Illinois ESF-8 Plan: Pediatric and Neonatal
Surge Annex

Pediatric and Neonatal Care Guidelines

June 2017
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Introduction

During a large-scale disaster, normal interfacility transfer patterns may be disrupted. Health care facilities that typically transfer their acutely ill/injured pediatric patients or children with special health care needs (CSHCN)/children with functional access needs (CFAN) to pediatric tertiary care centers/specialty care centers may need to care for these patients for longer periods of time until they are able to transfer these patients to a higher level of care. The *Pediatric and Neonatal Care Guidelines* are available as an adjunct to the Illinois Department of Public Health (IDPH) Emergency Support Function (ESF) 8 Plan: Pediatric and Neonatal Surge Annex which is the state health and medical disaster plan. These care guidelines provide support and guidance to those practitioners caring for children during the initial 96 hours following a disaster. The *Pediatric and Neonatal Care Guidelines* are not meant to be all inclusive, should not replace an existing policy and procedure at a health care facility, nor substitute for clinical judgment. These guidelines may be modified at the discretion of the health care provider.

These guidelines are maintained by the Illinois Emergency Services for Children program and revised as needed.
Purpose: To provide guidance to practitioners caring for pediatric patients during a disaster.

Disclaimer: This guideline are not meant to be all inclusive, replace an existing policy and procedure at a hospital or substitute for clinical judgment. These guidelines may be modified at the discretion of the healthcare provider.

96 Hour Care Guidelines for Pediatric Burn Patients if Transfer to a Hospital with Burn Capabilities is Not Feasible

Initial Patient Treatment

- Stop the burning process
- Use universal precautions
- Remove all clothing and jewelry
- Prior to initiating care of the patient with wounds, it is critical that health care providers take measures to reduce their own risk of exposure to potentially infectious substances and/or chemical decontamination. Rinse liberally with water, according to protocol, if suspected chemical exposure. Apply clean, dry dressing(s) initially to avoid hypothermia.
- Apply clean DRY sheet or bedding to prevent hypothermia.
- For the care of a burn patient with radiation exposure, see page 21.
- Consult Pediatric Care Medical Specialist (PCMS) and/or the State Burn Coordinating Center (SBCC) for assistance with care of the acutely and critically ill patient, to individualize patient care; if patient does not improve and needs to be transferred; and as needed for further support and consult.
- Palliative care/comfort care patients: During a burn MCI, resources may not be available to treat those with extensive burn injuries. There are sections within the following guidelines that provide guidance to providers in order to address their needs. Consult the SBCC or the Pediatric Care Medical Specialist (PCMS) for additional assistance from palliative care experts.

<table>
<thead>
<tr>
<th>Assessment and Monitoring</th>
<th>Interventions</th>
<th>Key Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airway Maintenance with Cervical Spine Motion Restriction</td>
<td>Airway Maintenance with Cervical Spine Motion Restriction</td>
<td>Airway Maintenance with Cervical Spine Motion Restriction</td>
</tr>
<tr>
<td>• Assess throat and nares.</td>
<td>• Chin lift/jaw thrust with C-spine motion restriction as needed.</td>
<td>• Airway edema increases significantly after IV/IO fluids are started.</td>
</tr>
<tr>
<td>• Signs of airway injury:</td>
<td>• IMMOBILIZE SPINE as indicated. Position for optimal airway and suction as needed. Position infants and children &lt; 2 yrs supine on a backboard with a recess for the head or use a pad under</td>
<td>• Stridor or noisy breath sounds indicate impending upper airway obstruction.</td>
</tr>
<tr>
<td>o Hypoxia</td>
<td></td>
<td>• Younger children and those with larger burns are more likely to require intubation due to the smaller diameter of the child’s airway and the need for significant fluid volumes during resuscitation.</td>
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<tr>
<td>o Facial burns</td>
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</tbody>
</table>
### Assessments and Monitoring
- History of a closed space fire

### Interventions
- the back from the shoulders to the buttocks.
  - Place an oral pharyngeal airway or cuffed endotracheal tube (ETT) in the unconscious patient
  - Intubate early with cuffed ETT.
  - Secure ETT with ties passed around the head; do not use tape on facial burns since it will not adhere to burned tissue.
  - Insert gastric tube on all intubated patients.

### Key Points
- Prophylactic intubation is preferred because the ensuing edema obliterates landmarks needed for successful intubation. However, during a burn MCI, there is a need to consider resource availability (e.g. number of ventilators, number of trained staff to manage ventilators)
- It is critical that the ETT is secured well. An ETT that becomes dislodged may be impossible to replace due to the edema of the upper airway.

### Breathing and Ventilation
- Assess for appropriate rate and depth of respirations with adequate air exchange.
- Monitor pulse oximetry while checking carbon monoxide (CO) level (as needed).
- If circumferential torso burns, monitor chest expansion closely.
- Obtain Arterial Blood Gas (ABG).
- Obtain Carboxyhemoglobin (COHb) level if suspected inhalation injury.

### Interventions
- 100%, high flow oxygen using a non-rebreather mask or ETT; wean as appropriate.
- Mechanically ventilate as needed. Ventilator settings are not different for burn patients compared to other patients.
- Elevate head of bed (HOB) if not contraindicated to decrease facial edema.
- Consult with SBCC to determine if escharotomy is indicated and to receive guidance on performing an escharotomy.

### Key Points
- CO levels decrease by half (%) every 40 minutes while on 100% FiO₂. CO level goal is <10%.
- An escharotomy is an incision performed longitudinally through burned tissue down to subcutaneous tissue over the entire involved area of full thickness circumferential (or nearly circumferential burn) that is causing constriction and loss of peripheral perfusion or airway constriction. A chest escharotomy may be indicated in circumferential or full thickness chest burns due to location or depth of burn in the trunk area, which may interfere with ventilation.

### Circulation with Hemorrhage Control
- Continuous cardiac monitoring as needed.

### Interventions
- Two large bore peripheral IVs in non-burned extremities (secure well).

### Key Points
- Cardiac monitoring may be needed if there is an electrical injury, concurrent trauma or cardiac issues.
### Assessment and Monitoring
- Control any signs of hemorrhage.

### Interventions
- If unable to secure peripheral IV in non-burned extremity, burned extremity can be used if necessary; suture IV in place.
- If unable to establish a peripheral IV, place an intraosseus (IO). IO access can be through burned skin.
- Initial IVF with Lactated Ringers (LR)
  - ≤ 5 yrs. 125 mL LR/hour
  - 6-13 yrs. 250 mL LR/hour
  - ≥ 14 yrs. 500 mL LR/hour

### Key Points
- Dysrhythmias may be the result of an electrical injury
- To secure an IV on burned skin (tape will not stick), consider suturing in place or using self-adhesive (e.g. Coban) or other type of wrap. Self-adhesive or other wraps should be applied loosely to prevent skin breakdown.
- Palliative care/Comfort care patients: IVs should be started for the administration of medications for pain and anxiety. Do not administer large volumes of fluid. Excessive fluid will result in decreased circulation and increased pain due to edema.

### Disability
- Neurologic checks every 4 hours and PRN.
  - Determine level of consciousness.
  - Obtain Glasgow Coma Scale
  - Consider using “AVPU.”
    - A: Alert
    - V: Responds to verbal stimuli
    - P: Responds to painful stimuli
    - U: Unresponsive
  - Obtain glucose level

- Treat cause of altered mental status as indicated:
  - Hypoglycemia:
    - Dose: Dextrose 0.5-1 g/kg IV/IO
    - Birth - 28 days: D10W: 2 mL/kg IV
    - Infants > 28 days - 1 y/o: D12.5%W: 5-10 mL/kg IV/IO
    - 1 y/o-8 y/o: D25W: 2-4 mL/kg IV/IO
    - > 8 y/o: D50W: 1-2 mL/kg IV/IO

### Exposure
- Monitor temperature
- Remove all clothing and jewelry.
- Initially place a clean, dry sheet over the wounds until a thorough cleaning is done.
- Keep patient and environment warm.
  - Keep patient covered
  - Cover the patient’s head

- Localized hypothermia causes vasoconstriction to damaged area reducing blood flow and tissue oxygenation and may deepen the injury. Systemic hypothermia (core temp less than 95° F / 35° C) induces peripheral vasoconstriction that may increase the depth
<table>
<thead>
<tr>
<th>Assessment and Monitoring</th>
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</thead>
<tbody>
<tr>
<td>o Warm the room</td>
<td></td>
<td>of the burn and interfere with clotting mechanisms and respiration in addition, to causing cardiac arrhythmias.</td>
</tr>
<tr>
<td>o Warm the IV/IO fluids</td>
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<tr>
<td>o External patient warming devices</td>
<td></td>
<td>• Use portable radiant heaters with caution</td>
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</tbody>
</table>

### Secondary Assessment, Monitoring, Interventions and Key Points

<table>
<thead>
<tr>
<th>Assessment and Monitoring</th>
<th>Interventions and Key Points</th>
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</thead>
<tbody>
<tr>
<td>History</td>
<td></td>
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<tr>
<td>• Obtain circumstances of injury</td>
<td></td>
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<tr>
<td>• Obtain medical history. Consider using “AMPLE.”</td>
<td></td>
</tr>
<tr>
<td>o Allergies, Medications, Previous illness/history, Last meal/fluid intake, Events related to injury, Tetanus and childhood vaccinations</td>
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<tr>
<td>Complete Physical Exam</td>
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<tr>
<td>• Head to toe exam</td>
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<tr>
<td>• Vital signs: Perform as indicated in health care facility policy. May need to perform more frequently if patient is unstable.</td>
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<tr>
<td>o Heart rate (HR)</td>
<td></td>
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<tr>
<td>o Blood pressure (BP)</td>
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</tr>
<tr>
<td>o Respiratory rate (RR)</td>
<td></td>
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<tr>
<td>o Temperature</td>
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<tr>
<td>o Pulse oximetry</td>
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<tr>
<td>o Capillary refill</td>
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<tr>
<td>o Skin color of unburned skin</td>
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<tr>
<td>o Imperative to obtain weight on patient</td>
<td></td>
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<tr>
<td>▪ If possible obtain weight before initiating IVF resuscitation</td>
<td></td>
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<tr>
<td>• Determine extent/size of burn by calculating the TBSA using:</td>
<td></td>
</tr>
<tr>
<td>o Rule of Nines or Rule of the Palm (See page 19 for printable version)</td>
<td></td>
</tr>
<tr>
<td>o Lund-Browder chart (See page 18 for printable version)</td>
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<tr>
<td>• Determine the depth of the burn (See page 17 for more information)</td>
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</table>

<table>
<thead>
<tr>
<th>Interventions and Key Points</th>
<th>History</th>
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</thead>
<tbody>
<tr>
<td>• Obtain history from patient early before intubation if possible. Obtain contact information for family as well.</td>
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<tr>
<td>Complete Physical Exam</td>
<td></td>
</tr>
<tr>
<td>• Due to increased catecholamines and hypermetabolism associated with burn injures, the HR will be increased. Relative tachycardia is normal for burn patients (will vary based on the age of the patient). Sustained tachycardia may indicate hypovolemia, inadequate oxygenation, unrelieved pain or anxiety.</td>
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<tr>
<td>• May need to use doppler to obtain blood pressure</td>
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<tr>
<td>• Oral rehydration can be used in the following pediatric patients:</td>
<td></td>
</tr>
<tr>
<td>o Patients not intubated.</td>
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<tr>
<td>o Injury not an electrical injury.</td>
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<tr>
<td>o Awake and alert with &lt; 10% TBSA.</td>
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<tr>
<td>o Contact the SBCC for assistance with oral rehydration.</td>
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<tr>
<td>o Monitor quality and quantity of urine output on patient’s receiving oral rehydration.</td>
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<tr>
<td>• IV/IO fluid burn resuscitation-Use Lactated Ringers:</td>
<td></td>
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<tr>
<td>o When supplies of LR are depleted, 0.9 NS and 0.45 NS or colloids can be used for fluid resuscitation. Do not use fluid containing glucose for fluid resuscitation.</td>
<td></td>
</tr>
<tr>
<td>o 3 mL x wt (kg) x % TBSA = total for first 24 hours post burn.</td>
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<tr>
<td>o Administer half of the above amount in first 8 hours post burn.</td>
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</tbody>
</table>
### Assessment and Monitoring

- **Superficial (1st degree)**
  - Involves the epidermis,
  - Appearance: Red (e.g., sunburn)
  - Do not include when calculating % TBSA,
- **Partial thickness (2nd degree)**
  - Involves the entire epidermis and a variable portion of the dermis
  - Appearance: red, blistered and edematous.
- **Full thickness (3rd degree)**
  - Involves the destruction of the entire epidermis and dermis
  - Appearance: white, brown, dry, leathery with possible coagulated vessels
- If camera is available, take pictures of initial burn injuries to document progression of burn injury.
- Labs on admission and every day as indicated by medical condition:
  - Electrolyte panel
  - Complete blood count (CBC)
  - ECG for electrical injury or cardiac history
  - ABG with COHb
  - Cardiac panel for electrical injury
- CXR if intubated, inhalation injury suspected or underlying pulmonary condition.
- Monitor glucose at least every 2 hours x 24 hours.
- Monitor for the following signs and symptoms in full thickness, circumferential burn injuries which may indicate a circulation deficit and possible need for escharotomy: (6 P’s)
  - Pallor or cyanosis of distal unburned skin on a limb
  - Pain
  - Pulselessness
  - Paralysis
  - Paresthesia
- Place a soft feeding tube for all intubated patients. Feedings should be initiated within 6 hours of injury.
- The goal in the early stages of burn resuscitation should be to maintain the individual’s pre-event BP.
- If signs of circulation deficit are present, contact the SBCC.
- Eyes:
  - Remove contact lens prior to eyelid swelling if facial involvement.
  - Fluorescein should be used to identify corneal injury.
  - If eye involvement or facial burns consider, consulting an ophthalmologist.
- Consult with SBCC to determine if escharotomy is indicated and to receive guidance on performing an escharotomy.
- Finger escharotomies are rarely indicated.

### Interventions and Key Points

- Administer remaining amount over next 16 hours post burn.
- Pediatrics < 10 kg: Due to limited glycogen stores, in addition to resuscitation IV/IO fluids, administer D5% LR at maintenance rate:
  - To calculate maintenance IVF rate for children:
    - 4 mL/kg/hr for 1st 10 kg
    - + 2 mL/kg/hr for 2nd 10kg
    - + 1 mL/kg/hr for each additional kg over 20kg
    - = IV/IO fluid maintenance rate
  - The above calculation is a starting point for fluid resuscitation. IVF rate should be titrated to maintain urine output.
    - Pediatrics <30 kg: 1 mL/kg
    - Pediatrics >30 kg: 0.5 mL/kg
  - Tetanus prophylaxis, unless received within last 5 years.
  - Place a soft feeding tube for all intubated patients. Feedings should be initiated within 6 hours of injury.
  - The goal in the early stages of burn resuscitation should be to maintain the individual’s pre-event BP.
  - If signs of circulation deficit are present, contact the SBCC.

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ILinois EMSC

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### Assessment and Monitoring

<table>
<thead>
<tr>
<th>o Poikilothermia</th>
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<tbody>
<tr>
<td>o Inability to ventilate in patients with deep circumferential burns of the chest</td>
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</table>

### Interventions and Key Points

<table>
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<tr>
<th>Comfort</th>
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<tbody>
<tr>
<td>• Frequent pain/sedation assessment</td>
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<tr>
<td>o A minimum of every 4 hours</td>
</tr>
<tr>
<td>o Before and after pain/sedation medication given</td>
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<tr>
<td>• Use age appropriate pain scales for pediatric patients (e.g., Wong Baker FACES, FLACC)</td>
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</table>

<table>
<thead>
<tr>
<th>Comfort</th>
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<tbody>
<tr>
<td>• Emotional support and education is essential.</td>
</tr>
<tr>
<td>• IV/IO analgesia is preferred route during initial post injury period.</td>
</tr>
<tr>
<td>• Large amounts of IV/IO analgesic may be required to attain initial pain control.</td>
</tr>
<tr>
<td>o Administer opioids in frequent (every 5 minutes) small to moderate doses until pain is controlled.</td>
</tr>
<tr>
<td>▪ Morphine 0.1-0.2 mg/kg IV/IO (max 10mg/dose)</td>
</tr>
<tr>
<td>▪ Fentanyl 1-2 mcg/kg/dose IV/IO/IN (not to exceed maximum adult dose)</td>
</tr>
<tr>
<td>o Hydrocodone/acetaminophen 0.1-.02 mg/kg PO/NO/OG every 4-6 hours</td>
</tr>
<tr>
<td>o Acetaminophen-codeine (Tylenol #3) 0.5-1mg/kg/dose PO/NG/OG every 4-6 hours (NOTE: Not recommended in children &lt; 2 y/o)</td>
</tr>
<tr>
<td>• Consider use of non-pharmacological techniques.</td>
</tr>
<tr>
<td>o Examples:</td>
</tr>
<tr>
<td>▪ &lt; 2 y/o: distraction</td>
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<tr>
<td>▪ 2-6 y/o: distraction, deep breathing</td>
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<tr>
<td>▪ &gt; 6 y/o: deep breathing, distraction, imagery</td>
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<tr>
<td>• Consider anti-anxiety medication in addition to pain medication.</td>
</tr>
<tr>
<td>o Lorazepam (Ativan) PO/IV/IO</td>
</tr>
<tr>
<td>o Midazolam (Versed) IV/IO/IN</td>
</tr>
<tr>
<td>• Consider sedation for procedures and, if intubated:</td>
</tr>
<tr>
<td>o Ketamine</td>
</tr>
<tr>
<td>o Lorazepam (Ativan*)</td>
</tr>
<tr>
<td>o Midazolam (Versed*)</td>
</tr>
<tr>
<td>o Dexmedetomidine (Precedex*)</td>
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### Wound Care

<table>
<thead>
<tr>
<th>Wound Care</th>
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<tbody>
<tr>
<td>• Pre-medicate patients for pain and anxiety before wound care.</td>
</tr>
<tr>
<td>Assessment and Monitoring</td>
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<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>• Maintain temperature of patient since they are prone to hypothermia</td>
</tr>
<tr>
<td>• Assess the wound and monitor for:</td>
</tr>
<tr>
<td>o Change in wound appearance</td>
</tr>
<tr>
<td>o Change in size of wound</td>
</tr>
<tr>
<td>o Signs or symptoms of infection</td>
</tr>
<tr>
<td>• Describe what you see:</td>
</tr>
<tr>
<td>o Color (e.g. white, leathery, or pink, moist)</td>
</tr>
<tr>
<td>o Sensation (distinguish between pain and sensation)</td>
</tr>
<tr>
<td>o Temperature</td>
</tr>
<tr>
<td>o Swelling</td>
</tr>
<tr>
<td>o Cellulitis (redness around the wound)</td>
</tr>
<tr>
<td>o Odor (foul smelling, sweet smelling, etc.)</td>
</tr>
<tr>
<td>o Drainage (amount, type)</td>
</tr>
<tr>
<td>• Compartment syndrome</td>
</tr>
<tr>
<td>o Can have in non-burned limbs and abdomen</td>
</tr>
<tr>
<td>• Check of the circulation of an extremity before and after wound care</td>
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</table>
**Assessment and Monitoring** | **Interventions and Key Points**
---|---
| o Should be held in place with water-moistened gauze dressing. |
| o Dressing does not need to be changed for 7 days. |
| o The overlying gauze can be changed as necessary. |
| o If signs of infection appear, remove dressing to assess wound. |
| o Record the date of the application. |
| • Wrap fingers separately if burned. |
| • Place silver sulfadiazine (Silvadene) coated gauze between the toes. |
| • For extensive and severe burns to the face: |
| o Apply a double antibiotic ointment around the eyes and mouth to avoid cream from draining into them. |
| o Can use ophthalmic ointment around eyes. |
| o Silver sulfadiazine (Silvadene) can be used on the face |
| • For moderate facial burns, Bacitracin or other antibiotic ointment can be used without a dressing. |
| • Genital/Perineal Burns |
| o Urinary catheter may be indicated for genitalia or perineal burns. Evaluate each patient individually to determine if needed. |
| o Apply lubricated gauze to labia and in the foreskin to prevent adhesions and decrease risk of infection in this area of high contamination. |
| • Elevate burned extremities above the level of the heart. |

**Ongoing Assessment, Monitoring, Interventions and Key Points**

<table>
<thead>
<tr>
<th>Assessment and Monitoring</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Airway and Breathing</strong></td>
<td></td>
</tr>
<tr>
<td>• Obtain chest X-ray if intubated, inhalation injury suspected or underlying pulmonary condition.</td>
<td></td>
</tr>
<tr>
<td>• Chest X-ray will usually be clear on admit. If inhalation injury is present, the X-ray will show infiltrates around the second day correlating with a deteriorating oxygen status.</td>
<td></td>
</tr>
<tr>
<td>• Frequent suctioning is necessary to prevent occlusion of the airway and endotracheal tube. Anyone with an inhalation</td>
<td></td>
</tr>
<tr>
<td><strong>Airway and Breathing</strong></td>
<td></td>
</tr>
<tr>
<td>• Supportive therapy and $O_2$; wean as appropriate.</td>
<td></td>
</tr>
<tr>
<td>• HOB should be elevated 30 degrees to minimize facial and airway edema, unless contraindicated.</td>
<td></td>
</tr>
<tr>
<td>o Use reverse Trendelenburg for patients with C-spine motion restriction requirements.</td>
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<tr>
<td>• Suction airway frequently.</td>
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</tbody>
</table>
### Assessment and Monitoring

- Injury is subject to increased respiratory secretions and may have a large amount of carbonaceous debris in the respiratory tract.
- Airway edema peaks at 36 hours post burn
- Weaning from the ventilator and extubation:
  - CO level should be normalized (< 10%) for at least 6 hours
  - There is an increased risk of needing to re-intubate inhalation injury patients so maintain intubation equipment at bedside after extubation
  - Don’t extubate patient unless there is a leak around the ETT cuff

### Interventions

- **Inhalation Injuries:**
  - Treatment for inhalation injury is supportive care and includes:
    - Intubation as indicated
    - Provide adequate sedation to prevent dislodgement of ETT
    - Frequent suctioning
    - Positive End Expiratory Pressure (PEEP) may improve ventilation
  - Secure ETT with ties instead of tape since tape will not adhere to burned tissue
  - Mark ETT at fixed position (teeth or gums not lips which may have swelling)

### Circulation/Outputs of Resuscitation

- Monitor mean arterial blood pressure (MAP):
  - Goal for MAP is > 60 mmHg
- Monitor hourly urine output:
  - Goal: 1 mL/kg/hr for children < 30 kg
- Monitor for myoglobin/pigment in urine (burgundy color).
- Additional resuscitation fluid needs can occur with:
  - Very deep burns
  - Inhalation injury
  - Associated injuries
  - Electrical injury
  - Delayed resuscitation
  - Prior dehydration
  - Alcohol or drug dependence
  - Small children
- Children and patients with preexisting cardiac disease are particularly sensitive to fluid management.
- Diuretics are not indicated in myoglobin in the urine.
- Monitor glucose at least every 2 hrs x 24 hours.

### Outputs of Resuscitation

- Insert arterial line.
- Insert urinary catheter.
- If urine output is < goal, ↑ fluids by 1/3.
  - Example: u/o for 20 kg pediatric patient = 10 mL/hr, fluid rate at 50 mL/hr, ↑ to 66 mL/hr
- If urine output is > goal, ↓ rate of infusion by 1/3.
  - Example: u/o for 20 kg pediatric patient = 30 mL/hr fluid rate at 50 mL/hr, ↓ to 33 mL/hr
- Upon completion of the resuscitation phase (typically 24 hrs post burn), ↓ hourly fluid volume by 10% per hour to a maintenance fluid with D5 0.45 NS with 20 mEq KCL/L.
  - Check serum sodium and potassium on day 2 post burn
- Myoglobin in urine:
  - Maintain urine output:
    - 2 mL/kg/hr
  - Increase fluid rate (LR).
- Oliguria or anuria requires mostly due to inadequate fluid resuscitation and requires more rapid fluid administration. Diuretics are contraindicated!
### Assessment and Monitoring

- May take > 24 hours to see signs of adequate resuscitation:
  - Normalization of blood pH
  - Improved peripheral circulation
  - Clearing sensorium (more alert)
  - Stable BP
- If IVF requirements are still high after 24 hours of crystalloids, contact the SBCC for medical consultation.

### Interventions

- Treatments for hypotension:
  - Albumin human 5% injection (consult SBCC before using)
  - Vasopressors initiated when MAP is low despite adequate fluid resuscitation
    - Use institution specific dosing ranges

### Circulation

- Perform pulse checks (CMS) every 1 hour if there are circumferential burns on extremities.
  - Monitor pulses by palpation or doppler exam.
    - Decreased sensation
    - Severe unrelenting deep tissue pain
    - Diminished distal pulses
    - Capillary refill > 5 sec
- After 24-48 hrs decrease frequency of pulse checks to every 2 hours if stable.
- Assess bowel sounds to monitor for ileus.

### Circulation

- Elevate burned extremities on pillows or blankets to improve circulation and minimize edema.
- Circumferential chest injuries may become life threatening; an escharotomy may be necessary.
- Verify that pulselessness is not due to profound hypotension.
- Scrotal swelling, though often significant, does not require specific treatment.

### Body Temperature

- Perform temperature checks based on health care facility protocol.
  - If unstable or significant burn, hourly vital signs may be indicated.
- With 2nd and 3rd degree burns, patients may have difficulty regulating their temperature; monitor for hypo and hyperthermia.
- Keep patient normo-thermic, especially during wound care.
- Keep patient covered. When supplies of blankets are depleted, patients can be wrapped in plastic wrap or aluminum foil for insulation and warmth.
- Warm the room.
- Warm IV/O fluid if possible, especially if patient is very hypothermic.

### Other Pharmaceutical Considerations

- Stress ulcer prophylaxis
  - Begin feedings within 6 hours of injury
  - Start on prophylaxis medications if intubated (based on institutional preference, hospital formulary and availability)
- Anti-emetics
### Assessment and Monitoring

- Use cautiously (enteral feeding intolerance can be a sign of sepsis in burn patients)
- Ondansetron (Zofran®)

### Interventions

- Itching
  - Diphenhydramine (Benadryl®)
  - Hydroxyxine (Atarax®)

- Vitamin Supplements
  - Start vitamins after feedings (via tube or PO) are initiated
  - Multivitamins
  - Ascorbic acid
  - Zinc sulfate
  - Glutamine (if available and on formulary)

- Venous thromboembolism prophylaxis
  - Consult SBCC/pediatric experts before starting

### Nutrition

- Obtain dry weight on admission.
- Nutritional plan should start < 6 hours post injury
- Increased need for protein, calories, vitamins and minerals for wound healing
- Adequate intake is more important than route of intake
- TPN is rarely used. Oral feedings (via tube or PO) provides most benefit for burn patients.
- Indications for feeding tube:
  - Intubated
  - >20% TBSA
  - Unable to maintain caloric needs via PO
- Indications for post pyloric feeding tube:
  - Conscious sedation
  - Twice daily wound care
  - Frequent operative interventions
  - Intolerance of gastric feeding (nausea, vomiting, increased gastric residuals)

- Consult hospital dietitian to adjust nutritional plan based on lab result trends (CRP, Prealbumin, albumin & transferrin)
- Conduct daily calorie counts
- Daily calorie needs based on % TBSA, weight and age
  - Consult SBCC and pediatric experts for calculations
- Increased protein needs.
  - 20% of calories should be from protein (approximately 2.5 - 4.0 grams protein/kg)
- Regular high calorie, high protein diet if able to take PO.
  - If unable to maintain adequate caloric requirements, initiate tube feedings.
- No free water drinks (plain water) if taking PO, only high calorie liquids.
- Ensure stool softeners are ordered to prevent constipation due to pain medications.
- Begin enteral nutrition as soon as possible.
- Soft feeding tubes are preferred over hard salem sump nasogastric tube.
- Titrating patient off tube feedings to PO
  - Switch to night feedings first
  - If eating during the day and taking in enough calories, can progress to PO feedings only
### Assessment and Monitoring

- See Nutritional Algorithm for Pediatric Burn Patients on page 25 for initial infusion rates, titrating feeding rates and residual check

<table>
<thead>
<tr>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Titrating might be done in acute rehab setting and not in hospital setting</td>
</tr>
</tbody>
</table>

### Infection Control

- Utilize universal precautions.
- If wounds are exposed:
  - Apply gown, mask and gloves to protect patient.
- No systemic antibiotics are required for the burn injuries.

### Splinting, Positioning and Mobility

- In a disaster, physical and occupational therapists may splint patients in functional positions and help with dressings.
- Rehabilitation (splinting, positioning and mobility) should be initiated early on in care of patient.
- Check circulation status of extremities before and after positioning and splinting.
- Monitor for pressure areas under splints.

- Obtain physical therapy /occupational therapy consult.
- Early mobilization of patients
- HOB elevated at all times.
- Elevate burned extremities above the level of the heart.
- Positioning:
  - Degree of functioning preserved depends on early intervention and prevention of further tissue damage
  - Designed to:
    - Minimize edema formation
    - Prevent tissue destruction
    - Maintain soft tissue in an elongated state to facilitate optimal functional recovery
- Use whatever tools are available to assist (e.g., pillows, towels, splints, bedside tables, wedges).
- Neck burns
  - Maintain the head in a neutral position.
  - No pillows or blankets under the head flexing the neck forward.
- Axilla burns
  - Keep arms extended to decrease contractures.
- Ear burns
  - No external pressure should be applied.
  - No pillows or blankets under the head.
- Out of bed (OOB) - If legs are burned, apply ace wraps when OOB.
Assessment and Monitoring

- Encourage active range of motion hourly when awake.
- Encourage activities of daily living.
- Splinting:
  - Use either ace/elastic wraps, gauze rolls/wraps, strappings with post-mold material (e.g., thermoplastic-perforated), or whatever is available
  - Wearing schedule:
    - 24 hours/day except for dressing changes and range of motion exercises
    - At night only for compliant patients who are able to perform exercises independently
    - Post wearing schedule at patient’s bedside

Proper Positioning of a Burn Patient

<table>
<thead>
<tr>
<th>Area Involved</th>
<th>Contracture Predisposition</th>
<th>Contracture Preventing Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior neck</td>
<td>Flexion</td>
<td>Extension, no pillows</td>
</tr>
<tr>
<td>Anterior axilla</td>
<td>Shoulder adduction</td>
<td>90° abduction, neutral rotation</td>
</tr>
<tr>
<td>Posterior axilla</td>
<td>Shoulder extension</td>
<td>Shoulder flexion</td>
</tr>
<tr>
<td>Elbow/Forearm</td>
<td>Flexion/pronation</td>
<td>Elbows extended, forearm supinated</td>
</tr>
<tr>
<td>Wrists</td>
<td>Flexion</td>
<td>15°–20° extension</td>
</tr>
<tr>
<td>Hands:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCPs</td>
<td>Hyperextension</td>
<td>70°–90° flexion</td>
</tr>
<tr>
<td>IPs</td>
<td>Flexion</td>
<td>full-extension</td>
</tr>
<tr>
<td>Palmar Burn</td>
<td>Finger flexion, thumb opposition</td>
<td>All joints full extension, thumb radially abducted</td>
</tr>
<tr>
<td>Chest</td>
<td>Lateral/anterior flexion</td>
<td>Straight, no lateral or anterior flexion</td>
</tr>
<tr>
<td>Hips</td>
<td>Flexion, adduction, external rotation</td>
<td>Extension, 10° abduction, neutral rotation</td>
</tr>
<tr>
<td>Knees</td>
<td>Flexion</td>
<td>Extension</td>
</tr>
<tr>
<td>Ankles</td>
<td>Plantar flexion</td>
<td>90° dorsiflexion</td>
</tr>
</tbody>
</table>

Reunification
During a large scale disaster, family members may become separated. It is crucial that staff attempt to reunify patients with their family. Children are more vulnerable to maltreatment, abuse and abduction, if separated from their care giver. Community partners, such as the American Red Cross and National Center for Missing and Exploited Children, can assist with this process. The reunification process begins with EMS at the scene and, if possible, trying to keep known family members together when making transport decision. The Patient Identification Tracking Form (Attachment 12 in Burn Surge Annex) should be utilized for all patients to assist with the reunification process.

### Psychosocial

- Address the psycho-social needs of burn patients
  - Immediate needs (pain, fear of unknown, similar to any trauma patient)
  - Long term needs (more ongoing, can need support for years)
- Treatment therapies may trigger traumatic response
- Explain any procedures.
- Involve patient and family.
- Consider social worker consultation.
- Offer spiritual care.
- Consult child life specialists, if available.
- Child’s needs and understanding of the injury and care will vary based on their developmental level.
  - Infants
    - Learn through sensory stimulation (especially touch) and movement.
    - Can experience separation anxiety from family/care taker.
  - Toddler/Preschool
    - May see the burn injury as punishment for being “bad” so at risk for ineffective coping.
    - Routine is important so coordinate procedures around daily routines.
  - School age
    - Anxiety can be decreased by providing child education about processes and involving child in care.
  - Adolescent
    - Body image is significant concern.

### Palliative Care/Comfort Care

During disasters, patients with extensive burn injuries may be triaged as Expectant based on the Burn Triage Guidelines. Patient’s triaged as Expectant still need palliative care/comfort care provided. See the following page for additional information.
# PALLIATIVE CARE COMPONENTS DURING DISASTER MANAGEMENT

<table>
<thead>
<tr>
<th>PATHWAY COMPONENT</th>
<th>CONSIDERATIONS</th>
</tr>
</thead>
</table>
| Assess the situation | Health of the patient  
Family dynamic if present |
| Identify key players | Patient needs  
Family and friends needs  
Physician needs  
Nurses needs |
| Consider the big picture of the key players | Staff Concerns and any distress of key players  
Psychological Symptoms of any key players  
Distress  
Physical Symptoms of the patient  
Pain  
Dyspnea  
Existential and Spiritual Symptoms of any key players  
Examples:  
- Last rites from a priest with Catholic backgrounds  
- Imam being available for Islamic backgrounds  
- Hindu and Buddhists have their own beliefs and requests at the end of life. Some request the patient being put on the floor; can be accommodated by lowering the bed all the way to the floor.  
Legal and Ethical Aspects of Care  
Any member of the key players uncomfortable with end of life pathways  
Cultural Aspects of Care  
Examples:  
- Family requests for positioning of patient  
- Turning the bed toward specific directions if requested  
- Having LED candles available if family requests candles around the body  
End of Life Logistics  
Find a location that is accessible for family and friends |
| Communication | Set expectations and maintain communication |
| Develop and implement plan | Develop Plan/Manage Death:  
Implement postmortem logistics  
Pronouncing death  
Bereavement  
Staff debriefing/support |
| Manage pain, dyspnea, and agitation at the end of life | Family and nursing input is essential  
Don’t forget that using opioids with the intent to control symptoms at the end of life is ethically appropriate  
Assess:  
- Distress  
- Pain: grimace, tachycardia, verbal cues  
- Agitation: writhing, sweating  
- Dyspnea: retractions, flaring, tachypnea  
Un-intubated patients:  
- Pain or dyspnea: Intermittent IV dosing preferred: Morphine and hydromorphone preferred  
  - Reassess every 10 minute; repeat dose if needed  
  Agitation: Benzodiazepines preferred: Lorazepam and haloperidol preferred  
Intubated patients:  
- Pain: Continuous IV infusions preferred: Morphine, fentanyl, and hydromorphone preferred  
- Agitation: Continuous IV infusions preferred: Midazolam and lorazepam preferred  
- Increase the dosing every ten minutes  
- If distress is present, bolus the mediation by one hour equivalent and increase infusion by 25 to 100%. Write orders allowing for titration |
### Assess Degree of Injury

<table>
<thead>
<tr>
<th>Degree of Injury</th>
<th>Appearance</th>
<th>Surface</th>
<th>Sensation</th>
<th>Time to Healing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st degree/superficial</td>
<td>Pink or red</td>
<td>Dry</td>
<td>Painful</td>
<td>4-5 days</td>
</tr>
<tr>
<td>2nd degree/superficial partial thickness</td>
<td>Pink, clear blisters</td>
<td>Moist, weeping</td>
<td>Painful</td>
<td>14–21 days</td>
</tr>
<tr>
<td>2nd degree/deep partial thickness</td>
<td>Pink, hemorrhagic blisters, red</td>
<td>Moist</td>
<td>Painful</td>
<td>Weeks, may progress to 3rd degree and require graft, may lead to contractures</td>
</tr>
<tr>
<td>3rd degree/full thickness</td>
<td>White, brown, charred</td>
<td>Dry, waxy, leathery</td>
<td>Painless</td>
<td>Requires excision, high risk for infection/fluid loss</td>
</tr>
<tr>
<td>4th degree (tendon, nerve, muscle, bone and/or deep fascia involvement)</td>
<td>Brown, charred</td>
<td>Dry</td>
<td>Painless</td>
<td>Requires excision, high risk for infection/fluid loss</td>
</tr>
</tbody>
</table>
### Lund & Browder Chart

#### BURN DIAGRAM, ESTIMATE
(Lund & Browder)

<table>
<thead>
<tr>
<th>AREA</th>
<th>Infant</th>
<th>1-4</th>
<th>5-9</th>
<th>10-14</th>
<th>15</th>
<th>adult</th>
<th>PARTIAL THICKNESS</th>
<th>FULL THICKNESS</th>
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</thead>
<tbody>
<tr>
<td>head</td>
<td>12</td>
<td>17</td>
<td>13</td>
<td>11</td>
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<td>7</td>
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<td></td>
<td></td>
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<tr>
<td>ant. trunk</td>
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<td></td>
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</tr>
<tr>
<td>pos. trunk</td>
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<td>13</td>
<td>13</td>
<td>13</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>r. buttock</td>
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<td>2 1/2</td>
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<td>2 1/2</td>
<td>2 1/2</td>
<td>2 1/2</td>
<td>2 1/2</td>
<td></td>
</tr>
<tr>
<td>l. buttock</td>
<td>2 1/2</td>
<td>2 1/2</td>
<td>2 1/2</td>
<td>2 1/2</td>
<td>2 1/2</td>
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<td>genitalia</td>
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<td>1</td>
<td>1</td>
<td>1</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>r. u. arm</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
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<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>l. u. arm</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
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<td></td>
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<tr>
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<td></td>
</tr>
<tr>
<td>l. l. arm</td>
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<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>r. hand</td>
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<td>2 1/2</td>
<td>2 1/2</td>
<td>2 1/2</td>
<td>2 1/2</td>
<td>2 1/2</td>
<td>2 1/2</td>
<td></td>
</tr>
<tr>
<td>l. hand</td>
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<td>2 1/2</td>
<td>2 1/2</td>
<td>2 1/2</td>
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<tr>
<td>r. thigh</td>
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<td>6 1/2</td>
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<td>0 1/2</td>
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<td>l. thigh</td>
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<td>5 1/2</td>
<td>5 1/2</td>
<td>5 1/2</td>
<td>6 1/2</td>
<td>8 1/2</td>
<td>8 1/2</td>
<td>9 1/2</td>
</tr>
<tr>
<td>r. leg</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>6 1/2</td>
<td>7</td>
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<tr>
<td>l. leg</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>6</td>
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</tr>
<tr>
<td>r. foot</td>
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<tr>
<td>l. foot</td>
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<td>3 1/2</td>
<td>3 1/2</td>
<td>3 1/2</td>
<td>3 1/2</td>
</tr>
</tbody>
</table>

**TOTAL:**

**BURN ASSESSMENT**

Date        Time        Signature
Rule of 9’s Charts:

**BURN DIAGRAM ESTIMATE**
(Rule of 9’s: Estimate of TBSA – Total Burn Surface Area)

### Rule of 9’s Charts

<table>
<thead>
<tr>
<th>Area</th>
<th>Infant</th>
<th>Child</th>
<th>Adult</th>
<th>Burn Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>18</td>
<td>14</td>
<td>19</td>
<td>Partial thickness</td>
</tr>
<tr>
<td>Chest (Ant. torso)</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>Full thickness</td>
</tr>
<tr>
<td>Back (Post. Torso)</td>
<td>18 (back)</td>
<td>18</td>
<td>18</td>
<td>Full thickness</td>
</tr>
<tr>
<td>Abdomen</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>Full thickness</td>
</tr>
<tr>
<td>Right arm &amp; hand</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>Full thickness</td>
</tr>
<tr>
<td>Left arm &amp; hand</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>Full thickness</td>
</tr>
<tr>
<td>Right Leg &amp; foot (anterior)</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Left Leg &amp; foot (anterior)</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Right Leg &amp; foot (anterior)</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Perineum</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>No burn assessment</td>
</tr>
</tbody>
</table>

**Burn Assessment**: Date __________ Time _______ Signature __________________

*Bolded areas = nine or multiple of nine*
MANAGEMENT OF BURN PATIENTS WITH RADIATION EXPOSURE

Initial Management of All Pediatric Patients Involved in Radiological Event

- Determine if decontamination is needed due to external contamination (See below and pages 107 and 110 for information specific to decon)
- Stabilize ABCs (Airway, Breathing, Circulation)
- Immobilize spine as indicated
- Perform history and physical exam
- Look for other injuries (trauma)
- Keep patient NPO (including pacifiers)
- Follow your own hospital radiological response policy, if applicable.
- Consult the SBCC and the Pediatric Care Medical Specialist for assistance with care of the acutely and critically ill patient, to individualize the care of patient, if patient does not improve and needs to be transferred and as needed for further support and consult.
- Contact the IEMA Communication Center (1-217-782-7860 OR 1-800-782-7860) to report that any type of radiologic event has occurred and/or report that patients arriving at the hospital have been involved in any type of radiologic incident.
- It is recommended that hospitals consult REAC/TS (Radiation Emergency Assistance Center/Training Site) for questions regarding additional care management information (24 hour emergency phone number: 865-576-1005)

Steps for Decontaminating Externally Contaminated Pediatric Patients

- Admit to controlled area
- Remove clothing (cut clothing in direction away from patient’s airway and roll it outward away from patient’s skin, trapping any material inside the clothes)
- Place all clothing in plastic bags for testing

- Assess for and stabilize any emergent medical issues
  - Obtain medical/event history if patient or family able to provide
  - Identify/contain contaminate
  - Minimize any additional possible intake
  - Follow IEMA, REAC/TS, and/or Department of Nuclear Safety recommendations
  - See next page for general Information about Radiological Decontamination

Decontamination Order Priority:
1. Wounds
2. Body Orifices
3. Intact skin

Reassess all areas after decon

- Contamination reduced to acceptable levels?
  - NO
  - YES

Begin medical treatment (see next page)
Management for All Pediatric Patients Involved Radiological Event

Does patient have possible external irradiation or internally contaminated (see page 110 for definitions)?
- Evaluate using appropriate instrumentation (dosimeter) or history of event. Consult with hospital radiation safety officer for assistance and identifying available instrumentation, if available.

NO

Follow normal treatment procedures

YES

- If externally contaminated and patient is medically stable, follow decontamination procedures as indicated on previous page before beginning these recommended care guidelines.
- If externally contaminated and patient is medically unstable, stabilize prior to decon.
- Consult REAC/TS, the SBCC, and Pediatric Care Medical Specialist for lab exams based on exposure and resources.
- Minimize uptake or facilitate excretion of contaminant through use of recommended medications and other techniques. (See next page for further management)
- Perform wound closures and any other surgical interventions within first 48 hours of irradiation (before wound healing and immunity is impaired)

Is there persistent vomiting, erythema and/or fever?

NO

- Observe for vomiting for 24 hours.
- If no vomiting, discharge home with medical and radiological specialist follow up.

YES

Admit patient. Consult with REAC/TS and Pediatric Care Medical Specialist to assist with determining need for admission, transfer or discharge

Repeat CBC with differential every 4-6 hours for as long as REAC/TS recommends
- Administer antiemetics
  - Ondansetron (Zofran):
    - >6 months-4 years = 0.15 mg/kg IV/SQ q 4 hours
    - 4-11 years = 4 mg SQ/PO q 4 hours
    - >12 years = 8 mg SQ/PO q 12 hours
  - Granisetron (Kytril):
    - > 2 years = 10 mcg/kg IV over 5 minutes once a day OR 2 mg PO once a day

REASSESS

Discharge home with appropriate medical and radiological specialist follow up.

Significant absolute lymphocyte decrease or other medical problems?

NO

YES

Continuous care:
- Medical evaluation and treatment (see next page)
- Continue to collect excretions as per REAC/TS recommendations
- Perform a dose assessment
- Consult REAC/TS, the SBCC, and Pediatric Care Medical Specialist for lab exams based on exposure and resources for ongoing laboratory testing

Cytogenetics
Biodosimetry (gold standard for determining whole-body radiation dose. Contact REAC/TS for more information).
Medical Management (Continued)

Medical management is dependent upon the type of specific isotope and the amount of exposure so identifying agent as quickly as possible is important.

Several categories of medical management for internal contamination:

1. Reduction and/or inhibition of absorption of isotope in the GI tract
2. Blocking uptake to the organ of interest
3. Isotope dilution
4. Altering the chemistry of the substance
5. Displacing the isotope from receptors
6. Traditional chelation techniques
7. Early excision of radionuclides from wounds to minimize absorption
8. Bronchoalveolar lavage for severe cases of insoluble inhaled particles

Extensive information for medical management of patients with radiation exposure can be obtained by contacting REAC/TS or in The Medical Aspects of Radiation Incidents, which can be found on REAC/TS website at www.orise.ornl.gov/reacts

Safety and effectiveness of many of the therapy recommendations have not been established in the pediatric patient. Contact Pediatric Care Medical Specialist and/or REAC/TS representative for treatment recommendations.

The following medications (potassium iodide and Prussian blue) can be obtained through the Strategic National Stockpile (SNS). Hospitals should follow their existing policy to request medications from the SNS. For questions or concerns regarding the policy to request medication from the SNS, hospitals can contact their local health departments, Regional Hospital Coordinating Center (RHCC) or the Pediatric Care Medical Specialist.

**Potassium Iodide (KI)**

Children are susceptible to thyroid cancer after being exposed to radioactive iodine. The uptake of radioactive iodine needs to be blocked by administering oral potassium iodide (KI) within 4 hours of exposure for exposures of ≥ 0.05 Gy (5 rad). See the dosing chart below.

<table>
<thead>
<tr>
<th>Age of Patient</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 month</td>
<td>16 mg PO</td>
</tr>
<tr>
<td>1 month-3 years</td>
<td>32 mg PO</td>
</tr>
<tr>
<td>4-18 years</td>
<td>65 mg PO</td>
</tr>
<tr>
<td>Pregnant or lactating women</td>
<td>130 mg PO</td>
</tr>
</tbody>
</table>

Protective effects of KI lasts approximately 24 hours and is usually given once. If child is unable to be evacuated to a safer area within 24 hours, contact Pediatric Care Medical Specialist for the possible need for repeat doses. If liquid form is not available, below are the steps for how to convert the KI tabs to KI solution:

1. Place one 130 mg tablet (or two 65 mg tablets) into a bowl and grind into a fine powder.
2. Add 20 mL of water to bowl and dissolve the KI powder.
3. Add 20 mL of milk, juice, soda or syrup to flavor the KI/water mixture
4. Resulting solution has a concentration of 16.26 mg/5 mL
5. Unused iodine mixture may be stored in the refrigerator for up to 7 days.

Other considerations:

- Need to monitor a newborn’s thyroid function 2-3 weeks after receiving KI because KI can cause a transient decrease in thyroxin and increase in the TSH level
- Breastfeeding:
  - The Food and Drug Administration (FDA) and American Academy of Pediatrics (AAP) have each released recommendations for breastfeeding after a mother has been exposed to radiation. The FDA’s recommendation is a mother can breast feed after she has been treated with KI. The AAP recommends that mothers do not breast feed, even if they have been treated with KI unless no other alternative is available. For more information or assistance with determining if breast feeding should continue, consult the Pediatric Care Medical Specialist and/or REAC/TS.
**Prussian Blue**

Prussian Blue is utilized when the source is cesium, rubidium or thallium. The dosing recommendations are:

- **Children 2-12 years old**: 1 gm PO TID
- **Children >13 years old**: 3 gm PO TID

---

**Approximate Thresholds for Acute Radiation Syndromes**

<table>
<thead>
<tr>
<th>Dose</th>
<th>Signs/Symptoms*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-100 rads (0-1 Gy)</td>
<td>NA</td>
</tr>
<tr>
<td>&gt; 100 rads (&gt; 1 Gy)</td>
<td>Hematopoietic</td>
</tr>
<tr>
<td>&gt; 6-800 rads (&gt; 6-8 Gy)</td>
<td>Anorexia, nausea, vomiting, initial</td>
</tr>
<tr>
<td></td>
<td>granulocytosis and lymphocytopenia.</td>
</tr>
<tr>
<td>&gt; 2000 rads (&gt; 20 Gy)</td>
<td>Cardiovascular/ CNS</td>
</tr>
<tr>
<td></td>
<td>Nausea/vomiting within first hour, prostration, ataxia, confusion</td>
</tr>
</tbody>
</table>

* At higher doses the time to onset of signs/symptoms may be compressed.

---

**Psychological Considerations**

Radiation emergencies, whether it be from a leak at a nuclear power plant or from a terrorist type incident such as a dirty bomb, leads to significant public anxiety. The anxiety associated with such events can appear out of proportion to the radiation induced health effects and can greatly affect the entire community. Many patients may present with symptoms such as nausea. It is important for providers to determine if nausea is from contamination or from the anxiety of the event. Long term psychological effects can manifest years after an event. General examples of long term effects include: feelings of vulnerability, PTSD, chronic anxiety, feelings of loss of control, fear of safety and health of themselves as well as future generations, and multiple idiopathic physical symptoms (MIPS). Provide educational materials and counseling options to all patients and their families after a radiological emergency.

---

**Radioactive Contamination versus Exposure**

- **Radioactive contamination**: radioactive material is on or inside a person
  - External contamination-radioactive material is only on outside of a person
  - Internal contamination-radioactive material is ingested, inhaled, or absorbed through the skin or open wound
- **Radiation exposure**: a person is exposed to radioactive materials
- **Difference between contamination and exposure**:
  - Person exposed to radiation may not be contaminated. An radiation exposure means radioactive material penetrated the person’s body. For a person to be contaminated with radioactive materials, the materials must be on or inside of the person’s body.
## General Information about Radiological Decontamination

- Typically is not emergently needed as compared to chemical decon
  - *Can begin treatment for life threatening conditions before initiating decon*
  - Low risk to health care providers if decon is delayed
- Radioactive material cannot be neutralized, only moved from one point to another
- Clean dry sheet or drapes should be applied to the area to prevent spread of contamination to uncontaminated areas
- Standard pediatric considerations for decontamination apply:
  - Use warm water (98°-110°F)
  - Do not carry infants/young children through decon shower
  - Have rewarming measures available after decon is completed
- Clean wound via baby wipes or via irrigation
  - Options: baby wipes, irrigation, OR soft cloth with soap and tepid water
- Irrigation:
  - Irrigate wound/orifice/area with sterile saline or equivalent
  - Prevent splashing
- Run-off should be directed into a receptacle (i.e. lined garbage can)
  - Keep all waste (run-off, absorbent pads, sheets, towels) for later collection and disposal
- Repeat until no further contamination is noted.
- Minor debridement may be needed if wound has foreign bodies in it
- After decon completed, clean wound as per hospital protocol.
- Other considerations:
  - Partial thickness burns:
    - Always irrigate
    - Leave blisters closed
    - Irrigate open blisters
  - Full thickness burns:
    - Radioactive contaminant will slough in eschar
    - Contaminates will remain in layers of dead tissue
Nutritional Algorithm for Pediatric Burn Patients

< 20% TBSA Burn

- Age appropriate diet
- 2 day calorie count
- Nutritional supplements
- Multivitamin with minerals

Conscious sedation or twice daily wound care or inadequate calorie counts (<85%)?

YES

- Place postpyloric feeding tube
- Confirm with abdominal X-ray
- If unable to place after 2 bedside attempts, obtain GI consult for placement under fluoroscopy or with interventional radiology.
- Start feedings
- HOB > 30 degrees

11-17 years old

- Initial infusion rate: 1.5 kcal/mL high calorie formula @ 30 mL/hr.
- Titration rate: Increase by 20 mL/hr every 4 hours to a goal of 60 mL/hr

NO

- Continue current regimen.

≥ 20% TBSA Burn

- All patients receive feeding tube.
- Indications for postpyloric feeding tube present?
  - Conscious sedation
  - Twice daily wound care
  - Frequent operative interventions
  - Intolerance of gastric feeding**

YES

- Place feeding tube in stomach
- Confirm with abdominal X-ray.
- Start gastric feedings.
- HOB > 30 degrees.
- Reassess for indications for placing a postpyloric feeding tube

NO

≤ 10 years old

- Initial infusion rate: 1 kcal/mL of high calorie pediatric formula @ 20 mL/hr.
- Titration rate: Increase by 10 mL/hr every 4 hours to a goal is 40 mL/hr.

If patient is receiving tube feedings, check residuals as indicated below

Intermittent Feedings

- Check residuals before each feeding:
  - If the residual is < ½ of the last feeding volume, return the residual feeding and continue with feedings as prescribed.
  - If the residual volume is > ½ of the last feeding volume, hold feeding and notify physician.

Continuous Feedings

- Check residuals every 4 hours:
  - If residual volume is < the volume infused in previous 4 hours, continue tube feeding as ordered.
  - If residual volume is > the volume infused in previous 4 hours and patient is asymptomatic, hold feeding, recheck residuals in 1 hour, and notify physician.
  - If residual volume is > the volume infused in previous 4 hours and the patient has symptoms/signs of not tolerating the feeding, hold the feeding and notify physician.
  - If patient continues to not tolerate feedings, contact SBCC**

** Intolerance of feedings can be a sign of sepsis in burn patients
**INITIAL CONTACT**

- Unable to obtain information from patient: (skip to Assessment section)
- Reason for admission:

<table>
<thead>
<tr>
<th>LMP:</th>
<th>Due date:</th>
<th>Gestation:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Number of current gestation:**
- Single gestation
- Multiple gestation (number):

**ASSESSMENT/INTERVENTIONS**

**Vaginal bleeding**
- History of bleeding disorders and/or taking medications for bleeding disorders:

  | | |
  | Time of onset of bleeding: |
  | Description of blood loss: |
  | Watery | Bright red | Dark red |
  | Estimation of blood loss: |
  | Amount: |
  | Clots: |
  | Number | Size: |
  | Pain: |
  | Absent | Present | Constant | Intermittent |

**Abdomen:**
- Rigid
- Soft
- Relaxation between contractions
- Scars from previous surgeries
- Fundal height cm (uppermost border of the symphysis pubis to the upper border of the fundus)

**Contraction:**
- Onset
- Frequency
- Pain rating (0-10): |
- Intensity: |
  - Mild (abdomen feels like a nose)
  - Moderate (abdomen feels like a chin)
  - Firm (abdomen feels like the forehead)

**Membrane status:**
- Intact
- Ruptured: Time:

**Fluid:**
- Clear
- Bloody
- Meconium

**Fetal movement:**
- Normal
- Decreased
- Absent

**Fetal Heart Tones (Rate):**

**Vital signs:**
- HR: |
- RR: |
- Temp: |
- SpO2: |
- BP: |

If elevated BP:

**History of HTN:**
- Yes □ No □ Pregnancy induced

**Swelling:**
- Feet and Legs □ Face □ None

**Complaints of:**
- Headache □ Nausea
- Blurred vision and/or visual disturbances □ Epigastric pain

**Prolapsed cord present?**
- Yes □ No

**GSB screening completed?** (see OB Care Guideline for details)
- Yes □ No

**DISPOSITION**

Form completed by: ________________________________
Date: ________________ Time: ________________

**Patient disposition:**
- Discharge □ Admit
- Transfer: ________________________________

**For patient’s requiring transfer:**
- Patient Triage Category:
  - Level III Perinatal Center Criteria
  - Level II-E Perinatal Center Criteria
  - Level I or II Perinatal Center Criteria

**After delivery: Mother**
- Placenta delivered: |
- Time of delivery: ________________________________
- Placenta intact: |
- Utterance status: |
  - Firm □ Soft □ Midline
- Medcations received during labor/after delivery:
  - Oxytocin (Pitocin)
  - Misoprostol (Cytotec)
  - Methylergometrine (Methergine)
  - Hemabate (Carboprost)
  - Magnesium
  - Other

**Active Labor:**
- Bloody show: |
  - Yes □ No
- Feeling rectal pressure, grunting or bearing down: |
  - Yes □ No
- Separation of labia or bulging of perineum: |
  - Yes □ No
- Presenting part: |
- Scalp visible: |
  - Yes □ No
- Crowning: |
  - Yes □ No
- Time of delivery: ________________________________

**After delivery: Baby**

See Newborn Care Guideline for information

**HISTORY**

What number pregnancy is this? __________

Number of:
- Previous deliveries: |
- Term: |
- Pre-term: |
- Abortion: |
- Living children: |

Mode of previous deliveries:

- Vaginal
- Cesarean Section

Medical history:

Surgical history:

Previous uterine surgery:

Home medications:

History of pre-natal care:

Known antenatal fetal defect/special conditions of the fetus:

Known Group B Strep (GSB) status
- Positive □ Negative □ Unknown

Known high risk pregnancy:

History of drug use:

**ASSESSMENT/INTERVENTIONS**

**Level I Perinatal Center Criteria**

**Level II Perinatal Center Criteria**

**Level III Perinatal Center Criteria**

**Illinois EMSC**
### Common Pediatric Inpatient Treatment and Monitoring Interventions

#### INTERVENTION

**Vital Signs:**
- Vital signs at least every 4 hours (T, HR, RR)
- BP every 8 hours, if stable
- Pulse oximetry if on O₂
  - Continuous preferred
  - At least every 4 hour checks
- HR may be continuously monitored via pulse oximetry

#### PEDIATRIC CAVEATS/RATIONALE

**Vital Signs:**
- Vital signs vary greatly with age:

<table>
<thead>
<tr>
<th>Age</th>
<th>Average HR (beats/min)</th>
<th>Average RR (breaths/min)</th>
<th>Average Systolic BP (mm/Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn 0-1 month</td>
<td>100-180</td>
<td>30-60</td>
<td>&gt;60</td>
</tr>
<tr>
<td>Infant 1-12 months</td>
<td>100-160</td>
<td>30-60</td>
<td>&gt;70</td>
</tr>
<tr>
<td>Toddler 1-3 years</td>
<td>90-150</td>
<td>24-40</td>
<td>&gt;70</td>
</tr>
<tr>
<td>Pre-School Age 3-5 years</td>
<td>80-140</td>
<td>22-34</td>
<td>&gt;75</td>
</tr>
<tr>
<td>School Age 5-11 years</td>
<td>70-120</td>
<td>18-30</td>
<td>&gt;80</td>
</tr>
<tr>
<td>Adolescent 13-18 years</td>
<td>60-100</td>
<td>12-16</td>
<td>&gt;90</td>
</tr>
</tbody>
</table>

- Best predictors of shock:
  - Tachycardia is first sign of shock
  - Altered mental status
  - Low urine output
  - Capillary refill (not well-validated)
- Infants can’t increase cardiac stroke volume, thus tachycardia early sign of dehydration
Assessments:
- Obtain head circumference on all children under 2 years of age.
  - Compare to normal for age See: CDC Grow Charts: [http://www.cdc.gov/growthcharts](http://www.cdc.gov/growthcharts)
  - If head injury present, obtain measurements daily
- Assess patient’s fontanels on all children under the age of 12 months.
- Obtain abdominal circumference on all abdominal trauma patients
  - Compare to normal for age
  - Obtain measurements daily
- Obtain daily weight (kilograms only)
- Bedside glucose check on all infants who are cold and tachypneic or children with altered mental status.
- PEWS (Pediatric Early Warning Score)
  - Complete every 4 hours or more often as indicated on card

Assessments:
- Head circumference is an important measurement to determine swelling in the absence of more sophisticated monitoring options.
- Abdominal circumference is an important measurement to determine pathological changes within the abdomen.
- Fontanels:
  - Assess when infant is not crying
  - Anterior fontanel closes at 12-18 months old
  - Posterior fontanel closes within first 3 months
  - Fontanels should be flat, not depressed or bulging
    - Bulging, firm, tense: sign of increased intracranial pressure
    - Sunken, depressed: sign of dehydration
- Hypoglycemia in children:
  - Infants are at high risk of hypoglycemia when cold or stressed
  - Hypoglycemia:
    - < 60 mg/dL in an infant and child (source: PALS)
    - <50 mg/dL in a neonate (source: STABLE)
  - See Treatment: Medication section for dextrose dosing for hypoglycemia
- PEWS Score: (see next page)
  - Can help nurses assess pediatric patients objectively
  - Using vital signs, child's behavior, cardiovascular and respiratory symptoms
### PEDIATRIC EARLY WARNING SCORE CARD

<table>
<thead>
<tr>
<th>Behavior</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
<th><strong>SCORE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Behavior</strong></td>
<td>• Lethargic, confused, or Reduced pain response</td>
<td>• Irritable or agitated and NOT consolable</td>
<td>• Sleeping or</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Irritable and consolable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Playing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Appropriate for patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cardiovascular</strong></td>
<td>• Grey or</td>
<td>• Capillary refill ≥5 seconds or</td>
<td>• Pale</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Capillary refill ≥5 or</td>
<td>• Tachycardia of 20 above normal parameters</td>
<td>• Capillary refill 3 seconds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Tachycardia 30 above normal or</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Bradycardia for age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Respiratory</strong></td>
<td>• 5 below normal with retractions and/or</td>
<td>• &gt;20 above normal</td>
<td>• &gt;10 above normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• ≥ 50% FiO₂</td>
<td>• Using accessory muscles or</td>
<td>• Using accessory muscles or</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 40%-49% FiO₂ or ≥ 2 LPM</td>
<td>• 45-40% FiO₂ or ≥ 2 LPM</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ≥ 3 LPM</td>
<td>• Any initiation of O₂</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Add 2 points for frequent interventions (suction, positioning, O₂ changes or multiple IV attempts)

**TOTAL**

**Parental concern should be an automatic call to the Rapid Response Team**

Score ≥ 7: Assess every 30 minutes  
Score = 6: Assess every 1 hour  
Score = 5: Assess every 1-2 hours  
Score 0-4: Assess every 4 hours
Pain:
- Need to use age/developmental appropriate pain scales
- Examples:
  - Faces Scale for children > 3 years old
  - FLAACC Scale for children < 3 years old

Comfort measures
- Oral glucose drops effective for neonates
- Distract with favorite media, games

---

Pain:
Wong-Baker Pain Rating Scale:

<table>
<thead>
<tr>
<th>Category</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face</td>
<td>No particular expression or smile</td>
<td>Occasional grimace or frown, withdrawn, disinterested</td>
<td>Frequent to constant frown, clenched jaws, quivering chin</td>
</tr>
<tr>
<td>Legs</td>
<td>Normal position or relaxed</td>
<td>Uneasy, restless, tense</td>
<td>Kicking or legs drawn up</td>
</tr>
<tr>
<td>Activity</td>
<td>Lying quietly, normal position, moves easily</td>
<td>Squirming, shifting back and forth, tense</td>
<td>Arched, rigid, or jerking</td>
</tr>
<tr>
<td>Cry</td>
<td>No cry (awake or asleep)</td>
<td>Moans, whimper, occasional complaint</td>
<td>Crying steadily, screams or sobs, frequent complaints</td>
</tr>
<tr>
<td>Consolability</td>
<td>Content, relaxed</td>
<td>Reassured by occasional touching, hugging or being talked to, distractible</td>
<td>Difficult to console or comfort</td>
</tr>
</tbody>
</table>

FLAACC Pain Scale:

<table>
<thead>
<tr>
<th>Category</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face</td>
<td>No particular expression or smile</td>
<td>Occasional grimace or frown, withdrawn, disinterested</td>
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<td>Reassured by occasional touching, hugging or being talked to, distractible</td>
<td>Difficult to console or comfort</td>
</tr>
</tbody>
</table>
- Developmentally delayed children may have exaggerated CNS depression with opiates
  - Start with lowest dose and titrate

<table>
<thead>
<tr>
<th>Intake/Output:</th>
<th>Intake/Output:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet/Nutrition</td>
<td>Diet/Nutrition</td>
</tr>
<tr>
<td>- Age appropriate diet as tolerated</td>
<td>- Check with parents about diet/formula needs.</td>
</tr>
<tr>
<td>- Allow to breastfeed as tolerated unless contraindication present</td>
<td>- Contraindications to breastfeeding:</td>
</tr>
<tr>
<td></td>
<td>- Mothers who are/have:</td>
</tr>
<tr>
<td></td>
<td>- +HIV</td>
</tr>
<tr>
<td></td>
<td>- Active untreated TB</td>
</tr>
<tr>
<td></td>
<td>- Radioactive milk</td>
</tr>
<tr>
<td></td>
<td>- Using street drugs</td>
</tr>
<tr>
<td></td>
<td>- Herpes simplex lesions on breasts</td>
</tr>
<tr>
<td></td>
<td>- Taking anti-metabolites or chemotherapeutic agents, and small number of other medications until they clear from the milk</td>
</tr>
<tr>
<td></td>
<td>- Age appropriate diet:</td>
</tr>
<tr>
<td></td>
<td>- Newborn:</td>
</tr>
<tr>
<td></td>
<td>- Breast or bottle fed, 2-3 ounces/feeding every 2-3 hours</td>
</tr>
<tr>
<td></td>
<td>- Infants:</td>
</tr>
<tr>
<td></td>
<td>- 2-4 months:</td>
</tr>
<tr>
<td></td>
<td>- Breast or bottle fed only, 3-4 ounces/feeding every 3-4 hours</td>
</tr>
<tr>
<td></td>
<td>- 4-6 months:</td>
</tr>
<tr>
<td></td>
<td>- 4-5 ounces/feeding (breast or bottle) 4 times/day</td>
</tr>
<tr>
<td></td>
<td>- Begin baby food (i.e. rice cereal)</td>
</tr>
<tr>
<td></td>
<td>- 6-9 months:</td>
</tr>
<tr>
<td></td>
<td>- 6-8 ounces/feeding (breast or bottle) 4 times/day</td>
</tr>
<tr>
<td></td>
<td>- Baby food and mashed table food</td>
</tr>
</tbody>
</table>
Nasogastric / Orogastric tube placement may be needed to decompress the stomach of air after resuscitation or for feedings.

### Urine Output:
- Assess urine output
  - Place indwelling urinary catheter if needed.

- 9-12 months:
  - 6-8 ounces/feeding (breast or bottle) 4 times /day
  - Soft bite-sized pieces of food
    - Toddlers:
      - Table food is appropriate
      - Soft bite-sized pieces: Avoid foods that can cause choking (i.e. hot dogs, grapes, chunks of meat)
    - Preschool:
      - Regular table food is appropriate
      - Soft bite-sized pieces: Avoid foods that can cause choking (i.e. hot dogs, grapes, chunks of meat)
    - School age and adolescent:
      - Regular table food is appropriate

- Insertion technique for NG/OG is similar to adults.
  - Measure the length needed by placing the tip of the catheter at the nose, hold the tube at the earlobe and measure to the xiphoid process. Place a small piece of tape at that measurement to guide your placement depth. Lubricate the tube well. Abdominal x-ray should be done to confirm placement.

<table>
<thead>
<tr>
<th>OG/NG Tube Size Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant</td>
</tr>
<tr>
<td>Child</td>
</tr>
</tbody>
</table>

- Normal urine output is at least 1 mL/kg/hr
- For catheter placement, use similar technique as with adult placement.
- See next page for urinary catheter size selection.
- Weigh diapers if strict I/O is required

<table>
<thead>
<tr>
<th>Urinary Catheter Size Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn / Infant</td>
</tr>
<tr>
<td>Toddler/Preschool</td>
</tr>
<tr>
<td>School Age</td>
</tr>
<tr>
<td>Adolescent</td>
</tr>
</tbody>
</table>

- To weigh diapers:
  - Subtract total weight from dry diaper weight
  - 1 gm=1 mL urine

**IV Fluids:**

**IV Site selection:**
- Infants (< 12 months): hand, wrist, antecubital, saphenous, feet, scalp
- >12 months: hand, wrist, antecubital

**IO Site Selection**
- Proximal tibia
- Distal tibia
- Humerus (if sites palpable)
- Distal femur (manual IO only)

**IV/IO Monitoring**
- Assess site at least every 2 hours

**Suggested IV Catheter Sizes**
| Newborns/Infants | 24 G-22 G |
| Toddlers/School Age | 24 G-22 G |
| Adolescents | 22 G-18 G |

**IO Needle Sizes**
- Follow manufacture’s recommendations for needle size for pediatric patients.
- Needles for the IO drills are not long enough to use in the distal femur. Manual IO should be used.

**IV/IO Monitoring:**
- IV/IO can infiltrate quickly because of the child’s activity. Careful assessment will minimize infiltrate damage
Ensure you are able to palpate & visualize the site when taping the line
- Do not wrap tape circumferentially around an extremity

### IV Fluids: Replacement
- Birth - 28 days:
  - Bolus 0.9% NS at 10 mL/kg
- > 28 days:
  - Bolus 0.9% NS at 20 mL/kg
- Suspected cardiogenic shock:
  - Bolus 0.9% NS at 5-10 mL/kg

### IV Fluids: Replacement
- 0.9% NS Bolus used for fluid replacement or for intravascular expansion to treat shock
- May use Lactate Ringers if acidotic
- Administer as rapidly as possible without sacrificing IV/IO
- May repeat x 3 if for severe dehydration or non-cardiogenic shock

### IV Fluids: Maintenance
- D5 0.45% NS is standard
- Add 20 mEq KCl/Liter if not hyperkalemic
- Monitor weight, urine output and electrolytes and adjust rate/composition of IV fluids accordingly
- To calculate maintenance rate:
  - Birth-28 days:
    - 80-100 mL/kg/24 hrs
  - >28 days:
    - First 10 kg = 4 mL/kg/hr
    - Second 10 kg = 2 mL/kg/hr
    - Each additional kg = 1 mL/kg/hr
- Wrapping tape circumferentially around an extremity may cause tissue damage if the IV infiltrates

### IV Fluids: Maintenance
- Maintenance fluids usually contain D5
  - Provides 17 calories/100 mL and nearly 20% of the daily caloric needs which will prevent ketone production and helps minimize protein degradation
    - Will lose weight on this regimen if enteral feedings not given also
  - Need to be started on total parental nutrition after a few days of maintenance fluids if enteral feedings are still not possible. (Nelsons, 2011)
  - Potassium should only be added after renal function is proven to be adequate and patient has voided
  - Example 23 kg child:
    - 4 mL/hr x 10 kg +
    - 2 mL/hr x 10 kg +
    - 1 mL/hr x 3 kg = 63 mL/hr
### Safety:

- Ensure crib rails are up at all times when patient is not directly attended to by a caregiver/parent
- No extra supplies should be kept in the crib or in reach
- Place infant on their back when sleeping
- Children under 3 years of age should be placed in a crib

### Safety:

- Infants can easily roll out of the crib and be injured.
- Supplies may be a choking hazard.
- Infants sleeping on the back decreases the risk of SIDS
- A hospital is not “child proof.” Even if a toddler sleeps in a youth or regular bed at home, consider placing them in a crib for their safety.

### Treatments:

**Medications**

**Analgesics/Antipyretics**

- Acetaminophen
  - 15 mg/kg PO/PR every 4 hrs PRN (max dose in 24 hours=3 gms)

- Ibuprofen (infant/child > 6 months)
  - 10 mg/kg PO every 6 hr PRN

**Medications**


**Acetaminophen**

- Advantages
  - Minimal adverse effects on GI tract or renal function
- Disadvantages
  - Liver toxicity

**Ibuprofen**

- Advantages
  - Inhibits prostaglandin-induced nociception
- Disadvantages
  - May have limited effect on the immediate treatment of acute pain as these agents do not directly block nociceptors. Inactive against already released inflammatory mediators. Side effects include nausea, vomiting, ulcers, platelet dysfunction, liver toxicity
### Analgesics

- **Acetaminophen with hydrocodone**
  - **<50 kg**: 0.1-0.2 mg/kg/dose of hydrocodone every 4-6 hrs (max 10 mg)
  - **>50 kg**: 5-10 mg of hydrocodone every 4-6 hrs

- **Ketorolac** *(Toradol)*
  - 0.25-1 mg/kg IM/IV/IO every 6 hr PRN
  - Can be given PO for children >50 kg

- **Morphine**
  - 0.1-0.2 mg/kg IM/IV/IO, every 2-4 hrs PRN

- **Fentanyl**
  - 1-2 mcg/kg/dose IM/IV/IO, IN* every 30-60 minutes PRN

### Acetaminophen with hydrocodone

- **Elixer**: Hycet/Lortab: 7.5 mg hydrocodone and 325 mg acetaminophen per 15 ml
- **Tablet**: Lorcet/Norco

**Advantages**
- Oral medication
- Moderately rapid onset

**Disadvantages**
- Dizziness, sedation, nausea, vomiting, constipation

**Ketorolac**:

**Advantages**
- Effective alternative to opioids for treatment of moderate to severe pain. Can be combined with acetaminophen or low-dose opioids for greater analgesia

**Disadvantages**
- Bleeding diathesis, hyperkalemia and depression of renal function, hepatotoxicity

**Morphine**:

**Advantages**
- Moderately rapid predictable onset. Significant role for patients who need prolonged pain control (e.g., fracture reduction, multiple trauma, sickle cell disease

**Disadvantages**
- Respiratory depression, hypotension, bradycardia, CNS depression,
- Avoid patients with renal failure
- Monitor for respiratory depression

**Fentanyl**:

**Advantages**
- Rapid onset if given IV/IO, short duration, potent analgesic, better safety
Antibiotics

Children > 28 days
- Ceftriaxone
  - 75 mg/kg IV/IO every 24 hrs
  - Not for infants < 1 m/o
- Clindamycin
  - 10 mg/kg IV/IO every 6 hrs
- Vancomycin
  - 15 mg/kg IV/IO every 6 hrs
- Piperacillin/Tazobactam
  - 75 mg/kg IV/IO every 6 hrs
- Cefepime
  - 50 mg/kg IV/IO every 8 hours (max: 2 g/dose)
- Cefuroxime
  - Infants and children 28 days and older: 50 mg/kg/dose every 8 hours (max dose: 2000 mg/dose)

Neonates (birth - 28 days)
- Ampicillin 100 mg/kg/day IV/IO divided every 6 hours
- Cefotaxime IV/IO

*For IN route, divide dose equally between each nostril

Profile for renal patients, preferred medication for renal patients

Disadvantages
- Respiratory depression, apnea may precede alteration of consciousness chest wall rigidity if given too rapidly.
- IN route should not be used with facial trauma due to ineffective absorption.

Antibiotics

- Ceftriaxone
  - Effective for: UTI, pneumonia, bacteremia
  - For CNS infections, dose is 100 mg/kg every 24 hrs and Vancomycin should be added
- Clindamycin
  - Treats most skin/soft tissue infections
- Vancomycin
  - Reserve for severe infections
  - Good for pneumonia with suspected MRSA or resistant *Pneumococcus*
  - Severe skin/soft tissue infections
  - Gram-positive bacteremia
- Piperacillin/Tazobactam
  - Intra-abdominal infections

Neonates:
- Cefotaxime
  - Broad spectrum
Neonates < 7 days old:
50 mg/kg/dose every 12 hours

Neonates 8-28 days:
50 mg/kg/dose every 8 hours

Maximum dose: 2000 mg/dose

- Cefuroxime IV/IO
  - Neonates < 7 days old:
    50 mg/kg/dose every 12 hours
  - Neonates 8-28 days:
    50 mg/kg/dose every 8 hours
  - Maximum dose: 2000 mg/dose

- Acyclovir
  - ≥ 35 weeks post-conceptual age:
    60 mg/kg/day divided every 8 hrs.
  - < 35 weeks post conceptual age:
    40 mg/kg/day divided every 12 hrs

- Gentamycin 2.5 mg/kg IV/IO every 8 hrs

**Antivirals**
- Oseltamivir
  - 2 weeks - 1 year (Use for treatment only):
    3 mg/kg/dose every 12 hours x 5 days

**Antivirals:**
- Oseltamivir
  - Recommended by CDC for hospitalized patients with influenza
- Acyclovir
  - Usually reserved for CNS infections
### Acyclovir
- **<12 yrs:** 20 mg/kg IV/IO every 8 hrs
- **>12yrs:** 10 mg/kg IV/IO every 8 hrs

### Dextrose:
- **Dextrose 0.5-1 g/kg IV/IO**
- **D50W:** 1-2 mL/kg IV/IO
- **D25W:** 2-4 mL/kg IV/IO
- **D10W:** 5-10 mL/kg IV/IO (infants >28 days)
- **D10W:** 2 mL/kg IV/IO (birth - 28 days)

**Other Treatments:**
**Blood Administration:**
- Replacement with PRBC/Platelet/Albumin 5%/FFP = 10mL/kg
- Assess the child frequently throughout the infusion for a possible transfusion reaction

### Dextrose:
- Maximum recommended concentration for a bolus administration in children >28 days for hypoglycemia is D25W
- Maximum recommended concentration for a bolus administration in neonates for hypoglycemia is D10W
- To convert D50W to D10W
  - Mix 1 part D50W to 4 parts sterile water or normal saline
- To convert D50W to D25W
  - Mix 1 part D50W to 1 part sterile water or normal saline

**Other Treatments:**
**Blood Administration:**
- All blood products may be infused through any size IV catheter
- Total blood volume varies by weight
  - Approximate volume is 80mL/kg.
Other Considerations:
- Tracheostomy Care (established)
- G-Tube or J-Tube (established)

Other Considerations:
Children with Special Health Care Needs/Children with Functional Access Needs:
The parent of a child with special needs will be your best reference for how to manage their care. They will be willing to share their treatment plan and techniques. Some parents will have a resource binder or other reference with them.
- Tracheostomy Care: Similar care to adults, wash site gently with warm water as needed. Change tracheostomy ties daily and as needed.
- G-Tube/J-Tube: Similar care to adults, wash site gently with warm water as needed. If tube is accidentally dislodged and a replacement tube is not readily available, you may replace with an indwelling urinary catheter. Slide the catheter in gently. There should be minimal resistance.

Resource: EMSC CSHCN Reference Guide included in the following two pages
Children with Special Health Care Needs

- Listen to the caregivers. They know their child best. Inquire about:
  - child's baseline abilities
  - devices or medications
  - syndromes or diseases
  - usual vital signs
  - symptoms
- Bring care plans or Emergency Information Forms (EIF) to the hospital with the patient.
- Assess and communicate directly with the child based on development-age, not chronological age. DO NOT make assumptions about their level of understanding based on their appearance.
- Look for MedicAlert jewelry or health forms, if usual caregiver is not available.
- Bring necessary specialized equipment and medications into the ED with the child if possible (ventilator, tracheostomy tube or gastrostomy tube, etc).
- Ask caregivers for the best way to move the child, particularly if the child is very prone to fractures, such as in osteogenesis imperfecta (“brittle bone disease”). If child suffers a fracture & has a brace or splint on the affected area, leave the brace or splint on & immobilize around it.
- Down Syndrome patients may have upper cervical instability and may be more prone to spinal cord injury. Immobilization is important in any mechanism of injury in which there has been significant movement of the neck.
- Cardiac patients may have absent pulses in limbs, may be chronically hypoxic or have hypoxic spells. Confirm the baseline assessment with caregiver.

TECHNOLOGY-ASSISTED CHILDREN: Among Children with Special Health Care Needs is a growing sub-population of children with chronic illnesses who are dependent on medical devices. Several of the most common devices are summarized below with information to assist in the care of children with those devices.

TRACHEOSTOMY: Breathing tube into trachea through opening in neck

Uses: Respiratory problems – narrow or obstructed airways, bronchopulmonary dysplasia (chronic lung disease seen in premature babies), etc.
- Neurological or Neuromuscular conditions – brain damage, muscular dystrophy, etc.
- May be ventilator dependent totally, part of the time or may breathe on own

Types: Unassisted – infant & young child; Cuffed – older child (usually age 8yr) & adolescent
- Fenestrated – hole in tube allows breathing through vocal cords to permit talking, or weaning off tracheostomy
- May be single tube or have inner cannula, which can be removed & cleaned

Assessment Issues: Evaluate for DOPE & Infection (tracheal or pulmonary). Reassess pulse/respiratory rates frequently.
- Displaced – total or partial removal of tube
- Obstructed – mucous plug, blood, foreign body, or moved against soft tissues
- Pulmonary problems – pneumothorax, pneumonia, reactive airway, aspiration
- Equipment – ventilator malfunction, oxygen depletion, tubing kinked

Treatment:
- ELS: If on ventilator, disconnect and attempt to oxygenate with bag using tracheostomy adaptor (if present) or infant mask over trach opening or stoma (hole in neck). Call ALS if available, especially if respiratory distress present.
- If not on ventilator: administer oxygen with bag or infant mask over trach as needed.
- Suction as needed – no more than 10 sec. Insert no more than 1/4 length of neck
- If unable to suction because of thick secretions, request caregiver to instill 2-3 ml saline, then suction
- If inner cannula present: request that caregiver remove and clean with saline.
- If unable to ventilate, cover opening with gauze and ventilate with bag and mask over mouth & nose
- If above does not work, may remove tube and either reinsert new tube or use endotracheal tube of same approximate size. If unable to find opening, may thread suction catheter through new tracheostomy tube or endotracheal tube and use catheter tip to probe opening, sliding tube over catheter into opening and then removing catheter.

Ventriculating tracheostomy

NOTE: This reference card should not replace or supersede regional prehospital medical treatment protocols. Development and printing of this card has been supported in part by a federal grant from the Assistant Secretary for Preparedness & Response (ASPR), U.S. Department of Health & Human Services. This card is adapted from a document developed by New York State EMSC. Drawings are primarily by Susan Gilbert and are adapted from the Teaching Resource for Instructors in Prehospital Pediatrics (TRIP).
CENTRAL INTRAVENOUS CATHETERS: Indwelling intravenous access

**Uses:** Medication administration, parenteral (IV) hydration/nutrition administration

**Types:** Totally implanted (such as Mediport®); multihole catheters (such as Hickman® or Broviac® catheters); or peripherally inserted central catheter (PICC) lines

**Assessment Issues: Evaluate for DOPE & Infection**

- **Displaced:** total or partial dislodgement or movement out of vein into internal tissues
- **Obstructed:** blood clot, protein, crystallized medications / IV nutrition
- **Pericardial Tamponade:** fluid in the pericardial sac due to perforation by catheter
- **Pulmonary problems:** pneumothorax, pulmonary embolism from clot or catheter sheath
- **Equipment:** tubing, kinked or cracked, infusion pump failure

**Treatment:**

**BLS:** Direct pressure if bleeding at site or drain/tube if tubing leaking. Administer oxygen as needed.

**ALS:** Aspirate / flush only if permitted by local protocols. Administer IV or IO fluids if signs of shock

**CSF SHUNT (Ventriculoperitoneal or V-P shunt): Drains excess fluid from brain**

**Uses:** Post meningitis, brain injury/surgery/tumors, hydrocephalus (“water on the brain”)

**Types:** Polyethylene tubing with reservoir from brain ventricles to abdomen or heart

**Assessment Issues: Evaluate for infection and signs of increased intracranial pressure:**

- **Auraa, Headache, Nausea, Vomiting, Lethargy, Drowsiness, Downward Deviation of Eyes**

**Treatment:**

**BLS & ALS:** Administer oxygen as needed. Perform mild hyperventilation if signs of brain herniation such as unresponsiveness with unequal pupils, fixed dilated or unresponsive pupils, or increased BP and decreased heart rate.

**GASTROSTOMY: Feeding tube**

**Uses:** Total or enhanced feeding & / or medication administration

**Abdominal gastrointestinal problems:** Neurological or neuromuscular – brain damage, muscular dystrophy, etc.

**Types:** Bottom/catheter type-gastrostomy (G) tube – stomach or jejunal (J) tube – intestine

**Assessment Issues: Evaluate for DOPE & Infection**

- **Dispended:** total or partial removal of tube
- **Obstructed:** blood, crystallized feeding / medications, abdominal tissues
- **Peritonitis or Perforation of stomach/bowel**
- **Equipment:** tubing, kinked or cracked, feeding, infusion pump failure

**Treatment:**

**BLS:** Direct pressure if bleeding at site. Dry sterile dressing over area if tube is dislodged, or tape partially dislodged tube in place. Transport for evaluation of abdominal symptoms or for reinsertion/replacement of tube. (Stoma can close off within hours). If tube blocked, abdominal dimension or vomiting – stop feeding. Attach the connector to the tube and leave tube open and draining into a cup. Bring old tube to ED for sizing purposes.

**ALS:** Administer IV or IO fluids if signs of dehydration or shock. Transport with patient on right side or sitting up to avoid potential aspiration.

**COLOSTOMY OR ILEOSTOMY: Drainage of fecal material**

**Uses:** Temporary or permanent malnutrition or obstruction of intestine or urinary system

**Types:** Open stoma draining into plastic pouch

**Assessment Issues: Evaluate infection, irritation/trauma, peritonitis**

**Treatment:**

**BLS:** Direct pressure if bleeding at site. Saline moistened sterile dressing covered by dry dressing if stoma exposed

**ALS:** Administer IV or IO fluids if signs of dehydration or shock

**URETEROSTOMY OR NPHOSTOMY TUBE OR FOLEY CATHETER: Drainage of urine**

**Uses:** Temporary or permanent malnutrition or obstruction of urinary system

**Types:** Open stoma draining into plastic pouch or through catheter in urethra

**Assessment Issues: Evaluate infection, irritation / trauma, peritonitis, blocked urinary drainage**

**Treatment:**

**BLS:** Direct pressure if bleeding at site. Saline moistened sterile dressing covered by dry dressing if stoma exposed

**ALS:** Administer IV or IO fluids if signs of dehydration or shock

*Drawings by Susan Gilbert*
Purpose: To provide guidance to practitioners caring for pediatric patients during a disaster. This form is to be filled out by the initial hospital and sent with the patient (either when discharged home or to another facility) to communicate what initial management has been completed. 

Disclaimer: This guideline are not meant to be all inclusive, replace an existing policy and procedure at a hospital or substitute for clinical judgment. These guidelines may be modified at the discretion of the healthcare provider.

In a disaster scenario, normal routine newborn care may be inadvertently delayed. Therefore, an evaluation of the newborn by a health care provider with expertise in the care of a newborn (e.g., pediatrician, family practice physician, or pediatric nurse practitioner) should occur as soon as possible. The form below and information found in this care guideline is provided to assist those hospitals who typically do not care for newborns to provide necessary care until the above experts can evaluate the patient.

<table>
<thead>
<tr>
<th>PHYSICAL EXAM</th>
<th>YES</th>
<th>NO</th>
<th>ISSUE</th>
<th>PLAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam WNL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PHYSICAL FUNCTIONS**

| Vital signs WNL |     |    |       |      |
| See attached for normal values |     |    |       |      |

Pulse ox screening
- Age of child _____
- Right hand SpO₂% _____
- Left or Right Foot SpO₂% _____

Any medical problems?
- Anomaly present

Feeding assessment
- Breastfeeding
- Bottle feeding

Voiding

Stooling
- Birth weight _____
- Current weight _____

Weight loss >7%

Jaundice absent

Signs or concerns for infection

Normal hearing screening

**LAB RESULTS**

Maternal
- Blood type/Rh _____
- Group B streptococcus _____
- Other (i.e. HIV) _____

Newborn
- Blood type/Rh _____
- Glucose _____
- Hematocrit _____
- Bilirubin _____
- Phenylketonuria (PKU) _____
- HIV if mother’s status is unknown
- Other _____

**MEDICATIONS**

Hepatitis B

Vitamin K
- Dose given: _____
- Route: _____

Eye prophylaxis
- Medication used: _____
Newborns are one of the most vulnerable population groups.
Hand hygiene is essential.
Breastfeeding is the gold standard.
Keep mother and baby together.

**Care of Newborn after Delivery in Transition Period (0-8 hours)**

<table>
<thead>
<tr>
<th>INTERVENTION</th>
<th>CAVEATS/RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry baby immediately with a towel and then gently suction mouth and nose</td>
<td></td>
</tr>
<tr>
<td>Calculate APGAR Scores:</td>
<td></td>
</tr>
<tr>
<td>• Perform at 1 and 5 minutes.</td>
<td></td>
</tr>
<tr>
<td>• Repeat APGAR scores every 5 minutes for 20 minutes or until APGAR score ≥ 7.</td>
<td></td>
</tr>
<tr>
<td>• If child is stable with a pink core and a 5-minute APGAR score &gt;7, then rewrap the baby in clean, warm, dry blankets and allow parents to hold baby.</td>
<td></td>
</tr>
<tr>
<td>Sample APGAR Score Card</td>
<td></td>
</tr>
<tr>
<td><strong>SIGN</strong></td>
<td><strong>SCORE</strong></td>
</tr>
<tr>
<td>Appearance</td>
<td>0</td>
</tr>
<tr>
<td>Blue</td>
<td>1</td>
</tr>
<tr>
<td>Pulse</td>
<td>Absent</td>
</tr>
<tr>
<td>Absent</td>
<td>&gt;100</td>
</tr>
<tr>
<td>Grimace</td>
<td>No response</td>
</tr>
<tr>
<td>Activity</td>
<td>Flaccid, limp</td>
</tr>
<tr>
<td>Activity</td>
<td>Absent</td>
</tr>
<tr>
<td>Respirations</td>
<td>Absent</td>
</tr>
<tr>
<td>Respiratory Status:</td>
<td>Respiratory rate: 30-60 breaths/minute</td>
</tr>
<tr>
<td>• May have coarse rales until amniotic fluid is cleared from infant’s lungs</td>
<td></td>
</tr>
<tr>
<td>• Grunting and retractions may occur until amniotic fluid is cleared from infant’s lungs but these should resolve within an hour</td>
<td></td>
</tr>
</tbody>
</table>

At 15 minutes old assess:
- Overall condition
- Respiratory status
- Cardiovascular status
- Skin color
### Muscle tone
- Abnormal:
  - Apnea lasting longer than 20 seconds
  - Persistent central cyanosis
  - $O_2 < 85\%$ in room air
  - Needing supplemental $O_2$ after 2 hours of age
  - Excessive oral mucus
  - Drooling
  - Periods of cyanosis
  - Choking or coughing episodes

### Temperature
- Abnormal:
  - Hypothermia

### Cardiovascular Status:
- Heart rate: 120-160 bpm. Heart rate may fall to 80 bpm, but without changes in color or respirations
- Murmurs can be normal
- Abnormal:
  - Persistent bradycardia
  - Capillary refill > 3 seconds and unstable blood pressures may indicate: hypoxia, sepsis, CNS injury, or other cardiovascular problems

### Neurological/Muscle Tone:
- Abnormal:
  - Listlessness
  - Lethargy
  - Hypotonia
  - Irritability
  - Excessive tremors
  - Jitteriness

### Skin color:
- Abnormal:
  - Persistent pallor in the post-partum period may indicate anemia, cardiovascular collapse, or intra-partum asphyxia

### Temperature:
- Temperature may fall to 36.5°C ($97.7\text{°}F$) at the mean age of 75 minutes old
- Do not bathe the baby until the temperature is stable between 36.5°-37.0°C ($97.7\text{°}-98.0\text{°}F$)
Check axillary temperature every 30-60 minutes during transition

- Infant skin-to-skin contact with mother keeps the baby warm
- If using a radiant warmer then must compare infant’s temperature against the radiant warmer

Perform glucose screen if newborn is high risk or symptomatic

- Newborns have limited glycogen stores which are rapidly depleted during times of stress.
- Hypoglycemia is < 50 mg/dL
  - This value is based on the STABLE recommendation and is typically used for high risk newborns. PALS and NRP have other values listed as their definition of hypoglycemia (45 and 40, respectively).
- High Risk:
  - Premature
  - Small for gestation age
  - Mothers who were diabetic
  - Any newborn looking ill
- Symptoms:
  - Irritability, tremors, jitteriness, seizures
  - Abnormal high pitch cry
  - Exaggerated Moro reflex
    - Definition of Moro reflex: In response to loss of balance, newborns arch their back, flings their arms outwards, extends the legs, and opens the hands, after which they slowly returns to a flexed position
  - Lethargy, limpnness, hypotonia
  - Cyanosis, apnea, irregular respirations
  - Hypothermia, vasomotor instability, temperature instability
  - Poor suck
  - Feeding poorly or refusal to feed when feeding well previously
- Treatment for hypoglycemia:
  - If possible, allow newborn to feed (breast milk or formula)
  - If unable to feed, consider providing pumped breast milk or formula via NG
  - If unable to take PO, administer Dextrose 10% bolus of 2 mL/kg
- If hypoglycemia reoccurs or lasts 48-72 hours post-delivery:
  - Could suggest an inborn error of metabolism or some kind of endocrine disorder which necessitates further medical care

Administer eye prophylaxis

- Erythromycin 0.5% ointment OR
- Silver nitrate 1% solution OR
- Tetracycline 1% ointment

- Illinois State mandate
- Best given within 1st hour of delivery
Administer Vitamin K

- Infant weight < 1.5 kg: 0.5 mg IM as a single dose
- Infant weight > 1.5 kg: 1.0 mg IM as a single dose

Vitamin K

- Give within 1 hour of birth
- Given to prevent Vitamin K Deficiency Bleeding (aka “Hemorrhagic Disease of the Newborn”)

Newborn Complications:

- Hyperbilirubinemia:
  - Bilirubin should be checked in a newborn that is jaundiced before 24 hours of age
- Sepsis:
- Other potential interventions depending on presenting symptoms:
  - Oxygen administration
  - Suctioning as needed
  - Normothermic environment
  - Bedside glucose
  - Pulse oximetry reading in right arm compared against any other extremity
  - Frequent monitoring
  - Chest X-ray
  - Echocardiogram
  - Exogenous surfactant fluid replacement therapy
  - Mechanical ventilation
  - Antibiotic coverage
  - IV nutrition if respiratory distress interferes with feeding

- Hyperbilirubinemia:
  - Common causes:
    - Breast-feeding-associated jaundice
    - ABO & Rh incompatibility
    - Polycythemia
    - Bruising of the newborn (e.g., cephalhematoma)
    - Bowel obstruction
    - Inborn errors of metabolism
    - G6PD deficiency
  - Treatment for breast-feeding-associated jaundice:
    - Promote frequent breastfeeding (minimal 8-10 times/day)
    - Have mother pump her breasts after feeding
    - Avoid pacifiers
    - Avoid supplementation unless medically indicated (excessive weight loss or hypoglycemic).
    - Expressed breast milk or formula is preferred
  - Other treatment includes phototherapy requiring qualified personnel
- Sepsis:
  - Symptoms may include:
    - Apnea
    - Respiratory distress
    - Poor activity
    - Poor feeding
    - Hypothermic
    - Poor color
  - Risk factors include:
    - Maternal group B streptococcus
    - Premature rupture of membranes
    - Mother with intrapartum fever
    - Chorioamnionitis
Feeding:
- Promote breastfeeding within 30-60 minutes after delivery
  - Feed every 2-3 hours so at least 8 to 12 feedings occur every 24 hours
- Bottle feed when breastfeeding or pumped breast milk not possible
  - 2-3 oz. of formula per feeding every 2-3 hours
- Early and exclusive breastfeeding is best for normal term, healthy neonates and prevents hypoglycemia
- Contraindications to breastfeeding:
  - Mothers who are/have:
    - +HIV
    - Active untreated TB
    - Radioactive milk
    - Using street drugs
    - Herpes simplex lesions on breasts
    - Taking anti-metabolites or chemotherapeutic agents, and small number of other medications until they clear from the milk

Caring for Newborns After Delivery (8-96 hours)

<table>
<thead>
<tr>
<th>INTERVENTION</th>
<th>CAVEATE/RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vital Signs:</td>
<td></td>
</tr>
<tr>
<td>- Obtain vital signs every 8 hours</td>
<td></td>
</tr>
<tr>
<td>- RR: count for full minute</td>
<td></td>
</tr>
<tr>
<td>- HR: auscultate apical pulse for full minute</td>
<td></td>
</tr>
<tr>
<td>- Pulse oximetry screening: perform when at least 24 hours old</td>
<td></td>
</tr>
<tr>
<td>- BP: not recommended if well newborn</td>
<td></td>
</tr>
<tr>
<td>- Temperature</td>
<td></td>
</tr>
<tr>
<td>Vital Signs:</td>
<td></td>
</tr>
<tr>
<td>- RR:</td>
<td></td>
</tr>
<tr>
<td>- Normal respirations: 30-60 breaths/minute</td>
<td></td>
</tr>
<tr>
<td>- Respiratory distress includes:</td>
<td></td>
</tr>
<tr>
<td>- Grunting</td>
<td></td>
</tr>
<tr>
<td>- Nasal flaring</td>
<td></td>
</tr>
<tr>
<td>- Retractions</td>
<td></td>
</tr>
<tr>
<td>- Cyanosis</td>
<td></td>
</tr>
<tr>
<td>- Tachypnea</td>
<td></td>
</tr>
<tr>
<td>- Apnea</td>
<td></td>
</tr>
<tr>
<td>- Hypoxemia</td>
<td></td>
</tr>
<tr>
<td>- Abnormal:</td>
<td></td>
</tr>
<tr>
<td>- Apnea &gt; 15 seconds may indicate:</td>
<td></td>
</tr>
<tr>
<td>- Sepsis</td>
<td></td>
</tr>
<tr>
<td>- Maternal drugs/medications</td>
<td></td>
</tr>
</tbody>
</table>
Hypoglycemia
Anemia
Other metabolic abnormality

- Tachypnea > 60 breaths/minute may indicate a respiratory, cardiovascular or metabolic problem

- HR:
  - Normal heart rate: 80-160 bpm (slower when sleeping and faster when crying)
  - Abnormal:
    - Symptoms of cardiovascular compromise may include:
      - Tachycardia
      - Unequal pulses or blood pressures
      - Poor pulses
      - Respiratory distress
      - Cyanosis of face
      - Central cyanosis
      - Hepatomegaly
    - Abnormal heart rate (80 < bpm > 180) may indicate:
      - Sepsis
      - Asphyxia
      - Hypoxemia
      - Heart block
      - Anemia
      - Hypovolemia
      - Sepsis

- Pulse oximetry screening:
  - Normal is at least ≥ 95% in either extremity with a ≤ 3% absolute difference between upper and lower extremity.
  - Must use right hand (preductal) and on one foot (post-ductal)
  - SpO2 < 90% require an expert evaluation to test for infectious and pulmonary causes and for ruling out critical congenital heart disease.
  - High altitudes may result in false positives.

- Temperature:
  - Normal axillary temperature: 36.5°-37°C (97.9°-98.3°F)
  - If not normothermic must consider causes:
### Environmental
- Sepsis
- Postasphyxial insult
- Low brown fat stores
- Prematurity
- Small for gestational age (SGA)
  - Must reevaluate temperature minimally every 30 minutes if temperature is abnormal (<36.5° or >37°C (97.9°/98.3°F)).
  - Place baby skin-to-skin contact with mother if infant's temperature <36.5° C (97.9°F) or use a radiant warmer if skin-to-skin contact not feasible.
  - Remove environmental factors (e.g., over-bundling or hot room) if temperature > 37°C (98.3°F).

### Diet/Feeding:
- **Breastfeeding:**
  - Every 2-3 hours so at least 8 to 12 feedings occur every 24 hours
- **Bottle feeding:**
  - 2-3 oz of formula per feeding every 2-3 hours

### Diet/Feeding:
- **General:**
  - Early signs of hunger:
    - Increased alertness
    - Physical activity
  - Mouthing or rooting
  - Late sign of hunger
    - Crying
- **Burping:**
  - Attempted when newborn has ingested 0.5 to 1 ounce of formula and at the end of every feeding
  - Ensure airway is maintained and the head and trunk are supported
  - Gently rub or pat from the lower back in an upwards motion with the newborn sits with support on the caregiver's lap or while being held upright against a caregiver's chest
- **Breastfeeding:**
  - Preferred choice even during disasters
  - Feedings should last about 10-15 minutes of active suck on each breast
  - Alternate starting breast at each feeding
  - May need to wake up for feedings especially if it has been four hours since the last feeding
  - Do not interrupt breastfeeding
  - Do not offer any type of supplement feedings unless ordered by a physician
  - Offer pacifier only after breastfeeding has been well established. Otherwise use pacifier only during specific circumstances like pain relief during medical procedures
### Bottle feeding:
- Iron-fortified infant formula that is commercially-prepared is the recommended
- Do not prop the bottle
  - Infants must be held in a cuddled position so that the head is slightly above the stomach.
  - Position the angle of the bottle to prevent air swallowing.
  - Can rub the nipple softly along the lower lip to help open the infant's mouth
- All feeding supplies should be washed with clean hot soapy water and then rinsed with clean hot water and allowed to air dry.
  - Sterile technique is recommended when there is a problem with the clean water supply, lack of access to refrigeration, or when the newborn has an immune deficiency problem
- Prepare formula according to manufacturer's recommendations
  - Only prepare bottles with the amount formula that is expected to be consumed in one feeding.
  - Discard unused formula within 1 hour.
  - Bottles can be made in advance and stored in a refrigerator for up to 24 hours.
- Warming formula:
  - Formula should be warmed to room temperature only
  - Avoid formula that is either cold or too hot
  - Do not warm formula in the microwave.
  - May warm formula by holding the bottle under warm running water.
  - Test the temperature of warmed formula by shaking the bottle first before applying a few drops to the adult's inner wrist

### Consider placing a nasogastric tube (NG) if newborn is not NPO but is having difficulty feeding or is hypoglycemic and administer either pumped breast milk or formula as indicated above

### Elimination:
#### Urine output:
- First 1-2 days: 2-6 wet diapers/day
- 3-5 days: 3-5 wet diapers/day
- 5-7 days: 4-6 wet diapers/day

#### Stool:
- First 1-2 days: well newborns pass meconium stool (black, tarry stool).
- 3-5 days: 3-4 stools/day
- 5-7 days: 3-6 stools/day

#### Staff should notify physician if no urine output for 12 hours
#### Routine circumcision not recommended by the AAP
#### Do not forcibly retract foreskin
<table>
<thead>
<tr>
<th>Skin Care/Cord Care:</th>
<th>Skin Care/Cord Care:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Skin care:</td>
<td>• <strong>Skin care:</strong></td>
</tr>
<tr>
<td>o Bath every 2-3 days as long as the</td>
<td>o Observe face, trunk, and extremities</td>
</tr>
<tr>
<td>face and diaper area are kept clean</td>
<td>for cyanosis or jaundice</td>
</tr>
<tr>
<td>regularly</td>
<td>o Do not scrub vernix off</td>
</tr>
<tr>
<td>• Cord Care:</td>
<td>o Scrubbing may damage skin</td>
</tr>
<tr>
<td>o Clean with every diaper change</td>
<td>o Vernix may offer antibacterial</td>
</tr>
<tr>
<td>and with sponge baths</td>
<td>properties</td>
</tr>
<tr>
<td></td>
<td>o Use a gentle soap without perfumes</td>
</tr>
</tbody>
</table>

- **Cord care:**
  - Cord typically falls off in 7-10 days
  - Make sure diaper does not cover the cord
  - No isopropyl alcohol on cord
  - May sponge with warm water on the cord until it falls off
  - When the cord has fallen off, may use gentle soap and water
  - Do not immerse the baby in bath water until the cord has fallen off
  - **Abnormal:**
    - Drainage that looks serous, purulent, or sanguineous
    - Circumferential redness at base of the cord
Initial Management of All Obstetrical (OB) Patients

- Stabilize ABCs (Airway, Breathing, Circulation)
- For OB trauma patients, stabilize the patient’s condition and provide treatment according to trauma guidelines before evaluating the fetus. (See pg. 60 for further care). Be aware of the following caveats:
  - Use rapid sequence induction with cricoid pressure and gastric decompression when oral intubation is required
  - Use closed-tube thoracotomy at a higher intercostal space when treating pneumothorax
  - Place patients who are > 20 weeks gestation in the left lateral position, left lateral tilt, right lateral position or right lateral tilt (while maintain spinal precautions as applicable) to maximize venous return
- Triage:
  - Determine:
    - Number of weeks gestation
    - If the presenting complaint due to the pregnancy
    - If the presenting complaint unrelated to the pregnancy but affects the pregnancy
    - If the presenting complaint affects the pregnancy
  - Triage all pregnant women that are >20 weeks gestation based on the level of severity of patient’s complaint related to or that affects the pregnancy to determine level of perinatal services needed:
    - Emergent: (In need of Level III Perinatal Center care) (background read thru for each perinatal center under each section)
      - Cardio-pulmonary failure/arrest
      - Eclampsia
      - Active hemorrhage/heavy bleeding
      - Fetal parts or foreign bodies protruding from vagina
      - Diabetic coma/DKA
      - Altered level of consciousness
      - Multiple gestation (greater than twins) in active labor
      - Active labor in mothers with <30 weeks gestation
      - Laboring mother with known antenatal fetus defect (i.e. cardiac, pediatric surgery)
      - Pre-eclampsia or Hemolysis, Elevated Liver Enzymes, and Low Platelets (HELLP) syndrome
      - Other life threatening conditions to mother or fetus
    - Urgent: (In need of Level II-E Perinatal Center care)
      - Active labor in mothers with >30 and <35 weeks gestation
      - Multiple gestation (no more than twins) in active labor
      - Decreased fetal movement
      - Abdominal pain
      - Preterm rupture of membranes >30 and <35 weeks gestation
      - Obesity
Non-urgent: (In need of Level I or Level II Perinatal Center care)
- Active labor in mothers with >35 weeks gestation
- Preterm rupture of membranes >35 weeks gestation
- Rule out rupture of membranes (ROM)
- Stable gestational hypertension

Perform a complete assessment of pregnant patient at time of presentation (See Initial Assessment of the Pregnant Patient for checklist)

For all OB patients:
- Establish large bore IV access
- Obtain lab exams (if available): CBC with differential, Type and RH or Type and Screen, and HIV
- Obtain prenatal care records (if available)

Consult Pediatric Care Medical Specialist for assistance with care of the acutely and critically ill patient (mother and child); to individualize the care of patient; if patient needs to be transferred; and as needed for further support and consult.
## Management for Common Life Threatening Obstetrical Conditions

*Identifying Preeclampsia and/or Eclampsia*

<table>
<thead>
<tr>
<th>ASSESS</th>
<th>NORMAL</th>
<th>MODERATE</th>
<th>SEVERE/ECLAMPSIA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Awareness</strong></td>
<td>Alert/Oriented</td>
<td>Agitated, confused, drowsy,</td>
<td>Unresponsive, seizure activity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>difficulty speaking</td>
<td></td>
</tr>
<tr>
<td><strong>Headache</strong></td>
<td>None</td>
<td>Mild headache, nausea, vomiting</td>
<td>Unrelieved headache</td>
</tr>
<tr>
<td><strong>Vision</strong></td>
<td>None</td>
<td>Blurred or impaired</td>
<td>Temporary blindness</td>
</tr>
<tr>
<td><strong>Systolic BP (mmHg)</strong></td>
<td>100-139</td>
<td>140-159</td>
<td>≥ 160</td>
</tr>
<tr>
<td><strong>Diastolic BP (mmHg)</strong></td>
<td>50-89</td>
<td>90-105</td>
<td>≥ 105</td>
</tr>
<tr>
<td><strong>Heart rate</strong></td>
<td>61-110</td>
<td>111-129</td>
<td>≥ 130</td>
</tr>
<tr>
<td><strong>Respirations</strong></td>
<td>11-24</td>
<td>25-30</td>
<td>&lt; 10 or &gt; 30</td>
</tr>
<tr>
<td><strong>SpO₂ (%)</strong></td>
<td>≥ 95</td>
<td>91-94</td>
<td>≤ 90</td>
</tr>
<tr>
<td><strong>Shortness of breath</strong></td>
<td>None</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td><strong>Pain (abdomen or chest)</strong></td>
<td>None</td>
<td>Nausea, vomiting, chest pain, abdominal pain</td>
<td>Nausea, vomiting, chest pain, abdominal pain</td>
</tr>
<tr>
<td><strong>Urine output (mL/hr)</strong></td>
<td>≥ 50</td>
<td>30-49</td>
<td>≤ 30 (in 2 hours)</td>
</tr>
<tr>
<td><strong>Proteinuria</strong></td>
<td>Trace</td>
<td>+1, +2, ≥ 300/24 hours</td>
<td>&gt; +3; ≥ 5 gm/24 hours</td>
</tr>
<tr>
<td><strong>Platelets</strong></td>
<td>&gt; 100</td>
<td>50-100</td>
<td>&lt; 50</td>
</tr>
<tr>
<td><strong>AST/ALT</strong></td>
<td>&lt; 70</td>
<td>&gt; 70</td>
<td>&gt; 70</td>
</tr>
<tr>
<td><strong>Creatinine</strong></td>
<td>&lt; 0.8</td>
<td>0.9-1.2</td>
<td>&gt; 1.2</td>
</tr>
<tr>
<td><strong>Magnesium Sulfate Toxicity</strong></td>
<td>DTR +1; Respiration 16-20</td>
<td>Depression of patellar reflexes</td>
<td>Respirations &lt;12</td>
</tr>
</tbody>
</table>

### Normal:
Monitor patient for changes in condition as per hospital protocol.

### Moderate:
Consult Pediatric Care Medical Specialist to assist with arranging transfer of patient to higher level perinatal center.

<table>
<thead>
<tr>
<th>Positive Trigger</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 of any type</td>
<td>Increase assessment frequency</td>
</tr>
<tr>
<td></td>
<td>Notify provider</td>
</tr>
<tr>
<td>≥ 2 of any type</td>
<td>Order labs/tests</td>
</tr>
<tr>
<td></td>
<td>Consider Magnesium Sulfate</td>
</tr>
<tr>
<td></td>
<td>Provide supplemental O₂</td>
</tr>
</tbody>
</table>

### Severe/Eclampsia:
- Central imaging is not necessary for the diagnosis and management of most with eclampsia but is indicated in patients with focal neurologic deficits or prolonged coma.
- Eclampsia can occur during the antepartum, intrapartum and postpartum period.
- Consult Pediatric Care Medical Specialist to assist with arranging transfer of patient to higher level perinatal center.
- See next page for Treatment.
Treatment of Severe Preeclampsia and/or Eclampsia

Respiratory:
- O₂, 10L via NRB mask
- Chest x-ray r/o pulmonary edema

Fetal Monitoring
- Monitor fetal heart rate
- Consider ultrasound

Fluid balance:
- IVF maintenance rate of 83 mL/hr
- Place a urinary catheter to monitor urine output hourly

Seizure treatment/prophylaxis
- Magnesium sulfate bolus (6 g) IV/IO over 15-20 minutes followed by magnesium sulfate infusion (1-2 g/hr) IV/IO. Monitor for respirator depression and maintain urine output ≥100mL/3 hours.
- Recurrent seizures: Magnesium sulfate 2 gm IV/IO; check magnesium level

Hypertension
- Target BP= 140-150/80-90
- Treat when SBP ≥ 160 and/or DBP ≥ 110
  - Labetalol:
    - Contraindications: asthma, COPD, Bradycardia, and/or heart block.
    - 20 mg IV/IO bolus. If no improvement after 15 minutes, give 40 mg IV/IO. If no improvement after 15 minutes give 80 mg IV/IO. If no improvement after 15 minutes, repeat 80 mg IV/IO. Max is 300 mg in 24 hours AND/OR
  - Hydralazine:
    - 5mg IV/IO Bolus over 2-4 minutes. If no improvement, repeat in 20 minutes. If no improvement, 10 mg IV/IO every 20 minutes for a MAXIMUM dose of 40 mg in a 24 hour period. Monitor vital signs immediately after and every 5 minutes during administration.

Thromboembolism
- Apply compression stockings
- Consider heparin

Identify Severe Preeclampsia and/or Eclampsia

Prevent maternal injury and support ABCs
Implement monitoring: 1:1 staff ratio

Plan for delivery:
- Route: Vaginal preferred over cesarean
- Plan for transfer to Level III Perinatal Center
### Post-Partum Maternal Hemorrhage: Recognition and Treatment

<table>
<thead>
<tr>
<th>Class</th>
<th>Est. Blood Loss (EBL)*</th>
<th>Pulse</th>
<th>Respiration</th>
<th>Blood Pressure</th>
<th>Mental Status</th>
<th>Urine Output</th>
<th>Cap Refill</th>
<th>Fluid Replacement (3:1 Rule)</th>
<th>Labs</th>
<th>Product Replacement</th>
<th>Bleeding Abatement</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>~ 900 mL</td>
<td>&lt;100</td>
<td>14-20</td>
<td>Normal</td>
<td>Anxious</td>
<td>≥ 30 mL/hr</td>
<td>Normal</td>
<td>Crystalloids</td>
<td>CBC; PT/PTT; Fibrinogen; T&amp;S versus T&amp;C; FDP; Platelets; D-dimer</td>
<td>Crystalloids → Transfuse PRBCs → Transfuse other (FFP, Cryo, Plts)</td>
<td>Massage → Uterotonics → Surgery → Packing/Tamponade/Embolization</td>
</tr>
<tr>
<td>II</td>
<td>~ 1200-1500 mL</td>
<td>&gt; 100</td>
<td>20-30</td>
<td>Orthostatic changes</td>
<td>Anxious</td>
<td>20-30 mL/hr</td>
<td>&gt;2 seconds</td>
<td>Crystalloids</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>~ 1800-2100 mL</td>
<td>&gt; 120</td>
<td>30-40</td>
<td>Overt hypotension</td>
<td>Anxious and Confused</td>
<td>5-15 mL/hr</td>
<td>&gt;2 seconds Cold &amp; clammy</td>
<td>Crystalloids &amp; blood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>&gt; ~ 2400 mL</td>
<td>&gt; 140</td>
<td>&gt; 35</td>
<td>Overt hypotension</td>
<td>Confused and Lethargic</td>
<td>Anuria</td>
<td>&gt;2 seconds Cold &amp; clammy</td>
<td>Crystalloids &amp; blood</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Estimating Blood Loss (EBL): Guide to objective measurement of blood loss*

1 cup = 250 mL  
= 5 cm clot (orange)  
= 1 unit of PRBCs  
12 oz soda can = 355 mL  
2 cups = ~500 mL  
= 10 cm clot (softball)  
= 2 units of PRBCs  
Floor spills:  
20” (50 cm) = 500 mL  
30” (75 cm) = 1000 mL  
40” (100 cm) = 1500 mL  
Ideal method is weighing:  
1g of blood = 1 mL

Blood product replacement consideration:  
- If the fetus has not been delivered: use O negative or cross matched products
**Post-Partum Maternal Hemorrhage: Recognition and Treatment (continued)**

### Preplanning

**RISK ASSESSMENT**
- Seizure
- Chronic anemia
- Polyhydramnios
- Pts. blood issues
- Blood dyscrasias
- Jehovah's Witness
- Thrombocytopenia
- Sickle cell
- Preclampsia
- IUFD
- Chorioamnionitis
- Grand multigravity
- Hx of Hemorrhage
- Prolonged active phase
- Prolonged labor
- General anesthesia
- MgSO4
- Oxytocin
- Uterine atony

**ORDER LABS**
- HH
- T/S versus T/C

**CHECK AVAILABILITY**
- Pitoche
- Methergine
- Misoprostol
- Hemobate

**EQUIPMENT**
- Cell saver
- Pumps
- Blood warmers

**ALERT**
- Blood bank
- Interventional Radiology
- Pediatrics

**DETERMINE**
- Location Delivery

### Recognition and Management of Hemorrhage

**RECOGNITION AND MANAGEMENT OF HEMORRHAGE**

**CALL FOR HELP/ RAPID RESPONSE TEAM**

**Blood Loss Recognized**

**Homeostasis - Correct hypovolemia**

**GOALS**

**Stop the Hemorrhage**

**ALERT BLOOD BANK**

**AIRWAY**
- O2/Mask

**IV ACCESS**
- Fluid Rx
  - 2 Ls
  - IV bag 10-18
  - NS

**FOLEY**
- I/V

**SEND LABS**
- H & H
- T & S

**DETERMINE ETIOLOGY**

**TRANSFUSE**
- Only products needed
  - Assess lab results
  - 3cc crystalloid / 1 cc PRBC
  - INR, PTT
  - Platelets <50, give 6u
  - Fibrinogen <125, give 10 u

**RETAINED PRODUCTS**

**OB TRAUMA**
- Artic, vaginal, perineal tears, uterine rupture

**SURGICAL THERAPY**
- Pelvic pressure pack
- Arterial embolization, tamponade devices

**Hysterectomy**

**UTERINE ATONY**
- Examination uterus, bimanual massage

**Uterotonic Rx**
- Oxytocin
  - 10-20 mL / 20-40 mL

**Methergine**
- 0.2 mg IM every 4-6 h

**Hemobate**
- 250 mg IM every 15 minutes

**Misoprostol**
- 400-1000 mcg PR X1

**Hyprocatic artery ligation**

**Uterine artery ligation**
**Placenta Abruption**

**Term/Near Term**
- **Fetus alive**
  - Reassuring fetal status
  - Stable mother
  - Transfer to hospital with OB services
  - Vaginal delivery
  - Contraindications to vaginal delivery:
    - Non-reassuring fetal status
    - Unstable mother
  - Emergent delivery necessary via Cesarean delivery
- **Fetus dead**
  - Vaginal delivery
  - Contraindications to vaginal delivery
  - Cesarean delivery

**Preterm**
- **Fetus alive < 24 weeks**
  - Assess
  - Unstable mother
  - Emergent delivery necessary
  - Stable mother
  - Manage conservatively
- **Fetus alive > 24 weeks**
  - Assess
  - Non-reassuring fetal status
  - Unstable mother
  - Emergent delivery necessary
  - Reassuring fetal status
  - Stable mother
  - Manage conservatively and transport to hospital with OB services
- **Fetus dead**
  - Deliver
  - Ensure proper documentation
  - Debrief staff
  - Provide emotional support to parents

**In all cases:**
- Check CBC and coagulation indices
- Replace blood volume (refer to pg. 58 for Maternal Hemorrhage
- Correct coagulopathies
- Monitor I & O’s and renal function

**Deliver**
- Between 37-38 weeks
### Trauma

#### Prenatal Trauma Management (ACEP)

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Treatment</th>
</tr>
</thead>
</table>
| **General concepts**   | - Medications, tests, treatments and procedures required to stabilize the mother should not be withheld because of pregnancy.  
                         - Evaluate for possible pregnancy-related causes for an accident (i.e. seizure secondary to eclampsia)  
                         - Maternal physiologic changes may delay signs of shock  
                           - Monitor urine output and fetal heart tracing patterns to provide early warning signs instead of only the mother’s pulse and BP  
                         - Consult Pediatric Care Medical Specialist for assistance with care of the acutely and critically ill patient, to individualize the care of patient, if patient needs to be transferred and as needed for further support and consult. |
| **Positioning**        | - Place any pregnant patient > 24 weeks gestation in left lateral decubitus position to avoid hypotension. Right lateral decubitus position is also acceptable.  
                         - If patient is on a backboard, tilt it toward the left or place a wedge under right side  
                         - If patient’s BP is unstable or concerns exist regarding cervical spine injury, patient should be log-rolled with her neck being stabilized |
| **Hypotension**        | - Administer IV fluids and consider blood transfusion                        |
| **Hypertension**       | - Criteria for definition: > 140 systolic and > 90 diastolic;  
                         - Treat > 160 systolic and > 110 diastolic with labetalol 10-20 mg IV bolus |
| **Fetal/Uterine Monitoring** | - Initiate fetal monitoring for viable fetus as soon as mother is stabilized (if available and trained personnel available to stay with patient)  
                         - If fetal monitoring unavailable, check fetal heart tones via doppler  
                         - A viable fetus should be placed on continuous monitoring until under the care of the obstetrician.  
                         - Electronic fetal heart and uterine monitoring in pregnant trauma patients > 20 weeks gestation may detect placental abruption  
                         - Continuous monitoring can be discontinued after 4 hours if there are no fetal heart rate abnormalities, uterine contractions, bleeding or uterine tenderness |
| **Vaginal Bleeding**   | - Treat heavy vaginal bleeding the same as hypovolemic shock  
                         - Massive continual vaginal bleeding may require emergency cesarean delivery  
                         - Obtain OB consultation  
                         - Administer RhIG to Rh negative patients |
| **Lab tests**          | - CBC (monitor hemoglobin/platelet count)  
                         - Type and Screen (monitor for Rh negative)  
                         - Kleihauer-Betke  
                         - Coagulation panel (INR, PTT, fibrin degradation, fibrinogen, i-COOMBS) |
### Diagnostics
- Diagnostic procedures to evaluate potentially serious traumatic injuries should not be withheld for fetal concerns. Order exams for the same indications as non-pregnant trauma patients
  - A complete trauma exam with CT scanning will not approach radiation levels that adversely affect the fetus.
- Consider ultrasound to replace x-ray when possible
- Shield abdomen, pelvis and neck when possible

### Treatments: IV Fluids
- Larger fluid requirements when hypotensive
- Avoid administering large amounts of IVF containing Dextrose which can cause glucose regulation difficulties in neonates if delivery is imminent

### Treatments: Intubations and RSI
- Same as non-pregnant patients

### Treatments: Medications
#### Analgesia:
- Acute trauma pain control with narcotics can be given in any trimester as needed
- Inform OB of doses and times if fetal delivery is imminent
#### Antibiotics:
- Ceftriaxone or clindamycin
#### Antiemetics:
- Metoclopramide or Zofran

### Treatments: Oxygen
- Provide high concentrated O₂

### Treatments: Rh negative patients
- RhIG 1 ampule (300g) IM

### Treatments: Seizures
- Eclamptic: magnesium sulfate 6 g IV/IO load over 15-20 minutes
- Non-eclamptic: lorazepam 1-2 mg/min IV/IO

### Treatments: Tetanus
- Safe in pregnancy

### Treatments: Transfusions
- CMV antibody negative; Leukocyte reduced

### CPR/ACLS
- Left lateral decubitus; no response after 4 minutes of CPR, consider cesarean for viable fetus

### Maternal Death
- Consider immediate cesarean delivery for a viable fetus in any patient who cannot be resuscitated
- Consider immediate cesarean delivery in cases of brain death in mother with intact cardiovascular system if fetal compromise is present
- Consider maintaining life support management until fetus is at an acceptable level of maturity for delivery
Prolapsed Cord

Anticipate

Suspect

Diagnose

Call for help

Establish condition

Risk factors for cord prolapse:
- PROM*
- Breech position
- Multiple gestation
- Long umbilical cord
- Spontaneous labor with high head and increased amniotic fluid
- Every vaginal exam (VE), check for and exclude presentation/ prolapsed cord

PROM* or PPROM** with risk factors for cord prolapse

PROM or PPROM with abnormal fetal heart monitoring

Perform speculum exam

Cord visible, seen with speculum or felt during VE

Notify (if available at hospital):
- Anesthesiologist
- Neonatologist
- Obstetrician
- On-call surgeon

Contact the Pediatric Care Medical Specialist for OB and Neonatal consultation if services unavailable at hospital and to assist with transfer to NICU after delivery

Determine if fetus is alive:
- Cord pulsations
- Fetal stethoscope
- Hand held Doppler
- Ultrasound
- Fetal heart monitors

Fetus alive

Fetus dead

Confirm fetal death by ultrasound if available

Plan of action:
- Mode of delivery is what is safest for mother
- Non-urgent (as long as no maternal complication and mother is stable)
- Provide counseling to parents

*PROM=premature rupture of membranes (term fetus)
**PPROM= Preterm premature rupture of membranes

Illinois EMSC
Fetus alive

Cervix not fully dilated
- Relieve compression and prevent vasospasm of cord
  - Head low (Trendelenburg, knee-chest or left lateral position with pelvis elevated)
  - Place gloved fingers into vagina between pubic bone and presenting part with the cord in between two fingers and exert counter pressure on presenting part and maintain pressure until baby can be delivered
  - Administer O₂ via face mask at 8 L/min to mother
  - Do not push cord back into vagina
  - Cover exposed cord with moist dressing and keep warm

Cervix fully dilated
- Vacuum delivery
- Forceps delivery
- Assisted breech delivery
- Breech extraction

Transfer to operating room, maintaining relief of cord compression

Reconfirm fetus is alive (Ultrasound scan if possible)

Emergency cesarean section
- Empty bladder before entering peritoneal cavity
- Prepare for neonatal resuscitation and transfer to Level III Perinatal Center after delivery

Ensure proper documentation
- Debrief staff
- Provide counseling to parents about treatment options
- Provide emotional support to parents
Breech Birth

Gravida in labor with fetus in breech position

Assess for contributing factors:
- Preterm labor
- Placenta Previa
- Fetal anomalies
- Uterine malformation
- Multiple gestation
- Leiomyomata uteri

Reasons against vaginal breech delivery?
- Macrosomic
- Premature or small for dates fetus
- Macrocephaly
- Pre-term labor
- Fetal tumors
- Contracted or distorted pelvis
- Unavailable skilled, experienced practitioner

Signs of adverse details of breech presentation?
- Posterior sacral position
- Incomplete breech presentation
- Extended fetal head

Optimal candidate for breech delivery with no adverse risk factors

Determine labor status

Not in labor

Await active labor

Vaginal vertex delivery

**Monitor for head entrapment (cervix clamping around neck as body is delivered). This is an emergent situation. Contact OB experts for assistance.**

Labor in progress

Early labor with intact membranes

Await active labor

Follow progression pattern in active phase

Normal cervical dilatation and fetal descent** and frank breech

Vaginal breech delivery

Protrusion or arrest pattern or 1 foot/leg is presenting part

Vaginal delivery contraindicated

Cesarean delivery

YES

NO

YES

NO
Shoulder Dystocia

Shoulder dystocia:
Anterior shoulder of the baby becomes impacted against the symphysis pubis preventing the shoulders from descending through the pelvis.

**Possible Risk Factors:**

<table>
<thead>
<tr>
<th>Antenatal</th>
<th>Intrapartum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous shoulder dystocia</td>
<td>Prolonged first stage</td>
</tr>
<tr>
<td>Fetal macrosomia</td>
<td>Prolonged second stage</td>
</tr>
<tr>
<td>Maternal diabetes</td>
<td>Labor augmentation</td>
</tr>
<tr>
<td>Maternal obesity</td>
<td>Instrumental delivery</td>
</tr>
<tr>
<td>Postdate pregnancy</td>
<td>Precipitate birth</td>
</tr>
<tr>
<td>Short stature</td>
<td>Uterine hyperstimulation</td>
</tr>
</tbody>
</table>

**Complications:**

<table>
<thead>
<tr>
<th>Maternal</th>
<th>Neonatal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ruptured uterus</td>
<td>Brachial plexus injury</td>
</tr>
<tr>
<td>Postpartum hemorrhage</td>
<td>Fractured clavicle</td>
</tr>
<tr>
<td>Perineal tears</td>
<td>Birth asphyxia</td>
</tr>
<tr>
<td>Emotional trauma</td>
<td>Neonatal death</td>
</tr>
</tbody>
</table>

**Identify shoulder dystocia**

- Turtle sign (chin retracts and depresses the perineum)
- Head when delivered may be tightly applied to vulva
- Anterior shoulder fails to deliver with routine traction

- Failure of fetal head to restitute
- Failure of shoulders to descend

**Notify (if available at hospital):**

- Anesthesiologist
- Neonatologist
- Obstetrician
- On-call surgeon

Contact the Pediatric Care Medical Specialist for OB and Neonatal consultation if services unavailable at hospital and to assist with transfer to NICU after delivery

**McRoberts Maneuver** (abduct and hyper flex legs against abdomen)

**Suprapubic pressure** (apply pressure in a downward, lateral direction just above the maternal symphysis pubis to push the posterior aspect of the shoulder towards fetal chest)

**Consider episiotomy if it will make internal maneuvers easier**

Try either maneuver first, depending on clinical circumstances and clinician experience

**Internal rotation maneuvers:**

- Deliver posterior arm
- If all above maneuvers fail to release the impacted shoulder, consider placing patient in all fours position or repeat the above

**Secondary Maneuvers:**

- Cleidiotomy: deliberate fracture of clavicle
- Zavanelli Maneuver: restoring fetus into uterus and performing a cesarean section (contraindicated if a nuchal cord has been previously clamped and cut)
- Symphysiotomy: contact Pediatric Care Medical Specialist

Ensure proper documentation
Debrief staff
Provide counseling to parents on treatment options
Provide emotional support to parents
**Group B Strep**

Group B Streptococcus (GBS): a gram-positive organism, known to colonize the lower GI tract, with the potential for secondary spread to the genitourinary tract and subsequent transmission to the fetus during delivery. GBS is a leading cause of serious neonatal infection with case-fatality rate reported to be as high as 20% in newborns.

Inquire about GBS status during initial assessment of all laboring patients that present to hospital. Complete a vaginal and rectal GBS screening cultures at 35 – 37 weeks’ gestation for ALL pregnant women [unless patient had GBS bacteriuria during the current pregnancy or a previous infant with invasive GBS disease].

### INTRAPARTUM PROPHYLAXIS INDICATED
- Previous infant with invasive GBS disease
- GBS bacteriuria during current pregnancy
- Positive GBS screening culture during current pregnancy (unless a planned cesarean delivery, in the absence of labor or amniotic membrane rupture, is performed)
- Unknown GBS status (culture not done, incomplete or results unknown) and any of the following:
  - Delivery at < 37 weeks’ gestation*
  - Amniotic membrane rupture > 18 hours
  - Intrapartum temperature > 100.4°F/38.0°C

### INTRAPARTUM PROPHYLAXIS NOT INDICATED
- Previous pregnancy with a positive GBS screening culture (unless a culture was also positive during the current pregnancy)
- Planned cesarean delivery performed in the absence of labor or membrane rupture (regardless of maternal GBS culture status)
- Negative vaginal and rectal GBS screening culture in late gestation during the current pregnancy, regardless of intrapartum risk factors

*If onset of labor or rupture of amniotic membranes occurs at <37 weeks’ gestation and there is a significant risk for preterm delivery (as assessed by the clinician), follow the algorithm below for GBS prophylaxis management.

<table>
<thead>
<tr>
<th>No GBS Culture</th>
<th>GBS Positive</th>
<th>GBS Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obtain vaginal &amp; rectal GBS culture and initiate Penicillin (PCN) IV</td>
<td>PCN IV for ≥ 48 hrs (during tocolysis)</td>
<td>No GBS Prophylaxis</td>
</tr>
<tr>
<td>If no growth at 48hrs, stop PCN IV</td>
<td>Intrapartum antibiotic prophylaxis</td>
<td>If undelivered in 6+ weeks repeat culture</td>
</tr>
</tbody>
</table>

### RECOMMENDED REGIMENS FOR INTRAPARTAL ANTIMICROBIAL PRPHYLAXIS FOR GBS PREVENTION

<table>
<thead>
<tr>
<th>Category</th>
<th>Regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommended</strong></td>
<td>Penicillin G, 5 million units IV initial dose, then 2.5-3.0 million units every 4 hrs until delivery</td>
</tr>
<tr>
<td><strong>Alternative</strong></td>
<td>Ampicillin 2 grams IV initial dose, then 1 gram every 4 hrs until delivery</td>
</tr>
<tr>
<td><strong>IF PENICILLIN ALLERGIC</strong></td>
<td></td>
</tr>
<tr>
<td>Low Risk for Anaphylaxis</td>
<td>Cefazolin 2 grams IV initial dose, and then 1 gram every 8 hrs until delivery</td>
</tr>
</tbody>
</table>
| High Risk for Anaphylaxis | **GBS susceptible to clindamycin or erythromycin:** Clindamycin 900 milligrams every 8 hrs until delivery  
**GBS resistant to clindamycin or erythromycin or susceptibility unknown:** Vancomycin** 1 gram every 12 hours until delivery |

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Maternal Cardiopulmonary Arrest

If the mother suffers from cardiopulmonary arrest, follow Advance Cardiac Life Support guidelines. The following are additional guidelines for care of pregnant women in cardiopulmonary arrest:

- Displace the uterus either manually or by placing a hip roll under the patient’s right hip. Left tilt is preferable, however, either side would benefit the patient if left tilt is not possible.
- If present, remove fetal monitors before defibrillation or cardioversion. This also includes removing internal monitors.
- For patients with refractory ventricular fibrillation and pulseless ventricular tachycardia, the drug of choice is amiodarone.
- Delivery by post mortem emergent cesarean section should be accomplished within the first 5 minutes of the maternal code.

Management of Other Common Delivery Complications

For additional common delivery complications, consult the Pediatric Care Medical Specialist for assistance and guidance with both obstetrical and pediatric care.
Initial Management of All Pediatric Patients with Influenza Like Illness (ILI)

- Stabilize ABCs (Airway, Breathing, and Circulation)
- Obtain weight (actual or use of weight/length based tool)
- Monitor Heart Rate (HR), Blood pressure (BP), Oxygen Saturation (SpO₂), mental status, temperature, perfusion, urine output, bedside glucose
- Perform history & physical exam
- Provide oxygen if patient is hypoxic or in acute distress (goal is SpO₂ > 95%).
  - O₂ blow-by or NC if in mild distress
  - O₂ 15L NRB or partial rebreather for moderate to severe distress
  - O₂ 15L BVM for severe distress/arrest
- Consult Pediatric Care Medical Specialist for assistance with care of the acutely and critically ill patient, to individualize the care of patient, if patient does not improve and needs to be transferred and as needed for further support and consult.

Management for All Pediatric Patients with ILI

TREATMENT

See Pediatric Respiratory Care Guideline for airway/respiratory management of children

Strategic National Stockpile (SNS):
  During a Class 2 or Class 1 Health and Medical Emergency Event (multiple regions or entire state is affected by Pandemic and state disaster declaration has been issued), IDPH may deploy federally supplied medication, medical supplies and medical equipment from the CDC SNS to assist hospitals with the care and treatment of influenza like illness of all patients, including children and newborns. Request for such resources should occur through the Request for Medical Resources process indicated in the Illinois Health and Medical Care Response Plan (ESF-8).

Immunization:
  Annual vaccination is the most important method to prevent seasonal influenza infection. All people > 6 months old should receive the vaccination. Children, their caregivers and other members of their household should be screened for the need to receive the vaccination during a pandemic.

Antivirals:
  Each pandemic may differ in the recommended medication for treatment and prophylaxis. Consult the Local Health Department, Pediatric Care Medical Specialist and/or the Centers for Disease Control and Prevention (CDC) for medication and pediatric dosing recommendations.

Hydration:
  Ensure children maintain adequate hydration when experiencing an influenza like illness.

Monitor urine output:
  Normal urine output: at least 1 mL/kg/hr
IV/IO Fluids: replacement
  Birth -28 days:
    Bolus 0.9%NS at 10 mL/kg
  28 days:
    Bolus 0.9%NS at 20 mL/kg
Infectious Control Measures

Droplet isolation
- Maintained on hospital patients with suspected or confirmed influenza for 7 days after the onset of symptoms or for 24 hours after resolution of fever and respiratory symptoms, whichever is longer
  - Children may have prolonged viral shedding and may need isolation longer

Facemasks and Children:
- Helps provide a physical barrier and blocks large particle droplets when coughing/sneezing
- Should be used on children with:
  1. ILI symptoms
  2. Immuno-suppression or chronic illnesses
  3. ILI symptoms who have to leave hospital/exam room
  4. Asymptomatic children in crowded health care settings (i.e. ED waiting room)
- Considerations:
  1. Masks should not be placed on infants or any pediatric patient who is anxious, restless, vomiting, lethargic or in respiratory distress
  2. Use pediatric sized/child friendly masks if available. Adult sized masks can be folded in half to fit children’s smaller faces.

See EMSC’s Children and Facemask...To Mask or Not to Mask..... for more information on page 72.

Triaging upon entry to hospital

All patients and visitors should be screened upon entry to building for ILI and the need for PPE

Promptly separate out unexposed and exposed asymptomatic children from symptomatic children and adults (see cohorting)

For the wellbeing of the child (asymptomatic or symptomatic), it is best to keep caregiver (asymptomatic or symptomatic) with child

Provide facemasks to all who have signs/symptoms of respiratory infection/ILI

Visitor restrictions

Primary caregivers should not be restricted to visit their child regardless if they are potentially infectious.

Mask and other appropriate barrier methods should be implemented.

Testing

Surveillance and testing: frequency of reporting and testing will be determined by state and federal recommendations and reflect the pandemic severity index level
- Need to have in place ways to monitor community acquired and health care-associated transmissions

Special considerations

Psychosocial needs of Children: experience from isolation/disease containment may be traumatic for children and families and have similar effects as natural disasters. It is important to implement strategies during a pandemic to help build the resiliency of children and parents.

Resource Allocation

For information on resource allocation, see: EMSC’s Resource Allocation Strategies for the Pediatric Population and within the IDPH ESF-8 Plan: Catastrophic Incident Response Annex
Cohorting

Consider cohorting children by age group as well as the groups listed below. If separating those who are suspected/exposed/symptomatic from those who are non-ILI/exposed and asymptomatic into separate areas is not possible, cohorting in same area can be accomplished by maintaining a distance of 6 feet between these two groups.

Consider the following opportunities to separate/cohort groups:

1. Upon entry to hospital (ED)
   a. ILI Assessment/Triage Area and waiting room
   b. Non-ILI Assessment/Triage Area and waiting room
2. In ED
   a. Suspected/Exposed and Symptomatic Treatment Areas
   b. Non ILI/Exposed and Asymptomatic Treatment Areas
3. Inpatient units/rooms
   a. Confirmed Influenza
   b. Suspected/Exposed to ILI (may be merged with Confirmed Influenza as pandemic progresses and resources are limited)
   c. Not exposed/Immune and Asymptomatic

Perinatal and Newborn Considerations:

1. Whenever possible, keep health mothers and newborns together. Consider alternate sites of care for mothers and newborns who are Not exposed/Asymptomatic.
2. Hospitalized pregnant labor with either suspected or confirmed influenza should be placed on droplet precautions and adhere to respiratory hygiene, cough etiquette, hand hygiene and PPE
3. During delivery, droplet precautions should be maintained
4. After delivery:
   a. CDC recommends hospitals consider temporarily separating newborns from the mother in cases of suspected or confirmed influenza during hospital stay
      i. Length of separation has not been established but recommendations based on H1N1 virus:
         1. Mother received antivirals for > 48 hours
         2. Mother afebrile without antipyretics for > 48 hours
         3. Mother able to control her cough and respiratory secretions
   b. If separation not possible/accepted, allow newborn to room–in with mother but create physical barriers (i.e. curtains between mother and newborn), keeping newborn > 6 feet away from ill mother and ensure a health adult is present to care for newborn. If/when mother has direct contact with newborn, mother should wear a facemask and practice hand hygiene.
   c. Newborns of mothers with suspected or confirmed influenza can be cared for in the newborn nursery as long as no symptoms are present and should be cared for by non-ill staff. If the newborn develops symptoms, they should be placed on droplet precautions
5. Discharge home:
   a. Encourage immediate family who will have contact with newborn to receive influenza vaccination
   b. Encourage a vaccinated, non-ill family member to provide care to newborn at home until mother’s symptoms resolve
General Influenza Concepts for All Patients

Infectivity of the Influenza Virus:
- Incubation period: 1-3 days
- Period of Communicability: Infectious 1 day before onset of symptoms and may be longer than 7 days after onset of symptoms

Influenza virus is inactivated by hospital germicides, household cleaning products, soap, hand wash or hand hygiene products.

It is critical that infection prevention and control policies/procedures are maintained to decrease the transmission of influenza in the hospital setting.
- Hand Hygiene for staff, patients and visitors
- Hygiene measures to minimize influenza transmission
- PPE (mask use, gloves)
- Cleaning, disinfecting and sterilizing patient care equipment
- Environmental control (i.e. housekeeping)

Pandemic Severity Index: CDC uses fatality ratio as the critical driver for forecasting a pandemic’s severity. This can help forecast the impact of a pandemic and enable recommendations to be made for mitigation strategies.
CHILDREN AND FACEMASKS

....TO MASK OR NOT TO MASK....

Why should children wear facemasks?
❖ Provide a physical barrier between the mouth/nose and the immediate environment
❖ Block large particle droplets from coughs and sneezes

Who should wear facemasks?
❖ Children presenting with Influenza Like Illness (ILI)
❖ Children presenting with immuno suppression or chronic illness
❖ Children with ILI who leave the hospital/exam room to go to the bathroom or diagnostic procedures
❖ Healthy children in a crowded healthcare setting (i.e. emergency room waiting area)

Who is at higher risk for infection?
❖ Children under 5 years of age
❖ Children who have asthma, chronic pulmonary, cardiovascular, hepatic, hematological, neurologic, neuromuscular or metabolic disorders such as diabetes
❖ Children who are immunosuppressed (caused by medications or by HIV)
❖ Children and adolescents who are receiving long term aspirin therapy and who might be at risk for experiencing Reyes Syndrome after influenza virus infection

How to keep facemasks on children?
❖ If available, ideally use a pediatric sized/child friendly mask
❖ Educate children and families on the need to keep the mask on, even when talking, coughing or sneezing

Make it fun for children:
❖ Create a game for putting/keeping the mask on (i.e. superhero type mask)
❖ Use of positive reinforcement measures (i.e. stickers)
❖ Use older children as role models for keeping them on (i.e. older siblings)
❖ Praise child for a job well done
Assessing pediatric patients wearing facemasks

- Good assessment of the pediatric patient is important, especially those under 6 months who cannot receive the influenza vaccine. Be alert to subtle changes.

- Do not use facemasks on pediatric patients who are anxious, restless, vomiting, lethargic, or in respiratory distress.

- Routinely assess children wearing a mask, especially if quiet, to assure that their condition is not deteriorating.

- Be aware of the risk of misidentifying children when multiple siblings are wearing masks and undergoing treatment.

What to do when supplies of pediatric facemasks are limited

- Promote and educate on cough and sneeze etiquette:
  - If available, review learning materials (e.g., CDC brochures, Sesame Street cough etiquette video).
  - Provide sufficient hand sanitizer, tissues or wipes and disposal containers.
  - Fold adult sized masks in half and fit them across their small faces.
  - Ask children to decorate their “special” mask (non-toxic markers, stickers, crayons).
  - Cohort symptomatic (influenza like illness) children.
  - If separating siblings (families), be sure to have enough staff members to assist. If this is not possible, consider separating families with flu symptoms from other well families and children.

- Avoid close contact - keep healthy children at least 6 ft apart from IILI patients.

- Adopt visitor policies, restricting children during a pandemic outbreak.

Remember to:

Properly dispose of used pediatric facemasks and wash your hands.

References:
1. McNelis, Susan M., Responding to the Threat of Pandemic Flu in Pediatric Patients. PNA Connection. 2009;Nov; 5:3 (ED): 8
Purpose: To provide guidance to practitioners caring for pediatric patients during a disaster.

Disclaimer: This guideline is not meant to be all inclusive, replace an existing policy and procedure at a hospital or substitute for clinical judgment. These guidelines may be modified at the discretion of the healthcare provider.

Initial Management of a Premature Neonate

Initial management immediately following delivery should adhere to Neonatal Resuscitation Program (NRP) guidelines. This care guideline reviews the additional special care considerations for premature newborns.

Please see the Newborn Care Guideline for standard care of all newborns.

Contact the Pediatric Care Medical Specialist for guidelines on withholding and discontinuing resuscitation of a premature newborn.

General Concepts for Caring for a Premature Neonate

Premature neonates are at a much higher risk of developing complications than the term infant. The anatomy/physiology of a premature neonate increases their vulnerability to morbidity/mortality factors. Constant monitoring is necessary to determine when increased management and support are needed. Therefore, it is recommended that premature neonates be stabilized and then transferred to a center that is capable of providing neonatal intensive care as soon as safely possible given the circumstances of the disaster incident.
## AIRWAY

### Preterm Neonates that require oxygen:
- Neonates with spontaneous respirations may be given supplemental oxygen per:
  - Neonatal nasal cannula at 1-2 LPM flow
  - Oxygen mask
  - Flow-inflating bag and mask
  - Oxygen hood or blow-by O₂ with O₂ tubing held close to neonate’s face
  - CPAP (if available) with a PEEP of 4 or 5

Consult Pediatric Care Medical Specialist for assistance with care if respiratory support needs go beyond the above methods.

### Preterm neonates that require assisted ventilation:
- Preterm newborns <35 weeks: resuscitation should be initiated with low oxygen (21-30%) and titrated to achieve appropriate oxygen saturation
- Follow Neonatal Resuscitation Program (NRP) guidelines for initiating positive pressure ventilation (PPV):
  - Heart rate < 100 bpm
  - Gasping respirations
  - Apnea
- Use the appropriate sized bag for PPV-maximum volume of 750 mL, and appropriate sized neonatal mask
- Monitor inflation pressures carefully.
  - Initial inspiratory pressure of 15-20 cm H₂O
  - Deliver subsequent breaths with approximately 15 cm H₂O of pressure, or just enough pressure to see the chest rise
- Best indication that PPV is effective is:
  - Increasing heart rate
  - Auscultation of equal breath sounds bilaterally
  - Color improvement
  - Increased oxygen saturation per pulse oximetry

### Avoid hypoxia/hyperoxia
- All neonates receiving O₂ should have oxygen saturations closely monitored with pulse oximetry
- Neonates ≤ 1250 grams at birth maintain SpO₂ between 85-92% with supplemental oxygen
- Use an oxygen blender in the delivery of supplemental O₂ so that the FiO₂ may be titrated according to pulse oximetry

### Preterm neonates that require prolonged assisted ventilation:
- Consider intubation. See endotracheal intubation below more information.
- The potential risk for serious complications with intubation and ventilator management is high. It is recommended to consult the Pediatric Care Medical Specialist for assistance with care.

### Consider surfactant therapy for preterm neonates who have clinical signs of respiratory distress syndrome:
- Signs of impairment in oxygenation:
  - PaO₂ < 50 mmHg in room air, central cyanosis in room air
  - O₂ required to maintain PaO₂ > 50mmHg, or required supplemental oxygen to maintain pulse oximeter saturation over 85% in the first 24 hours of life
  - Newborn is often tachypneic with grunting, nasal flaring and chest retractions. Lung sounds may be decreased with rales present.
- **AND**, chest radiograph is consistent with Respiratory Distress Syndrome (reticulo-granular appearance of lung fields with or without low lung volumes and air bronchograms within the first 24 hours of life)
- Should only be considered and administered by care providers with expertise in surfactant administration. The potential for complications with surfactant administration is high. Consult Pediatric Care Medical Specialist for assistance with care.
Endotracheal Intubation

Endotracheal tube size is determined based on the neonate’s weight or gestation.

<table>
<thead>
<tr>
<th>Weight (in grams)</th>
<th>Gestational Age (in weeks)</th>
<th>Endotracheal Tube Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1000 grams</td>
<td>&lt;28 weeks gestation</td>
<td>2.5 uncuffed*</td>
</tr>
<tr>
<td>1000-2000 grams</td>
<td>28-34 weeks gestation</td>
<td>3.0 uncuffed*</td>
</tr>
<tr>
<td>2000-3000 grams</td>
<td>34-38 weeks gestations</td>
<td>3.5 uncuffed*</td>
</tr>
</tbody>
</table>

*Cuffed endotracheal tubes are not recommended for the neonatal population.

Determine the initial depth of endotracheal tube insertion using the ‘Tip-to-lip’ rule:
Add 6 to the neonate’s weight in kg to determine the centimeter marking on the Endotracheal tube at the lip.
For example a neonate that weighs 2,030 grams: 6 + 2 (kg)= 8cm marking at the lip.
Correct Endotracheal tube placement is confirmed with chest x-ray, and should be at the level of T1- T3 (Below the clavicles and above the carina).

THERMOREGULATION

Premature neonates are at an increased risk of developing hypothermia and are more vulnerable to cold stress than the term neonate. The axillary temperature should be monitored within the first 30 minutes of life, and then every 1 hour, and should be maintained between 97.7° F and 99.5° F (36.5° C and 37.5° C). Continue to monitor temperature every 1-3 hours once stabilized.

Measures that may prevent hypothermia include:
1. Increase the room/delivery room temperature >25° C (77° F)
2. Use of radiant warmer for resuscitation if available
3. Use of chemical warming mattress
   a. Caution: Place receiving blanket on chemical warming mattress to avoid direct skin contact with warming device
4. Use of occlusive/polyethylene wrap or large plastic bag (i.e. gallon size food grade storage bag) for neonates <28-30 weeks gestation.
   a. Wrap neonate in occlusive wrap up to the neck, or insert entire body of neonate up to the neck in plastic bag
   b. Caution: Do not allow plastic to cover any part of the face
5. Use of knit hat
6. Neonates > 32 weeks gestation may be placed skin-to-skin with mother if stable. Place unwrapped, undressed neonate directly onto mother’s chest/abdomen and cover both with warm blankets.
7. To avoid burns, Never use hot water bottles or gloves filled with hot water to warm the neonate.
<table>
<thead>
<tr>
<th>HYPOGLYCEMIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is no consensus as to what specific plasma glucose concentration defines a normal glucose value. Because premature neonates are at an increased risk of hypoglycemia, it is recommended that the blood glucose levels be maintained between &gt;50 and &lt;200mg/dL. Monitor blood glucose within the first hour of birth, and then every 1-3 hours if stable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IV FLUIDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Establish IV access</td>
</tr>
<tr>
<td>• Preferred IV fluids for infusion during first 24 hours of life is D10W</td>
</tr>
<tr>
<td>• Initial maintenance rate: 80 mL/kg/day</td>
</tr>
<tr>
<td>• Calculation example: 1.8kg X 80mL divided by 24 = rate of 6 mL per hour</td>
</tr>
<tr>
<td>• Always administer IV fluids via infusion pump</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GLUCOSE BOLUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• For blood glucose &lt; 50 mg/dL, administer a glucose bolus:</td>
</tr>
<tr>
<td>o D10W, 2 mL/kg at a rate of 1mL/min</td>
</tr>
<tr>
<td>o Calculation example: 1.8kg X 2 = 3.6mL to be administered over 4 minutes</td>
</tr>
<tr>
<td>• Recheck blood glucose (use heel for site) within 15 min. post bolus infusion</td>
</tr>
<tr>
<td>• Repeat glucose bolus if blood glucose remains &lt; 50 mg/dL</td>
</tr>
<tr>
<td>Premature neonates with persistent low blood glucose may need to consider increasing IV glucose maintenance fluid rate or IV fluid glucose concentration. Consult Pediatric Care Medical Specialist for assistance with care</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ADDITIONAL SPECIAL CONSIDERATIONS FOR PREMATURE NEONATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>METHODS TO DECREASE RISK OF INTRAVENTRICULAR HEMORRHAGE</td>
</tr>
<tr>
<td>• Handle the neonate gently</td>
</tr>
<tr>
<td>• Closely monitor pressures delivered if positive-pressure ventilation is needed</td>
</tr>
<tr>
<td>o Avoid big changes in pulmonary pressures</td>
</tr>
<tr>
<td>o Avoid delivering high pressures if possible</td>
</tr>
<tr>
<td>• Avoid rapid infusion of IV boluses and fluids</td>
</tr>
<tr>
<td>• Avoid hypertonic solutions</td>
</tr>
<tr>
<td>• Make any changes in care/management, (i.e. ventilation or O2 requirements), gradually and according to assessment of response</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ADDRESSING THE INCREASED RISK OF INFECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Obtain blood lab work to include blood cultures and CBC</td>
</tr>
<tr>
<td>o IF UNABLE TO OBTAIN BLOOD WORK OR LUMBAR PUNCTURE, AND NEONATE AT RISK FOR INFECTION, ADMINISTER ANTIBIOTICS AS SOON AS POSSIBLE</td>
</tr>
<tr>
<td>• Initiate antibiotic therapy promptly:</td>
</tr>
<tr>
<td>o Ampicillin: 100mg/kg IV every 12 hours. Infuse over 30 min.</td>
</tr>
<tr>
<td>o Gentamycin: Consult Pediatric Care Medical Specialist for assistance with dosing.</td>
</tr>
</tbody>
</table>
Other Premature Neonate Considerations

### RISK FACTORS

<table>
<thead>
<tr>
<th>MATERNAL RISK FACTORS</th>
<th>NEONATAL RISK FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic Hypertension</td>
<td>Prematurity (&lt;37 weeks)</td>
</tr>
<tr>
<td>Pregnancy-induced hypertension</td>
<td>Small for gestational age (&lt;10th percentile for gestational age)</td>
</tr>
<tr>
<td>Illicit and certain prescription drugs use</td>
<td>Large for gestational age (&gt;90th percentile for gestational age)</td>
</tr>
<tr>
<td>Tobacco, alcohol use</td>
<td>Intrauterine growth retardation (IUGR)</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>Infection</td>
</tr>
<tr>
<td>Premature or prolonged rupture of membranes</td>
<td>Birth trauma</td>
</tr>
<tr>
<td>Maternal infection</td>
<td>Meconium stained amniotic fluid</td>
</tr>
<tr>
<td>Oligohydramnios/Polyhydramnios</td>
<td></td>
</tr>
</tbody>
</table>

### UNIQUE ANATOMY/PHYSIOLOGY CONSIDERATIONS RELATED TO MEDICAL MANAGEMENT OF THE PREMATURE NEONATE

<table>
<thead>
<tr>
<th>MANAGEMENT</th>
<th>ANATOMICAL/PHYSIOLOGICAL CONSIDERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airway</td>
<td>• Weak chest muscle anatomy → may cause ineffective breathing</td>
</tr>
<tr>
<td></td>
<td>• Immature nervous system → decreased or absent respiratory drive</td>
</tr>
<tr>
<td></td>
<td>• Deficient surfactant production</td>
</tr>
<tr>
<td></td>
<td>• Vulnerable to hyperoxia</td>
</tr>
<tr>
<td></td>
<td>• Lung anatomy more fragile and less compliant than term neonates</td>
</tr>
<tr>
<td>Thermoregulation</td>
<td>• High risk of rapid heat loss → hypothermia</td>
</tr>
<tr>
<td></td>
<td>• Thin skin</td>
</tr>
<tr>
<td></td>
<td>• Large surface area to body mass ratio</td>
</tr>
<tr>
<td></td>
<td>• Decreased or no fat stores</td>
</tr>
<tr>
<td></td>
<td>• Risk of ↑ evaporative water loss → promoting heat loss</td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>• Diminished glycogen stores: most hepatic glycogen stores are gained in the third trimester of pregnancy</td>
</tr>
<tr>
<td></td>
<td>• Decreased fat stores</td>
</tr>
<tr>
<td></td>
<td>• Potential increased glucose utilization due to respiratory distress, hypoxia, hypothermia</td>
</tr>
<tr>
<td>Intraventricular hemorrhage</td>
<td>• Fragile germinal matrix → increased risk in preemies &lt;32 weeks gestation</td>
</tr>
<tr>
<td>Increased risk of infection</td>
<td>• Immature immune system</td>
</tr>
<tr>
<td></td>
<td>• Association of preterm labor with maternal infection (i.e. chorioamnionitis)</td>
</tr>
<tr>
<td></td>
<td>• Preterm premature rupture of membranes, and/or rupture of membranes &gt; 18 hours</td>
</tr>
</tbody>
</table>
Respiratory Care Guideline

Purpose: To provide guidance to practitioners caring for pediatric patients during a disaster.

Disclaimer: This guideline are not meant to be all inclusive, replace an existing policy and procedure at a hospital or substitute for clinical judgment. These guidelines may be modified at the discretion of the healthcare provider.

Initial Management of All Pediatric Respiratory Patients

- Stabilize ABCs and c-spine (Airway, Breathing, and Circulation)
- If exam consistent with tension pneumothorax, consider emergent needle decompression then placement of chest tube (if experienced/ skilled practitioner available)
- Obtain weight (actual or use of weight/length based tool)
- Monitor:
  - Heart Rate (HR), Blood pressure (BP), Oxygen Saturation (SpO2), mental status, temperature, perfusion, urine output, bedside glucose
- Perform history & physical exam
- Provide oxygen if patient is hypoxic or in acute distress (goal is SpO2 > 95%)
  - O2 blow by if in mild distress
  - O2 15L NRB or partial rebreather for moderate to severe distress
  - O2 15L BVM for severe distress/arrest
- Consult pediatric expert for assistance with care of the acutely and critically ill patient, to individualize the care of patient, if patient does not improve and needs to be transferred and as needed for further support and consult.

Management for Respiratory Distress for All Pediatric Patients

Determine if patient is critically ill

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyanosis</td>
<td></td>
</tr>
<tr>
<td>Marked stridor</td>
<td></td>
</tr>
<tr>
<td>Retractions, nasal flaring</td>
<td></td>
</tr>
<tr>
<td>Inability to speak</td>
<td></td>
</tr>
<tr>
<td>S/S worsening resp. distress</td>
<td></td>
</tr>
<tr>
<td>Severe distress</td>
<td></td>
</tr>
<tr>
<td>Unconscious</td>
<td></td>
</tr>
<tr>
<td>Wheezing</td>
<td></td>
</tr>
</tbody>
</table>

- Maintain position of comfort
- Provide supplemental O2 to maintain SpO2 > 94%
- If wheezing and ≥ 2 y/o with known or suspected history of asthma, administer albuterol HHN or mask (repeat x 2)
  - 2.5 mg/3 mL (max single dose 5mg) AND Atrovent (ipratropium)
    (may repeat x 2)
  - 0.5 mg/2.5 mL
- If wheezing and < 2 y/o with no suspected history of asthma, perform nasal suctioning on child as indicated
- Establish vascular access
- Place on cardiac and pulse ox monitor
- Administer corticosteroids
  - Methylprednisolone (solumedrol) 2 mg/kg (max 125 mg single dose) IV/IO
  - Oral prednisone if appropriate
- Group:
  - Dexamethasone 0.6 mg/kg IM/IV/IO
  - Racemic epinephrine 2.25% solution neb
    - < 4 years old: 0.05 mL/kg/dose diluted in 3 mL NS over 15 minutes every 1-2 hours
    - > 4 years old: 0.5 mL/dose diluted in 3 mL NS over 15 minutes every 1-2 hours
    - In the event that racemic epinephrine is not available, epinephrine 1:1000 can be used as a substitute. Use epinephrine 1:1000, 0.25-0.5 mg/kg (max 5 mL/dose) in 3 mL and provide as a nebulizer over 15 minutes
  - REASSESS

- Maintain position of comfort
- Provide supplemental O2 to maintain SpO2 > 94%
- If wheezing and ≥ 2 y/o with known or suspected history of asthma, administer MDI with spacer 2-4 puffs OR
  - Albuterol HHN or mask (repeat x 2)
  - 2.5 mg/3 mL (max single dose 5 mg) AND Atrovent (ipratropium) (repeat x 2)
    - 0.5 mg/2.5 mL
- If wheezing and < 2 y/o with no suspected history of asthma, perform nasal suctioning on child as indicated
- Administer corticosteroids as needed
  - Prednisone 1-2 mg/kg (max 60 mg/day) PO
  - Group:
    - Consider single dose dexamethasone 0.6 mg/kg PO/IM
    - Cool mist nebulizer treatment
  - REASSESS

Proceed to next page
- Intubation if indicated
- Ventilator settings
  - Tidal volume: 6-10 mL/kg
  - I-time: 0.5-1.0
  - Respiratory rate: set based on age
  - PEEP: 3-5 mm H2O
  - Peak Inspiratory Pressure: 20-30 mm H2O
- For more information, see: Use of Strategic National Stockpile (SNS)
  Ventilators in the Pediatric Patient: Instructional Guidelines with Training Scenarios, 2nd edition
- Admit patient
- Consult Pediatric Care Medical Specialist to assist with individualizing admission orders
- Sample admission orders (see next page)

- Albuterol 1 hour continuous nebulizer
  - 0.5 mg/kg/hr (max 25 mg/hr)
- Monitor End Tidal CO2 (EtCO2) if possible/available
- Consider magnesium 25 mg/kg (max 2 gm) slow IV infusion over 30 minutes
- Consider terbutaline
- Monitor closely for deterioration
- Obtain CXR if febrile
  - Consider antibiotics for suspected pneumonia

REASSESS

- Admit patient
- Consult Pediatric Care Medical Specialist to assist with individualizing admission orders
- Sample admission orders (see next page)

- Albuterol 1 hour continuous nebulizer
  - 0.5 mg/kg/hr (max 25 mg/hr)
- Obtain CXR if febrile
  - Consider antibiotics for suspected pneumonia
- Improved, returned to baseline

- Observe for 1-2 hour
- Discharge if symptoms resolved and no signs of distress
- Follow up plan:
  - MDI with spacer 2-4 puffs every 4 hours as needed
  - Continue steroids
Sample Pediatric Respiratory Admission Orders

Admitting physician: ____________________________________________________________

Diagnosis: ____________________________________________________________________

Condition: □ Critical □ Serious □ Stable

Weight (kg): __________________ Height (cm): ____________________________

Allergies: ____________________________________________________________________

Pulse Oximetry:
- Obtain pulse oximetry on admission to unit
- If SpO₂ > 90%, obtain spot check pulse oximetry readings with each treatment, with vital signs or if patient exhibits decline in respiratory status
- If SpO₂ < 90%, provide oxygen and begin continuous pulse oximetry monitoring

Supplemental Oxygen Orders:
- If SpO₂ < 90% on room air, apply oxygen to maintain SpO₂ 91-94%
  - Nasal Cannula
  - Aerosol Mask
- Titrate oxygen to maintain pulse oximetry >90%
- Wean oxygen if oxygen saturation maintains 94%.
  - Decrease oxygen by ½ liter per minute (LPM) and reassess patient 5-10 minutes after change in oxygen
  - Do not decrease oxygen more frequently than every 60 minutes

Ventilator settings: __________________________________________________________

□ For more information, see: Use of Strategic National Stockpile (SNS) Ventilators in the Pediatric Patient: Instructional Guidelines with Training Scenarios, 2nd edition

Peak Expiratory Flow Rate (PEFR)
- Peak Flow will be done on admission for patients > 5 years of age to determine patient’s compliance/ability to effectively perform
- Check Peak Flow before and after breathing treatments.

AVERAGE PREDICTED PEAK EXPIRATORY FLOW RATES FOR NORMAL CHILDREN

<table>
<thead>
<tr>
<th>Height (in)</th>
<th>PEFR (L/min) 70% PEFR</th>
<th>Height (in)</th>
<th>PEFR (L/min) 70% PEFR</th>
<th>Height (in)</th>
<th>PEFR (L/min) 70% PEFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>109</td>
<td>147</td>
<td>103</td>
<td>52</td>
<td>132</td>
</tr>
<tr>
<td>44</td>
<td>112</td>
<td>160</td>
<td>112</td>
<td>53</td>
<td>135</td>
</tr>
<tr>
<td>45</td>
<td>114</td>
<td>173</td>
<td>121</td>
<td>54</td>
<td>137</td>
</tr>
<tr>
<td>46</td>
<td>117</td>
<td>187</td>
<td>131</td>
<td>55</td>
<td>140</td>
</tr>
<tr>
<td>47</td>
<td>119</td>
<td>200</td>
<td>140</td>
<td>56</td>
<td>142</td>
</tr>
<tr>
<td>48</td>
<td>122</td>
<td>214</td>
<td>150</td>
<td>57</td>
<td>145</td>
</tr>
<tr>
<td>49</td>
<td>124</td>
<td>227</td>
<td>159</td>
<td>58</td>
<td>147</td>
</tr>
<tr>
<td>50</td>
<td>127</td>
<td>240</td>
<td>168</td>
<td>59</td>
<td>150</td>
</tr>
</tbody>
</table>
Medications:

- **Albuterol**
  - MDI via spacer device
    - 2 puffs every 3 hours (6-11 months old)
    - 4 puffs every 3 hours (>12 months old)
  - Nebulizer ______mg every ____ hrs (0.5mg/kg/hr, max dose 30mg/hr)
  - Continuous
    - If patient requires treatment prior to two hour interval, administer Albuterol
      continuous nebulizer for two hours and begin continuous pulse oximetry monitoring
      - Albuterol 0.5mg/kg/hr (max dose 10mg/hr)

- **Ipratropium bromide (Atrovent):**
  - 0.5mg to be given with 2\(^{nd}\) and 3\(^{rd}\) doses of Albuterol

- **Corticosteroids:**
  - Prednisolone Sodium Phosphate (Orapred): _____mg PO STAT (2mg/kg loading dose-max 60mg/dose) then _____mg PO every 12 hours (1mg/kg maintenance dose-max 30mg/dose) x 5 days
  - Methylprednisone (Solumedrol): _____mg IV STAT (2mg/kg loading dose-max 60mg/dose) then _____mg IV every 6 hours (1mg/kg maintenance dose-max 30mg/dose) x 4 doses

- **Topical anesthetic for IV start and lab draws:**
  - Apply topically once 30-90 minutes prior to painful procedures (maximum 1gm, 10 centimeter area squared, or application time of 2 hours)

- **Antibiotics:**
  - __________________________________________________________________________
  - __________________________________________________________________________
  - __________________________________________________________________________

- **Analgesics/Antipyretics:**
  - Acetaminophen (Tylenol) (15mg/kg/dose)_____mg PO/GT every 4 hrs PRN for temperature ≥ 38.6°C/101.5°F or discomfort (max dose 3000mg/day)
  - Acetaminophen (Tylenol) (20mg/kg/dose)_____mg PR every 4 hrs PRN for temperature ≥ 38.6°C/101.5°F or discomfort (max dose 3000mg/day)
  - Ibuprofen (Motrin) (10mg/kg/dose) _____mg PO/GT every 6 hours PRN for temperature ≥ 38.6°C/101.5°F or discomfort

- **See Sample Pediatric Standard Admission Orders** for additional examples for diet, IV, labs etc.

- **Asthma Score** (see next page)
**General Information**

Unlike adults, cardiac arrest in children most often occurs secondary to respiratory insufficiency. Once the child proceeds to a cardiac event, the likelihood of resuscitating that child is dismal. Rapid airway assessment and intervention is imperative. Several conditions manifest as respiratory distress in children including: airway obstruction, upper airway disease (croup, epiglottitis), and lower airway disease (asthma, bronchiolitis, and pneumonia). Signs and symptoms of impending respiratory collapse include:

- Cyanosis
- Tachycardia
- Bradycardia
- Shallow respiration
- Decreasing LOC/restlessness
- Hypotension

Pediatric asthma may present differently from the adult form. Children may not wheeze, but continuously cough for 20-30 minutes after excitement or exercise, or may abruptly vomit.

Due to the small diameter of their airways, even incremental edema/bronchoconstriction may cause severe air exchange problems. The inability of pediatric patients to increase their tidal-volumes often results in markedly increased respiratory rate which dehydrates airways and accelerates the development of mucous plugs. Hypoxemia & hypercarbia lead to acidosis and bradycardia. Treat aggressively.

### Asthma Score

- Intended for use with patients > 2 years old who are being treated for asthma or an asthma exacerbation
- Not intended for patients who:
  - Are being treated for bronchiolitis, pneumonia, croup, reactive airway disease
  - Have chronic lung disease, cystic fibrosis, airway anomalies, cardiac disease, foreign body or neurologic disorders
  - Calculate the asthma score upon admission, prior to each aerosol treatment, and during the weaning process
  - Wean if score of 0-1 and/or peak expiratory flow rate (PEFR) greater than 70% predicted – see Asthma Weaning Guidelines on next page.
- Treatment should be given for a score of 2 or higher and/or PEFR less than 70% predicted.

<table>
<thead>
<tr>
<th>ASTHMA SCORE</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Respiratory Rate (Count for a full minute)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-12 mos:</td>
<td>&lt; 40</td>
<td>40-50</td>
<td>&gt; 50</td>
</tr>
<tr>
<td>1-5 y/o:</td>
<td>&lt; 30</td>
<td>30-40</td>
<td>&gt; 40</td>
</tr>
<tr>
<td>6-9 y/o:</td>
<td>&lt; 25</td>
<td>25-30</td>
<td>&gt; 30</td>
</tr>
<tr>
<td>10-15 y/o:</td>
<td>&lt; 23</td>
<td>23-27</td>
<td>&gt; 27</td>
</tr>
<tr>
<td>&gt;15 y/o:</td>
<td>&lt; 20</td>
<td>20-24</td>
<td>&gt; 24</td>
</tr>
<tr>
<td><strong>Retractions</strong></td>
<td>None</td>
<td>Suprasternal/Subcostal/ Intercostal</td>
<td>Using neck or abdominal muscles (belly breathing) if atypical for child</td>
</tr>
<tr>
<td><strong>Breath Sounds</strong></td>
<td>Normal, equal, Mild expiratory wheeze</td>
<td>Wheeze throughout expiration Localized decreased breath sounds</td>
<td>Wheeze throughout inspiration &amp; expiration Multiple areas with decreased breath sounds</td>
</tr>
<tr>
<td><strong>Oxygen Saturation (Spo₂)</strong></td>
<td>≥ to 92%</td>
<td>≥ 90-92%</td>
<td>≤ 90%</td>
</tr>
</tbody>
</table>

Adapted from: Cincinnati Children’s Hospital Medical Center Respiratory Assessment/Care Record, 2002; Kelly et al, Improved Outcomes for Hospitalized Asthmatic Children Using a Clinical Pathway, 2000.
### Asthma Weaning Phases

**NOTE:** Initial asthma phase should be chosen on the patient’s clinical presentation (e.g., the frequency of initial treatments needed to show improvement), with some assistance with asthma score. For example, a patient with asthma score of 2-3 would likely start in phase II or III. If patient has an asthma score of 4 or more, consider starting patient in phase I or II.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description</th>
</tr>
</thead>
</table>
| **PHASE I:** Continuous Albuterol treatment | - Assess Asthma Score every 1-2 hours  
- If score less than 2 for two consecutive assessments, wean to Phase II  
- If worsening score or has not met weaning criteria after 6 hours, RT to call physician |
| **PHASE II:** Every 2 hour Albuterol treatment | - Assess Asthma Score before and after every treatment  
- If score less than 2, wean to Phase III  
- If worsening score (score increased by 2 or more) or has not met weaning criteria after 8 hours, RT to call physician |
| **PHASE III:** Every 3 hour Albuterol treatment | - Assess Asthma Score before and after every treatment  
- Transition to MDI with spacer +/- mask or mouthpiece if able to comply  
  - **ALL MDI ALBUTEROL IS 4-6 PUDDS PER TREATMENT (in 30 second intervals)**  
- If score less than 2, wean to Phase IV  
- If worsening score (score increased by 2 or more) or has not met weaning criteria after 12 hours, RT to call physician |
| **PHASE IV:** Every 4 hour Albuterol treatment | - Assess Asthma Score before and after every treatment  
- If worsening score (score increased by 2 or more) or has not met discharge criteria after 12 hours, RT to call physician  
- If patient has met discharge criteria after 2 beta-agonist treatments at q 4 hours, RT to call physician |

**Discharge Criteria:** Must meet all 5 discharge criteria

1. SpO2 > 92% (goal = 91-94%)
2. Off of supplemental oxygen for at least 6 hours (must include one sleep period—this may be a nap*)
3. Normal respiratory rate
4. End expiratory wheeze only
5. Minimal → no retractions

*A nap is at least 30 continuous minutes of sleep*
Management of All Pediatric Shock Patients

- Stabilize ABCs and c-spine (Airway, Breathing, and Circulation)
- Obtain weight (actual or use of weight/length based tool)
- Establish 2 peripheral IVs (consider large bore if possible) or if unable, establish intraosseous (IO) access
- Control any external bleeding
- Monitor Heart Rate (HR), Blood pressure (BP), Oxygen Saturation (SpO₂), mental status, temperature, perfusion, urine output, bedside glucose
- Perform history & physical exam
- Consult Pediatric Care Medical Specialist for assistance with care of the acutely and critically ill patient, to individualize the care of patient, if patient does not improve and needs to be admitted/transferred and as needed for further support and consult.

Initial Management of All Pediatric Shock Patients

- Does patient have signs of organ dysfunction?
  - Hypotension
    - < 2y/o Systolic BP (SBP) < 70mmHG
    - 2-10 y/o SBP < (70 + 2 x age in years)
    - >10 y/o SBP < 90mmHG
  - Capillary refill > 2 seconds
  - Witnessed apnea
  - Need for FiO₂ > than 0.50 to maintain SpO₂ > 92
  - Altered mental status
  - Consult pediatric care medical specialist

  REASSESS

  YES
  - Begin IVF bolus (0.9 NS) 20mL/kg over 15 minutes or as fast as possible. Repeat x 1
  - Consider need for intubation
  - If cardiogenic shock suspected, administer IVF boluses at a rate of 5-10mL/kg over 10-20 minutes. Repeat PRN. Assess for pulmonary edema after each bolus
  - Draw labs (blood gas, glucose, CBC, CMP, PT/PTT, lactic acid, blood culture, Type and Screen)

  NO
  - Give IVF bolus (0.9NS) 20mL/kg over 15 minutes or as fast as possible. Repeat x 1
  - Perform vital signs, perfusion and neuro checks q15mins
  - If cardiogenic shock suspected, administer IVF boluses (0.9NS) at a rate of 5-10mL/kg over 10-20 minutes. Repeat PRN. Assess for pulmonary edema after each bolus
  - Draw labs (blood gas, glucose, CBC, CMP, PT/PTT, lactic acid, blood culture, Type and Screen)

  REASSESS

  Normalized and ≤ 40mL/kg IVF given?
  - Monitor vital signs & perform perfusion checks q 1 hr x 2
  - Maintenance IVF
  - Ongoing assessment: monitor for hypothermia and hypoglycemia
  - Determine and treat cause (see Determine and Treat Cause Section for additional information)

  YES
  Proceed to next page

  NO
  Proceed to next page

Purpose: To provide guidance to practitioners caring for pediatric patients during a disaster.

Disclaimer: This guideline is not meant to be all inclusive, replace an existing policy and procedure at a hospital or substitute for clinical judgment. These guidelines may be modified at the discretion of the healthcare provider.
- Administer IVF bolus (0.9NS) 20mL/kg over 15 minutes or as fast as possible
- Assess for clinical or laboratory signs of organ dysfunction:
  - Metabolic: base deficit > 5 (BE < -5); lactate > 2X upper limit of normal
  - Respiratory: PaO2/FiO2<300; PCO2>65 or greater than 20 above baseline
  - Hematologic: Platelets <80K (unexplained); INR>2
  - Renal: Creatinine > 2X upper limit of normal; oliguria<0.5mL/kg/hr
  - Hepatic: total bilirubin>4; AST> 2X upper limit of normal
- If patient in septic shock, initiate antibiotics within 60 minutes

**REASSESS**

**Fluid refractory**
- Begin vasoactive therapy and titrate to correct hypotension/poor perfusion
  - Dopamine: 5-20mcg/kg/min Titrate in 1-4 mcg/kg/min increments every 10-30 minutes to maximum of 20mcg/kg/min
- Consider establish central line and arterial access if experienced/skilled practitioner available to place

**REASSESS**

**Fluid refractory/Dopamine Resistant**
- If SpO2 Sat<70%, hypotensive, and poor perfusion/vasoconstricted:
  - Transfuse with PRBCs if HGB<10 (10mL/kg)
  - Epinephrine 0.1-1mcg/kg/min OR
  - Dobutamine 2-20mcg/kg/min
- If SpO2 Sat>70%, hypotensive, and vasodilated:
  - Norepinephrine 0.1-2mcg/kg/min

**REASSESS**

- If at risk for adrenal insufficiency:
  - Hydrocortisone 2mg/kg bolus IV (max 100mg)
- If SpO2 Sat<70%, normal blood pressure, and/or poor perfusion/vasoconstricted:
  - Nitroprusside OR
  - Milrinone
- If SpO2 Sat<70% and hypotensive:
  - Titrate IVF
  - Continue Epinephrine
- If SpO2 Sat>70% and hypotensive:
  - Titrate IVF
  - Continue Norepinephrine

**REASSESS**

**Improved and/or normalized**

- Monitor vital signs & perform perfusion checks q 1 hr x 2
- Ongoing assessment: monitor for hypothermia and hypoglycemia
- Maintenance IVF
- Consult pediatric care medical specialist
- Determine and treat cause (see Determine and Treat Cause Section)
- Admit patient (see sample admission orders):
  - Sepsis (see pg. 4 of this care guideline)
  - Hypovolemia (see pg. 7 of this care guideline)

**Improved, normalized AND ≥ 40mL/kg IVF given**

**Worse or not improved**

- Consult Pediatric Care Medical Specialist for additional orders and to request transfer
- Ongoing assessment: monitor for hypothermia and hypoglycemia
- Admit patient (see sample admission orders)
  - Sepsis (see pg. 4 of this care guidelines)
  - Hypovolemia (see pg. 7 of this care guidelines)
### Determine and treat cause

<table>
<thead>
<tr>
<th>Anaphylaxis:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>o Epinephrine 1:1000 0.1 mL/kg (not to exceed 0.3 mg/dose) IM, every 15 minutes x 2 then every 4 hours OR</td>
<td></td>
</tr>
<tr>
<td>o Epinephrine Autoinjector 0.3 mg IM (for patients&gt;30kg) OR Junior Autoinjector 0.15 mg (for patients 10-30 kg) OR</td>
<td></td>
</tr>
<tr>
<td>o If hypotension continues after IVF bolus, Epinephrine 0.01 mg/kg (1:10000) IV/IO every 3-5 minutes (max dose 1 mg)</td>
<td></td>
</tr>
<tr>
<td>o Benadryl 1.25-1.5 mg/kg IV/IO/IM every 4-6 hours (max dose 50 mg)</td>
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</tr>
<tr>
<td>▪ Monitor for respiratory depression</td>
<td></td>
</tr>
<tr>
<td>o Methylprednisone 2 mg/kg IV initially (max 60 mg) then 0.5 mg/kg every 6 hours or 1 mg/kg every 12 hours (max 125 mg/day).</td>
<td></td>
</tr>
<tr>
<td>o Pepcid 0.5 mg/kg IV every 12 hours</td>
<td></td>
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<tr>
<td>Cardiogenic shock:</td>
<td></td>
</tr>
<tr>
<td>o Administer IVF boluses at a rate of 5-10 mL/kg over 10-20 minutes. Repeat PRN. Assess for pulmonary edema after each bolus</td>
<td></td>
</tr>
<tr>
<td>o Consider Diuretics</td>
<td></td>
</tr>
<tr>
<td>o Consider Milrinone</td>
<td></td>
</tr>
<tr>
<td>o Consider need to increase cardiac output</td>
<td></td>
</tr>
<tr>
<td>▪ Vasodilators</td>
<td></td>
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<tr>
<td>▪ Inotropes</td>
<td></td>
</tr>
<tr>
<td>o Reduce metabolic demands:</td>
<td></td>
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<tr>
<td>▪ Antipyretics PRN</td>
<td></td>
</tr>
<tr>
<td>Hemorrhage:</td>
<td></td>
</tr>
<tr>
<td>o If signs/symptoms of shock and at risk for hemorrhage, consider administering PRBCs 10 mL/kg</td>
<td></td>
</tr>
<tr>
<td>▪ Administering 10 mL/kg of PRBCs will increase hemoglobin by 2 g/dL or hematocrit 4-6%</td>
<td></td>
</tr>
<tr>
<td>Hypocalcemia</td>
<td></td>
</tr>
<tr>
<td>o Calcium chloride: 10-20 mg/kg (0.1-0.2 mL/kg calcium chloride 10%) infused at a rate that does not exceed 100 mg/min OR</td>
<td></td>
</tr>
<tr>
<td>Calcium gluconate: 15 mg/kg</td>
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<tr>
<td>Hypoglycemia</td>
<td></td>
</tr>
<tr>
<td>o Birth-28 days: D10W 2 mL/kg IV</td>
<td></td>
</tr>
<tr>
<td>o &gt;28 days-1 year: D12.5% 4-8 mL/kg IV</td>
<td></td>
</tr>
<tr>
<td>o &gt;1 year: D25% 2-4 mL/kg IV</td>
<td></td>
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<tr>
<td>o D50% 1-2 mL/kg IV</td>
<td></td>
</tr>
<tr>
<td>Obstructive shock:</td>
<td></td>
</tr>
<tr>
<td>Treat underline cause:</td>
<td></td>
</tr>
<tr>
<td>o Cardiac Tamponade (perform pericardiocentesis if experienced/skilled practitioner available)</td>
<td></td>
</tr>
<tr>
<td>o Tension Pneumothorax (perform needle decompression and place chest tube if experienced/skilled practitioner available)</td>
<td></td>
</tr>
<tr>
<td>o Closed ductus arteriosus</td>
<td></td>
</tr>
<tr>
<td>▪ Prostaglandin E1 0.05-0.1 mcg/kg/min continuous IV</td>
<td></td>
</tr>
<tr>
<td>o Pulmonary embolism</td>
<td></td>
</tr>
<tr>
<td>Spinal cord injury:</td>
<td></td>
</tr>
<tr>
<td>If hypotensive/bradycardic after IVF boluses:</td>
<td></td>
</tr>
<tr>
<td>o Atropine 0.02 mg/kg IV/IO (min single dose 0.1 mg/max single dose 1 mg). May repeat every 3 minutes to max 2 mg.</td>
<td></td>
</tr>
<tr>
<td>If continue to be hypotensive and bradycardic:</td>
<td></td>
</tr>
<tr>
<td>o Dopamine to maintain SBP &gt;90</td>
<td></td>
</tr>
<tr>
<td>o Phenylephrine or vasopressin</td>
<td></td>
</tr>
<tr>
<td>o Consult neuro surgeon for further medical management</td>
<td></td>
</tr>
<tr>
<td>Sepsis:</td>
<td></td>
</tr>
<tr>
<td>• Antibiotics: broad spectrum antimicrobial agent initiated within 60 minutes</td>
<td></td>
</tr>
<tr>
<td>• Neonates: Ampicillin, Cefotaxime, Cefuroxime, Gentamicin</td>
<td></td>
</tr>
<tr>
<td>• Children &gt; 1 month: Ceftriaxone, Vancomycin, Cefepime, Gentamicin, Piperacillin/Tazobactam, Clindamycin</td>
<td></td>
</tr>
</tbody>
</table>
| • Antipyretics: Acetaminophen 15 mg/kg or ibuprofen 10 mg/kg.
Sample Pediatric Septic Shock Admission Orders

Admitting physician: ____________________________________________________________

Diagnosis: __________________________________________________________________

Condition: □ Critical □ Serious □ Stable

Weight (kg): ______________ Height (cm): ______________

Allergies: ___________________________________________________________________

Isolation: ___________________________________________________________________

Assessment:
□ Continuous cardiac monitoring
□ Continuous pulse oximetry
□ Blood pressure with all vital signs
□ Routine I&O
□ Strict I&O
□ Daily weight
□ Seizure precautions
□ Neuro checks every _____ hours
□ All non-rectal temperatures > 38°C/100.4°F should be confirmed rectally on infants ≤60 days of age

Tests:
□ CBC with differential
  □ now (order if not performed prior to admission)
  □ at ______
  □ every ______ hours

□ CMP
  □ now (order if not performed prior to admission)
  □ at ______
  □ every ______ hours

□ BMP
  □ now (order if not performed prior to admission)
  □ at ______
  □ every ______ hours

□ Blood culture (order if not performed prior to admission)
□ Viral blood culture
□ Catheterized urinalysis (order if not performed prior to admission)
□ Catheterized urine culture (order if not performed prior to admission)
□ Stool culture
□ Stool for Rotavirus
□ Stool gram stain
□ RSV
□ Influenza
□ Viral culture
□ Chest x-ray (PA and lateral) (order if not performed prior to admission)

For infants ≤60 days of age with fever:
□ CSF for (laboratory should perform these in ranking order as listed below)
  □ Cell count
  □ Glucose
□ Protein
□ Gram stain
□ Aerobic culture
□ Viral culture
□ Enterovirus PCR
□ Herpes PCR
□ Meningitis antigen profile
□ Conjunctiva viral culture
□ Viral culture of skin lesion on ________________
□ Rectal viral culture
□ ________________
□ ________________
□ ________________
□ ________________

Medications:
□ Analgesics/Antipyretics:
  □ Acetaminophen (Tylenol) (15mg/kg/dose) _______mg PO/GT every 4 hrs PRN for temperature 38.6°C/101.5°F or discomfort (max dose 3000mg/day)
  □ Acetaminophen (Tylenol) (20mg/kg/dose) _______mg PR every 4 hrs PRN for temperature ≥ 38.6°C/101.5°F or discomfort (max dose 3000mg/day)
  □ Ibuprofen (Motrin) (10mg/kg/dose) _______mg PO/GT every 6 hours PRN for temperature ≥ 38.6°C/101.5°F or discomfort (for infants >5 months)
□ Antibiotics:
  □ Ceftriaxone _______mg IV every _____ hours (max 4gm/day)
  □ Vancomycin _______mg IV every _____ hours (max 1gm/dose)
□ ________________
□ ________________
□ ________________
□ ________________
□ For infants ≤ 30 days of age with fever:
  □ Ampicillin _______mg IV every ___ hours (200 mg/kg/day)
  □ Cefuroxime _______mg IV every ___ hours (200 mg/kg/day)
  □ Cefotaxime _______mg IV every ___ hours
  □ Acyclovir _______mg IV every ___ hours
    (If greater than or equal to 35 weeks post-conceptual age, give 60 mg/kg/day divided every 8 hours. If less than 35 weeks post conceptual age, give 40 mg/kg/day divided every 12 hours)
  □ Gentamycin _______mg IV every _____ hours
□ Topical anesthetic for IV start and lab draws:
  □ Apply topically once 30-90 minutes prior to procedure (maximum 1gm, 10 centimeter area squared, or application time of 2 hours)

IV Therapy:
□ Saline lock
□ D5 ½ NS with 20 mEq KCl/L running at _____ mL/hr (ensure patient is voiding)
□ __________________ running at _____ mL/hr
□ __________________ running at _____ mL/hr
Supplemental Oxygen Orders:
- If \( \text{SpO}_2 < 90\% \) on room air, apply oxygen to maintain \( \text{SpO}_2 91-94\% \)
  - Nasal Cannula
  - Aerosol Mask
- Titrate oxygen to maintain \( \text{SpO}_2 > 90\% \)
- Wean oxygen if oxygen saturation maintains 94%.
  - Decrease oxygen by \( \frac{1}{2} \) liter per minute (LPM) and reassess patient 5-10 minutes after change in oxygen
  - Do not decrease oxygen more frequently than every 60 minutes

Ventilator Settings:
- For more information, see: Use of Strategic National Stockpile (SNS) Ventilators in the Pediatric Patient: Instructional Guidelines with Training Scenarios, 2nd edition

See Sample Pediatric Standard Admission Orders for additional examples for diet, IV, labs etc
Sample Pediatric Hypovolemic Shock Admission Orders

Admitting physician: _____________________________________________________________
Diagnosis: ___________________________________________________________________
Condition: □ Critical □ Serious □ Stable
Weight (kg): ___________________ Height (cm): ____________________
Allergies: __________________________________________________________________
Isolation: ___________________________________________________________________

Assessment:
☐ Continuous cardiac monitoring
☐ Continuous pulse oximetry
☐ Blood pressure with all vital signs
☐ Routine I&O
☐ Strict I&O
☐ Daily weight

Tests:
☐ CBC with differential
☐ now (order if not performed prior to admission)
☐ at ______
☐ every _______ hours

☐ CMP
☐ now (order if not performed prior to admission)
☐ at ______
☐ every _______ hours

☐ BMP
☐ now (order if not performed prior to admission)
☐ at ______
☐ every _______ hours

Medications:
☐ Analgesics/Antipyretics:
☐ Acetaminophen (Tylenol) (15mg/kg/dose) _________mg PO/GT every 4 hrs PRN for
temperature ≥38.6°C/101.5°F or discomfort (max dose 3000mg/day)
☐ Acetaminophen (Tylenol) (20mg/kg/dose) _________mg PR every 4 hrs PRN for temperature ≥
38.6°C/101.5°F or discomfort (max dose 3000mg/day)
☐ Ibuprofen (Motrin) (10mg/kg/dose) _________mg PO/GT every 6 hours PRN for temperature
≥38.6°C/101.5°F or discomfort (for infants >5 months)

☐ Antiemetic:
☐ _____________________________________________________________________________

☐ Antibiotics:
☐ _____________________________________________________________________________

☐ _____________________________________________________________________________
Topical anesthetic for IV start and lab draws:
- Apply topically once 30-90 minutes prior to procedure (maximum 1gm, 10 centimeter area squared, or application time of 2 hours)

IV Therapy:
- ___________
- D5 ½ NS with 20 mEq KCl/L running at _____ mL/hr (ensure patient is voiding)
- __________________ running at _____ mL/hr
- __________________ running at _____ mL/hr

Supplemental Oxygen Orders:
- If SpO₂ < 90% on room air, apply oxygen to maintain SpO₂ 91-94%
  - Nasal Cannula
  - Aerosol Mask
- Titrate oxygen to maintain SpO₂ > 90%
- Wean oxygen if oxygen saturation maintains 94%.
  - Decrease oxygen by ½ liter per minute (LPM) and reassess patient 5-10 minutes after change in oxygen
  - Do not decrease oxygen more frequently than every 60 minutes

Ventilator Settings:
- For more information, see: Use of Strategic National Stockpile (SNS) Ventilators in the Pediatric Patient: Instructional Guidelines with Training Scenarios, 2nd edition

See Sample Pediatric Standard Admission Orders for additional examples for diet, IV, labs etc
<table>
<thead>
<tr>
<th>Definitions and Other Pediatric Shock Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TYPES</strong></td>
</tr>
<tr>
<td>Distributive Shock</td>
</tr>
<tr>
<td><strong>Definition:</strong> Excessive vasodilation and impaired distribution of blood flow</td>
</tr>
<tr>
<td><strong>Common types:</strong> Sepsis, anaphylaxis, spinal cord injuries (neurogenic)</td>
</tr>
<tr>
<td>Hypovolemic Shock</td>
</tr>
<tr>
<td><strong>Definition:</strong> Deficiency of intravascular blood volume</td>
</tr>
<tr>
<td><strong>Common causes:</strong></td>
</tr>
<tr>
<td>1. Intravascular volume loss: gastroenteritis, burns, diabetes insipidus, heat stroke</td>
</tr>
<tr>
<td>2. Hemorrhage: trauma, surgery</td>
</tr>
<tr>
<td>3. Interstitial loss: burns, sepsis, nephrotic syndrome, intestinal obstruction, ascites</td>
</tr>
<tr>
<td>Obstructive Shock</td>
</tr>
<tr>
<td><strong>Definition:</strong> Circulatory failure caused by a physical obstruction</td>
</tr>
<tr>
<td><strong>Common causes:</strong> Physical causes of shock should be considered (e.g. cardiac Tamponade or pulmonary embolism), especially in neonates who may have been born with obstructive congenital health disease (i.e. coarctation of the aorta, severe aortic valvular stenosis)</td>
</tr>
<tr>
<td><strong>Presentation:</strong> Neonates who present with signs of shock associated with enlarged liver, enlarged cardiac silhouette and/or heart murmur</td>
</tr>
<tr>
<td>Cardiogenic Shock</td>
</tr>
<tr>
<td><strong>Definition:</strong> Impaired cardiac contractility</td>
</tr>
<tr>
<td><strong>Common causes:</strong></td>
</tr>
<tr>
<td>1. Congestive heart failure</td>
</tr>
<tr>
<td>2. Cardiomyopathy</td>
</tr>
<tr>
<td>3. Cardiac Tamponade</td>
</tr>
<tr>
<td>4. Drugs</td>
</tr>
<tr>
<td>5. Tension Pneumothorax</td>
</tr>
</tbody>
</table>

**Key Points**

**Stages of shock:**
- Compensated, Decompensated & Irreversible
  - Tachycardia=Compensated
  - Progression to next stage can be abrupt
  - Adolescents compensate like kids, not adults
  - Hypotension=Decompensated

**Early indicators of shock**
- Hyperthermia/hypothermia, leukocytosis/neutropenia, unexplained tachycardia, tachypnea, poor distal perfusion
<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>DISORDERS</th>
<th>GOALS</th>
<th>THERAPIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory</td>
<td>Acute respiratory distress syndrome</td>
<td>Prevent/treat: hypoxia and respiratory acidosis</td>
<td>Oxygen</td>
</tr>
<tr>
<td></td>
<td>Respiratory muscle fatigue</td>
<td>Prevent barotrauma</td>
<td>Early endotracheal intubation and mechanical ventilation</td>
</tr>
<tr>
<td></td>
<td>Central apnea</td>
<td>Decrease work of breathing</td>
<td>Positive end-expiratory pressure (PEEP) Permissive hypercapnia High-frequency ventilation Extracorporeal membrane oxygenation (ECMO)</td>
</tr>
<tr>
<td>Renal</td>
<td>Pre-renal failure</td>
<td>Prevent/treat: hypovolemia, hypervolemia, hyperkalemia, metabolic acidosis, hypernatremia/ hyponatremia, and hypertension</td>
<td>Judicious fluid resuscitation Low-dose dopamine Establishment of normal urine output and blood pressure for age Furosemide (Lasix) Dialysis, ultrafiltration, hemofiltration</td>
</tr>
<tr>
<td></td>
<td>Renal failure</td>
<td>Monitor serum electrolytes</td>
<td></td>
</tr>
<tr>
<td>Hematologic</td>
<td>Coagulopathy (disseminated intravascular coagulation)</td>
<td>Prevent/treat: bleeding</td>
<td>Vitamin K Fresh frozen plasma Platelets</td>
</tr>
<tr>
<td></td>
<td>Thrombosis</td>
<td>Prevent/treat: abnormal clotting</td>
<td>Heparinization Activated protein C</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>Stress ulcers</td>
<td>Prevent/treat: gastric bleeding Avoid aspiration, abdominal distention</td>
<td>Histamine H2 receptor–blocking agents or proton pump inhibitors Nasogastric tube</td>
</tr>
<tr>
<td></td>
<td>Ileus</td>
<td>Avoid mucosal atrophy</td>
<td>Early enteral feedings</td>
</tr>
<tr>
<td></td>
<td>Bacterial translocation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endocrine</td>
<td>Adrenal insufficiency, primary or secondary to chronic steroid therapy</td>
<td>Prevent/treat: adrenal crisis</td>
<td>Stress-dose steroids in patients previously given steroids Physiologic dose for presumed primary insufficiency in sepsis</td>
</tr>
<tr>
<td>Metabolic</td>
<td>Metabolic acidosis</td>
<td>Correct etiology Normalize pH</td>
<td>Treatment of hypovolemia (fluids), poor cardiac function (fluids, inotropic agents) Improvement of renal acid excretion Low-dose (0.5-2 mEq/kg) sodium bicarbonate if the patient is not showing response, pH &lt; 7.1, and ventilation (CO2 elimination) is adequate</td>
</tr>
</tbody>
</table>
Initial Management of All Pediatric Trauma Patients

- Stabilize ABCs and c-spine (Airway, Breathing, and Circulation)
  - Initiate spinal motion restriction as indicated. Position for optimal airway and suction as needed. Position infants and children < 2 y/o supine on a backboard with a recess for the head or use a pad under the back from the shoulders to the buttocks.
  - Consider needle decompression for signs of pneumothorax, hemothorax or tension pneumothorax
- Obtain weight (actual or use of weight/length based tool)
- Establish 2 peripheral IVs (consider large bore if possible) or if unable, establish intraosseous (IO) access
- Control any external bleeding
- Avoid removal of penetrating objects in the emergency department (should be performed in operating room due to risk of hemorrhage)
- Monitor
  - Heart Rate (HR), Blood pressure (BP), Oxygen Saturation (SpO₂), mental status, temperature, perfusion, urine output, bedside glucose
- Perform detailed primary and secondary history & physical exam including mechanism of injury, Pediatric Trauma Score (PTS) and Pediatric Glasgow Coma Scale (PGCS)
- Consult pediatric care medical specialist for assistance with care of the acutely and critically injured patient (see below for Level I Trauma Criteria), to individualize the care of patient, if patient does not improve and needs to be admitted/-transferred and as needed for further support and consult.
- Category 1 Trauma Criteria (minimum):
  - All penetrating injuries to head, neck, torso, and/or groin
  - Two or more body regions with potential threat to life or limb
  - Combination trauma with ≥20% TBSA burn
  - Limb paralysis and/or sensory deficit above the wrist and ankle
  - Flail chest
  - Amputation proximal to wrist or ankle
  - Blunt or penetrating trauma with unstable vital signs AND/OR:
    - Hemodynamic compromise (Pediatric SBP≤80)
    - Respiratory compromised (Respiratory rate <10 or >29)
    - Altered mentation (PGCS≤10)
- Additional Blast Injury Considerations:
  - Classification of Blast Injuries (see page 102 for more detailed information on pediatric clinical presentations for common blast injuries and management of specific blast injuries)
    - Primary
      - Results from impact of the over-pressurized blast wave
      - Gas filled/ hollow structures most susceptible
      - Examples: blast lung, tympanic membrane rupture, abdominal hemorrhage and perforation, eye globe rupture, traumatic brain injury (TBI) without physical signs of head injury
- Secondary
  - Results from flying debris and bomb fragments
  - Entire body may be affected
  - Examples: penetrating and blunt trauma injuries, eye penetration
- Tertiary
  - Results from victims being thrown by blast wind
  - Entire body may be affected
  - Examples: fractures, amputations, closed and open brain injury
- Quaternary
  - All injuries, illnesses not due to Primary, Secondary or Tertiary mechanisms
  - Entire body may be affected
  - Example: crush injuries, burns, asphyxia, toxic exposures, exacerbation or complications from existing or chronic conditions
Management for Pediatric Trauma & Blast Injury Patients

Determine if patient is critically ill/injured
- Capillary refill > 2 seconds
- Slow or fast breathing rate
- Penetrating wound to head/chest/abdomen
- Significant blunt trauma to chest/abdomen
- Pelvic/femoral fracture
- Open chest wound
- Spinal injury with paresthesia
- Unconscious/history of LOC
- Amputation/crush injury
- Respiratory distress/failure
- Signs/symptoms of intra-abdominal injury:
  - Hematuria, Grey Turner sign (discoloration of flank/periumbilical area), abdominal asymmetry/distention, tender/guarding/pain on palpation
- Signs of Shock
- Prolonged extrication

YES

Treat all life threatening injuries:
- Protect airway:
  - Apply supplemental oxygen to maintain SpO₂ ≥ 94%
  - Use NPA/OPA as needed if not contraindicated
  - Intubated as needed to protect airway
    - Tidal volume: 6-10mL/kg
    - I-time: 0.5-1.0
    - Respiratory rate: set based on age
    - PEEP: 3-5 mm H₂O
    - Peak Inspiratory Pressure: 20-30 mm H₂O
    - For more information, see: Use of Strategic National Stockpile (SNS) Ventilators in the Pediatric Patient: Instructional Guidelines with Training Scenarios, 2nd edition
  - Control any bleeding
  - Administer 0.9NS IVF bolus 20mL/kg if signs of hypoperfusion exist. Repeat x 2 PRN
  - Consider PRBCs if patient does not respond to IVF boluses (10mL/kg)
- Perform x-rays, CTs as indicated:
  - Immobilize/splint/stabilize any fractures
- Draw labs as indicated (CBC, CMP, PT/PTT, urine analysis, Type and Screen)
- Initiate pain control
- Administer antibiotics and tetanus as indicated
- Perform detailed head to toe assessment (see pg. 7 for details)

NO

Additional Blast Injury Considerations:
- See page 8 of this care guidelines for detailed assessment and management for blast injuries
- Maintain urine output of 2-4mL/kg/hr
- Prolonged extrication requires high fluid volume and possible alkanization of the urine
  - For potential potential rhabdomyolysis (0.45% NS with 50mEq/liter of sodium bicarbonate).
  - Monitor urine for RBCs and myoglobin
  - Obtain CKMB, ECG and maintain cardiac monitor
  - Consider compartment syndrome if pain disproportionate to injury
    - Consider performing a fasciotomy (if experienced/skilled practitioner available or after...
Reassess

Worse, not improved or not normalized, or improved but not normalized

- Administer 0.9NS IVF bolus 20mL/kg x 1 PRN
- Perform x-rays, CTs and labs as indicated by injuries.
- Immobilize and splint and identified fractures
- Check for growth plate involvement
- C-Spine x-rays NOT required if (per ATLS Guidelines):
  - No neck pain or palpable tenderness AND
  - No distraction injury AND
  - GCS 15 AND
  - Not intoxicated or under influence of drugs
- Assess circulation, movement and sensation (CMS) and neuro checks every 2 hours as indicated
- Pain control as needed (consider pharmacological and non-pharmacological pain control measures)
- Blast injury Considerations:
  - Monitor urine for RBCs and myoglobin
  - Obtain ECG if indicated
  - Maintain urine output of 2-4mL/kg/hr

Reassess

Worse, not improved or not normalized, or improved but not normalized

- Repeat 0.9NS IVF bolus 20 mL/kg x 2 PRN
- Consult with pediatric care medical specialist for possible transfer
- Monitor CMS, neuro status and vital signs every 2-4 hours
- Admit patient
- See Sample admission orders (pg. 5 of this care guideline)

Improved

- Monitor for 6-8 hours and if:
  - Stable vital signs AND
  - Neuro status appropriate for age AND
  - CMS intact AND
  - Serial exams show no signs of deterioration
  - Discharge with appropriate follow up instructions
**Sample Pediatric Trauma/Blast Injury Admission Orders**

**Admitting physician:**

**Diagnosis:** ______________________________________________________________________

**Condition:**  
☐ Critical  
☐ Serious  
☐ Stable

**Weight (kg):** ___________________  
**Height (cm):** ___________________

**Allergies:** __________________________________________________________________________

**Assessment:**

☐ Continuous cardiac monitoring

☐ Continuous pulse oximetry

☐ Blood pressure with all vital signs

☐ Routine I&O

☐ Strict I&O q 1 hour (maintain urine output at 2-4mL/kg/hr)

☐ Daily weight

☐ Seizure precautions

☐ Neuro checks every_____ hours

☐ Perform CMS checks on extremities every ____ hours to monitor for compartment syndrome/crush syndrome

**Tests:**

**Medications:**

☐ Analgesics/Antipyretics:

☐ Acetaminophen (Tylenol) (15mg/kg/dose)_________mg PO/GT every 4 hrs PRN for temperature ≥ 38.6°C/101.5°F or discomfort (max dose 3000mg/day)

☐ Acetaminophen (Tylenol) (20mg/kg/dose)_________mg PR every 4 hrs PRN for temperature ≥ 38.6°C/101.5°F or discomfort (max dose 3000mg/day)

☐ Ibuprofen (Motrin) (10mg/kg/dose) _________mg PO/GT every 6 hours PRN for temperature ≥ 38.6°C/101.5°F or discomfort (for infants >5 months). Ensure adequate renal function before utilizing.

☐ Analgesics

☐ Acetaminophen with hydrocodone (Hycet/Lortab/Lorcet/Norco) ________mg/kg PO every 4-6 hours PRN for pain

☐ Morphine (0.1-0.2 mg/kg) _____ mg IV every 2-4 hours as needed (max 10mg/dose)

☐ Fentanyl _______mg IV every ______ hours as needed.

☐ Antibiotics:

☐ __________________________________________________________________________

☐ __________________________________________________________________________

☐ __________________________________________________________________________

☐ Topical anesthetic for IV start and lab draws

☐ Apply topically once 30-90 minutes prior to procedure (maximum 1gm, 10 centimeter area squared, or application time of 2 hours)

**IV Therapy:**

☐ Saline Lock

☐ NS bolus _______ mL IV to run over 1 – 2 hours
□ LR bolus _______mL IV to run over 1-2 hours
□ D5 0.45 NS with 20 mEq KCl/L to run at _________mL/hr (Ensure adequate renal function before utilizing potassium)
□ D5 0.2 NS with 20 mEq KCl/L to run at _________mL/hr (Ensure adequate renal function before utilizing potassium)
□ Other

Supplemental Oxygen Orders:

- If SpO₂ < 90% on room air, apply oxygen to maintain SpO₂ 91-94%
  - Nasal Cannula
  - Aerosol Mask
- Titrate oxygen to maintain SpO₂ > 90%
- Wean oxygen if SpO₂ maintains 94%.
  - Decrease oxygen by ½ liter per minute (LPM) and reassess patient 5-10 minutes after change in oxygen
  - Do not decrease oxygen more frequently than every 60 minutes

□ Ventilator Settings:
  - For more information, see: *Use of Strategic National Stockpile (SNS) Ventilators in the Pediatric Patient: Instructional Guidelines with Training Scenarios, 2nd edition*

□ See **Sample Pediatric Standard Admission Orders** for additional examples for diet, IV, labs etc.
□ If hypovolemic, refer to **Pediatric Shock Care Guidelines: Sample Hypovolemic Shock Admission Orders**
Detailed Assessment of Pediatric Trauma Patients

- Inspect/palpate each body area for DCAP-BLS, TIC, PMS (Deformity, contusions, abrasions, punctures, burns, lacerations, swelling, tenderness, instability, crepitus; + pulses, motor, and sensory ability) as appropriate plus:
  - MENTAL STATUS: Assessment using the Pediatric Glasgow Coma Score (PGCS), Neuro exam, motor/sensory, nuchal rigidity, appearance, tone, acting appropriate for age, consolability, look/gaze, and speech/cry.
  - HEAD, FACE, EYES, EARS, NOSE, MOUTH: Note any drainage; re-inspect pupils for size, shape, equality, fixed deviation and reactivity; conjugate movements; note gross visual acuity
  - NECK: Carotid pulses, neck veins, subcutaneous (Sub-Q) emphysema, location of trachea, and cervical spines
    May need to temporarily remove anterior aspect of c-collar to re-assess neck
  - CHEST: Expose chest as needed. Auscultate breath/heart sounds.
  - RESPIRATION/VENTILLATION: rate, rhythm, pattern and work of breathing
  - ABDOMEN: Signs of injury/peritonitis. Note contour, visible pulsations, wounds/bruising patterns, pain referral sites, localized tenderness, guarding, rigidity
  - PELVIS/GU: Inspect perineum and apply PASG/mast trousers if suspected pelvic fracture.
  - EXTREMITIES: Inspect for position, false motion, skin color, and signs of injury
  - BACK: Note any muscle spasms
  - SKIN/SOFT TISSUE: Inspect/palpate for color, temperature, moisture, signs of SQ emphysema, pulses in all extremities, capillary refill

<table>
<thead>
<tr>
<th>Component</th>
<th>+2</th>
<th>+1</th>
<th>-1</th>
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<tbody>
<tr>
<td>Size</td>
<td>&gt; 20kg &gt; 5 years old</td>
<td>11-20kg 1-5 years old</td>
<td>≤ 10kg &lt; 1 year old</td>
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<td>50-90mmHg</td>
<td>&lt; 50 mmHg</td>
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<td>Obtunded/lost consciousness</td>
<td>Coma/unresponsive</td>
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<tr>
<td>Skeletal Injury</td>
<td>None</td>
<td>Closed fracture</td>
<td>Open/multiple fractures</td>
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<tr>
<td>Open Wounds</td>
<td>None</td>
<td>Minor</td>
<td>Major/penetrating</td>
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</tbody>
</table>

Score of < 8 usually indicates the need for evaluation at a Trauma Center.

### Pediatric Glasgow Coma Scale

#### Eye Opening (E)
- (4) Spontaneous
- (3) To speech
- (2) To pain
- (1) None

#### Verbal Response (V)
- (5) Coos, babbles, appropriate words
- (4) Irritable, cries
- (3) Cries to pain
- (2) Moans to pain
- (1) None

#### Motor Response (M)
- (6) Normal spontaneous movements
- (5) Withdraws from touch
- (4) Withdraws from pain
- (3) Abnormal flexion (decorticate)
- (2) Abnormal extension (decerebrate)
- (1) None

#### For Patients <2 Years Old
- (4) Spontaneous
- (3) To speech
- (2) To pain
- (1) None

#### For Patients >2 Years Old
- (5) Oriented
- (4) Confused
- (3) Inappropriate words
- (2) Incomprehensible
- (1) None

- (6) Obey commands
- (5) Localizes to pain
- (4) Withdrawal to pain
- (3) Flexion to pain
- (2) Extension to pain
- (1) None
## Detailed Assessment and Management of Blast Injury


<table>
<thead>
<tr>
<th>Type of Injury</th>
<th>Presentation</th>
<th>Diagnosis</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal injury</td>
<td>• Injury presentation may be subtle and variable</td>
<td>• Similar to standard abdominal trauma</td>
<td>• NPO</td>
</tr>
<tr>
<td></td>
<td>• Signs/symptoms: abdominal pain, rebound tenderness, absent bowel sounds, nausea, vomiting, fever and sighs of hypovolemia or hemorrhage</td>
<td>• Serial abdominal exams</td>
<td>• Avoid removal of penetrating objects in the emergency department (perform in OR)</td>
</tr>
<tr>
<td></td>
<td>• Injuries following underwater blasts have increased severity</td>
<td>• Laboratory tests</td>
<td>• Antibiotics, tetanus vaccination</td>
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<tr>
<td></td>
<td><strong>Pediatric Considerations:</strong></td>
<td>• Radiology tests: fee air, unexplained ileus, intra-abdominal hematoma/hemorrhage, solid organ contusion/laceration, intra-abdominal abscess</td>
<td>• Serial exams and laboratory monitoring</td>
</tr>
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<td></td>
<td>o Smaller and more pliable ribs and thinner abdominal walls leaves abdomen organs unprotected so children are more prone to abdominal injuries</td>
<td></td>
<td>• Women in 2nd and 3rd trimester should have fetal monitoring</td>
</tr>
<tr>
<td></td>
<td>o Proportionally, children have larger organs so they are more prone to injury</td>
<td></td>
<td>• All pregnant women should have a Kleihauer-Betke test:</td>
</tr>
<tr>
<td></td>
<td>o Spleen and liver are especially more vulnerable to injury from blunt and penetrating force trauma.</td>
<td></td>
<td>o Positive requires mandatory pelvic ultrasound, fetal non-stress test monitoring and OB/GYNE consult</td>
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<tr>
<td></td>
<td>o Traumatic asphyxia results from sudden compression of the abdomen or chest against a closed glottis. Symptoms include: hyperemic sclera, seizures, disorientation, petechiae on upper body, respiratory failure. Treatment is supportive.</td>
<td></td>
<td>• Radiology exams: plain abdominal films, CT scan, Focused Abdominal Sonography for Trauma (FAST)</td>
</tr>
<tr>
<td></td>
<td><strong>Brain/Neurological/Cervical Injury</strong></td>
<td></td>
<td>• Appropriate referral to trauma center as applicable</td>
</tr>
<tr>
<td></td>
<td>• Head injury is most common cause of death in bombings</td>
<td>• Glasgow Coma Scale (GCS)/ Pediatric Glasgow Coma Scale (PGCS)</td>
<td>• Strict discharge and return instructions if signs/symptoms of abdominal injury occur after discharge</td>
</tr>
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</tr>
</tbody>
</table>
| • Diffuse axonal injury, skull fractures, coup-counter-coup injury, subarachnoid and subdural hemorrhage common | • Mild TBI: At least 1 of the following inclusion criteria present:
- Any period of LOC and GCS/PGCS of 13-15 after the LOC
- Any loss of memory of the event immediately before or after the incident with posttraumatic amnesia of < 24hrs
- Any alteration in mental status at the time of incident
| • Mild Traumatic Brain Injury (mTBI) may go undiagnosed or misdiagnosed as PTSD | • Maintain:
- Cerebral perfusion pressure
- Body temperature
- Neuromuscular blockage and sedation (for intubated patients)
- Cervical spine control
- Glucose control
- Seizure control
- DVT prophylaxis
| • May or may not have history of loss of consciousness (LOC) | • Complete rest until asymptomatic
| • Headache, seizures, dizziness, memory problems | • Symptoms that persist beyond 7-10 days suggests post-concussion syndrome and warrants additional follow up.
| • Gait/balance problems, nausea, vomiting, difficulty concentrating | Pediatric considerations:
- Traumatic brain injury (TBI) can occur in patients who have not had a loss in consciousness. Children may appear alert and awake initially but should be evaluated if they have any of the following symptoms:
  - Abnormal behavior (i.e. irritability, excessive sleepiness)
  - Persistent vomiting
  - Seizures
  - Loss of consciousness
  - Evidence of CSF leak
| • Visual Disturbances, tinnitus, slurred speech | • Young children have immature neck musculature and relatively large heads which makes them more prone to cervical spine injuries in C1-C3.
| • Disoriented, irritable, confused | • Children less than 8 years old are susceptible to SCIWORA (spinal cord injury without radiographic abnormality)
| • Extremity weakness or numbness | • MRI is more sensitive to diagnosis diffuse axonal injury
### Crush Injury and Crush Syndrome

- Consider cervical spine injury in children with head injury
- Reperfusion syndrome:
  - Hypotension
  - Renal failure d/t rhabdomyolysis, myoglobinuria and metabolic abnormalities
  - Metabolic abnormalities (hypocalcemia, hyperkalemia, metabolic acidosis)
- Cardiac arrhythmias
- Compartment syndrome

- History of events/ injury
- Laboratory tests

- If possible, administer IVF before releasing crushed body part
- Administer IV hydration
  - Maintain urine output of 2-4mL/kg/hr
- Monitor for cardiac arrhythmias
- Treat hyperkalemia and hypocalcemia
- Alkalize the urine
- Monitor for renal failure-consider hemodialysis as needed
- Monitor for compartment syndrome
- Monitor urine for red blood cells
- Treat open wounds with antibiotics and tetanus vaccination
- Observe all crush injuries and monitor for the pain, pallor, paresthesia, pain with passive movement and pulselessness

### Ear Injury

- External Ear:
  - May have degloving of cartilage which is considered a serious injury
  - Pinna hematoma from blunt trauma
- Tympanic Membrane (TM):
  - Can be stretched and displaced medially
  - Range of injuries includes intra-tympanic hemorrhage to TM perforation
  - Injuries can be unilateral or bilateral, small or complete, single or double
  - Laceration can be smooth and linear, punched out or ragged with inverted or everted edges
- Middle Ear:
  - Conductive and sensorineural hearing loss, vestibular disturbances, cranial

- Otoscopic evaluation

- External Ear:
  - Manage injuries with foreign body removal, clean and close wounds
  - Consider consultation on closure requirements if cartilage of pinna is degloved
  - Drain pinna hematomas and apply pressure dressing
- Tympanic Membrane:
  - Rupture: Keep ear clean and dry. Refer patient to specialist
  - Perforation: Antibiotic eardrops to irrigate and clear ear of debris
- Middle and Inner Ear:
  - Can defer until patient can see specialist
  - Will need audiometry exams
<table>
<thead>
<tr>
<th>Extremity Injuries</th>
<th>Eye Injuries</th>
</tr>
</thead>
</table>
| nerve palsy, CNS complications (brain abscess & meningitis)  
• Inner Ear:  
  o Damage to auditory and vestibular components  
  o Temporary hearing changes | nerve palsy, CNS complications (brain abscess & meningitis)  
• Document systemic musculoskeletal, neurological, and vascular states of each extremity  
• Document each open wound  
• Photograph if possible  
• Radiological exams as indicated |
| Traumatic amputations: primarily occur through bony shaft rather than joint disarticulations  
• Fragments imbedded into extremity  
• Blunt force injuries  
• Crush injuries (see above for more information) | Perform thorough debridement  
• Antibiotics for all open fractures  
• Obviously contaminated wounds:  
  o Irrigate with sterile saline; dress with Betadine soaked sponges  
  o Tetanus prophylaxis if indicated  
  o Splint fractured extremities  
  o Surgical management:  
    o Initial debridement and bony stabilization should be done in OR |
| Eye Injuries  
• Presents with wide range of symptoms  
  • Significant eye damage may be present with normal vision and minimal symptoms (irritation, foreign body sensation, altered vision, bleeding, periorbital swelling or bruising)  
  • Minor injuries include: Corneal abrasions, conjunctivitis, superficial foreign bodies  
  • Open globe (360° conjunctival hemorrhage, misshapen pupil, brown/pigmented tissue outside of globe, clear gel like tissue outside of globe, abnormally deep or shallow anterior chamber  
  • Eyelid lacerations are common  
  • Serious non-penetrating injuries: hyphema, traumatic cataract, citrous hemorrhage, retinal detachment, choroidal rupture and optic nerve injuries | Obtain visual acuity  
• Test for light perception, hand motion and count fingers  
• Thin cut CT scan of orbits may help identify foreign bodies  
• MRI is contraindicated until proven that no metal foreign bodies are present |
| Do not force eyelid open-defer exam if massive swelling is present  
• Assume all eye injuries may also be ruptured globe  
• Do not patch or bandage the eye  
• Use convex plastic or metal shield or the bottom of a clean paper cup taped in place  
• Do not remove impaled FBs  
• Tetanus if indicated  
• Administer anti-emetics for nausea and vomiting  
• Administer IV broad spectrum antibiotics if rupture globe is suspected  
• Consult an ophthalmologist as soon as possible  
• Rapid transport to facility with ophthalmic OR capabilities is primary goal |
### Lung/Chest Injury
- May present with no external injuries to chest
- Symptoms: dyspnea, hemoptysis, cough, chest pain
- Signs: tachypnea, hypoxia, cyanosis, apnea, wheezing, decreased breath sounds, hemodynamic instability
- Associated pathology: bronchopleural fistula, air emboli, hemothorax, pneumothorax

**Pediatric Considerations:**
- Chest injuries are a common cause of death in children after an explosive event. Below are some anatomical features found in children that affect their injury pattern:
  - Chest wall is more compliant so rib fractures are less common. Severe thoracic injuries can occur without significant external evidence of injury
  - Mediastinal structures are more mobile. Tension pneumothorax can shift mediastinum and cause respiratory and cardiovascular compromise. Suspect tension pneumothorax in children who are hypotensive and hypoxic
  - Traumatic asphyxia results from sudden compression of the abdomen or chest against a closed glottis. Symptoms include: hyperemic sclera, seizures, disorientation, petechiae on upper body, respiratory failure. Treatment is supportive.

### Chest Radiography:
- Characteristic “butterfly” pattern
- Arterial blood gases (ABG)
- CT Chest
- Doppler

### Care
- Care is similar to a pulmonary contusion
  - Cautious IVF use ensuring tissue perfusion without volume overload
- High flow oxygen to prevent hypoxemia
- Secure airway for: impending airway compromise, secondary edema, injury or massive hemothysis
- Prompt decompression for hemo- or pneumothorax
- Use caution with decision to intubate patient-mechanical ventilation and positive end pressure may increase risk of alveolar rupture and air embolism
- Air embolism: high flow oxygen; place patient in prone, semi-left lateral or left lateral position and transfer to hyperbaric chamber
- Patients with normal chest xray and ABG and no complaints can be discharged after observing for 4-6 hours

### Mental Health
- Will vary based on age and developmental level
- Provide psychological first aid (PFA)
- Refer to behavioral health specialist as indicated
Purpose: To provide guidance to practitioners caring for pediatric patients who need inpatient hospital care during a disaster.

Disclaimer: This guideline is not meant to be all inclusive, replace an existing policy and procedure at a hospital or substitute for clinical judgment. These guidelines may be modified at the discretion of the healthcare provider.

Sample Pediatric Standard Admission Orders
Sample Pediatric Respiratory Admission Orders
Sample Pediatric Septic Shock Admission Orders
Sample Pediatric Hypovolemic Shock Admission Orders
Sample Pediatric Trauma/Blast Injury Admission Orders
Sample Pediatric Standard Admission Orders

Admitting physician: ____________________________________________________________

Diagnosis: __________________________________________________________________

Condition: □ Critical □ Serious □ Stable

Patient Admission Status: □ Full inpatient □ Observation □ Observation

Weight (kg):__________________ Height (cm):__________________

Allergies: ____________________________________________________________________

Activity:

□ As tolerated
□ Strict bed rest
□ Bed rest with bathroom privileges

Isolation: ____________________________________________________________________

Vital signs/assessment:

□ Per nursing protocol (if applicable)
□ Continuous cardiac monitoring
□ Continuous pulse-ox
□ Spot check pulse-ox with vitals and if exhibiting respiratory difficulty
□ Continuous pulse-ox if patient receiving supplemental O2
□ Routine I & O
□ Strict I & O
□ Daily weights
□ BP with vitals
□ Seizure precautions
□ Neuro checks every ______
□ Notify physician if temperature is greater than ____ or less than ____
□ Notify physician if pulse oximetry is less than ______
□ Other ______________________________________________________________________

Diet:

□ General PO ad lib
□ Soft diet PO ad lib
□ Full liquid diet PO ad lib
□ Clear liquid diet PO ad lib
□ Breastfeeding PO ad lib
□ _____________________________ formula PO ad lib
□ NPO
□ Other ______________________________________________________________________

IVS:

□ Saline Lock
□ NS bolus _______ mL IV to run over 1 – 2 hours
□ D5 ½ NS with 20 mEq KCl/L to run at _________mL/hr
□ D5 ¾ NS with 20 mEq KCl/L to run at _________mL/hr
□ Other ______________________________________________________________________
Supplemental Oxygen:
Oxygen to maintain saturation ≥______________% via:
□ Nasal cannula __________________________
□ High-humidity nasal cannula _____________
□ High flow high humidity nasal cannula ______ L
□ Trach collar _____________________________
□ Other: __________________________________________________________________________

Respiratory Treatments:
□________________________________________________________________________________
□________________________________________________________________________________
□________________________________________________________________________________

Labs:
□ CBC with Differential
□ CBC (Hemogram)
□ CMP
□ BMP
□ CBG
□ VBG
□ ESR
□ CRP
□ UA: □ Clean catch □ Bagged □ Cath □ HCG □ Urine culture
□ Blood culture
□ Stool for: □ Culture □ Rotavirus □ C. diff □ O&P □ Gram stain
□ Heme
□ NP wash for: □ RSV □ Influenza □ Viral culture
□ __________________________________________________________________________________
□ __________________________________________________________________________________
□ __________________________________________________________________________________
□ __________________________________________________________________________________
□ __________________________________________________________________________________
□ __________________________________________________________________________________

Radiology:
□ CXR (AP) Reason: __________________________________________________________________
□ CXR (PA and lateral): Reason: __________________________________________________________________
□ Abdominal series: Reason: __________________________________________________________________
□ KUBL: Reason: ____________________________________________________________________________
□ Other __________________________________________________________________________________
□ Other __________________________________________________________________________________
□ Other __________________________________________________________________________________
Medications:

☐ Analgesics/Antipyretics:

☐ Acetaminophen (Tylenol) (15 mg/kg/dose) _______mg PO/GT every 4 hours PRN temperature ≥ 38.6°C/101.5°F and/or discomfort (not to exceed 4000 mg a day)

☐ Acetaminophen (Tylenol) (20 mg/kg/dose) _______mg PR every 4 hours PRN temperature ≥ 38.6°C/101.5°F and/or discomfort (not to exceed 4000 mg a day)

☐ Ibuprofen (Motrin) (10 mg/kg/dose) _______ mg PO/GT every 6 hours PRN temperature ≥ 38.6°C/101.5°F and/or discomfort

☐ Analgesics

☐ Acetaminophen with hydrocodone (Hycet/Lortab/Lorcet/Norco) _______mg/kg PO every 4-6 hours PRN for pain

☐ Morphine (0.1-0.2 mg/kg) _____ mg IV every 2-4 hours as needed (max 10 mg/dose)

☐ Fentanyl _______ mcg IV every ______ hours as needed.

☐ Topical Anesthetic to be applied prior to routine blood draws and IV starts

☐ Other:

☐ ______________________________________________________________________

☐ ______________________________________________________________________

☐ ______________________________________________________________________

☐ ______________________________________________________________________

☐ ____________________________________________

Consults:

☐ ______________________________________________________________________

☐ ______________________________________________________________________

☐ ______________________________________________________________________

Additional Orders:

☐ ______________________________________________________________________

☐ ______________________________________________________________________

☐ ______________________________________________________________________

☐ _________________________________________________________________

☐ ______________________________________________________________________

☐ ______________________________________________________________________
Sample Pediatric Respiratory Admission Orders

Admitting physician: ____________________________________________
Diagnosis: ______________________________________________________

Condition: □ Critical □ Serious □ Stable

Weight (kg): ___________________ Height (cm): _____________________
Allergies: ______________________________________________________

Pulse Oximetry:

- Obtain pulse oximetry on admission to unit
- If SpO₂ > 90%, obtain spot check pulse oximetry readings with each treatment, with vital signs or if patient exhibits decline in respiratory status
- If SpO₂ < 90%, provide oxygen and begin continuous pulse oximetry monitoring

Supplemental Oxygen Orders:

- If SpO₂ < 90% on room air, apply oxygen to maintain SpO₂ 91-94%
  - Nasal Cannula
  - Aerosol Mask
- Titrate oxygen to maintain pulse oximetry > 90%
- Wean oxygen if oxygen saturation maintains 94%.
  - Decrease oxygen by ½ liter per minute (LPM) and reassess patient 5-10 minutes after change in oxygen
  - Do not decrease oxygen more frequently than every 60 minutes

Ventilator settings: ________________________________

For more information, see: Use of Strategic National Stockpile (SNS) Ventilators in the Pediatric Patient: Instructional Guidelines with Training Scenarios, 2nd edition

Peak Expiratory Flow Rate (PEFR)

- Peak Flow will be done on admission for patients > 5 years of age to determine patient’s compliance/ability to effectively perform
- Check Peak Flow before and after breathing treatments.

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<th>Height</th>
<th>PEFR (L/min)</th>
<th>PEFR (L/min)</th>
<th>PEFR (L/min)</th>
<th>PEFR (L/min)</th>
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</tbody>
</table>

AVERAGE PREDICTED PEAK EXPIRATORY FLOW RATES FOR NORMAL CHILDREN

Medications:

☐ Albuterol
  ☐ MDI via spacer device
    ☐ 2 puffs every 3 hours (6-11 months old)
    ☐ 4 puffs every 3 hours (> 12 months old)
  ☐ Nebulizer ____mg every ____ hrs (0.5 mg/kg/hr, max dose 30 mg/hr)
  ☐ Continuous
    ☐ If patient requires treatment prior to two hour interval, administer Albuterol
       continuous nebulizer for two hours and begin continuous pulse oximetry monitoring
  ☐ Albuterol 0.5mg/kg/hr (max dose 10mg/hr)

☐ Ipratropium bromide (Atrovent):
  ☐ 0.5 mg to be given with 2<sup>nd</sup> and 3<sup>rd</sup> doses of Albuterol

☐ Corticosteroids:
  ☐ Prednisolone Sodium Phosphate (Orapred): ____mg PO STAT (2 mg/kg loading dose-max 60 mg/dose) then ____mg PO every 12 hours (1 mg/kg maintenance dose-max 30 mg/dose) x 5 days
  ☐ Methylprednisone (Solumedrol): ____mg IV STAT (2 mg/kg loading dose-max 60 mg/dose) then ____mg IV every 6 hours (1 mg/kg maintenance dose-max 30 mg/dose) x 4 doses

☐ Topical anesthetic for IV start and lab draws:
  ☐ Apply topically once 30-90 minutes prior to painful procedures (maximum 1 gm, 10 centimeter area squared, or application time of 2 hours)

☐ Antibiotics:

☐ Analgesics/Antipyretics:
  ☐ Acetaminophen (Tylenol) (15 mg/kg/dose) ____mg PO/GT every 4 hrs PRN for temperature ≥ 38.6°C/101.5°F or discomfort (max dose 3000mg/day)
  ☐ Acetaminophen (Tylenol) (20 mg/kg/dose) ____mg PR every 4 hrs PRN for temperature ≥ 38.6°C/101.5°F or discomfort (max dose 3000mg/day)
  ☐ Ibuprofen (Motrin) (10mg/kg/dose) ____mg PO/GT every 6 hours PRN for temperature ≥ 38.6°C/101.5°F or discomfort

☐ See Sample Pediatric Standard Admission Orders for additional examples for diet, IV, labs etc.

☐ Asthma Score (see next page)
### Asthma Score

- Intended for use with patients > 2 years old who are being treated for asthma or an asthma exacerbation.
- Not intended for patients who:
  - Are being treated for bronchiolitis, pneumonia, croup, reactive airway disease.
  - Have chronic lung disease, cystic fibrosis, airway anomalies, cardiac disease, foreign body or neurologic disorders.
- Calculate the asthma score upon admission, prior to each aerosol treatment, and during the weaning process.
- Wean if score of 0-1 and/or peak expiratory flow rate (PEFR) greater than 70% predicted ➔ see Asthma Weaning Guidelines on next page.
- Treatment should be given for a score of 2 or higher and/or PEFR less than 70% predicted.

<table>
<thead>
<tr>
<th>ASTHMA SCORE</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Respiratory Rate (Count for a full minute)</strong></td>
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<tr>
<td>0-12 mos:</td>
<td>&lt; 40</td>
<td>0-12 mos:</td>
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<tr>
<td>1-5 y/o:</td>
<td>&lt; 30</td>
<td>1-5 y/o:</td>
<td>1-5 y/o:</td>
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<tr>
<td>6-9 y/o:</td>
<td>&lt; 25</td>
<td>6-9 y/o:</td>
<td>6-9 y/o:</td>
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<tr>
<td>10-15 y/o:</td>
<td>&lt; 23</td>
<td>10-15 y/o:</td>
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<tr>
<td>&gt;15 y/o:</td>
<td>&lt; 20</td>
<td>&gt;15 y/o:</td>
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<tr>
<td><strong>Retractions</strong></td>
<td>None</td>
<td>Suprasternal/Subcostal/ Intercostal</td>
<td>Using neck or abdominal muscles (belly breathing) if atypical for child</td>
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<tr>
<td><strong>Breath Sounds</strong></td>
<td>Normal, equal, Mild expiratory wheeze</td>
<td>Wheeze throughout expiration Localized decreased breath sounds</td>
<td>Wheeze throughout inspiration &amp; expiration Multiple areas with decreased breath sounds</td>
</tr>
<tr>
<td><strong>Oxygen Saturation (SpO₂)</strong></td>
<td>≥ to 92%</td>
<td>≥ 90-92%</td>
<td>≤ 90%</td>
</tr>
</tbody>
</table>

Adapted from: Cincinnati Children’s Hospital Medical Center Respiratory Assessment/Care Record, 2002; Kelly et al, Improved Outcomes for Hospitalized Asthmatic Children Using a Clinical Pathway, 2000.
Sample Pediatric Septic Shock Admission Orders

Admitting physician: ____________________________________________

Diagnosis: ______________________________________________________

Condition:  □ Critical    □ Serious    □ Stable

Weight (kg):__________________  Height(cm):____________________

Allergies: ______________________________________________________

Isolation: ______________________________________________________

Assessment:
  □ Continuous cardiac monitoring
  □ Continuous pulse oximetry
  □ Blood pressure with all vital signs
  □ Routine I&O
  □ Strict I&O
  □ Daily weight
  □ Seizure precautions
  □ Neuro checks every_____ hours
  □ All non-rectal temperatures > 38°C/100.4°F should be confirmed rectally on infants ≤60 days of age

Tests:
  □ CBC with differential
    □ now (order if not performed prior to admission)
    □ at_______
    □ every ______ hours

□ CMP
  □ now (order if not performed prior to admission)
  □ at_______
  □ every ______ hours

□ BMP
  □ now (order if not performed prior to admission)
  □ at_______
  □ every ______ hours

□ Blood culture (order if not performed prior to admission)
□ Viral blood culture
□ Catheterized urinalysis (order if not performed prior to admission)
□ Catheterized urine culture (order if not performed prior to admission)
□ Stool culture
□ Stool for Rotavirus
□ Stool gram stain
□ RSV
□ Influenza
□ Viral culture
□ Chest x-ray (PA and lateral) (order if not performed prior to admission)
For infants ≤ 60 days of age with fever:
    □ CSF for (laboratory should perform these in ranking order as listed below)
IDPH ESF-8 Plan: Pediatric and Neonatal Surge Annex  
Sample Pediatric Admission Orders  

☐ Cell count  
☐ Glucose  
☐ Protein  
☐ Gram stain  
☐ Aerobic culture  
☐ Viral culture  
☐ Enterovirus PCR  
☐ Herpes PCR  
☐ Meningitis antigen profile  
☐ Conjunctiva viral culture  
☐ Viral culture of skin lesion on _____________  
☐ Rectal viral culture  
☐ ____________________________________________  
☐ ____________________________________________  
☐ ____________________________________________  

Medications:  
☐ Analgesics/Antipyretics:  
  ☐ Acetaminophen (Tylenol) (15 mg/kg/dose) ________mg PO/GT every 4 hrs PRN for temperature ≥ 38.6°C/101.5°F or discomfort (max dose 3000 mg/day)  
  ☐ Acetaminophen (Tylenol) (20 mg/kg/dose) ________mg PR every 4 hrs PRN for temperature ≥ 38.6°C/101.5°F or discomfort (max dose 3000 mg/day)  
  ☐ Ibuprofen (Motrin) (10 mg/kg/dose) ________mg PO/GT every 6 hours PRN for temperature ≥ 38.6°C/101.5°F or discomfort (for infants > 5 months)  

☐ Antibiotics:  
  ☐ Ceftriaxone _______mg IV every ______ hours (max 4 gm/day)  
  ☐ Vancomycin ________mg IV every ______ hours (max 1 gm/dose)  
  ☐ ____________________________________________  
  ☐ ____________________________________________  
  ☐ ____________________________________________  
  ☐ For infants ≤ 30 days of age with fever:  
    ☐ Ampicillin ________ mg IV every 6 hours (200 mg/kg/day)  
    ☐ Cefuroxime ________mg IV every 6 hours (200 mg/kg/day)  
    ☐ Cefotaxime ________ mg IV every ______ hours  
    ☐ Acyclovir _________mg IV every _____ hours  
      (If greater than or equal to 35 weeks post-conceptual age, give 60 mg/kg/day divided every 8 hours. If less than 35 weeks post conceptual age, give 40 mg/kg/day divided every 12 hours)  
    ☐ Gentamycin ________mg IV every ______hours  

☐ Topical anesthetic for IV start and lab draws:  
  ☐ Apply topically once 30-90 minutes prior to procedure (maximum 1 gm, 10 centimeter area squared, or application time of 2 hours)  

IV Therapy:  
☐ Saline lock  
☐ D5 ½ NS with 20 mEq KCl/L running at ______ mL/hr (ensure patient is voiding)
Sample Pediatric Admission Orders

- □ _______________ running at ______ mL/hr
- □ _______________ running at ______ mL/hr

Supplemental Oxygen Orders:
- If SpO₂ < 90% on room air, apply oxygen to maintain SpO₂ 91-94%
  - Nasal Cannula
  - Aerosol Mask
- Titrate oxygen to maintain SpO₂ > 90%
- Wean oxygen if oxygen saturation maintains 94%.
  - Decrease oxygen by ½ liter per minute (LPM) and reassess patient 5-10 minutes after change in oxygen
  - Do not decrease oxygen more frequently than every 60 minutes

- □ Ventilator Settings:__________________________
  - For more information, see: Use of Strategic National Stockpile (SNS) Ventilators in the Pediatric Patient: Instructional Guidelines with Training Scenarios, 2nd edition

- □ See Sample Pediatric Standard Admission Orders for additional examples for diet, IV, labs etc.
Sample Pediatric Hypovolemic Shock Admission Orders

Admitting physician: ______________________________________________________________
Diagnosis: ______________________________________________________________________
Condition: □ Critical □ Serious □ Stable
Weight (kg):__________________ Height (cm):_________________
Allergies: ______________________________________________________________________
Isolation: ______________________________________________________________________

Assessment:
□ Continuous cardiac monitoring
□ Continuous pulse oximetry
□ Blood pressure with all vital signs
□ Routine I&O
□ Strict I&O
□ Daily weight

Tests:
□ CBC with differential
  □ now (order if not performed prior to admission)
  □ at______
  □ every ______ hours
□ CMP
  □ now (order if not performed prior to admission)
  □ at______
  □ every ______ hours
□ BMP
  □ now (order if not performed prior to admission)
  □ at______
  □ every ______ hours

Medications:
□ Analgesics/Antipyretics:
  □ Acetaminophen (Tylenol) (15 mg/kg/dose) _________mg PO/GT every 4 hrs PRN for
temperature ≥ 38.6°C/101.5°F or discomfort (max dose 3000 mg/day)
  □ Acetaminophen (Tylenol) (20mg/kg/dose) _________mg PR every 4 hrs PRN for temperature
≥ 38.6°C/101.5°F or discomfort (max dose 3000 mg/day)
  □ Ibuprofen (Motrin) (10mg/kg/dose) _________mg PO/GT every 6 hours PRN for temperature
≥ 38.6°C/101.5°F or discomfort (for infants > 5 months)
□ Antiemetic:
  □ ______________________________________________________________________________
□ Antibiotics:
  □ ______________________________________________________________________________
  □ ______________________________________________________________________________
  □ ______________________________________________________________________________
Sample Pediatric Admission Orders

- **Topical anesthetic for IV start and lab draws:**
  - Apply topically once 30-90 minutes prior to procedure (maximum 1gm, 10 centimeter area squared, or application time of 2 hours)

- **IV Therapy:**
  - □ ____________________________________________________________________
  - □ D5 ½ NS with 20 mEq KCl/L running at _____ mL/hr (ensure patient is voiding)
  - □ ______________________ running at _____ mL/hr
  - □ ______________________ running at _____ mL/hr

- **Supplemental Oxygen Orders:**
  - If SpO₂ < 90% on room air, apply oxygen to maintain SpO₂ 91-94%
    - Nasal Cannula
    - Aerosol Mask
  - Titrate oxygen to maintain SpO₂ > 90%
  - Wean oxygen if oxygen saturation maintains 94%.
    - Decrease oxygen by ½ liter per minute (LPM) and reassess patient 5-10 minutes after change in oxygen
    - Do not decrease oxygen more frequently than every 60 minutes

- **Ventilator Settings:**
  - For more information, see: Use of Strategic National Stockpile (SNS) Ventilators in the Pediatric Patient: Instructional Guidelines with Training Scenarios, 2nd edition

- See **Sample Pediatric Standard Admission Orders** for additional examples for diet, IV, labs etc
Sample Pediatric Trauma/Blast Injury Admission Orders

Admitting physician: ________________________________________________________________

Diagnosis: ______________________________________________________________________

Condition:  □ Critical  □ Serious  □ Stable

Weight (kg): ___________________  Height (cm): ___________________

Allergies: _______________________________________________________________________

Assessment:
□ Continuous cardiac monitoring
□ Continuous pulse oximetry
□ Blood pressure with all vital signs
□ Routine I&O
□ Strict I&O q 1 hour (maintain urine output at 2-4 mL/kg/hr)
□ Daily weight
□ Seizure precautions
□ Neuro checks every _____ hours
□ Perform CMS checks on extremities every _____ hours to monitor for compartment syndrome/crush syndrome

Tests:
□ ______________________________________________________________________________
□ ______________________________________________________________________________
□ ______________________________________________________________________________

Medications:
□ Analgesics/Antipyretics:
  □ Acetaminophen (Tylenol) (15 mg/kg/dose) _________ mg PO/GT every 4 hrs PRN for temperature ≥ 38.6°C/101.5°F or discomfort (max dose 3000 mg/day)
  □ Acetaminophen (Tylenol) (20 mg/kg/dose) _________ mg PR every 4 hrs PRN for temperature ≥ 38.6°C/101.5°F or discomfort (max dose 3000 mg/day)
  □ Ibuprofen (Motrin) (10 mg/kg/dose) _________ mg PO/GT every 6 hours PRN for temperature ≥ 38.6°C/101.5°F or discomfort (for infants > 5 months). Ensure adequate renal function before utilizing.

□ Analgesics
  □ Acetaminophen with hydrocodone (Hycet/Lortab/Lorcet/Norco) _________ mg/kg PO every 4-6 hours PRN for pain
  □ Morphine (0.1-0.2 mg/kg) _____ mg IV every 2-4 hours as needed (max 10 mg/dose)
  □ Fentanyl _______ mcg IV every ______ hours as needed.

□ Antibiotics:
□____________________________________________________________________________
□____________________________________________________________________________
□____________________________________________________________________________
□ Topical anesthetic for IV start and lab draws
□ Apply topically once 30-90 minutes prior to procedure (maximum 1gm, 10 centimeter area squared, or application time of 2 hours)

IV Therapy:
□ Saline Lock
□ NS bolus ______ mL IV to run over 1–2 hours
□ LR bolus ______mL IV to run over 1-2 hours
□ D5 ½ NS with 20 mEq KCl/L to run at __________mL/hr (Ensure adequate renal function before utilizing potassium)
□ D5 ¼ NS with 20 mEq KCl/L to run at __________mL/hr (Ensure adequate renal function before utilizing potassium)
□ Other__________________________________________________

Supplemental Oxygen Orders:
- If SpO₂ < 90% on room air, apply oxygen to maintain SpO₂ 91-94%
  □ Nasal Cannula
  □ Aerosol Mask
- Titrate oxygen to maintain SpO₂ > 90%
- Wean oxygen if SpO₂ maintains 94%.
  □ Decrease oxygen by ½ liter per minute (LPM) and reassess patient 5-10 minutes after change in oxygen
  □ Do not decrease oxygen more frequently than every 60 minutes

□ Ventilator Settings:__________________________________________________
  □ For more information, see: Use of Strategic National Stockpile (SNS) Ventilators in the Pediatric Patient: Instructional Guidelines with Training Scenarios, 2nd edition

□ See Sample Pediatric Standard Admission Orders for additional orders for diet, IV, labs etc
□ If hypovolemic, refer to Pediatric Shock Care Guidelines: Sample Hypovolemic Shock Admission Orders
<table>
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<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
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<tbody>
<tr>
<td>AAP</td>
<td>American Academy of Pediatrics</td>
</tr>
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<td>Airway, breathing, circulation</td>
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<td>ABG</td>
<td>Arterial blood gas</td>
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<td>ABO &amp; Rh</td>
<td>Blood group antigens (ABO) and the Rh antigen</td>
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<td>Appearance, Pulse, Reflex (Grimace), Activity, Respiration</td>
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<td>Center for Disease Control and Prevention</td>
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<td>Creatine kinase MB</td>
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<td>Centimeter</td>
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<td>Pediatric Advanced Life Support Course</td>
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<td>PaO₂</td>
<td>Partial pressure of oxygen in blood</td>
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<td>PASG</td>
<td>Pneumatic antishock garment</td>
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<td>Positive End Expiratory Pressure</td>
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<td>Respiratory Therapy</td>
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<td>Systolic blood pressure</td>
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<td>Spinal cord injury without radiographic abnormality</td>
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<td>Small for gestational age</td>
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<td>SNS</td>
<td>Strategic National Stockpile</td>
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<td>Blood oxygen saturation</td>
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<td>Subcutaneous</td>
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<td>Description</td>
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<td>---------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>TBI</td>
<td>Traumatic Brain Injury</td>
</tr>
<tr>
<td>TBSA</td>
<td>Total body surface area</td>
</tr>
<tr>
<td>TID</td>
<td>Three times per day</td>
</tr>
<tr>
<td>TM</td>
<td>Tympanic membrane</td>
</tr>
<tr>
<td>TSH</td>
<td>Thyroid stimulating hormone</td>
</tr>
<tr>
<td>y/o</td>
<td>year old</td>
</tr>
<tr>
<td>°C</td>
<td>Degree Celsius</td>
</tr>
<tr>
<td>°F</td>
<td>Degree Fahrenheit</td>
</tr>
</tbody>
</table>
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Consultation of this document provided by personal communication with Dr. Frank Hernandez, Neonatologist, Rockford Memorial Hospital, Rockford, IL


Hypothermia Task Force. Led by Dr Patricia Ittmann, Neonatologist. Rockford Memorial Hospital. Rockford, IL


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Trauma & Blast Injury Care Guideline


