# Evaluation and Management of the Injured Child

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# Evaluation and Management of the Injured Child

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## Planning Treatment

The three most common causes of death are:

- **Airway obstruction**
- **Blood loss**
- **Central nervous system (CNS) injury**

Consider these critical issues in pediatric trauma:

- **Beware of hypothermia.** Children lose body heat rapidly. The room and IV fluids should be warmed.
- **Multisystem injury is common.** Check all regions.
- **Head injury is frequent.** Observe closely for altered consciousness.

**Determine Pediatric Trauma Score** *(Figure 1)*

*Figure 1.* **Pediatric Trauma Score**

| PTS | +2 | +1 | −1 |
|---|---|---|---|
| **Size** | >20 kg | 10–20 kg | <10 kg |
| **Airway** | Normal | Maintainable | Unmaintainable |
| **Systolic BP** | >90 mmHg | <90–50 mmHG | <50 mmHg |
| **CNS** | Awake | Obtunded or Any Loss of Consciousness | Comatose |
| **Open Wound** | None | Minor | Major or Penetrating |
| **Skeletal** | None | Closed Fractures | Open or Multiple Fractures |

The PTS is an anatomic and physiologic scoring system useful for triage and prediction of severity of injury. PTS>8 = no mortality; PTS≤ 8 = 30% mortality.

## 1. Airway & Breathing

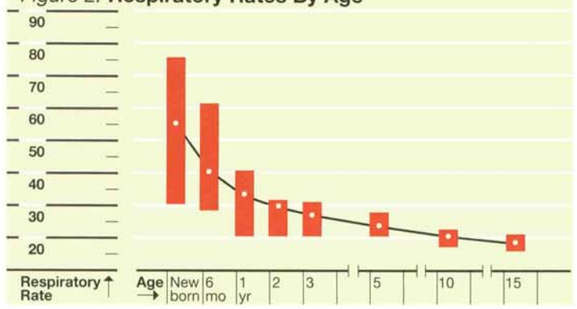
**A child's airway anatomy is special:**

- The upper airway may easily be occluded
- The tonsils and tongue are large
- The larynx is anterior and high in the neck
- The trachea is short — avoid inadvertent extubation or endobronchial intubation

**Suggestions for airway access:**

- "Sniffing" position
- Chin lift or jaw thrust (for obstruction by tongue or foreign material)
- Use oral airway with bag and mask
- **Orotracheal intubation preferred** — following preoxygenation, sedation, and paralysis
- Needle cricothyroidotomy is preferable to tracheostomy

*Figure 2.* **Respiratory Rates By Age**




## 2. Circulation

- Hypovolemia causes tachycardia and peripheral vaso-constriction **before** hypotension
- Hemorrhage or hypovolemia makes **surgical consultation essential**
- Be alert for shock caused by gradual or internal blood loss

**Physiologic Guidelines**

- Normal blood volume = 80 ml/kg
- Hypotension: Loss of 24% of blood volume
- Blood pressure and heart rates are age-related

*Figure 3A.* **Resuscitation From Hypovolemia**

20 ml/kg Ringer's lactate as bolus (may repeat twice)

**Hemodynamics Stable** → Further evaluation → Observation / Operation

**Hemodynamics Unstable** → 10 ml/kg P-RBCs → **Stable** → Further evaluation → Observation / **Unstable** → Operation

*Figure 3B.* **Heart Rate By Age**

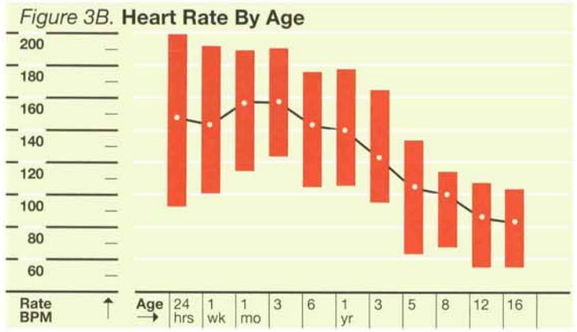
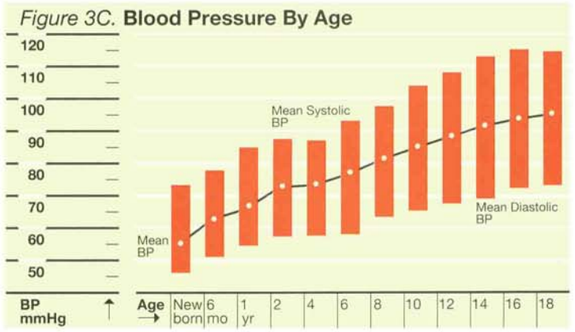



*Figure 3C.* **Blood Pressure By Age**




## Special Considerations

- Administer oxygen to *all* injured children
- Hyperventilate for CNS injury. Ideal $pCO_2$ = 30 torr
- Consider NG tube to relieve gastric distention

Maintain adequate urine output:

Infant.....2ml/kg/hr

Child.....1–1.5 ml/kg/hr

Adolescent.....0.5–1 ml/kg/hr

Monitor all vital signs closely:

- Complete a neurologic examination. Calculate Glasgow Coma Scale for all patients, and obtain neurosurgical consultation if indicated
- Infuse mannitol (0.5–1.0 gm/kg over 20 min) for rapid CNS deterioration or lateralizing signs (in consultation with a trauma surgeon or neurosurgical consultant)
- Be alert to ongoing, occult bleeding, and incomplete volume resuscitation

*Figure 4 lists equipment necessary for pediatric resuscitation*

*Figure 4.* **Equipment**

| | Airway/Breathing | | | | | | | Circulation | | Supplemental Equipment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $O_2$ Mask | Oral Airways | Bag-Valve Mask | Laryngoscope Blades | ET Tubes | Stylet | Suction | BP Cuff | IV Catheter | NG Tubes | Chest Tubes | Urinary Catheter | Cervical Collar |
| **Premature** 3kg | Premature Newborn | Infant | Infant | 0—Straight | 2.5–3.0 Uncuffed | 6F | 6–8F | Premature Newborn | 22–24 Catheter | 12F Anderson | 10–14F | 5F Feeding | — |
| **Newborn 0–6** mo., 3.5 kg | NB | Infant Small | Infant | 1—Straight | 3.0–3.5 Uncuffed | 6F | 8F | NB Infant | 22–24 Catheter | 12F Anderson | 12–18F | 5–8F Feeding | — |
| **6–12 mo.** 7kg | PED | Small | PED | 1—Straight | 3.5–4.5 Uncuffed | 6F | 8–10F | Infant Child | 22–24 Catheter | 12F Anderson | 14–20F | 8F | Small |
| **1–3 yrs.** 10–12 kg | PED | Small | PED | 1—Straight | 4.0–4.5 Uncuffed | 6F | 10F | Child | 20–22 Catheter | 12F Anderson | 14–24F | 10F | Small |
| **4–7 yrs.** 16–18 kg | PED | Medium | PED | 2—Straight or Curved | 5.0–5.5 Uncuffed | 14F | 14F | Child | 20–22 Catheter | 12F Anderson | 20–32F | 10–12F | Small |
| **8–10 yrs.** 24–30 kg | Adult | Medium Large | PED Adult | 2–3 Straight or Curved | 5.5–6.5 Cuffed | 14F | 14F | Child Adult | 20–22 Catheter | 12F Anderson | 28–38F | 12F | Medium |