

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

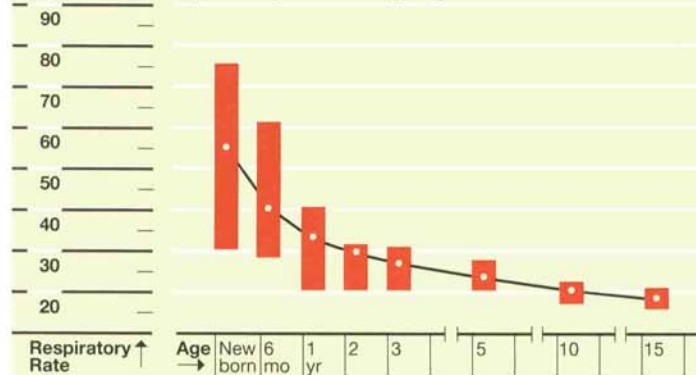
A child's airway anatomy is special:

- 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 vasoconstriction **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



Figure 3B. Heart Rate By Age

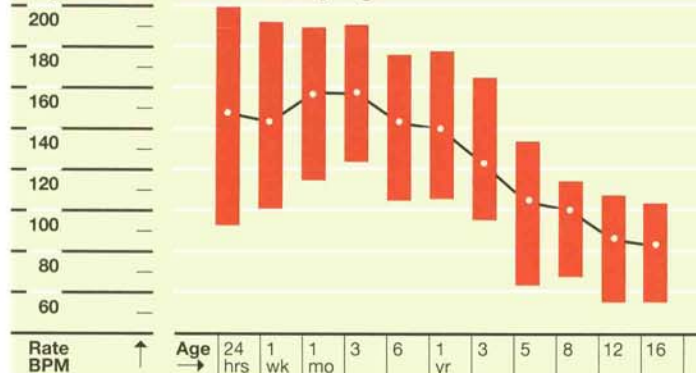
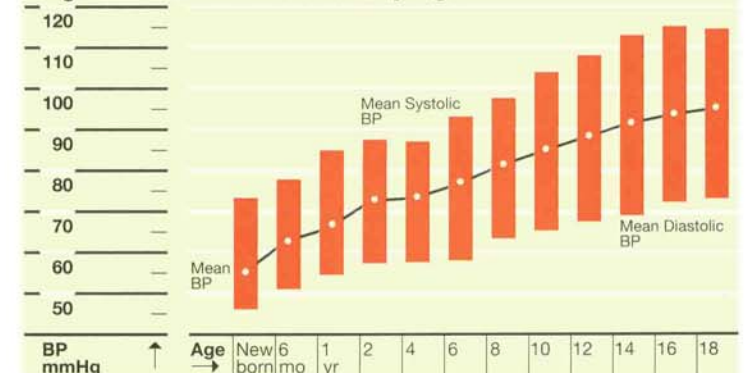


Figure 3C. Blood Pressure By Age



Special Considerations

- Administer oxygen to *all* injured children
- Hyperventilate for CNS injury. Ideal pCO₂ = 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

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