ASSESMENT OF THE INFANT AND PEDIATRIC TRAUMA PATIENT

Objectives

- Understand basic statistics of pediatric injury and death
- Know physical differences between adults, pediatrics and infants
- Understand physiological changes in a infant and pediatric trauma patient
- Approach a pediatric trauma patient assessment in a systematic manner
- Know the importance of a good basic assessment of the infant and pediatric patient
- Identify sick and not sick patients
- Understand basic treatment for pediatric trauma patients

PEDIATRIC TRAUMA CALL

10 Leading Causes of Death by Age Group, United States – 2010

	Age Groups										
Rank	<1	1-4	5-9	10-14	15-24	25-34	35-44	45-54	55-64	65+	Total
1	Congenital Anomalies 5,107	Unintentional Injury 1,394	Unintentional Injury 758	Unintentional Injury 885	Unintentional Injury 12,341	Unintentional Injury 14,573	Unintentional Injury 14,792	Malignant Neoplasms 50,211	Malignant Neoplasms 109,501	Heart Disease 477,338	Heart Disease 597,689
2	Short Gestation 4,148	Congenital Anomalies 507	Malignant Neoplasms 439	Malignant Neoplasms 477	Homicide 4,678	Suicide 5,735	Malignant Neoplasms 11,809	Heart Disease 36,729	Heart Disease 68,077	Malignant Neoplasms 396,670	Malignant Neoplasms 574,743
3	SIDS 2,063	Homicide 385	Congenital Anomalies 163	Suicide 267	Suicide 4,600	Homicide 4,258	Heart Disease 10,594	Unintentional Injury 19,667	Chronic Low. Respiratory Disease 14,242	Chronic Low Respiratory Disease 118,031	Chronic Low. Respiratory Disease 138,080
4	Maternal Pregnancy Comp. 1,561	Malignant Neoplasms 346	Homicide 111	Homicide 150	Malignant Neoplasms 1,604	Malignant Neoplasms 3,619	Suicide 6,571	Suicide 8,799	Unintentional Injury 14,023	Cerebro-vascular 109,990	Cerebro-vascular 129,476
5	Unintentional Injury 1,110	Heart Disease 159	Heart Disease 68	Congenital Anomalies 135	Heart Disease 1,028	Heart Disease 3,222	Homicide 2,473	Liver Disease 8,651	Diabetes Mellitus 11,677	Alzheimer's Disease 82,616	Unintentional Injury 120,859
6	Placenta Cord. Membranes 1,030	Influenza & Pneumonia 91	Chronic Low Respiratory Disease 60	Heart Disease 117	Congenital Anomalies 412	HIV 741	Liver Disease 2,423	Cerebro-vascular 5,910	Cerebro-vascular 10,693	Diabetes Mellitus 49,191	Alzheimer's Disease 83,494
7	Bacterial Sepsis 583	Septicemia 62	Cerebro-vascular 47	Chronic Low Respiratory Disease 73	Cerebro-vascular 190	Diabetes Mellitus 606	Cerebro-vascular 1,904	Diabetes Mellitus 5,610	Liver Disease 9,764	Influenza & Pneumonia 42,846	Diabetes Mellitus 69,071
8	Respiratory Distress 514	Benign Neoplasms 59	Benign Neoplasms 37	Benign Neoplasms 45	Influenza & Pneumonia 181	Cerebro-vascular 517	HIV 1,898	Chronic Low. Respiratory Disease 4,452	Suicide 6,384	Nephritis 41,994	Nephritis 50,476
9	Circulatory System Disease 507	Perinatal Period 52	Influenza & Pneumonia 37	Cerebro-vascular 43	Diabetes Mellitus 165	Liver Disease 487	Diabetes Mellitus 1,789	HIV 3,123	Nephritis 5,082	Unintentional Injury 41,300	Influenza & Pneumonia 50,097
10	Necrotizing Enterocolitis 472	Chronic Low Respiratory Disease 51	Septicemia 32	Septicemia 35	Complicated Pregnancy 163	Congenital Anomalies 397	Influenza & Pneumonia 773	Viral Hepatitis 2,376	Septicemia 4,604	Septicemia 26,310	Suicide 38,364

Data Source: National Vital Statistics System, National Center for Health Statistics, CDC.
Produced by: Office of Statistics and Programming, National Center for Injury Prevention and Control, CDC using WISQARS™.

Centers for Disease Control and Prevention
National Center for Injury Prevention and Control

10 Leading Causes of Injury Deaths by Age Group Highlighting Unintentional Injury Deaths, United States – 2010

	Age Groups										
Rank	<1	1-4	5-9	10-14	15-24	25-34	35-44	45-54	55-64	65+	Total
1	Unintentional Suffocation 905	Unintentional Drowning 436	Unintentional MV Traffic 354	Unintentional MV Traffic 452	Unintentional MV Traffic 7,024	Unintentional Poisoning 6,767	Unintentional Poisoning 7,476	Unintentional Poisoning 9,662	Unintentional Poisoning 4,451	Unintentional Fall 21,649	Unintentional MV Traffic 33,687
2	Homicide Unspecified 154	Unintentional MV Traffic 343	Unintentional Drowning 134	Suicide Suffocation 168	Homicide Firearm 3,889	Unintentional MV Traffic 5,558	Unintentional MV Traffic 4,552	Unintentional MV Traffic 5,154	Unintentional MV Traffic 4,134	Unintentional MV Traffic 6,037	Unintentional Poisoning 33,041
3	Homicide Other Spec., classifiable 82	Homicide Unspecified 163	Unintentional Fire/Burn 89	Unintentional Drowning 117	Unintentional Poisoning 3,183	Homicide Firearm 3,331	Suicide Firearm 2,914	Suicide Firearm 4,092	Suicide Firearm 3,387	Unintentional Unspecified 4,596	Unintentional Fall 26,009
4	Unintentional MV Traffic 76	Unintentional Fire/Burn 151	Homicide Firearm 58	Homicide Firearm 107	Suicide Firearm 2,046	Suicide Firearm 2,594	Suicide Suffocation 1,839	Suicide Poisoning 2,061	Unintentional Fall 2,011	Suicide Firearm 4,276	Suicide Firearm 19,392
5	Undetermined Suffocation 39	Unintentional Suffocation 134	Unintentional Suffocation 31	Suicide Firearm 80	Suicide Suffocation 1,824	Suicide Suffocation 1,910	Homicide Firearm 1,673	Suicide Suffocation 1,965	Suicide Poisoning 1,382	Unintentional Suffocation 3,400	Homicide Firearm 11,078
6	Unintentional Drowning 39	Unintentional Pedestrian, Other 103	Unintentional Other Land Transport 26	Unintentional Suffocation 48	Unintentional Drowning 656	Suicide Poisoning 787	Suicide Poisoning 1,279	Unintentional Fall 1,283	Suicide Suffocation 1,130	Adverse Effects 1,544	Suicide Suffocation 9,493
7	Undetermined Unspecified 35	Homicide Other Spec., classifiable 84	Unintentional Pedestrian, Other 20	Unintentional Fire/Burn 46	Homicide Cut/Pierce 420	Undetermined Poisoning 580	Undetermined Poisoning 712	Homicide Firearm 1,097	Unintentional Suffocation 613	Unintentional Poisoning 1,402	Suicide Poisoning 6,599
8	Adverse Effects 22	Unintentional Natural/ Environment 52	Adverse Effects 14	Unintentional Other Land Transport 42	Suicide Poisoning 371	Unintentional Drowning 476	Unintentional Fall 493	Undetermined Poisoning 955	Homicide Firearm 533	Unintentional Fire/Burn 1,088	Unintentional Suffocation 6,165
9	Unintentional Fire/Burn 22	Homicide Firearm 43	Unintentional Natural/ Environment 14	Unintentional Poisoning 40	Undetermined Poisoning 282	Homicide Cut/Pierce 438	Unintentional Drowning 409	Unintentional Drowning 578	Undetermined Poisoning 480	Suicide Poisoning 709	Unintentional Unspecified 5,688
10	Unintentional Natural/ Environment 22	Unintentional Struck by or Against 37	Unintentional Poisoning 14	Unintentional Firearm 26	Unintentional Other Land Transport 221	Unintentional Fall 299	Homicide Cut/Pierce 349	Unintentional Suffocation 464	Unintentional Fire/Burn 479	Suicide Suffocation 648	Unintentional Drowning 3,782

Data Source: National Center for Health Statistics (NCHS), National Vital Statistics System.
Produced by: Office of Statistics and Programming, National Center for Injury Prevention and Control, CDC using WISQARS™.

Centers for Disease Control and Prevention
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Differences Between Adults and Pediatrics

Airway and C-Spine Differences

- Tongue is bigger
- Airway Cartilage is softer and smaller in diameter
- Infants are obligatory nose breathers
- Cricoid is more narrow (under 8 years old)
- Neck muscles are weak
- Spine is more flexible
- Occiput is more prominent

Breathing Differences

- Normal Respiratory Rates Vary
- Diaphragm Position is More Horizontal (until 12 years old)
- Chest Wall is More Pliable
- Prone to Gastric Air
- Lower Glycogen Stores /Lower Tidal Volume / Less Residual Capacity

Circulation Differences

- Blood Pressure varies according to patient age
- Compensate for up to a 25% blood loss
- Heart Rate varies
- Blood Volume
  - Neonate 85–90 ml/kg body weight (3.5 kg (7.7 lbs) = 297.5- 315 ml)
  - Children 80 ml/kg body weight (8 yo 27 kg (60 lbs) = 2.16 liters)
  - Adults 70ml/kg body weight (75 kg (165 lb) = 5.25 liters)

Disability Differences

- Head is larger and heavier
- Infants have fontenelles
- Cranium is thinner
- White Matter is not well mylinated
- Pediatric Trauma Score
- Glasgow Coma Score

Pediatric Trauma Scale

Pediatric Trauma Score				
Component	**2**	**1**	**-1**	
Size	Child/ Adolescent, > 20Kg	Toddler, 11-20 Kg	Infant, < 10 Kg	
Airway		Assisted O2, mask, cannula	Intubated; ETT, King, LMA, Cricothyrotomy	
Consciousness	Awake	Obtunded; loss of consciousness	Coma; unresponsiveness	
Systolic BP	> 90 mm/HG; good peripheral pulses, perfusion	51- 90 mm/Hg; peripheral pulses, pulses palpable	<50 mm/Hg; weak peripheral or no pulses	
Fracture	None seen or suspected	Single closed fracture anywhere	Open, multiple fractures	
Cutaneous	No visible injury	Contusion, abrasion; laceration < 7 cm not through fascia	Tissue loss; any GSW or Stabbing through fascia	

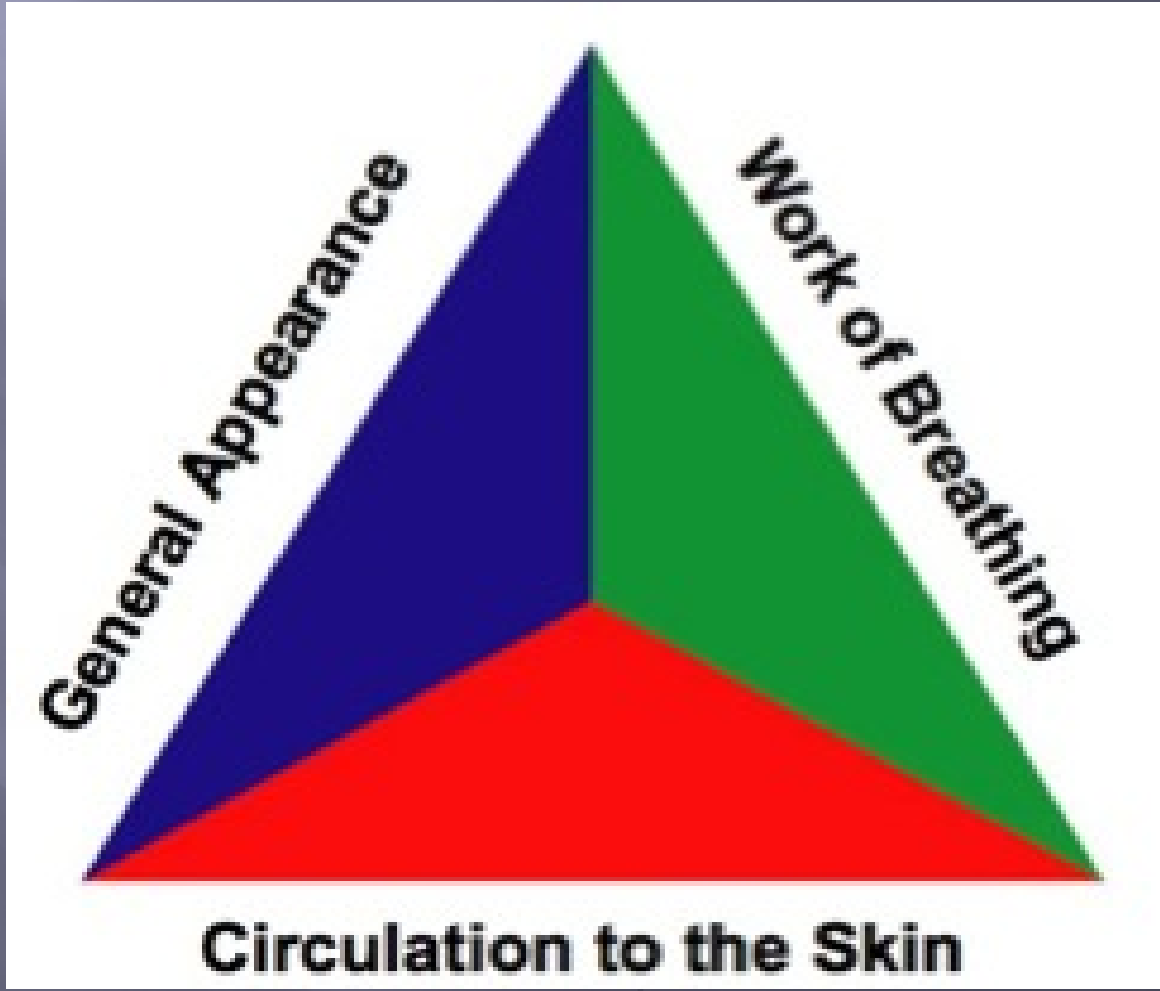
Glasgow Coma Scale

Category		Best Response
Eye opening		
Spontaneous		4
To speech		3
To pain		2
None		1
Verbal	(Modified for Infants)	
Oriented	Babbles	5
Confused	Irritable	4
Inappropriate words	Cries to pain	3
Moans	Moans	2
None	None	1
Motor		
Follows commands		6
Localizes to pain		5
Withdraws to pain		4
Abnormal flexion		3
Abnormal extension		2
None		1
Glascow Coma Score		
Best possible score		15
Worst possible score		3
If tracheally intubated then verbal designated with "T"		
Best possible score while intubated		10T
Worst possible score while intubated		2T

Expose Differences

- Less effective thermoregulatory mechanism
- Greater body surface area to body mass
- Less subcutaneous tissue

Rapid Assesment using the Pediatric Assesment Triangle



General Appearance

- Reflects the adequacy of ventilation, oxygenation, brain perfusion, body homeostasis, and central nervous system function.
- Assess from across the room; allow child to remain on caregiver's lap.
- Use bright lights or toys to measure interactiveness.
- Have caregiver assist with assessment if appropriate

General Appearance

- **T**one — Extremities should move spontaneously, with good muscle tone; should not be flaccid or move only to stimuli
- **I**nteractiveness — Should respond to environmental stimuli or presence of a stranger; should not be listless, obtunded or lethargic
- **C**onsolability — Easily comforted or calmed by caretaker (i.e., speaking softly, holding child, or offering a pacifier)
- **L**ook/Gaze — Should maintain eye contact with objects or people; should not have a “nobody home” or glassy-eyed stare
- **S**peech/Cry — Should be present, strong and spontaneous; should not be weak, muffled, or hoarse

General Appearance

- The child's general appearance is the most important thing to consider when determining how severe the illness or injury is, the need for treatment, and the response to therapy.

Work of Breathing

- Is a more accurate, quick indicator of oxygenation and ventilation than respiratory rate or chest sounds on auscultation.
- Reflects the child's attempt to make up for difficulties in oxygenation and ventilation.

Work of Breathing

- Abnormal sounds — Snoring muffled or hoarse speech, stridor, grunting, wheezing
- Abnormal position — Sniffing position, tripoding, refusing to lie down
- Retractions — Supraclavicular, intercostal, or substernal retractions of the chest wall; head bobbing in infants
- Flaring — Nasal flaring

Circulation to Skin

- Reflects the adequacy of cardiac output and core perfusion, or perfusion of vital organs.
- Cold room temperatures may cause false skin signs, i.e., the cold child may have normal core perfusion but abnormal circulation to the skin.
- Inspect the skin (i.e., face, chest, abdomen) and mucous membranes (lips, mouth) for color in central areas.
- In dark skinned children, the lips and mucous membranes are the best places to assess circulation.

Circulation to Skin

- Pallor coloration — White or pale skin or mucous membrane
- Mottling — Patchy skin discoloration due to vasoconstriction
- Cyanosis membranes — Bluish discoloration of skin and mucous

Sick or not sick?

Sick or not sick?

Sick or not sick?

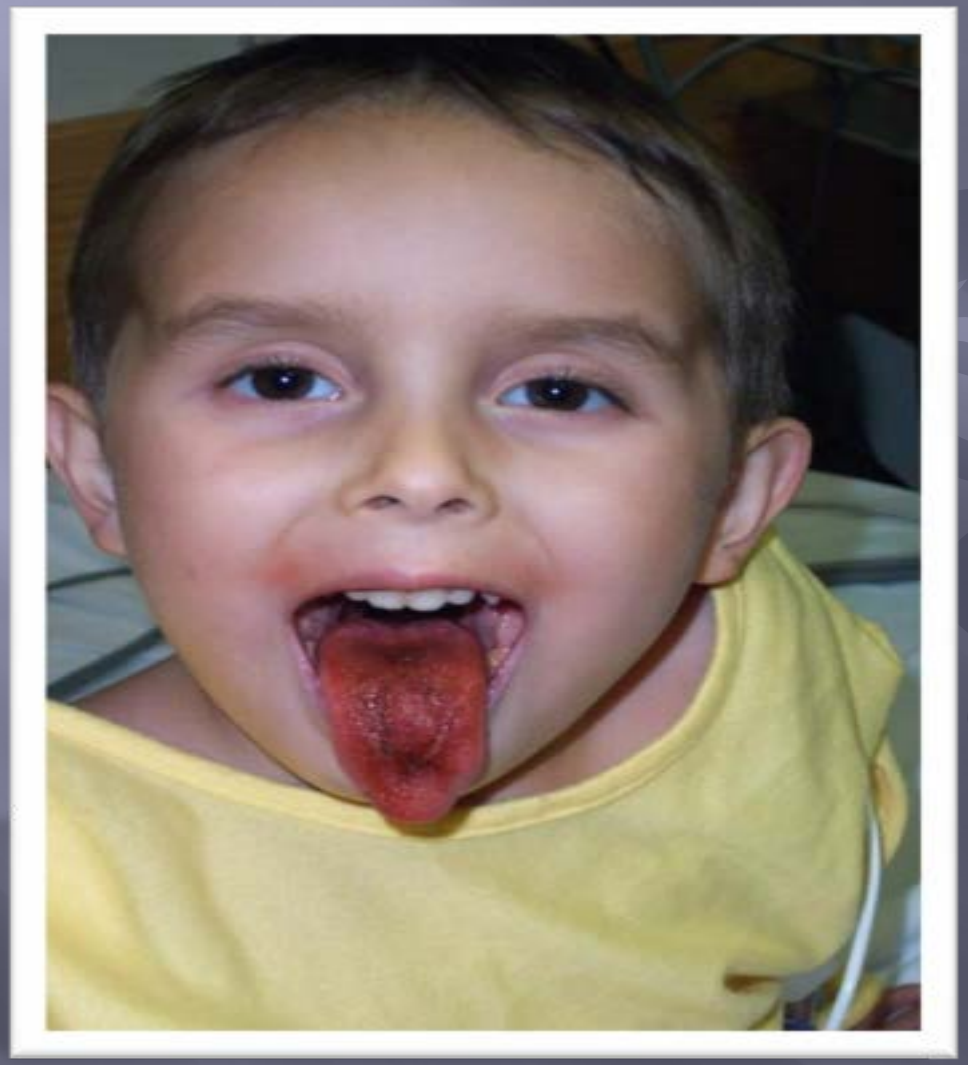
Sick or not sick?

Sick or not sick?

Sick or Not Sick

- Alert
- Interacts with toy
- Good spontaneous movement
- Good coordination and strength

Vomiting and diarrhea x 3 days



Dry, sunken eyes

Dry oral membranes

But is he *sick*?

Vomiting and diarrhea x 3 days

Watching passively

Since when does a kid this age stay still?

Is he *sick*?

Compare

Which would you treat first?

Before and After

A Good Assessment

Ongoing Assesment

- Full head to toe assessment
- Vital signs
- Inspect, palpate and auscultate
- Good baseline

- Signs and Symptoms
- Allergies
- Medications
- Previous History
- Last ate
- Events leading to Injury

Treatment Includes

- Comfort
  - Verbal reassurance
  - Touch
  - Environment
  - Keeping patient warm
  - Oxygen
  - EKG
  - IV

Treatment for Pediatrics

Use appropriately sized equipment for all pediatric patients

One Last Piece of Advice

Summary

- Many differences between pediatrics and adults
- Patient assessment triangle
- Perform a good assessment
- If a child looks sick, he is sick
- Treatment
- Right size equipment for right sized patient
- Don’t forget about parents and caregivers

Questions?

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