient (see Medical Procedure 4.6).
3.1.2 Airway Management

GENERAL GUIDELINES

- Initial Assessment Protocol 3.1.1.

TREATMENT GUIDELINES

Supportive Care

If spontaneous breathing is present without compromise:
- Monitor breathing during transport.
- Administer oxygen as needed to maintain O2 saturation of 94% or greater (a). Avoid over oxygenation; Wean oxygen concentration as tolerated.
  - Infants via infant mask at 2-4 L/min.
  - Small child (1-8 years) via pediatric mask at 6-8 L/min.
  - Older child (9-15 years) via non-rebreather mask at 10-15 L/min.
  - If the mask is not tolerated, administer oxygen via blow-by method.

If spontaneous breathing is present with compromise:
- Maintain the patient’s airway (e.g., modified jaw-thrust procedure) (see Medical Procedure 4.1.4).
- Suction as needed (see Medical Procedure 4.3.1, Flexible Suctioning, and Medical Procedure 4.3.2, Rigid Suctioning).
- Administer oxygen as needed to maintain O2 saturation of 94% or greater (a). Avoid over oxygenation; Wean oxygen concentration as tolerated.
  - Infants via infant mask at 2-4 L/min.
  - Small child (1-8 years) via pediatric mask at 6-8 L/min.
  - Older child (9-15 years) via non-rebreather mask at 10-15 L/min.
  - If the mask is not tolerated, administer oxygen via blow-by method.
- If unable to maintain the patient’s airway, insert an oropharyngeal, nasopharyngeal, or supraglottic airway (e.g., King tube or LMA) as needed (see Medical Procedure 4.4, King Supraglottic Airway).
  - Attach an end-tidal CO2 monitoring device.
  - Confirm placement via auscultation and capnography.
  - Secure the tube with tape or a tube stabilizing device.
  - Monitor SpO2 with the pulse oximeter.
- Assist ventilations with bag valve mask (BVM) as needed (see Medical Procedure 4.1.5, Rescue Breathing).
- Apply and monitor a pulse oximeter and capnography monitoring device, as soon as possible (see Medical Procedures 4.10 and 4.22).

If spontaneous breathing is absent or markedly compromised:
- Maintain the patient’s airway (e.g., modified jaw-thrust procedure) (see Medical Procedure 4.1.3, 4.1.4).
- Suction as needed (see Medical Procedure 4.3.1, Flexible Suctioning, and Medical Procedure 4.3.2, Rigid Suctioning).
## 3.1.2 Airway Management (continued)

### TREATMENT GUIDELINES

**ALS Level 1**

- If unable to maintain the patient’s airway, insert an oropharyngeal, nasopharyngeal, or supraglottic airway (e.g., King tube or LMA) as needed (see Medical Procedure 4.4, King Supraglottic Airway).
  - Attach an end-tidal CO2 monitoring device.
  - Secure the tube with tape or a tube stabilizing device.
  - Monitor SpO2 with the pulse oximeter.
  - Confirm placement via auscultation and capnography.
- Ventilate with a BVM (see Medical Procedure 4.1.5, Rescue Breathing)
- Perform endotracheal intubation as a procedure of last resort if previous advanced airway/BVM support is ineffective (a) (b) (c) (see Medical Procedure 4.4, Advanced Airways).
  - Attach an end-tidal CO2 monitoring device.
  - Confirm ETT placement via auscultation and capnography.
  - Secure the ETT with tape or an ETT-stabilizing device.
  - Monitor SpO2 with the pulse oximeter.
- If unable to intubate and the patient cannot be adequately ventilated by other means, perform a needle cricothyroidotomy (see Medical Procedure 4.5.1, Needle Cricothyroidotomy for Pediatrics) and transport the patient rapidly to the **Nearest** hospital.

**ALS Level 2**

- None

**Note**

(a) Ineffective ventilations may be evident by poor chest rise, poor lung sounds, and capnography readings failing to improve with ventilations.
(b) The BVM should be initially used for ventilatory support. Endotracheal intubation should be used only when the BVM is ineffective or prolonged ventilatory support is necessary.
(c) Follow the Universal Airway Algorithm on all advanced airways.
## 3.1.3 Medical Supportive Care

### Supportive Care

**EMT AND PARAMEDIC**
- Initial Assessment Protocol 3.1.1.
- Attempt to maintain or restore normal body temperature.
- Establish hospital contact for notification of an incoming patient and advise of the patient’s length/weight-based color category. In addition, the paramedic should obtain consultation for ALS Level 2 orders.

### ALS Level 1

**PARAMEDIC AND AUTHORIZED EMT**
- Establish an IV/IO; give normal saline with a regular infusion set as needed (a) (b), unless overridden by other specific protocols.

**PARAMEDIC ONLY**
- Monitor the ECG as needed.

### ALS Level 2

- None

### Note

(a) Authorized IV routes include all peripheral venous sites. External jugular veins may be utilized when other peripheral site attempts have been unsuccessful or would be inappropriate. A large-bore intracath should be used for unstable patients; avoid establishing access sites below the diaphragm.

(b) When unable to establish an IV in a pediatric patient who needs to be resuscitated, an intraosseous (IO) line may be used by the Paramedic Only (see Medical Procedures 4.18.5, 4.18.6 or 4.18.7).
## 3.1.4 Trauma Supportive Care

### EMT AND PARAMEDIC

- Initial Assessment Protocol 3.1.1.
- Initiate a Trauma Alert, if applicable (see General Protocol 1.10, Trauma Transport).
- Correct any open wound/sucking chest wound (occlusive dressing).
- Control any hemorrhage.
- Immobilize the c-spine and secure the patient to a backboard or pediatric immobilizer as needed (see Medical Procedure 4.24, Spinal Immobilization) (a).
- Keep the patient warm.

### PARAMEDIC ONLY

- Correct any massive flail segment that causes respiratory compromise with positive pressure ventilation (advanced airway as needed).
- Correct any tension pneumothorax (see Medical Procedure 4.9, Chest Decompression).
- Expedite transport.

### The following steps should not delay transport:

- Complete bandaging, splinting, and packaging as needed.
- Contact online medical control for notification of an incoming patient and obtain consultation for ALS Level 2 orders.

### ALS Level 1

- Establish an IV; give normal saline with a regular infusion set as needed (b)(c), unless overridden by other specific protocol. Rapid transport should not be delayed to establish an IV.
- Monitor the ECG.

### ALS Level 2

- None

### Note

(a) Infants and small children in car seats may be immobilized without removing them from the car seat, as long as it will not interfere with patient assessment and other needed procedures and the car seat is intact. If the patient is not in a car seat on your arrival, do not put the patient back into the car seat to immobilize him/ her; use a backboard or pediatric immobilizer instead.

(b) Authorized IV routes include all peripheral venous sites. The external jugular vein may be utilized when other peripheral site attempts have been unsuccessful or would be inappropriate. Two IVs, using large-bore intracaths, should be used for unstable patients; avoid establishing access sites below the diaphragm. Rapid transport should not be delayed to establish an IV.

(c) When unable to establish an IV in the pediatric patient who needs to be resuscitated, an intraosseous line may be used by the Paramedic Only (see Medical Procedures 4.18.5, 4.18.6 or 4.18.7).
### 3.1.5 Pain Management

#### GENERAL GUIDELINES

**PARAMEDIC ONLY**
This entire protocol is ALS/Paramedic Only.

**ISOLATED EXTREMITY FRACTURE**
The purpose of this procedure is to manage pain associated with isolated extremity fractures that are not associated with multisystem trauma or hemodynamic instability.

**ACUTE BACK STRAIN**
This procedure should be used in the isolated back strain where an acute abdominal process is not suspected (see Appendix 6.1, Abdominal Pain Differential).

**SOFT-TISSUE INJURIES, BURNS, BITES, AND STINGS**
This procedure is used for pain associated with soft-tissue injuries, burns, bites, and stings that are not associated with multisystem trauma or hemodynamic instability.

#### TREATMENT GUIDELINES

##### Supportive Care

- Initial Assessment Protocol 3.1.

##### ALS Level 1

- Patients should be asked to quantify their pain on an analog pain scale (from 0 = least severe to 10 = most severe) or Wong-Baker Faces Scale; for infants, an infant behavior score may be used. This score should be documented used to measure the effectiveness of analgesia.
- Distal circulation, sensation, and movement in the injured extremity should be noted and recorded.
- The extremity should be immobilized as described in Pediatric Protocol 3.9.5, Extremity Injuries. Self-administered analgesia with Nitrous Oxide should be given special consideration for pain management during this procedure (see Medical Procedure 4.20, Nitrous Oxide-Nitronox), if available
- Extremity fractures should be elevated, if possible, and cold applied.
- If pain persists and systolic BP is adequate (see Appendix 6.15, Pediatric Vital Signs), Morphine Sulfate may be given intravenously as a one time dose of 0.1mg/kg in pediatrics and infant dose (less than one year old) of 0.05 mg/kg IV. Maximum single dose of 4mg for all children. Administer at a rate not to exceed 1 mg/min.
- If pain persists and systolic BP is adequate (see Appendix 6.15, Pediatric Vital Signs), after the first dose of morphine sulfate, it may be repeated once. Maximum dose of 8mg for all children. Administer at a rate not to exceed 1 mg/min.

##### ALS Level 2

- None
3.1.5 Pain Management (continued)

TREATMENT GUIDELINES

ASSESSMENT OF SCORE

0  Relaxed: infant comfortable, not distressed.
1-2 Some transitory distress caused: returns immediately to “relaxed.”
3-4 Transitory distress; likely to respond to consolation.
5  Infant experiences pain; if no response to consolation, may require analgesia.
6  “Anguished” and “exaggerated”: infant experiencing acute pain; is unlikely to respond to consolation, will probably benefit from analgesia.
7-8 “Inert”: no response to traumatic procedure; infant is habituated to pain; will not respond to consolation; systematic pain control by analgesia should be considered.

FACIAL EXPRESSION

0  Relaxed - Smooth muscled; relaxed expression; either in deep sleep or quietly alert.
1  Anxious - Anxious expression; frown; REM behind closed lids; wandering gaze; eyes narrowed; lips parted; pursed lips as if “oo” is pronounced.
2  Anguished - Anguished expression/crumpled face; brow bulge; eye squeeze; nasolabial furrow pronounced; square-stretched mouth; cupped tongue; “silent cry.
3  Inert - No response to trauma; no crying; rigidity; gaze avoidance; fixed/staring gaze; apathy; diminished alertness (only during or immediately after traumatic procedure).

BODY MOVEMENT

0  Relaxed - Relaxed trunk and limbs; body in tucked position; hands in cupped position or willing to grasp a finger.
1  Restless - Moro reflex; startles; jerky or uncoordinated movement of limbs; flexion/extension of limbs; attempt to withdraw limb from site of injury.
2  Exaggerated - Abnormal position of limbs; limb/neck extension; splaying of fingers and/or toes; flailing or thrashing of limbs; arching of back; side swiping/guarding site of injury.
3  Inert - No response to trauma; inertia; limpness/ rigidity; immobility (only during or immediately after traumatic procedure).

COLOR

0  Normal skin color.
1  Redness; congestion.
2  Pallor; mottling; gray.
3.2 Pediatric Respiratory Emergencies

**GENERAL GUIDELINES**

Most children requiring urgent intervention have primary respiratory problems. Approximately 80-90% of all pediatric cardiac arrests originate in the respiratory system. When the child who is in respiratory distress can no longer compensate, respiratory failure will be followed by cardiac failure. It is crucial to recognize respiratory distress and dysfunction early, so that cardiopulmonary failure may be prevented. Note that the respiratory system also attempts to compensate for the hypoxia and acidosis found in primary circulatory failure. Assessment of the pediatric respiratory system should focus not on clinical status, as reflected by general appearance (adequacy of cerebral oxygenation and ventilation) and work of breathing.

**COMPONENTS OF APPEARANCE**

1. Appearance (adequacy of cerebral status and the environment). Is the patient restless, agitated or lethargic?
2. Alertness - How responsive and interactive is the child with a stranger or other changes in the environment? Is the patient restless, agitated or lethargic?
3. Distractibility - How readily does a person, object, or sound draw the child’s interest or attention? Will the patient play with a toy or new object?
4. Consolability - Can the patient be comforted by the caregiver or by the paramedic?
5. Eye contact - Does the child maintain eye contact with objects or people? Will the patient fix his/her gaze on a face?
6. Speech/cry - Is the speech/cry strong and spontaneous? Weak and muffled? Hoarse?
7. Spontaneous - Is the patient moving and resisting vigorously motor activity and spontaneously? Is there good muscle tone and responsiveness?
8. Color - Is the patient pink? Or is the patient pale, ashen, blue, or mottled? Does the skin coloring of the trunk differ from that of the extremities?

**SIGNS OF WORK OF BREATHING**

1. Use of accessory muscles - Pediatric patients will use accessory muscles early to compensate for deficiencies in perfusion. Intercostal and supraclavicular retractions, as well as diaphragmatic breathing (see-saw), may be very apparent.
2. Respiratory rate - Significant finding if above 60/min (for a premature baby to a 1 year old) or less than 20/min for an infant (less than one year old) and less than 10/min for children.
3. Tidal volume - Inspection of chest wall movement may not be adequate for assessment of tidal volume. It is imperative to auscultate bilateral lung sounds to determine the adequacy of tidal volume.
4. Nasal flaring - Flaring of the external nares indicates respiratory distress.
5. Grunting - Grunting is an ominous sign associated with severe distress. It is caused by a premature closure of the glottis on exhalation due to atelectasis. The patient is attempting to maintain a positive end-expiratory pressure (PEEP) to allow for better lung inflation.
6. Cyanosis - Cyanosis is usually a late finding and will initially be visible around the mouth and gums (perioral) and nail beds.
7. Pulse oximeter - SpO₂ less than 94% is suggestive of respiratory insufficiency.
8. Lung sounds - Auscultation of bilateral lung sounds not only assesses tidal volume, but may also uncover abnormal sounds (e.g., wheezing, stridor, rales).

Specific treatments for the different causes of respiratory distress are outlined in the following protocols. When the paramedic is unsure as to which protocol to follow, he/she should follow the protocols in Section 3.1 and contact medical control for further direction.
# 3.2.1 Airway Obstruction

## General Guidelines

Causes of upper airway obstruction include the tongue, foreign bodies, swelling of the upper airway due to angio-neurotic edema (see Pediatric Protocol 3.7.1, Allergic Reactions/Anaphylaxis), trauma to the airway, and infections (see Pediatric Protocol 3.2.2, Upper Airway [Stridor-Croup/Epiglottitis]). Differentiation of the cause of upper airway obstruction is essential to determine the proper treatment.

## Treatment Guidelines

### Supportive Care

- Initial Assessment Protocol 3.1.1
- Medical Supportive Care Protocol 3.1.3.
- If air exchange is inadequate and there is a reasonable suspicion of foreign body airway obstruction (FBAO), apply abdominal thrusts until the patient becomes unresponsive then administer chest compressions (a). For an infant apply chest compressions and back blows (see Medical Procedure 4.1.6, Suspected Foreign Body Airway Obstruction) (a).

### ALS Level 1

- If unable to relieve the FBAO, visualize it with a laryngoscope and extract the foreign body with Magill forceps.
- If the obstruction is due to trauma and/or edema, or if uncontrollable bleeding into the airway causes life-threatening ventilatory impairment, proceed directly to an advanced airway (see Medical Procedure 4.4, Advanced Airways). If unable to intubate and the patient cannot be adequately ventilated by other means, perform a needle cricothyroidotomy (see Medical Procedure 4.5.1, Needle Cricothyroidotomy for Pediatrics).

### ALS Level 2

- None

### Note

(a) If air exchange is adequate with a partial airway obstruction, do not interfere, but rather encourage the patient to cough up the obstruction. Continue to monitor for adequacy of air exchange. If air exchange becomes inadequate, continue with the protocol.
### 3.2.2 Upper Airway (Stridor - Croup/Epiglottitis)

#### GENERAL GUIDELINES

**Stridor** is a high-pitched “crowing” sound caused by restriction of the upper airway (usually heard on inspiration). In addition to FBAO (see Pediatric Protocol 3.2.1), stridor can be caused by croup and epiglottitis.

**Croup** (laryngotracheobronchitis) is a viral infection of the upper airway, which causes edema/inflammation below the larynx and glottis with a resultant narrowing of the lumen of the airway. Croup most often occurs in children 6 months to 4 years of age. The child with croup will have stridor, a distinctive barking cough, and cold symptoms (low-grade fever [100-101°F]), with a gradual onset of respiratory distress.

**Epiglottitis** is an acute infection and inflammation of the epiglottis that potentially is life-threatening. Since the Haemophilus influenza, type B (Hib) vaccine became available, the incidence of epiglottitis has markedly decreased, yet it may still occur from other bacterial pathogens. Epiglottitis usually occurs in children 4 years of age and older. The child with epiglottitis will present with stridor, acute respiratory distress, sore throat, pain upon swallowing that causes the distinctive drooling, and high-grade fever (102-104°F). The patient may assume the classic tripod position.

#### TREATMENT GUIDELINES

**Supportive Care**

- Initial Assessment Protocol 3.1.1
- Medical Supportive Care Protocol 3.1.3, including use of a pulse oximeter (see Medical Procedure 4.22, Pulse Oximeter). Avoid IVs in these patients (a).
- Avoid agitating the child with suspected epiglottitis. Keep the patient in a position of comfort (he/she may be held by a parent to avoid agitation). Never examine the epiglottis (a).
- Administer humidified oxygen. If humidified oxygen is unavailable, use nebulized saline. Do not force an oxygen mask on a pediatric patient; use the blow-by technique if necessary (a).

**ALS Level 1**

- 0.01 ml/kg aerosolized Epinephrine, 1:1000 (max 0.5 ml)

**ALS Level 2**

- None

**Note**

(a) Avoid any procedure that will agitate the pediatric patient.
### 3.2.3 Lower Airway (Wheezing-Asthma/Bronchiolitis)

#### GENERAL GUIDELINES

**Wheezing** is a whistling-type breath sound associated with narrowing or spasm of the smaller airways (usually heard on expiration, but may also be heard on inspiration).

Wheezing in the child younger than 1 year of age is usually the result of bronchiolitis, a viral infection of the bronchioles that causes prominent expiratory wheezing, clinically resembling asthma.

Asthma is a chronic inflammatory disease that is triggered by many different factors (e.g., environmental allergens, cold air, exercise, foods, irritants, certain medications). Asthma is characterized by a two-phase response. The first phase is associated with a histamine release, which causes bronchoconstriction and bronchial edema. Early treatment with bronchodilators may reverse the bronchospasm. The second phase consists of inflammation of the bronchioles and additional edema. The second phase will usually not respond to bronchodilators; instead, an anti-inflammatory medication (e.g., a corticosteroid) is typically required.

Assessment of the asthma patient usually includes a history of asthma with associated medications. The patient will be tachypneic and may have an unproductive cough. Use of accessory muscles is evident and wheezing may be heard, most commonly on expiration. In a severe asthma attack, the patient may not wheeze at all due to a lack of air flow.

#### TREATMENT GUIDELINES

<table>
<thead>
<tr>
<th><strong>Supportive Care</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Initial Assessment Protocol 3.1.1</td>
<td></td>
</tr>
<tr>
<td>- Medical Supportive Care Protocol 3.1.3, including use of a pulse oximeter (see Medical Procedure 4.22, Pulse Oximeter)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>ALS Level 1</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Administer the following bronchodilator: Albuterol (Ventolin®): one nebulizer treatment. (See Medical Procedure 4.18.9, Nebulizer). May repeat twice as needed.</td>
<td></td>
</tr>
<tr>
<td>- If patient less than 1 year or less than 10 kg, 1.25 mg/1.5 mL (0.083%);</td>
<td></td>
</tr>
<tr>
<td>- If patient greater than 1 year or greater than 10 kg, 2.5 mg/3 mL (0.083%)</td>
<td></td>
</tr>
<tr>
<td>- If a bronchodilator is administered, add Ipratropium Bromide (Atrovent®) to Albuterol nebulizer treatment. (See Medical Procedure 4.18.9, Nebulizer).</td>
<td></td>
</tr>
<tr>
<td>- If patient less than 8 year, 0.25mg/1.25mL</td>
<td></td>
</tr>
<tr>
<td>- If patient greater than 8 year, 0.5mg/2.5mL</td>
<td></td>
</tr>
<tr>
<td>- Consider the need for assisted ventilation and advanced airway (see Medical Procedure 4.4, Advanced Airways).</td>
<td></td>
</tr>
<tr>
<td>- If respiratory distress is severe, administer Epinephrine (1:1000) 0.01 mg/kg IM (up to a maximum dose of 0.3 mg).</td>
<td></td>
</tr>
<tr>
<td>- For severe dyspnea, administer Magnesium Sulfate 50 mg/kg (maximum dose = 2 g) IV (mixed in 50 mL of D5W given over 20 minutes), as needed.</td>
<td></td>
</tr>
<tr>
<td>- Repeat Epinephrine (1:1000) 0.01 mg/kg IM (up to a maximum dose of 0.3 mg).</td>
<td></td>
</tr>
<tr>
<td>- Solu Medrol 2 mg/kg IV (125 mg max)</td>
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<tr>
<td>- Epi Neb 0.5 mg (5 ml) 1:10,000</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>ALS Level 2</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- None</td>
<td></td>
</tr>
</tbody>
</table>

**Note**
### 3.3 Pediatric Cardiac Dysrhythmias

**General Guidelines**

Cardiac dysrhythmias in pediatric patients are uncommon and are usually due to noncardiac problems, unless the patient is known to have congenital or acquired cardiac disease. Cardiac arrest is usually the end result of hypoxemia and acidosis resulting from respiratory insufficiency or shock. Therefore, attention should be given initially to support of the respiratory system. Pediatric dysrhythmias can be classified into three categories: slow rhythms, fast rhythms, or no rhythm. The most common dysrhythmias is bradycardia, which is the result of hypoxia or acidosis. Tachycardia can be a compensatory mechanism or a result of a reentry mechanism. Ventricular fibrillation, although rare in pediatric patients, is usually the result of hypoxia. Asystole is a terminal event, following prolonged, untreated bradycardia.

Automated external defibrillators (AEDs) may be used for children 1 to 8 years of age who have no signs of circulation. Ideally the device should deliver a pediatric dose. The arrhythmia detection algorithm used in the device should demonstrate high specificity for pediatric shockable rhythms; i.e., it will not recommend delivery of a shock for non-shockable rhythms (Class IIb). The protocols in Section 3.3 follow the AHA/PALS guidelines. The paramedic should use these protocols to guide him/her through the treatment of cardiac patients with specific dysrhythmias and accompanying signs and symptoms. After stabilization of the patient, the paramedic may need to refer to additional protocols for continued treatment (e.g., other cardiac protocols).

In cardiac arrest, a major component of the primary and secondary survey is to consider the secondary differential diagnosis and to think carefully about what could be causing the arrest. The “H’s and T’s” chart will assist in the recognition of a possible underlying cause.

<table>
<thead>
<tr>
<th>H’s Cause</th>
<th>Treatment</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypovolemia</td>
<td>Fluid challenge with normal saline 20ml/kg or 10ml/kg for neonates (infants less than 1 month) IV/IO</td>
<td>Shock Protocol</td>
</tr>
<tr>
<td>Hypoxia</td>
<td>Airway management</td>
<td>Protocol 3.1.2</td>
</tr>
<tr>
<td>Hydrogen ion-acidosis</td>
<td>Airway management, ventilate consider Sodium Bicarbonate</td>
<td>Protocol 3.1.2 Drug Summary 5.32</td>
</tr>
<tr>
<td>Hyperkalemia</td>
<td>Consider Calcium Chloride Consider Sodium Bicarbonate 1 mEq/kg</td>
<td>Drug Summary 5.9 Drug Summary 5.32</td>
</tr>
<tr>
<td>Hypothermia</td>
<td>Cold-related emergencies</td>
<td>Protocol 3.8.3</td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>If glucose is less than 60 mg/dl, consider Dextrose or Glucagon</td>
<td>Protocol 3.7.2 Drug Summary 5.11 and 5.18</td>
</tr>
<tr>
<td>Hypocalcemia</td>
<td>Consider Calcium Chloride</td>
<td>Drug Summary 5.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>T’s Cause</th>
<th>Treatment</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tablets</td>
<td></td>
<td>Protocol 3.6</td>
</tr>
<tr>
<td>Tamponade, cardiac</td>
<td>Consider fluid challenge, Dopamine drip</td>
<td>Protocol 3.4.1</td>
</tr>
<tr>
<td>Tension pneumothorax</td>
<td>Consider chest decompression</td>
<td>Procedure 4.9</td>
</tr>
<tr>
<td>Thrombosis, coronary</td>
<td>Consider AMI, cardiogenic shock</td>
<td>Protocol 3.4</td>
</tr>
<tr>
<td>Thrombosis, pulmonary</td>
<td></td>
<td>Protocol 3.4</td>
</tr>
<tr>
<td>Trauma</td>
<td></td>
<td>Protocol 3.9</td>
</tr>
</tbody>
</table>
### General Guidelines

This protocol is used for asystole, electromechanical dissociation (EMD), pseudo-EMD, idioventricular rhythms, bradyasystolic rhythms, and post-defibrillation idioventricular rhythms.

### Treatment Guidelines

#### Supportive Care

- Consider criteria for death/no resuscitation (see General Protocol 1.4).
- Initial Assessment Protocol 3.1.1
- Medical Supportive Care Protocol 3.1.3.
- Determine the patient’s (un)responsiveness and check the CABs.
- If air exchange is inadequate and there is a reasonable suspicion of foreign body airway obstruction (FBAO), apply chest compressions. (see Medical Procedure 4.1.6)
- Oxygenate with 15-25 L/min via bag-valve mask with an appropriate airway adjunct device at 8-10 BPM (see Airway Protocol 3.1.2) (a).
- Begin immediate chest compressions at a rate of 100/min for 2 minutes while the monitor is being attached.
- Do not interrupt CPR to check the heart rhythm. Continuous uninterrupted compressions are paramount to patient survival.
- Check the heart rhythm; confirm asystole in two leads.
- Resume 2 minutes of continuous compressions at 100/min; check the heart rhythm.
- Consider the H’s and T’s.

#### ALS Level 1

- Confirm airway adjunct placement with electronic EtCO₂ and waveform on scene, during transport, and during transfer at the hospital.
- Establish IV or IO access; give normal saline wide open for fluid challenge at 20ml/kg or 10ml/kg for neonates (infants less than 1 month).
- When IV or IO line is established, administer a vasopressor:
  - Epinephrine (1:10,000) 0.01 mg/kg IV/IO (max dose 1mg); repeat every 3-5 minutes for the duration of pulselessness (b).
- Give 2 minutes of chest compressions; check the heart rhythm.
- Search for and treat possible contributing factors; see the H’s and T’s charts.
- If the patient is taking calcium channel blockers or if there is a high suspicion for hyperkalemia, administer Calcium Chloride 20 mg/kg IV/IO slowly.
- Perform a glucose test with a finger stick. If glucose is less than 60 mg/dL, administer:
  - If less than 1 year: D₁₀.₅ mL/kg IV/IO.
  - If 1-8 years: D₂₅ 2 mL/kg IV/IO.
  - If greater than 8 years: D₅₀ 1 mL/kg IV/IO (see Medical Procedure 4.17, Glucometer) (e).
  - If unable to obtain IV/IO access, provide Glucagon as follows:
    - Patient less than or equal to 20 kg: 0.5 mg IM
    - Patient greater than 20 kg: 1 mg IM
- Repeat a glucose test with a finger stick. If glucose less than 60 mg/dL, administer dextrose above dosing.
- Perform ten cycles of CPR and then reevaluate the heart rhythm.
- If a pulse is present, begin post-resuscitative care.
- Administer Narcan 0.1 mg/kg, may repeat once.
3.3.1 Asystole/Pulseless Electrical Activity (PEA) (continued)

TREATMENT GUIDELINES

ALS Level 2

Note

- None

(a) Provide a 15:2 compression to ventilation ratio. Once an advanced airway is in place, provide 1 breath every 6 seconds.

(b) As a last resort if IV/IO access is not available, Epinephrine 1:1000 0.1mg/kg ETT max ETT dose 2 mg injected directly into the ETT.

(c) If EtCO2 is less than 10mmHg: Attempt to improve CPR (compressions vs. ventilation).
   - If EtCO2=12 - 25mm Hg: Goal during resuscitation.
   - If EtCO2=35 - 45mm Hg: Check for ROSC

(d) If ROSC achieved, wean down oxygen to maintain a SpO2 at greater than or equal to 94%.

(e) To avoid infiltration and resultant tissue necrosis, Dextrose 25% and 50% should be given via slow IV with intermittent aspiration of the IV line to confirm IV patency, followed by saline flush
### 3.3.2 Bradycardia

#### General Guidelines

Causes of symptomatic bradycardia include hypoxemia, hypothermia, head injury, heart block, heart transplant (special situation), and toxin/poison/drug overdose.

#### TREATMENT GUIDELINES

**Supportive Care**

- Initial Assessment Protocol 3.1.1
- Medical Supportive Care Protocol 3.1.3.
- Assure adequate ventilation and oxygenation.
- If heart rate is less than 60/min in an infant or child associated with poor systemic perfusion, start chest compressions (see Medical Procedure 4.1.2, Cardiopulmonary Resuscitation).
- Consider the H’s and T’s.

**ALS Level 1**

- Start IV/IO administer a fluid challenge of normal saline 20 ml/kg IV or 10 ml/kg for neonates (infants less than 1 month).
- Administer Epinephrine (1:10,000) 0.01 mg/kg IV or IO (maximum dose = 1 mg IV/IO). (a).
- Administer Atropine 0.02 mg/kg IV or IO (minimum single dose = 0.1 mg) (b). May repeat Atropine once (a) (b) (c) (d).
- If the patient remains hypotensive and bradycardic and is conscious and aware of the situation, consider sedation with the following benzodiazepine:
  - Midazolam (Versed®) 0.1mg/kg, maximum single dose 4 mg IV, IO, IM. For IN administration use 0.2 mg/kg/dose (use 10 mg/2mL concentration), maximum single dose 5 mg; may repeat once if necessary. Maximum total dose of 10 mg (e).
- Use an external pacemaker (see Medical Procedure 4.14.2, External Pacemaker).

**ALS Level 2**

- None

**Note**

(a) Administer Atropine before Epinephrine for bradycardia due to suspected increased vagal tone or primary AV block.
(b) Small doses of Atropine less than 0.1 mg may produce paradoxical bradycardia.
(c) Maximum single dose for a child is 0.5 mg.
(d) Maximum single dose for an adolescent is 1 mg.
(e) For IN administration, administer 1ml per nare, give half the volume in one nostril and the other half of the volume in the other nare.
### 3.3.3 Narrow Complex Tachycardia

#### GENERAL GUIDELINES

**General Guidelines**

Pediatric patients suffering from tachycardia may or may not exhibit symptoms. Narrow complex tachycardia (QRS less than or equal to 0.08 second) may be either sinus tachycardia or supraventricular tachycardia. The following rates should be considered:

- **Sinus tachycardia** is a greater than normal rate (see Appendix 6.15, Pediatric Vital Signs), usually greater than 180/min for a child and greater than 220/min for an infant (less than one year old). The rate may vary with sinus tachycardia.
- **Supraventricular tachycardia** is usually a rate is above 220/min for infants. If the patient greater than 2 years of age, SVT may be slower (e.g., 180-220/min). The rate will not vary with SVT.

Wide complex SVTs are rare in children and, therefore, should initially be considered as ventricular in origin, unless proven otherwise (e.g., documented QRS morphology consistent with preexisting BBB or Wolff-Parkinson-White (WPW) syndrome).

#### TREATMENT GUIDELINES

**Supportive Care**

**UNSTABLE SINUS TACHYCARDIA (DIMINISHED PERFUSION)**

- Initial Assessment Protocol 3.1.1
- Medical Supportive Care Protocol 3.1.3.
- Determine the patient’s hemodynamic stability and symptoms.
- Apply SpO2 monitor and administer oxygen to maintain SpO2 at greater than or equal to 94%.
- Consider the H’s and T’s.

**ALS Level 1**

- Apply an ECG; record a rhythm strip and obtain a 12-lead ECG.
- If suspected hypovolemia, administer a fluid challenge of normal saline 20 ml/kg IV or 10 ml/kg for neonates (infants less than 1 month).
- If the patient is asymptomatic, provide Medical Supportive Care Protocol 3.1.3 and transport.

**ALS Level 2**

- None

**Note**
### 3.3.3 Narrow Complex Tachycardia (continued)

#### GENERAL GUIDELINES

<table>
<thead>
<tr>
<th>General Guidelines</th>
<th>STABLE SVT (NORMAL PERFUSION)</th>
</tr>
</thead>
</table>

#### TREATMENT GUIDELINES

**Supportive Care**
- Initial Assessment Protocol 3.1.1
- Medical Supportive Care Protocol 3.1.3.
- Determine the patient’s hemodynamic stability and symptoms.
- Apply SpO2 monitor and administer oxygen to maintain SpO2 greater than or equal to 94%.
- Consider the H’s and T’s

**ALS Level 1**
- Apply an ECG; record a rhythm strip and obtain a 12-lead ECG.
- Establish IV access; give normal saline wide open for fluid challenge at 20ml/kg or 10ml/kg for neonates (infants less than 1 month).
- If the patient is asymptomatic, provide Medical Supportive Care Protocol 3.1.3 and transport.
- Attempt vagal maneuvers; begin with ice water (see Medical Procedure 4.26, Vagal Maneuvers) (a).
- Administer Adenosine Triphosphate (Adenocard ®) 0.1 mg/kg (6 mg is the maximum first dose) via rapid IVP/IO, followed by 6 mL normal saline flush (a).
- Repeat Adenosine 0.2 mg/kg (12 mg is the maximum second dose) via rapid IVP/IO, followed by 6 mL normal saline flush (a).

**ALS Level 2**
- None

**Note**
### General Guidelines

**UNSTABLE SVT (DIMINISHED PERFUSION)**

## Treatment Guidelines

### Supportive Care

- Initial Assessment Protocol 3.1.1
- Medical Supportive Care Protocol 3.1.3.
- Determine the patient’s hemodynamic stability and symptoms.
- Apply SpO2 monitor and administer oxygen to maintain SpO2 greater than or equal to 94%.
- Consider the H’s and T’s.

### ALS Level 1

- Consider sinus tachycardia as the underlying rhythm, not SVT.
- Apply an ECG; record a rhythm strip and obtain a 12-lead ECG.
- Establish IV/IO access; give normal saline wide open.
- If the patient is responsive, administer Adenosine Triphosphate (Adenocard ®) 0.1 mg/kg (maximum dose = 6 mg) via rapid IVP/IO, followed by 6 mL normal saline flush (a).
- If the patient is responsive, repeat Adenosine 0.2 mg/kg (maximum dose = 12 mg) via rapid IVP/IO, followed by 6 mL normal saline flush. (a).
- If the patient is conscious and aware of the situation, consider sedation with the following benzodiazepine:
  - Midazolam (Versed®) 0.1mg/kg, maximum single dose 4 mg IV, IO, IM. For IN administration use 0.2 mg/kg/dose (use 10 mg/2mL concentration), maximum single dose 5 mg; may repeat once if necessary. Maximum total dose of 10 mg (c).
- If the patient is poorly responsive, apply synchronized cardioversion at 0.5 joule/kg. (b).
- If the patient remains poorly responsive, apply synchronized cardioversion at 1 joule/kg (b).
- If the patient is still poorly responsive, apply synchronized cardioversion at 2 joule/kg (b).
- Amiodarone 5 mg/kg IV, IO up to 300 mgs

### ALS Level 2

- None

### Note

(a) Record the patient’s heart rhythm while attempting to convert the rhythm so as to capture conversion data.
(b) Do not delay synchronized cardioversion to establish an IV for sedation purposes.
(c) Administer Benzodiazepines slowly, titrate to effect, and be aware of associated hypotension.
(d) For IN administration, administer 1ml per nare, give half the volume in one nostril and the other half of the volume in the other nare.
### General Guidelines

This protocol is used in wide complex tachycardia (QRS greater than 0.12 second).

### Treatment Guidelines

**Supportive Care**

STABLE (NORMAL PERFUSION) and UNSTABLE (DIMINISHED PERFUSION)

- Initial Assessment Protocol 3.1.1
- Medical Supportive Care Protocol 3.1.3.
- Determine the patient’s (un)responsiveness and check the CABs.
- Consider the H’s and T’s

**ALS Level 1**

STABLE (NORMAL PERFUSION) – Administer Amiodarone 5 mg/kg IV over 20 minutes.

UNSTABLE (DIMINISHED PERFUSION)

- If the patient is conscious and aware of the situation, consider sedation with one of the following benzodiazepines with Midazolam (Versed®) being the preferred benzodiazepine: (a)
  - Midazolam (Versed®) 0.1mg/kg, maximum single dose 4 mg IV, IO, IM. For IN administration use 0.2 mg/kg dose (use 10 mg/2mL concentration), maximum single dose 5 mg; may repeat once if necessary. Maximum total dose of 10 mg (b) (c).
  - OR
    - Diazepam (Valium) 0.2mg/kg (maximum dose 5 mg) IV, IO or IN; may repeat once, to a maximum dose of 10 mg (b) (c).
  - OR
    - Lorazepam (Ativan) 0.05 mg/kg IV, IO, or IN; may repeat once, to a maximum dose of 4 mg (b) (c).
- Apply synchronized cardioversion at 0.5 joule/kg
- Apply synchronized cardioversion at 1 joule/kg
- Apply synchronized cardioversion at 2 joule/kg
- If the patient converts to a sinus rhythm after cardioversion and the patient is normotensive, consult medical control for Amiodarone 5mg/kg over 20 minutes.

**ALS Level 2**

- None

**Note**

(a) Do not delay synchronized cardioversion to establish an IV for sedation purposes.
(b) Administer Benzodiazepines slowly, titrate to effect, and be aware of associated hypotension.
(c) For IN administration, administer 1ml per nare, give half the volume in one nostril and the other half of the volume in the other nare.
**3.3.5 Wide Complex Tachycardia Without a Pulse and Ventricular Fibrillation**

### General Guidelines

**TREATMENT GUIDELINES**

<table>
<thead>
<tr>
<th>Supportive Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Initial Assessment Protocol 3.1.1</td>
</tr>
<tr>
<td>• Medical Supportive Care Protocol 3.1.3.</td>
</tr>
<tr>
<td>• Determine the patient’s (un)responsiveness and check the CABs.</td>
</tr>
<tr>
<td>• Oxygenate with 15-25 L/min via bag-valve mask with an appropriate airway adjunct device at 8-10 BPM (see Airway Protocol 3.1.2).</td>
</tr>
<tr>
<td>• Begin immediate chest compressions at a rate of 100/min for 2 minutes while the monitor is being attached.</td>
</tr>
<tr>
<td>• Perform chest compressions at 15:2 ratio unless and advanced airway has been established (supraglottic or ETT)</td>
</tr>
<tr>
<td>• Do not interrupt CPR to check the heart rhythm. Continuous uninterrupted compressions are paramount to patient survival.</td>
</tr>
<tr>
<td>• Check the heart rhythm.</td>
</tr>
<tr>
<td>• Resume 2 minutes of continuous compressions at 100/min; check the heart rhythm.</td>
</tr>
<tr>
<td>• Consider the H’s and T’s.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ALS Level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Defibrillate at 2-4 joule/kg. The EMT should apply the AED (see Medical Procedure 4.1.1, Automated External Defibrillator).</td>
</tr>
<tr>
<td>• Resume CPR immediately. Administer ten cycles of CPR.</td>
</tr>
<tr>
<td>• Check the heart rhythm. Treat according to the applicable protocol.</td>
</tr>
<tr>
<td>• Defibrillate at 4 joule/kg; continue CPR while the defibrillator is charging.</td>
</tr>
<tr>
<td>• Resume CPR immediately.</td>
</tr>
<tr>
<td>• Administer Epinephrine (1:10,000) 0.01 mg/kg IV or IO (maximum dose 1 mg). Repeat every 3-5 minutes for the duration of pulselessness.</td>
</tr>
<tr>
<td>• Reevaluate the heart rhythm after ten cycles of CPR.</td>
</tr>
<tr>
<td>• Defibrillate at 4 joule/kg; continue CPR while the defibrillator is charging.</td>
</tr>
<tr>
<td>• Resume CPR immediately.</td>
</tr>
<tr>
<td>• Administer one of the following antiarrhythmics:</td>
</tr>
<tr>
<td>• Amiodarone 5 mg/kg IV or IO.</td>
</tr>
<tr>
<td>• If the patient has torsades de pointes, Magnesium Sulfate 25-50 mg/kg IV/IO, up to a maximum dose of 2 g, over 2 minutes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ALS Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• None</td>
</tr>
</tbody>
</table>

**Note**
### General Guidelines

Infant and newborn cardiopulmonary arrest is usually a result of prolonged poor oxygenation and/or severe circulatory collapse. Newborn/neonates (infants less than 1 month) should be resuscitated using Pediatric Protocol 3.4.1. Unless there are obvious signs of death (see General Protocol 1.4, Death in the Field), the infant in cardiopulmonary arrest should be resuscitated using the protocols in Pediatric Protocol 3.3. While some infants may not be salvageable, the paramedic may determine a resuscitation attempt is warranted for psychological reasons (e.g., the parent’s peace of mind). Consideration should also be given to SIDS (see Pediatric Protocol 3.4.2).
### 3.4.1 Newborn Resuscitation

#### General Guidelines

This protocol is to be used for newborns that are in need of resuscitation immediately following delivery.

#### Supportive Care

- **Initial Assessment Protocol** 3.1.1
- Dry and keep the newborn warm (cover with a thermal blanket or dry towel, and cover the scalp with a stocking cap).
- Position the patient so as to open the airway (a).
- Clear the airway; suction the mouth and nose with a bulb syringe as needed.
- **Paramedic Only**: If the newborn has signs of thick meconium after suctioning with a bulb syringe and if the newborn is not vigorous and crying, intubate and suction the trachea using the meconium aspirator (see Medical Procedure 4.3.1, Flexible Suctioning, Medical Procedure 4.3.2, Rigid Suctioning) (b). *(From PALS 2010: In the absence of randomized, controlled trials, there is insufficient evidence to recommend a change in the current practice of performing endotracheal suctioning of nonvigorous babies with meconium-stained amniotic fluid (Class IIb, LOE C). However, if attempted intubation is prolonged and unsuccessful, BVM should be considered, particularly if there is persistent bradycardia.)*
  - Stimulate the newborn (rub the newborn’s back).
  - Clamp and cut the cord, if not already done. Apply two umbilical clamps, 2 inches apart and at least 8 inches from the navel, and cut between clamps.
  - Assess skin color, respirations, and heart rate.
  - Administer 100% oxygen via blow-by method to newborns that are breathing but have central cyanosis or have no improvement in respiratory, circulatory, or neurological status within 90 seconds of initial assessment.
  - Ventilate at 40-60 breath/min with 100% oxygen under the following conditions:
    - Apnea.
    - Heart rate less than 100 beat/min.
    - Persistent central cyanosis after high-flow oxygen.
  - **Paramedic Only**: Place an advanced airway only under the following conditions (see Medical Procedure 4.4):
    - Bag valve mask (BVM) ventilation is ineffective after 2 minutes).
    - Tracheal suctioning is required, especially for thick meconium, and the newborn is not vigorous and crying using the meconium aspirator (b).
    - Prolonged positive-pressure ventilation is needed.
  - Newborns who require CPR in the prehospital setting, should receive CPR according to infant guidelines: 2 rescuers provide continuous chest compressions with asynchronous ventilations if an advanced airway is in place and a 15:2 ventilation-to-compression ratio if no advanced airway is in place (Class IIb, LOE C). Perform chest compressions at 120/min using two thumbs placed side by side (or superimposed one on top of the other) over the mid-sternum, just below the nipple line, with the fingers encircling the chest and supporting the back, under the following conditions:
    - Heart rate is less than 100 beat/min and not rapidly increasing despite adequate ventilation with 100% oxygen for approximately 30 seconds.
3.4.1 Newborn Resuscitation (continued)

### TREATMENT GUIDELINES

#### ALS Level 1

- Administer Epinephrine (1:10,000) 0.01mg/kg IV/IO under the following conditions:
  - Asystole.
  - Heart rate is less than 60 beat/min despite adequate ventilation with 100% oxygen and 30 seconds of chest compressions.
- Repeat every 3-5 minutes as needed.
- Administer a fluid challenge of normal saline 10mL/kg IV under the following conditions:
  - Pallor that persists after adequate oxygenation.
  - Faint pulses with a good heart rate.
  - Poor response to resuscitation with adequate ventilations.
- Check the blood glucose level for all resuscitated newborns who do not respond to initial therapy. Use a heel stick (see Medical Procedure 4.17, Glucometer).
  - If blood glucose less than 40 mg/dL, administer D\textsubscript{10} 5 mL/kg IV/IO (dilute D\textsubscript{50} 1:4 with normal saline to make D\textsubscript{10}).
- Perform Pediatric Assessment Triangle: Rapid Cardiopulmonary Assessment (see Pediatric Protocol 3.1.1, Initial Assessment) frequently.
- If the newborn is unresponsive with depressed respirations, consider Naloxone (Narcan®) 0.1 mg/kg (1 mg/mL concentration) IV/IO/IN/IM (c)

#### ALS Level 2

- None

#### Note

(a) The newborn should be placed on his/her back or side with the neck in a neutral position. To help maintain correct position, a rolled blanket or towel may be placed under the back and shoulders of the supine newborn to elevate the torso 0.75 or 1 inch off the mattress to extend the neck slightly. If copious secretions are present, the newborn should be placed on his/her side with the neck slightly extended to allow secretions to collect in the mouth rather than in the posterior pharynx.

(b) Tracheal suctioning for thick meconium should be done via an endotracheal tube using a meconium aspirator attached to the 15-mm adaptor of the ETT. The suction unit is then attached and placed on low pressure (no more than 100 mm Hg). Suctioning should be performed until the ETT is clear (maximum 5 seconds). It may be necessary to repeat the intubation and continue suctioning until clear (maximum three times).

(c) Avoid the use of Naloxone if the mother has a history of drug use/abuse, as Naloxone may precipitate seizures in the newborn due to acute withdrawal.
### 3.4.2 Sudden Infant Death Syndrome (SIDS)

#### General Guidelines

Sudden infant death syndrome (SIDS), also known as “crib death,” is the sudden and unexpected death of an apparently healthy infant, usually younger than 1 year of age, which remains unexplained after a complete medical history, death scene investigation, and postmortem examination. SIDS almost always occurs when the infant is asleep or thought to be asleep.

Although there may be obvious signs of death (see Appendix 6.17, Sudden Infant Death Syndrome), the paramedic may attempt resuscitation of the infant for psychological reasons (e.g., the parent’s peace of mind). There may also be some infants in whom the Paramedic determines that a resuscitation attempt is not warranted (see General Protocol 1.4, Death in the Field). In either event, the paramedic should be prepared for a myriad of grief reactions from the parents and/or caregiver.

Some SIDS deaths are mistaken for child abuse. If there are possible signs of abuse (see Appendix 6.2.2, Signs of Child Abuse), the paramedic should continue as if it were a SIDS death, to avoid any unnecessary grief on the part of the parents and/or caregiver. The paramedic should not attempt to determine whether child abuse has taken place. The scene should be treated as any other death scene, with attention to preservation of potential evidence.

#### Treatment Guidelines

<table>
<thead>
<tr>
<th>Supportive Care</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>• Initial Assessment Protocol 3.1.1</td>
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</tr>
<tr>
<td>• In most instances, resuscitation should be attempted (see the appropriate Pediatric Protocols).</td>
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<tr>
<td>• Assign a crew member to assist the parents and/or caregiver and to explain the procedures.</td>
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<tr>
<td>• If time permits, elicit a brief history and perform an environmental check. Document all findings on the EMS Run Report.</td>
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<tr>
<td>• Once resuscitation is started, do not stop until directed to do so in the hospital by a physician.</td>
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<table>
<thead>
<tr>
<th>ALS Level 1</th>
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<tr>
<td>• None</td>
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<table>
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<tr>
<th>ALS Level 2</th>
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<tbody>
<tr>
<td>• None</td>
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<tr>
<th>Note</th>
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## 3.5 Pediatric Neurologic Emergencies

### General Guidelines

This section covers the most common pediatric neurologic emergencies, altered mental status, and seizures. It is important for the paramedic to understand appropriate behavior for the child/infant’s age to properly assess level of consciousness (see Appendix 6.8.2, Glasgow Coma Scale Score, for pediatric patients). Attention should be given to how the child interacts with parents and the environment and whether the patient can make good eye contact. Parents may be invaluable for a baseline comparison of level of consciousness. The parents may simply state that the patient is not acting right. Causes of pediatric altered mental status may include hypoxia, head trauma, ingestion/poisoning, infection, and hypoglycemia.

Approximately 4-6% of all children will have at least one seizure. Seizures may be due to an underlying disease (e.g., epilepsy) or may simply be a result of fever. Other potential causes of pediatric seizures include trauma, hypoxia, infection of brain and spinal cord (e.g., meningitis), hypoglycemia, and ingestion/poisoning.
### 3.5.1 Altered Level of Consciousness (Altered Mental Status)

#### General Guidelines

Common signs of altered mental status in pediatric patients include combative behavior, decreased responsiveness, lethargy, weak cry, moaning, hypotonia, ataxia, and changes in personality. The initial management approach should be based on the assumption that the patient is suffering from infection, hypoxia, ischemia, hypoglycemia, or dehydration. Secondary considerations should include medications, illicit drugs/alcohol, plants, trauma, and other factors.

#### TREATMENT GUIDELINES

**Supportive Care**

- Initial Assessment Protocol 3.1.1
- Medical Supportive Care Protocol 3.1.3; consider the need for spinal immobilization (see Medical Procedure 4.24, Spinal Immobilization).
- Consider the need for ventilatory assistance.

**ALS Level 1**

- If the child remains unresponsive and prolonged ventilatory assistance is needed, consider use of an appropriate airway adjunct device (a).
- Perform a glucose test with a finger stick. If glucose less than 60 mg/dL, administer:
  - If less than 1 year: D_{10} 5 mL/kg IV/IO
  - If less than 8 years: D_{25} 2 mL/kg IV/IO.
  - If older than 8 years: D_{50} 1 mL/kg IV/IO (see Medical Procedure 4.17) (a) (b).
  - If unable to obtain IV/IO access, provide Glucagon as follows:
    - Patient less than or equal to 20 kg: 0.5 mg IM.
    - Patient greater than 20 kg: 1 mg IM
- Repeat a glucose test with a finger stick. If glucose less than 60 mg/dL, administer dextrose dosing above:
- If the patient’s mental status is depressed and signs of dehydration exist, administer a fluid challenge of normal saline 20 mL/kg IV or 10 mL/kg for neonates (infants less than 1 month).
- If the patient’s mental status and respiratory effort are depressed, administer naloxone (Narcan®) 0.1 mg/kg (maximum dose 2 mg) IV/IO/IM/IN. May repeat every 5 minutes as needed.
- If toxicology (poisoning) is suspected, contact the Poison Information Center (1-800-222-1222)

**ALS Level 2**

- None

**Note**

(a) Use appropriate discretion regarding the immediate use of airway adjuncts in pediatric patients, as they may quickly regain consciousness.
(b) To avoid infiltration and resultant tissue necrosis, dextrose should be given via slow IV, with intermittent aspiration of the IV/IO line to confirm IV/IO patency, followed by saline flush.
## 3.5.2 Seizure Disorders

### GENERAL GUIDELINES

This protocol should be used when the patient has shown continuous convulsions or repeating episodes without regaining consciousness or sufficient respiratory compensation. Consider an underlying etiology such as fever, hypoxia, head trauma, infection (e.g., meningitis), hypoglycemia, electrolyte imbalance, and ingestion/poisoning.

### TREATMENT GUIDELINES

<table>
<thead>
<tr>
<th>Supportive Care</th>
<th>ALS Level 1</th>
<th>ALS Level 2</th>
<th>Note</th>
</tr>
</thead>
</table>
| • Initial Assessment Protocol 3.1.1 | • Perform a glucose test with a finger stick. If glucose is less than 60 mg/dL, administer:  
  o If less than 1 year: D<sub>10</sub> 5 mL/kg IV/IO.  
  o If 1 - 8 years: D<sub>25</sub> 2 mL/kg IV/IO.  
  o If older than 8 years: D<sub>50</sub> 1 mL/kg IV/IO (see Medical Procedure 4.17, Glucometer) (a) (b).  
  o If unable to obtain IV/IO access, provide Glucagon as follows:  
    Patient less than or equal to 20 kg: 0.5 mg IM.  
    Patient greater than 20 kg: 1 mg IM  
  • Repeat a glucose test with a finger stick. If glucose less than 60 mg/dL, administer dextrose above dosing:  
  • If the seizure continues, administer:  
    o Midazolam (Versed®) 0.1mg/kg, maximum single dose 4 mg IV, IO, IM. For IN administration use 0.2 mg/kg/dose (use 10 mg/2mL concentration), maximum single dose 5 mg; may repeat once if necessary. Maximum total dose of 10 mg (d) (e).  
  • If temperature > 102° F, give Tylenol 15 mg/kg P.O. | • None | (a) For neonates (infants less than 1 month) with a blood glucose of less than 40 mg/dl administer D<sub>10</sub> 5 mL/kg IV/IO. In infants (1 month to 12 months of age) with blood glucose less than 60 mg/dL, administer D<sub>10</sub> 5 mL/kg IV/IO (dilute D<sub>50</sub> 1:4 with normal saline to make D<sub>10</sub>).  
(b) To avoid infiltration and resultant tissue necrosis, dextrose 10%, 25%, and 50% should be given via slow IV with intermittent aspiration of the IV/IO line to confirm IV/IO patency, followed by saline flush.  
(c) Providers should not withhold obtaining IV access for fear of not wanting to agitate the patient.  
(d) Administer Benzodiazepines slowly, titrate to effect, and be aware of associated hypotension.  
(e) For IN administration, administer 1ml per nare, give half the volume in one nostril and the other half of the volume in the other nare. |
### General Guidelines

This protocol is to be used for those patients suspected of exposure to toxic substances via any route of exposure (e.g., drug overdose, snake bite). Each of the subprotocols gives specific considerations for each type of exposure as well as general treatment guidelines. Additional assistance may be necessary in certain cases (e.g., hazardous materials team for toxic exposure; police for scene control, including the presence of violent and/or impaired patient - see Pediatric Protocol 3.7.5). Also refer to the Chemical Treatment Guidelines (found in Chapter 7) as needed.

A history of the events leading to the illness or injury should be obtained from the patient and bystanders, to include the following information:

1. To which drugs, poisons, or other substances was the patient exposed? Consider multiple substances, especially on overdoses. Also consider plants and herbal remedies.
2. When did the exposure occur, and how much exposure was there?
3. What is the duration of symptoms?
4. Is the patient depressed or suicidal? Does he/she have a history of previous over-dose? (if applicable)
5. Was the exposure accidental? What was the nature of the accident?
6. What was the duration of exposure? (if applicable)

Collect all pill bottles - empty or full - and check for a “suicide note” (if applicable). Transport any/all information or items that may assist in the treatment of the patient to the emergency department.

Contact the Poison Information Center (1-800-222-1222) for consultation regarding specific therapy.
### 3.6.1 Pediatric Ingestion (Overdose)

#### General Guidelines

This protocol should be used on most types of ingestion /poisoning (e.g., acetaminophen, benzodiazepines, narcotics, tricyclic antidepressants, vitamins with iron). See Adult Protocol 2.6 for lists of different types of medications. Symptoms vary with the substance involved. Also refer to the Pediatric Chemical Treatment Guidelines (found in Chapter 7) as needed.

#### Treatment Guidelines

<table>
<thead>
<tr>
<th>ALS Level</th>
<th>Steps</th>
</tr>
</thead>
</table>
| Supportive Care | • Initial Assessment Protocol 3.1.1  
• Medical Supportive Care Protocol 3.1.3.  
• Consider the need for ventilatory support (see Medical Procedure 4.1).  
• Contact the Poison Information Center (1-800-222-1222). |
| ALS Level 1 | • Consider the need for use of an airway adjunct device. If an endotracheal tube is used, attempt to utilize a “cuffed tube” to prevent aspiration.  
• If narcotic overdose is suspected in a non-neonate, administer naloxone (Narcan®) 0.1 mg/kg (maximum dose = 2 mg) IV/IO/IM/IN. May repeat every 5 minutes as needed.  
• If tricyclic antidepressant overdose is suspected, administer Sodium Bicarbonate 1 mEq/kg IV/IO (c).  
• If organophosphates / carbamates suspected, Atropine 0.02 mg/kg IV PRN  
• If calcium channel blocker is suspected, Calcium Chloride 20 mg/kg slow IV  
• If any other suspected poisoning, Calcium Chloride 20 mg/kg slow IV  
• If blood glucose is below 60, Glucagon 0.5 mg/kg IM |
| ALS Level 2 | • None |

#### Note

(a) If the patient is seizing, also see Pediatric Protocol 3.5.2.
3.6.2 Bites and Stings

**GENERAL GUIDELINES**

This protocol includes the treatment for snake and spider bites, dog and cat bites, insect stings, and marine animal envenomations and stings. All bite patients should be transported to the hospital.

- Contact the Poison Information Center (1-800-222-1222).
- Initial Assessment Protocol 3.1.1
- Trauma Supportive Care Protocol 3.1.4.

**TREATMENT GUIDELINES**

**Supportive Care**

**SNAKE BITES**

- Consider the need for Pediatric Protocol 3.7.1, Allergic Reactions/Anaphylaxis.
- Splint the affected area. Place the patient in a supine position with the extremities at a neutral level. Keep the patient quiet. Remove and secure all jewelry.
- Wash the area of the bite with copious amounts of water.
- Attempt to identify the snake, if it is safe to do so.
- Check the temperature and pulse distal to a bite on an extremity, and mark level of swelling and time with pen every 15 minutes.

**DOG, CAT, AND WILD ANIMAL BITES**

- Wound care: BLS. Do not use hydrogen peroxide on deep puncture wounds or wounds exposing fat.
- Advise dispatch to contact animal control and the police department for identification and quarantine of the animal.

**INSECT STINGS (INCLUDING CENTIPEDES, SCORPIONS, AND SPIDERS)**

- Consider the need for Pediatric Protocol 3.7.1, Allergic Reactions/Anaphylaxis.
- Remove the stinger by scraping the skin with the edge of a flat surface (e.g., a credit card). Do not attempt to pull the stinger out, as this may release more venom.
- Clean the wound area with soap and water.

**HUMAN BITES**

- General Protocol 1.12, Personal Exposure to Infectious Diseases.
- Wound care: BLS. Do not use hydrogen peroxide on deep puncture wounds or wounds exposing fat. Clean the wound area with soap and water.
- Advise dispatch to contact the police department for possible domestic disturbance.

**MARINE ANIMAL ENVENOMATIONS: STINGRAY, SCORPIONFISH (LIONFISH, ZEBRAFISH, STONEFISH), CATFISH, WEEVERFISH, STARFISH, AND SEA UCHIN**

- Consider the need for Pediatric Protocol 3.7.1, Allergic Reactions/Anaphylaxis.
- Immerse the punctures in nonscalding hot water to tolerance (110-113°F) to achieve pain relief (30-90 minutes). Transport should not be delayed for this purpose; immersion in nonscalding hot water may be continued during transport.
- Remove any visible pieces of the spine(s) or sheath. Gently wash the wound with soap and water, and then irrigate it vigorously with fresh water (avoid scrubbing).
### 3.6.2 Bites and Stings (continued)

**Supportive Care**

MARINE ANIMAL STINGS: JELLYFISH, MAN-OF-WAR, SEA NETTLE, IRUKANDJI, ANEMONE, HYDROID, AND FIRE CORAL

- Consider the need for Pediatric Protocol 3.7.1, Allergic Reactions/Anaphylaxis.
- Rinse the skin with sea water. Do not use fresh water, do not apply ice, and do not rub the skin.
- Remove any large tentacle fragments using forceps. Use gloves to avoid contact with your bare hands.

**ALS Level 1**

- Refer to Pediatric Protocol 3.1.5 for pain management guidelines.

**ALS Level 2**

- None

**Note**
### OTHER PEDIATRIC MEDICAL EMERGENCIES

<table>
<thead>
<tr>
<th>GENERAL GUIDELINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>The paramedic should use these protocols to guide him/her through the treatment of patients with other medical emergencies who are exhibiting signs and symptoms. In addition to these protocols, the paramedic may need to refer to other protocols for continued treatment.</td>
</tr>
</tbody>
</table>
### 3.7.1 Allergic Reactions/Anaphylaxis

**GENERAL GUIDELINES**

<table>
<thead>
<tr>
<th>General Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>This protocol should be used for patients who are exhibiting signs and symptoms consistent with allergic reaction:</td>
</tr>
<tr>
<td>- Skin: flushing, itching, hives, swelling, cyanosis.</td>
</tr>
<tr>
<td>- Respiratory: dyspnea, sneezing, coughing, wheezing, stridor, laryngeal edema, laryngospasm, bronchospasm.</td>
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<tr>
<td>- Cardiovascular: vasodilatation, increased heart rate, decreased blood pressure.</td>
</tr>
<tr>
<td>- Gastrointestinal: nausea/vomiting, abdominal cramping, diarrhea.</td>
</tr>
<tr>
<td>- CNS: dizziness, headache, convulsions, tearing.</td>
</tr>
<tr>
<td>Treatment is outlined according to the severity of the allergic reaction (mild, moderate, and severe or anaphylaxis).</td>
</tr>
</tbody>
</table>

**TREATMENT GUIDELINES**

**Supportive Care**
- Initial Assessment Protocol 3.1.1
- Trauma Supportive Care Protocol 3.1.4.

### ALS Level 1

**MILD REACTIONS**
Mild reactions consist of redness and/or itching, but normal perfusion without dyspnea.
- For severe itching, administer Diphenhydramine (Benadryl®) 1 mg/kg IM or IV (maximum dose = 50 mg). If administering Benadryl IV dilute amount in 9mL of normal saline.
- Epinephrine (1:1000) 0.01 mg/kg IM (maximum dose = 0.3 mg).

**MODERATE REACTIONS**
Moderate reactions are characterized by edema, hives, dyspnea, wheezing, and normal perfusion.
- Benadryl 1 mg/kg IV or IM
- Solu-Medrol 1-2 mg/kg slow IV
- Epinephrine (1:10,000) 5 ml Neb
- Epinephrine (1:10,000) 0.01 mg/kg IM (maximum dose of 0.3 mg) (a).
- Albuterol 2.5 mg / Atrovent 500 mcg Neb

**SEVERE REACTIONS**
- Severe reactions are characterized by edema, hives, severe dyspnea and wheezing, poor perfusion, and possible cyanosis and laryngeal edema. Consider the need for immediate intubation.
- Epinephrine (1:1000) 0.01 mg/kg IM (maximum dose = 0.3 mg) (a).
- Diphenhydramine (Benadryl®) 1 mg/kg IM/IV (maximum dose = 50 mg). If administering Benadryl IV dilute amount in 9 mL of normal saline.
- Albuterol (Ventolin®): If patient remains in respiratory distress, administer 1 nebulizer treatment (see Medical Procedure 4.18.9, Nebulizer).
  - If less than 1 year or less than 10 kg: 1.25 mg/1.5 mL (0.083%).
  - If greater than 1 year or greater than 10 kg: 2.5 mg/3 mL (0.083%).
- If bronchodilators are administered, may add Ipratropium Bromide (Atrovent®) 0.5 mg (2.5 mL) to either Albuterol nebulizer treatment for the first nebulizer treatment only.
- May repeat Epinephrine (1:1000) 0.01 mg/kg IM.
- Solu-Medrol 1-2 mg/kg slow IV
<table>
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<tr>
<th>ALS Level 2</th>
<th>Note</th>
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<tbody>
<tr>
<td></td>
<td>(a) The EpiPen® (greater than 8 yrs) or EpiPen Jr® (1-8 yrs) may be used if other means of Epinephrine administration are not available.</td>
</tr>
</tbody>
</table>

- None
## 3.7.2 Hypoglycemia/Hyperglycemia

### General Guidelines

This protocol is to be used for those patients whose blood glucose is less than 60 mg/dL (see Pediatric Protocol 3.4.1 for newborn guidelines). Consider medication errors, overdoses, accidental ingestions, and other factors related to etiology. Look for pill bottles.

### Treatment Guidelines

| ALS Level 1 | If the patient is conscious with an intact gag reflex, assist with self-administration of oral glucose, if possible.  
| | Perform a glucose test with a finger stick. If glucose less than 60 mg/dL, administer D25 1-2 cc/kg IV  
| | If unable to obtain IV/IO access provide Glucagon 0.025 mg/kg IM  
| | Repeat a glucose test with a finger stick. If glucose less than 60 mg/dL, administer dextrose dosing above  
| | If glucose > 250 with:  
| | o Signs of dehydration: administer Normal Saline Bolus 10 cc/kg  
| | o Signs of shock: administer Normal Saline Bolus 20 cc/kg  

| ALS Level 2 | None  

| Note | (a) To avoid infiltration and resultant tissue necrosis, dextrose 25% and 50% should be given via slow IV with intermittent aspiration of the IV line to confirm IV patency, followed by saline flush.  

### 3.7.3 Nausea and Vomiting

#### GENERAL GUIDELINES

<table>
<thead>
<tr>
<th>General Guidelines</th>
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</thead>
<tbody>
<tr>
<td>To enhance patient comfort and safety, the treatment of nausea and vomiting may be appropriately accomplished in the field. The symptoms of nausea and vomiting may occur as a result of acute illness or as a medication side effect</td>
</tr>
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#### TREATMENT GUIDELINES

<table>
<thead>
<tr>
<th>Supportive Care</th>
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<tbody>
<tr>
<td>• Initial Assessment Protocol 3.1.1</td>
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<tr>
<td>• Medical Supportive Care Protocol 3.1.3.</td>
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<tr>
<th>ALS Level 1</th>
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<tbody>
<tr>
<td>• Normal Saline Bolus 20 cc/kg (PRN)</td>
</tr>
<tr>
<td>• Administer ZOFRAN® (Ondansetron hydrochloride) Injection</td>
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<tr>
<td>o 0.1 mg/kg IVP, max of 4 mg</td>
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<tr>
<td>o May be repeated once if no improvement within 30 minutes.</td>
</tr>
<tr>
<td>o Do not exceed 8 mg total dosage (see Drug Summary 5.39)</td>
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<tr>
<td>o Consider Dopamine 5-20 mcg/kg/min</td>
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<th>ALS Level 2</th>
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<td>• None</td>
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### General Guidelines

This protocol should be used for patients who complain of abdominal pain without a history of trauma (refer to Appendix 6.2.2 Signs of Child Abuse). Assessment should include specific questions pertaining to the GI/GU systems.

**Abdominal physical assessment:**
- Ask patient to point to the area of pain (palpate this area last).
- Gently palpate for tenderness, rebound tenderness, distention, rigidity, guarding, and pulsatile masses. Also palpate the flank for CVAT (costovertebral angle tenderness).
- Abdominal history:
  - History of pain (OPQRRRST).
  - History of nausea/vomiting (color, bloody, coffee grounds, dark bilious).
  - History of bowel movement (last BM, diarrhea, bloody, tarry).
  - History of urine output (painful, dark, bloody).
  - History of abdominal surgery.
  - History of medication ingestions.
- SAMPLE history (pay attention to last meal).

Additional questions should be asked of the female adolescent patient regarding OB/GYN history (see Adult Protocol 2.7, Adult OB/GYN Emergencies).

An acute abdomen can be caused by appendicitis, diabetic ketoacidosis, incarcerated hernia, intussusception, cholecystitis, cystitis-UTI (bladder inflammation), duodenal ulcer, diverticulitis, abdominal aortic aneurysm, kidney infection, urinary tract infection (UTI), kidney stone, pelvic inflammatory disease (PID; female), or pancreatitis (see Appendix 6.1, Abdominal Pain Differential).

### Treatment Guidelines

#### Supportive Care
- Initial Assessment Protocol 3.1.1
- Medical Supportive Care Protocol 3.1.3.

#### ALS Level 1
- In case of decreased perfusion (see Appendix 6.15, Pediatric Vital Signs), administer a fluid challenge of normal saline 20 mL/kg IV and 10 ml/kg for neonates (infants less than 1 month).

#### ALS Level 2
- None

#### Note
3.7.6 Suspected Child Abuse

GENERAL GUIDELINES

This protocol should be used when the paramedic suspects that child abuse may have occurred. See Appendix 6.2.2, Signs of Child Abuse, and Appendix 6.2.1, Report of Abuse. Child abuse is when a person intentionally inflicts, or allows to be inflicted, physical or psychological injury to a child, which causes or results in risk of death, disfigurement, or distress. Child neglect is when a child’s physical, mental, or emotional condition is impaired or endangered because of failure of the legal guardian to supply basic necessities, including adequate food, clothing, shelter, education, or medical care.

TREATMENT GUIDELINES

Supportive Care
- Initial Assessment Protocol 3.1.1
- Trauma Supportive Care Protocol 3.1.4.
- Advise police that child abuse is suspected.
- Protect the child from further abuse.
- Obtain information in a nonjudgmental manner.
- Do not confront the caregiver and/or parent.
- Transport the patient to the hospital for evaluation and possible treatment (a).

ALS Level 1
- None

ALS Level 2
- None

Note
(a) If the parent refuses to have the pediatric patient transported to a hospital, request police assistance.
(b) Reporting of suspected child abuse is required by law.

Multiple bruises or injuries that are in different stages of healing are concerns for abuse.
### 3.7.7 Sickle Cell Anemia

#### GENERAL GUIDELINES

**General Guidelines**

Sickle cell anemia is a chronic hemolytic anemia occurring frequently in African Americans and Hispanics; it is characterized by sickle-shaped red blood cells. Sickle cell crisis results from the occlusion of a blood vessel by masses of sickle-shaped red blood cells. Pain is the principal manifestation— it represents the most common type of crisis. This pain typically occurs in the patient’s joints and back. Hepatic pulmonary or central nervous system involvement can occur, with each manifestation having its own group of symptoms. Patients with sickle cell disorder have a high incidence of life threatening disorders at a very young age.

#### TREATMENT GUIDELINES

**Supportive Care**

- Initial Assessment Protocol 3.1.1
- Medical Supportive Care Protocol 3.1.3.
- Provide emotional support.

**ALS Level 1**

- Administer a fluid challenge of normal saline 20mL/kg or 10 mL/kg for neonates (infants less than 1 month) IV.
- If pain persists and systolic BP is adequate (see Appendix 6.15, Pediatric Vital Signs):
  - Morphine Sulfate - may be given intravenously in increments every 3-5 minutes, titrated to pain, to a maximum dose of 4 mg. Administer at a rate not to exceed 1 mg/min. Pediatric dose: 0.1 mg/kg IV. Infant dose: 0.05 mg/kg IV (a).

**ALS Level 2**

- None

**Note**

(a) Do not administer narcotic analgesics to a patient with a SpO2 less than 92%.
### General Guidelines

The following protocols cover a range of problems related to the environment, including trauma due to changes in atmospheric pressure, exposure to heat and cold extremes, water submersion, and exposure to electricity. Initial management efforts should focus on removing the patient from the harmful environment.
# 3.8.1 Drowning

## GENERAL GUIDELINES

<table>
<thead>
<tr>
<th>General Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non fatal drowning patients are those persons who have been submerged in fresh or salt water and may or may not be conscious. If the patient is still in open water upon arrival of EMS crew members, a Dive Rescue Team should be used to remove the patient from the water whenever possible. Additional protocols may be needed for treatment decisions (e.g., Pediatric Protocol 3.8.4, Barotrauma/ Decompression Illness: Dive Injuries). Drownings are <em>not</em> Trauma Alerts, unless there is specific traumatic component associated with the event.</td>
</tr>
</tbody>
</table>

## TREATMENT GUIDELINES

<table>
<thead>
<tr>
<th>Supportive Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Initial Assessment Protocol 3.1.1</td>
</tr>
<tr>
<td>• Trauma Supportive Care Protocol 3.1.4: protect the c-spine (a).</td>
</tr>
<tr>
<td>• Determine any pertinent history (duration of submersion, depth, water temperature, possible seizure, drug and/or alcohol use, possible trauma).</td>
</tr>
<tr>
<td>• Maintain the patient’s body temperature; dry and warm the patient.</td>
</tr>
<tr>
<td>• All non-fatal drowning patients should be transported to the hospital, regardless of how well they may seem to have recovered. Delayed death or complications due to pulmonary edema or aspiration pneumonia are not uncommon. The most devastating injury is the result of asphyxia.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ALS Level 1</th>
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<tbody>
<tr>
<td>• Treat dysrhythmias per specific protocol (see Pediatric Protocol 3.3).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ALS Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) The routine use of chest thrusts for a non-fatal drowning patient is not recommended. This maneuver should be used only in cases of FBAO (see Medical Procedure 4.1.6, Suspected Foreign Body Airway Obstruction).</td>
</tr>
</tbody>
</table>
These protocols cover specific types of injuries and their treatment. The initial assessment of the trauma patient should include determination of Trauma Alert criteria (see General Protocol 1.10, Trauma Transport). When the situation demands it (e.g., when Trauma Alert criteria are met), scene time should be limited as much as possible (e.g., 10 minutes), and the patient should be expeditiously transported to a trauma center. Do not delay transport to establish vascular access or to bandage and splint every injury. Priority should be given to airway management, rapid preparation for transport (e.g., full immobilization on a backboard), and control of gross hemorrhage.

If a vascular access is obtained and hypovolemia is suspected (e.g., the patient shows signs and symptoms of shock), a fluid challenge of 20 mL/kg or 10 ml/kg for neonates (infants less than 1 month) should be administered. If the patient is still in shock, repeat the fluid challenge at 20 mL/kg until a maximum of 60 mL/kg of fluid is administered.

Be aware that administration of large volumes of IV fluids has been found to be deleterious to the survival of patients with uncontrolled hemorrhage, internally or externally. Studies (NEJM, 1994) have shown that maximal fluid resuscitation may increase bleeding, thereby preventing the formation of a protective thrombus or dislodging it once the intraluminal pressure exceeds the tamponading pressure of the thrombus. Therefore, consultation with the physician should be made prior to the administration of large volumes of IV fluids when the transport time is relatively short (e.g., less than 20 minutes).

Avoid the use of vasopressor agents (e.g., dopamine) in trauma patients who are hypotensive (see Appendix 6.15, Pediatric Vital Signs). The adolescent female in her second or third trimester of pregnancy should be placed on her left side for transport. If the injuries require the use of a backboard, following full immobilization to the backboard, the backboard should be tilted to the left. Failure to follow this practice may cause hypotension due to decreased venous return.
Pediatric Multiple Trauma

History:
- Time and mechanism of injury
- Damage to structure or vehicle
- Location in structure or vehicle
- Others injured or dead
- Speed and details of MVC
- Restraints / Protective equipment
  - Car seat
  - Helmet
  - Peds
- Ejection
- Past medical history
- Medications

Signs and Symptoms:
- Pain, swelling
- Deformity, lesions, bleeding
- Altered mental status
- Unconscious
- Hypotension or shock
- Arrest

Differential:
- Chest tension pneumothorax
- Flail chest
- Pericardial tamponade
- Open chest wound
- Hemothorax
- Intra-abdominal bleeding
- Pelvis / Femur fracture
- Spine fracture / Cord injury
- Head injury (see Head Trauma)
- Extremity fracture / dislocation
- HEENT (Airway obstruction)
- Hypothermia

Universal Patient Care Protocol

Spinal Immobilization Protocol

Vital signs / perfusion

Consider high index / trauma alert criteria

Abnormal

Rapid Transport

E Focused history and physical exam

Transport & Reassess

NS bolus 20 ml/kg
Repeat once

Continued Hypotension?
Contact Medical Control

Legend
- EMT
- Paramedic
- Medical Control

Pearls:
- Mechanism is the most reliable indicator of serious injury. Examine all restraints / protective equipment for damage.
- In prolonged extrications or serious trauma consider air transportation for transport times and the ability to give blood.
- Severe bleeding from an extremity not rapidly controlled may necessitate the application of a tourniquet.
- Do not overlook the possibility of child abuse.

Joint EMS Protocols
### 3.9.2 Eye Injuries

#### GENERAL GUIDELINES

This protocol covers a variety of injuries to the eye. If other injuries to the body exist, priority of care should be determined as appropriate.

#### TREATMENT GUIDELINES

**Supportive Care**

- Initial Assessment Protocol 3.1.1
- Trauma Supportive Care Protocol 3.1.4:
  - Establish IV access as needed.
  - Remove, or ask the patient to remove, contact lenses, if still in the affected eye(s).
  - For a penetrating object, stabilize the object and cover the affected eye with an ocular shield or similar rigid device. Cover both eyes to minimize eye movement. Avoid placing direct pressure on the eye or penetrating object.
  - If the eyeball has been forced out of the socket, cover the entire eye area with a rigid container, such as a disposable drinking cup. Avoid contact with the exposed globe. If bleeding is present, control it by applying direct pressure with a sterile dry dressing.
  - If there are signs and symptoms or suspicion of ocular exposure to chemicals or foreign body, without obvious or suspected penetrating injury or laceration of the cornea or globe, irrigate with a normal saline IV solution (see Medical Procedure 4.19, Morgan Lens).

**ALS Level 1**

- If the patient is experiencing eye pain, administer tetracaine 1 drop in each affected eye. Tetracaine is contraindicated in penetrating eye injuries or patients with allergies to lidocaine.

**ALS Level 2**

- None

**Note**
### General Guidelines

This protocol covers both blunt and penetrating chest trauma and should be part of the initial resuscitation effort if the patient’s breathing is compromised.

### Treatment Guidelines

**Supportive Care**

- Initial Assessment Protocol 3.1.1
- Trauma Supportive Care Protocol 3.1.4.
- Penetrating injuries to the chest or upper back should be covered immediately with an occlusive dressing (e.g., Vaseline gauze).

Do not attempt to remove an impaled object; instead, stabilize it with bulky dressing or other means. If the impaled object is very large or unwieldy, attempt to cut the object to no less than 6 inches from chest.

**ALS Level 1**

- For tension pneumothorax, with evidence of respiratory and circulatory compromise, decompress the chest on the affected side (see Medical Procedure 4.8, Chest Decompression).
- For massive flail chest with severe respiratory compromise, ventilate at 20 breaths/min for a child and 30 breaths/min for an infant consider advanced airway. If the flail chest does not cause severe respiratory compromise, stabilize the chest externally by placing the ipsilateral arm in a sling and swathe.
- For crush injury, establish two large-bore IVs. If the crushing object is still on the patient, infuse a minimum of 20 mL/kg of normal saline or 10 mL/kg for infants (less than one year old) IV or IO before attempting to lift the object off the patient.
- For traumatic asphyxix, administer Sodium Bicarbonate (8.4%) 1 mEq/kg IV (a).

**ALS Level 2**

- None

**Note**

(a) Sodium bicarbonate (4.2%) 1 mEq/kg IV/IO should be administered to infants (less than one year old) (dilute 8.4% 1:1 with normal saline to make 4.2%).
### 3.9.4 Abdomino-Pelvic Injuries

#### GENERAL GUIDELINES

**General Guidelines**

This protocol covers blunt and penetrating abdomino-pelvic trauma. Penetrating injuries may also affect the chest (see Pediatric Protocol 3.9.3, Chest Injuries, also refer to Appendix 6.2.2, Signs of Child Abuse).

#### TREATMENT GUIDELINES

**Supportive Care**

- Initial Assessment Protocol 3.1.1
- Trauma Supportive Care Protocol 3.1.4.
- For penetrating injuries, cover the wound with an occlusive dressing (e.g., Vaseline gauze).
- For evisceration, cover the organs with a saline-soaked sterile dressing, and then cover it with an occlusive dressing (e.g., foil). Do not attempt to put the organs back into the abdomen.
- Do not log-roll any patient with suspected pelvic fracture; you may use a scoop stretcher if it is appropriate given the patient’s size.

**ALS Level 1**

- None

**ALS Level 2**

- None

**Note**

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### 3.9.5 Extremity Injuries

#### GENERAL GUIDELINES

This protocol covers open and closed injuries to the extremities, including amputation.

#### TREATMENT GUIDELINES

**Supportive Care**
- Initial Assessment Protocol 3.1.1
- Trauma Supportive Care Protocol 3.1.4.
- Any fracture or suspected fracture should be splinted appropriately, with ice being applied to the affected area. Remove and secure all jewelry. Check the pulse, motor and sensation, in the extremity before and after splinting.
- Angulated fractures should be aligned using proximal and distal traction during splinting, except in fractures that involve a joint, which should be splinted in the position in which they are found.
- Traction splints should be used in cases of femur fractures, unless a pelvic fracture is suspected.
- Amputations should be dressed with bulky dressings. The amputated part should be wrapped in moistened sterile gauze and placed in a plastic bag; this bag should then be placed on ice for transportation to the hospital.

**ALS Level 1**
- If pain persists and systolic BP is adequate (see Appendix 6.15, Pediatric Vital Signs), morphine sulfate may be given intravenously as a one time dose of 0.1mg/kg in pediatrics and infant dose (less than one year old) of 0.05 mg/kg IV. Maximum dose of 4mg for all children. Administer at a rate not to exceed 1 mg/min.
- If pain persists and systolic BP is adequate (see Appendix 6.15, Pediatric Vital Signs), after the first dose of morphine sulfate, it may be repeated once.

**ALS Level 2**
- None

**Note**
### 3.9.6 Traumatic Arrest

#### General Guidelines

Begin resuscitation unless pt. meets criteria for Death in the Field. (see General Protocol 1.4, Death in the Field).

#### Treatment Guidelines

**Supportive Care**
- Initial Assessment Protocol 3.1.1
- Trauma Supportive Care Protocol 3.1.4.
- Rapidly prepare the patient for transport and then expeditiously transport the patient to the trauma center.

**ALS Level 1**
- If IV access can be established, infuse normal saline 20 mL/kg, (newborn 10mL/kg) up to a maximum of 60 mL/kg IV.
  
  Avoid use of vasopressors in cases of suspected hypovolemia

**ALS Level 2**
- None

**Note**
### 3.9.7 Burn Injuries

**General Guidelines**

Burns can be caused by thermal, chemical, and electrical sources. If an electrical burn is suspected, also see Pediatric Protocol 3.8.5, Electrical Emergencies. Remember that burn patients are volume depleted. Burns do not bleed, however, so look for other sources if bleeding is present. Assume that any patient with compromised perfusion has other injuries and treat him/her accordingly.

Many burn injuries are associated with inhalation injury. Signs and symptoms of inhalation injury include nasal and oropharyngeal burns, charring of the tongue or teeth, sooty (blackened) sputum, singed nasal and facial hair, abnormal breath sounds (e.g., stridor, rhonchi, wheezing), and respiratory distress. In cases of inhalation injury, attention should be given to the patency of the airway. Acute swelling can cause an airway obstruction. The paramedic should consider the need for early intubation to avoid a complete airway obstruction that requires a cricothyroidotomy.

### Treatment Guidelines

**Supportive Care**

- Initial Assessment Protocol 3.1.1
- Trauma Supportive Care Protocol 3.1.4.

- Stop the burning process, if necessary, but do not cause hypothermia.
  - Thermal burns: Lavage the burned area with tepid water (sterile, if possible) to cool skin. Do not attempt to wipe off semisolids (e.g., grease, tar, wax).
  - Dry chemical burns: Brush off dry powder, then lavage with copious amounts of tepid water (sterile, if possible) for 15 minutes.
  - Liquid chemical burns: Lavage the burned area with copious amounts of tepid water (sterile, if possible) for 15 minutes. (When phenol has caused the burn, flush with copious amounts of tepid water and then apply vegetable oil to the burned area, if available. Isopropyl alcohol may be used for very small areas.)

- Remove clothing from around the burned area, but do not remove or peel off any skin or tissue.

- Remove and secure all jewelry and tight-fitting clothing.

- Assess the extent of the burn using the modified Rule of Nines and the degree of burn severity (see Appendix 6.4.1, Burn Severity Categorization, and Appendix 6.4.2, Rule of Nines). An alternative method is to use the palmar surface of the patient as an estimate of 1% BSA.

- Apply a dressing to the burned area:
  - If there is greater than or equal to 20% second-degree or 5% third-degree burns, cover the burned areas with dry sterile dressings or Water Gel™ wraps.
  - If there is less than 20% second-degree or 5% third-degree burns, apply wet sterile dressings to the burned areas for 15 minutes to aid in pain control. Alternatively, Burn Free™ gel pads or Water Gel™ wraps may be applied continuously to aid in pain control.

- Prevent hypothermia, keep the patient warm, and ensure that all outer layers of dressings are dry.
### 3.9.7 Burn Injuries (continued)

<table>
<thead>
<tr>
<th>TREATMENT GUIDELINES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ALS Level 1</strong></td>
</tr>
<tr>
<td>• Pain Management Protocol 3.1.5.</td>
</tr>
<tr>
<td><strong>ALS Level 2</strong></td>
</tr>
<tr>
<td>• None</td>
</tr>
</tbody>
</table>

**Note**
The palm plus fingers is approximately 1% of the body surface area
These protocols cover specific types of special healthcare needs in pediatric patients. Children with special health care needs are those who have or are at risk for chronic physical, developmental, behavioral, and emotional conditions that necessitate use of health and related services of a type or amount not usually required by typically developing young children.

The general approach to children with special healthcare needs includes the following measures:

1. Priority is given to the CABs.
2. Do not be overwhelmed by the machines.
3. Listen to the caregiver.
4. If a nurse is present, rely on his/her judgment.
5. Remember that the child’s cognitive level of function may be altered.
6. Assume that the child can understand exactly what you say.
7. Bring all medications and equipment to the hospital.

Obtaining a history includes asking the patient/caregiver about the following issues:

1. The child’s normal vital signs.
2. The child’s actual weight.
3. The child’s developmental level.
4. The child’s allergies, including to latex.
5. Pertinent medications/therapies.
### GENERAL GUIDELINES

**General Guidelines**

Home mechanical ventilators may be indicated for chronically ill children with abnormal respiratory drive, severe chronic lung disease, or severe neuromuscular weakness. Some children require continuous mechanical ventilation, whereas others require only intermittent support during sleep or acute illness. Home ventilators may either be limited or pressure limited. All are equipped with alarms.

**TYPES OF VENTILATOR ALARMS**

- Low pressure or apnea: may be caused by a loose or disconnected circuit or an air leak in the circuit or at the tracheostomy, resulting in inadequate ventilation.
- Low power: caused by a depleted battery.
- High pressure: may be caused by a plugged or obstructed airway or circuit tubing, by coughing, or by bronchospasm.
- Setting error: caused by ventilator settings that exceeds the capacity of the equipment.
- Power switchover: occurs when the unit switches from alternating-current power to the internal battery.

### TREATMENT GUIDELINES

**Supportive Care**

- Initial Assessment Protocol 3.1.1
- Medical Supportive Care Protocol 3.1.3.
- If a ventilator-dependent child is in respiratory distress and the cause is not easily ascertained and corrected, remove the ventilator and provide assisted manual ventilations with a bag-valve device. Suction as needed.
- Consider the need for other protocols (e.g., Pediatric Respiratory Emergencies Protocol 3.2).

**ALS Level 1**

- None

**ALS Level 2**

- None

**Note**

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### 3.10.2 Tracheostomy

#### General Guidelines
Tracheostomies are indicated for long-term ventilatory support, to bypass an upper airway obstruction, and to aid in the removal of secretions. Tracheostomies come in neonatal, pediatric, and adult sizes and can include either a single lumen or a double lumen. Special attachments include a tracheostomy nose (filtration device), tracheostomy collar (for oxygen or humidification), and Passy-Muir valve (speaker valve).

#### Signs of Tracheostomy Tube Obstruction
- Excess secretions.
- No chest wall movement.
- Cyanosis.
- Accessory muscle use.
- No chest wall rise with bag-valve ventilations.

#### Treatment Guidelines

**Supportive Care**
- Initial Assessment Protocol 3.1.1
- Medical Supportive Care Protocol 3.1.3.
- If an obstruction is present, inject 1-3 mL of normal saline into the tracheostomy tube and suction as needed (set the suction pressure at 100 mm Hg or less).
- If unable to clear the obstruction by suctioning, remove the tracheostomy tube and insert a new tube (the same size or one size smaller). Do not force the tube.
- If unable to insert a new tracheostomy tube or if one is unavailable, insert an endotracheal tube of similar size into the stoma and ventilate with a bag-valve mask as needed.
- If unable to insert an endotracheal tube, ventilate with a bag-valve mask over the stoma or over the patient’s mouth while covering the stoma as needed.
- Consider the need for other protocols (e.g. Pediatric Respiratory Emergencies Protocol 3.2).

**ALS Level 1**
- None

**ALS Level 2**
- None

**Note**
### 3.10.3 Central Venous Lines

#### GENERAL GUIDELINES

**Central Venous Lines**

Central venous lines are indicated for administration of medications, delivery of chemotherapy, nutritional support, infusion of blood products, and blood draws. Types of central venous lines (CVL) include Broviac/Hickman, Port-a-Cath/ Med-a-Port, and percutaneous intravenous catheters (PIC). Central venous line emergencies include the catheter coming completely out, bleeding at the site, the catheter broken in half, blood embolus, thrombus, air embolus, and internal bleeding. Use of SQ ports requires special training; these ports should not be used for IV access.

**Signs of Blood Embolus, Thrombus, Air Embolus, and Internal Bleeding**

- Chest pain.
- Cyanosis.
- Dyspnea.
- Shock.

#### TREATMENT GUIDELINES

**Supportive Care**

- Initial Assessment Protocol 3.1.1
- Medical Supportive Care Protocol 3.1.3. CVL and PIC lines may be used for emergency IV access under sterile conditions.
- If the catheter has come completely out, apply direct pressure to the site.
- If there is bleeding at the site, apply direct pressure.
- If the catheter is broken in half, clamp the end of the remaining tube.
- If a blood embolus, thrombus, or internal bleeding is suspected, clamp the line.
- If an air embolism is suspected, clamp the line and place the patient on his/ her left side.
- Consider the need for other protocols (e.g., Pediatric Protocol 3.2, Pediatric Respiratory Emergencies).

**ALS Level 1**

- None

**ALS Level 2**

- None

**Note**
### 3.10.4 Feeding Tubes

#### GENERAL GUIDELINES

**General Guidelines**

Feeding tubes are indicated for administration of nutritional supplements and in patients who have an inability to swallow. Types of feeding tubes include nasogastric tubes (temporary) and gastrostomy tubes (G tube). Types of G tubes include those that are surgically placed, percutaneous endoscopic gastrostomy tubes (PEG tubes), and jejunal tubes (J tubes). Potential complications include leaks, bleeding around the site, and the displacement of the tube.

#### TREATMENT GUIDELINES

**Supportive Care**

- Initial Assessment Protocol 3.1.1
- Medical Supportive Care Protocol 3.1.3.
- If the catheter has come completely out, cover the site with Vaseline gauze and apply direct pressure to the site.
- If there is bleeding at the site, apply direct pressure.

**ALS Level 1**

- None

**ALS Level 2**

- None

**Note**