NORMAL PEDIATRIC VITAL SIGNS

<table>
<thead>
<tr>
<th>Age Group</th>
<th>HR (Beats/ min)</th>
<th>RR (Breaths/min)</th>
<th>BP (sys mm/Hg)</th>
<th>BP (dia.mm/Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn 0-1 month</td>
<td>100-180</td>
<td>30-60</td>
<td>73-92</td>
<td>52-65</td>
</tr>
<tr>
<td>Infant 1-12 months</td>
<td>80-150</td>
<td>30-60</td>
<td>90-109</td>
<td>53-67</td>
</tr>
<tr>
<td>Toddler 1-3 years</td>
<td>75-130</td>
<td>25-35</td>
<td>95-105</td>
<td>56-68</td>
</tr>
<tr>
<td>Pre-School 3-5 years</td>
<td>75-120</td>
<td>22-32</td>
<td>99-110</td>
<td>55-70</td>
</tr>
<tr>
<td>School Age 5-12 years</td>
<td>70-110</td>
<td>20-30</td>
<td>97-118</td>
<td>60-76</td>
</tr>
<tr>
<td>Adolescent 13-18 years</td>
<td>65-105</td>
<td>16-22</td>
<td>110-133</td>
<td>63-83</td>
</tr>
</tbody>
</table>

GLASSGOW COMA SCALE (GCS)

<table>
<thead>
<tr>
<th>Category</th>
<th>For Patients &lt;2 Years Old</th>
<th>For Patients &gt;2 Years Old</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Opening (E)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) None</td>
<td>(1) None</td>
<td></td>
</tr>
<tr>
<td>(2) Moans to pain</td>
<td>(2) Moans to pain</td>
<td></td>
</tr>
<tr>
<td>(3) Cries to pain</td>
<td>(3) Cries to pain</td>
<td></td>
</tr>
<tr>
<td>(4) Spontaneous</td>
<td>(4) Spontaneous</td>
<td></td>
</tr>
<tr>
<td>(5) Irritable, cries</td>
<td>(5) Irritable, cries</td>
<td></td>
</tr>
<tr>
<td>(6) Coos, babbles</td>
<td>(6) Coos, babbles</td>
<td></td>
</tr>
<tr>
<td>Verbal Response (V)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) None</td>
<td>(1) None</td>
<td></td>
</tr>
<tr>
<td>(2) Inappropriate words</td>
<td>(2) Inappropriate words</td>
<td></td>
</tr>
<tr>
<td>(3) Inappropriate words</td>
<td>(3) Inappropriate words</td>
<td></td>
</tr>
<tr>
<td>(4) Confused</td>
<td>(4) Confused</td>
<td></td>
</tr>
<tr>
<td>(5) Oriental</td>
<td>(5) Oriental</td>
<td></td>
</tr>
<tr>
<td>(6) Spontaneous</td>
<td>(6) Spontaneous</td>
<td></td>
</tr>
<tr>
<td>Motor Response (M)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) None</td>
<td>(1) None</td>
<td></td>
</tr>
<tr>
<td>(2) Extension to pain</td>
<td>(2) Extension to pain</td>
<td></td>
</tr>
<tr>
<td>(3) Abnormal flexion</td>
<td>(3) Abnormal flexion</td>
<td></td>
</tr>
<tr>
<td>(4) Withdraws from pain</td>
<td>(4) Withdraws from pain</td>
<td></td>
</tr>
<tr>
<td>(5) Localizes to pain</td>
<td>(5) Localizes to pain</td>
<td></td>
</tr>
<tr>
<td>(6) Normal spontaneous movements</td>
<td>(6) Normal spontaneous movements</td>
<td></td>
</tr>
</tbody>
</table>

PEDiatric ASSESSMENT TRIANGLE (PAT)

APPEARANCE

Mental status based on age

TICLS

WORK OF BREATHING

(normal/increased)

CIRCULATION TO THE SKIN

AVPU: Alert, Voice, Pain, Unresponsive - Used to assess level of consciousness or appearance in PAT tone or rigid or not moving.

Component

Abnormal Signs

Appearance T - tone abnormal floppy or rigid muscle tone or not moving, I - interactivity poor, L - look/gaze decreased responsiveness to parents or environmental stimuli; S - speech/cry abnormal or absent.

Work of Breathing

Increased/excessive (nasal flaring, retractions or accessory muscle use) or decreased/absent respiratory effort or noisy breathing

Circulation to the Skin

Cyanosis, mottling, paleness/pallor or obvious significant bleeding

PEDiatric RISKS DURING DISASTERS

System / Area

Risk

Respiratory

- Higher breaths/minute increases exposure to inhaled agents
- Nuclear fallout and heavier gases settle lower to the ground and may affect children more seriously

Gastrointestinal

- May be more at risk for dehydration from vomiting and diarrhea after exposure to contamination

Skin

- Higher body surface area increases risk of skin exposure
- Skin is thinner and more susceptible to injury from burns, chemicals and absorbable toxins

Endocrine

- Increased risk of thyroid cancer from radiation exposure

Thermoregulation

- Less able to cope with temperature problems with higher risk of hypothermia

Development

- Less capable to escape environmental dangers or anticipate hazards

Psychological

- Prolonged stress from critical incidents
- Susceptible to separation anxiety

PEDiatric SIGNS OF RESPIRATORY DISTRESS AND RESPIRATORY FAILURE

Respiratory distress is apparent when a child fails to maintain adequate gas exchange. As the child tires, effort and / or function deteriorate and gas exchange cannot be maintained.

Respiratory failure requires intervention to prevent deterioration to cardiac arrest.

Indicators may vary with severity.

Respiratory Distress

- Tachypnea
- Increased respiratory effort
- Increased work (nasal flaring, retractions)
- Increased work (nasal flaring, retractions)
- Increased work (nasal flaring, retractions)

Respiratory Failure

- Marked tachypnea
- Increased work (nasal flaring, retractions)
- Increased work (nasal flaring, retractions)
- Increased work (nasal flaring, retractions)
- Increased work (nasal flaring, retractions)

JUMPSpring FIELD PEDIATRIC MULTICASUALTY Triage System

Patients ages 1-8 years

Identify and direct all ambulatory patients to designated Green area for secondary triage and treatment. Begin assessment of nonambulatory patients as you come to them.

Proceed as below:

1. Identify and direct all ambulatory patients — Delayed to designated Green area for secondary triage.
2. Green = Minor / Ambulatory
   - Red = immediate
   - Black = deceased / expectant

TREATMENT PRIORITIZATION

Triage category Description

- Green Minor
  - Patients with mild injuries that are self-limited and can tolerate a delay in care without increasing mortality risk
- Yellow Delayed
  - Remaining patients who do not fit in the Red or Green categories
- Red Immediate
  - Patients who do not obey commands or do not have a peripheral pulse, or are in respiratory distress, or have uncontrolled major hemorrhage
- Black Expectant or Dead
  - Expectant: Patients who have injuries incompatible with life given the current available resources
  - Dead: Patients who are not breathing after life-saving interventions

For Patients ≤2 Years Old

- For Patients >2 Years Old

- Open airway
- Spontaneous respiration?
- YES
- NO
- Peripheral pulse?
- YES
- NO
- Perform 15 sec. Mouth to Mask Ventilation
- STOP
DAILY MAINTENANCE FLUID AND ELECTROLYTE REQUIREMENTS

**Calculation**

- **Fluids per hour**
  - 4mL/kg/hr for first 10kg of weight
  - 2mL/kg/hr for next 10 kg of weight
  - 1mL/kg/hr for each kg over 20kg

- **Fluids per 24 hour period**
  - 100mL/kg for the first 10kg body weight
  - 50mL/kg for the next 10 kg body wt
  - 1500mL+ 20mL, for each kg of body weight over 20kg

- **Maintenance electrolyte calculations for IV fluid**
  - Sodium: 3-4 mEq/kg/day or 30-50 mEq/m2/day
  - Potassium: 2-3 mEq/kg/day or 20-40 mEq/m2/day

APPROPRIATE INFANT NUTRITION

<table>
<thead>
<tr>
<th>Age</th>
<th>2-3 ounces (60-90 mL) per feeding, breast or bottle every 2-3 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth - 1 mo</td>
<td>3-4 ounces (90-120 mL) per feeding every 3-4 hours</td>
</tr>
<tr>
<td>2-4 mos</td>
<td>4-5 ounces (120-150 mL) per feeding, four or more times daily</td>
</tr>
<tr>
<td>4-6 mos</td>
<td>Begins baby food, usually rice cereal</td>
</tr>
<tr>
<td>6-8 mos</td>
<td>6-8 ounces (180-240 mL) per feeding, four times daily</td>
</tr>
<tr>
<td></td>
<td>Eats baby food such as rice cereal, fruits and vegetables</td>
</tr>
<tr>
<td>8-12 mos</td>
<td>6 ounces (180 mL) per feeding, four times a day</td>
</tr>
<tr>
<td></td>
<td>Soft finger foods</td>
</tr>
</tbody>
</table>

Breastfeeding is best—support mothers with safe locations to breastfeed and remain hydrated.

NORMAL BLOOD VOLUME

<table>
<thead>
<tr>
<th>Feature</th>
<th>Mild (&lt;5%)</th>
<th>Moderate (5% to 10%)</th>
<th>Severe (&gt;10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate</td>
<td>Normal</td>
<td>Slightly increased</td>
<td>Rapid, weak</td>
</tr>
<tr>
<td>Systolic BP</td>
<td>Normal</td>
<td>Normal to orthostatic</td>
<td>Hypotension</td>
</tr>
<tr>
<td>Urine output</td>
<td>Decreased</td>
<td>Moderately decreased</td>
<td>Markedly decreased</td>
</tr>
<tr>
<td>Mucous membranes</td>
<td>Slightly dry</td>
<td>Very dry</td>
<td>Parted</td>
</tr>
<tr>
<td>Anterior fontanel</td>
<td>Normal</td>
<td>Normal to sunken</td>
<td>Sunken</td>
</tr>
<tr>
<td>Tears</td>
<td>Present</td>
<td>Decreased, eyes sunken</td>
<td>Absent, eyes sunken</td>
</tr>
<tr>
<td>Skin</td>
<td>Normal turgor</td>
<td>Decreased turgor</td>
<td>Tensing</td>
</tr>
<tr>
<td>Skin perfusion</td>
<td>Normal capillary refill (&gt;2 seconds)</td>
<td>Capillary refill slowed (2-4 seconds); skin cool to touch</td>
<td>Capillary refill markedly delayed (&gt;4 seconds); skin cool, mottled, gray</td>
</tr>
</tbody>
</table>

FLUID RESUSCITATION

1. Administer 20 mL/kg of isotonic or crystalloid (NS or LR)
2. Monitor: Peripheral perfusion, Urine output, Vital signs, LOC
3. Repeat bolus if no improvement
4. Reassess status

Consider blood products in traumatic injuries requiring >40-60 mL/kg of fluid

HYPOVOLEMIC SHOCK

- Hypovolemic shock is the most common type of shock in children.
- Children increase their cardiac output by tachycardia; therefore bradycardia is an ominous sign.

Look for:
- Slow irregular breathing, grunting, bradycardia, cyanosis, hypotension, decreased LOC

BURN TREATMENT: FLUID RESUSCITATION

Fluid Resuscitation Formula (8-12 yrs):
3 mL x kg x %TBSA burn
(one half over 1st 8h, second 1/2 over next 16h)

For ages 0 - 2 yrs: Add maintenance fluid of D2 Lactated Ringer's (in addition to resuscitation fluid above) - see fluids per hour calculation

Pediatric Considerations
- Increased fluid requirements relative to adults
- Increased surface area : mass ratio
- Hypoglycemia may occur in infants (<30 kg) due to limited glycogen reserves
- Hourly urine output to assess effective fluid resuscitation

APPENDIX

USING KILOGRAMS

Weigh all children in kilograms. 1 kg = 2.2 lbs

Method to estimate weight:
- Newborn (term): usually 3 kg
- 1-10 yrs: age multiplied by 2 + 10 (kg)
- >10 yrs: age multiplied by 2 + 20 (kg)

If available, a length-based tape, (e.g., Broselow Tape) should be used for weight estimation.

NORMAL DEVELOPMENT

<table>
<thead>
<tr>
<th>Age</th>
<th>Growth &amp; Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>Learn through senses; Seek to build trust; Needs not being met; Stranger anxiety</td>
</tr>
<tr>
<td></td>
<td>Speak in quiet calm voice; Involve parents in care; Be aware of stranger anxiety</td>
</tr>
<tr>
<td>1-3</td>
<td>Imitates others; Understands objects exist even when not seen; Attempt to control environment</td>
</tr>
<tr>
<td></td>
<td>Separation; Loss of Control; Altered Rituals</td>
</tr>
<tr>
<td>4-6</td>
<td>Vivid imagination; More independent; Shares with others; Bodily injury; Loss of control; Being left alone; Dark</td>
</tr>
<tr>
<td></td>
<td>Be honest; Let child make choices when able; Reinforce child not responsible for injury or illness</td>
</tr>
<tr>
<td>7-12</td>
<td>Understands cause and effect; Greater sense of self; Loss of control; Bodily injury; Death</td>
</tr>
<tr>
<td></td>
<td>Allow child to make some care decisions; Prepare before major event or surgery; Emphasize things they can do</td>
</tr>
<tr>
<td>13-18</td>
<td>Abstract thinking; Develops own identity; Loss of control; Altered body image; Separation from peers</td>
</tr>
</tbody>
</table>

METHOD TO ESTIMATE ENDOTRACHEAL TUBE (ETT) SIZE:

- Tube diameter (mm) = [AGE (years)/4]+4 uncuffed tube size up to size 5.5 mm; for cuffed tubes use 1/2 size smaller (e.g., 2 year old 4.5 mm uncuffed or 4.0 cuffed)
- ETT 6.0 mm or greater are all cuffed; Cuffed tubes preferred if available for all ages

ETT Depth in cm at lip = 3x ETT size

EQUIPMENT ESTIMATIONS

- **EQUIPMENT SIZES: NEWBORN - 6 YEARS**
  - **Weight**: 3 kg 5 kg 10 kg 15 kg 20 kg
  - **ETT**: 3-3.5 3.5-4.0 4-4.5 4.5-5.0 5-5.5
  - **L Blade**: Miller 0-1 Miller 0-1 Miller 1-2 Miller 2
  - **Suction**: 6-8 Fr 8-10 Fr 10 Fr 10 Fr
  - **NG Tube**: 5-8 Fr 5-8 Fr 8-10 Fr 10-12 Fr 12-14 Fr
  - **Foley**: 6-8 Fr 6-8 Fr 8-10 Fr 10-12 Fr 12-14 Fr
  - **Chest Tube**: 10-12 Fr 12-16 Fr 16-20 Fr 20-24 Fr 24-32 Fr
  - **LMA (cuff)**: 1 (4 mL) 1.5 (7 mL) 2 (10 mL) 2 (10 mL) 2.25 (14 mL)

- **EQUIPMENT SIZES: 7 YEARS AND OLDER**
  - **Weight**: 7-9 yrs 10-12 yrs 13-15 yrs >15 yrs
  - **ETT**: 5.5-6.0 6.0-6.5 6.5-7.0 7.0-7.5 7.5-8.0
  - **L Blade**: Mil/Mac 2 Mil/Mac 2 Mil/Mac 3 Mil/Mac 3
  - **Suction**: 10 Fr 10 Fr 12 Fr 12 Fr 14-16 Fr
  - **Foley**: 12 Fr 12 Fr 14-16 Fr 16-18 Fr
  - **Chest Tube**: 28-32 Fr 28-32 Fr 32-40 Fr 32-40 Fr
  - **LMA (cuff)**: 2.5 (3 mL) 2.5 (20 mL) 3 (20 mL) 4-6 (30-50 mL)