### 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.

### Common Pediatric Inpatient Treatment and Monitoring Interventions

<table>
<thead>
<tr>
<th>INTERVENTION</th>
<th>PEDIATRIC CAVEATS/RATIONALE</th>
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<tbody>
<tr>
<td><strong>Common Pediatric Inpatient Treatment and Monitoring Interventions</strong></td>
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<tr>
<td><strong>Vital Signs:</strong></td>
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<tr>
<td>- Vital signs at least every 4 hours (T, HR, RR)</td>
<td>- Vital signs vary greatly with age:</td>
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<tr>
<td>- BP every 8 hours, if stable</td>
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<tr>
<td>- Pulse oximetry if on O₂</td>
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<tr>
<td>- Continuous preferred</td>
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<tr>
<td>- At least every 4 hour checks</td>
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<tr>
<td>- HR may be continuously monitored via pulse oximetry</td>
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<tr>
<td><strong>Age</strong></td>
<td><strong>Newborn 0-1 month</strong></td>
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<tr>
<td></td>
<td>Average RR</td>
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<tr>
<td></td>
<td>30-60</td>
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<tr>
<td></td>
<td>&gt;60</td>
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<tr>
<td><strong>Assessments:</strong></td>
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<tr>
<td><strong>Best predictors of shock:</strong></td>
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<tr>
<td>- Tachycardia is first sign of shock</td>
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<tr>
<td>- Altered mental status</td>
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<tr>
<td>- Low urine output</td>
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<tr>
<td>- Capillary refill (not well-validated)</td>
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<tr>
<td><strong>Infants can’t increase cardiac stroke volume, thus tachycardia early sign of dehydration</strong></td>
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</table>

Illinois EMSC  
www.luhs.org/emsc
- 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
  - 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
- 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:
  - Can help nurses assess pediatric patients objectively
  - Using vital signs, child's behavior, cardiovascular and respiratory symptoms
Pain:
- Need to use age/developmental appropriate pain scales
- Examples:
  - Faces Scale for children > 3 years old
  - FLAAC 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:
FLACC 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>
<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, whimpers, 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>

- Developmentally delayed children may have exaggerated CNS depression with opiates
  - Start with lowest dose and titrate

**Intake/Output:**

**Diet/Nutrition**
- Age appropriate diet as tolerated
- Allow to breastfeed as tolerated unless contraindication present

**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
### Age appropriate diet:

- **Newborn:**
  - Breast or bottle fed, 2-3 ounces/feeding every 2-3 hours
- **Infants:**
  - 2-4 months:
    - Breast or bottle fed only, 3-4 ounces/feeding every 3-4 hours
  - 4-6 months:
    - 4-5 ounces/feeding (breast or bottle) 4 times/day
    - Begin baby food (i.e. rice cereal)
  - 6-9 months:
    - 6-8 ounces/feeding (breast or bottle) 4 times/day
    - Baby food and mashed table food
  - 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.

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

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

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

### IV Fluids:
#### IV Site Selection:
- Infants (<12 months): hand, wrist, antecubital, saphenous, feet, scalp
- >12 months: hand, wrist, antecubital

<table>
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<tr>
<th>Suggested IV Catheter Sizes</th>
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<tr>
<td>Toddlers/School Age</td>
</tr>
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</tbody>
</table>
### 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
  - 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 10mL/kg
- > 28 days:
  - Bolus 0.9% NS at 20mL/kg
- Suspected cardiogenic shock:
  - Bolus 0.9% NS at 5-10mL/kg

### IV Fluids: Maintenance
- D5 0.45% NS is standard
- Add 20mEqKCl/Liter if not hyperkalemic
- Monitor weight, urine output and

### IO Needle Sizes
- Follow manufacture’s recommendations for needle size for pediatric patients.

### IV/IO Monitoring:
- IV/IO can infiltrate quickly because of the child’s activity. Careful assessment will minimize infiltrate damage
- Wrapping tape circumferentially around an extremity may cause tissue damage if the IV infiltrates

### 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
- 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
electrolytes and adjust rate/composition of IV fluids accordingly
• To calculate maintenance rate:
  o Birth-28 days: 80-100mL/kg/24hrs
  o >28days:
    First 10 kg = 4 mL/kg/hr
    Second 10 kg = 2 mL/kg/hr
    Each additional kg = 1 mL/kg/hr

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<tr>
<th>Safety:</th>
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<tbody>
<tr>
<td>• Ensure crib rails are up at all times when patient is not directly attended to by a caregiver/parent</td>
</tr>
<tr>
<td>• No extra supplies should be kept in the crib or in reach</td>
</tr>
<tr>
<td>• Place infant on their back when sleeping</td>
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<tr>
<td>• Children under 3 years of age should be placed in a crib</td>
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</table>

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<tr>
<td>• Infants can easily roll out of the crib and be injured.</td>
</tr>
<tr>
<td>• Supplies may be a choking hazard.</td>
</tr>
<tr>
<td>• Infants sleeping on the back decreases the risk of SIDS</td>
</tr>
<tr>
<td>• 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.</td>
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<tr>
<th>Treatments:</th>
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<tbody>
<tr>
<td>Medications:</td>
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<tr>
<td>Analgesics</td>
</tr>
<tr>
<td>• Acetaminophen</td>
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<tr>
<td>o 15mg/kg PO/PR q4hr PRN (max dose in 24 hours=3gms)</td>
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<tr>
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<tr>
<td>Acetaminophen:</td>
</tr>
<tr>
<td>• Advantages</td>
</tr>
<tr>
<td>o Minimal adverse effects on GI tract or renal function</td>
</tr>
<tr>
<td>• Disadvantages</td>
</tr>
<tr>
<td>o Liver toxicity</td>
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</tbody>
</table>
### 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.

### Codeine + Tylenol (Tylenol #3)
- **Advantages**
  - Rapid onset action, minimal respiratory depression orally
- **Disadvantages**
  - Nausea, vomiting, constipation, respiratory depression, hypotension, bradycardia, CNS depression, ineffective in 1/3 of patients

### Ketorolac (Toradol)
- **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

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- **Ibuprofen (infant/child > 6 months)**
  - 10mg/kg PO q6h PRN

- **Codeine + Tylenol (for children > 2 y/o only)**
  - 0.5-1mg/kg PO q4-6hrs PRN

- **Ketorolac (Toradol)**
  - 0.25-1mg/kg IM/IV/IO q6hr PRN
  - Can be given PO for children >50kg

- **Morphine**
  - 0.1-0.2 mg/kg IM/IV/IO, q2-4hrs PRN
**Fentanyl**
- **Advantages**
  - Rapid onset if given IV/IO, short duration, potent analgesic, better safety
  - 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 100mg/kg q24hrs 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
### Antimicrobials

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

**Gentamicin** 2.5 mg/kg IV/IO every 8 hours

### Antivirals

- **Oseltamivir**
  - 2 weeks-1 year (Use for treatment only): 3 mg/kg/dose q 12 hours x 5 days
  - > 1 yr (Use for treatment and prophylaxis): 3 mg/kg q12 hours x 5 days

- **Acyclovir**
  - <12 y: 20 mg/kg IV/IO q8hr
  - >12 y: 10 mg/kg IV/IO q8hr

### 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)

- 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
### 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

<table>
<thead>
<tr>
<th>To convert D50W to D25W</th>
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<tr>
<td>• Mix 1 part D50W to 1 part sterile water or normal saline</td>
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### Other Considerations:

**Children with Special Health Care Needs:**
- Tracheostomy Care (established tracheostomy)
- G-Tube or J-Tube (established)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td>• Tracheostomy Care: Similar care to adults, wash site gently with warm water as needed. Change tracheostomy ties daily and as needed.</td>
</tr>
<tr>
<td>• 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.</td>
</tr>
</tbody>
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Resource: EMSC CSCHN Reference Guide