

MEDAVIE

HealthEd

College of Paramedicine

ÉduSanté

Collège de formation paramédicale



PEDIATRIC ASSESSMENT

Advanced Care Paramedicine

Module: 02

Section: 03



- Pediatric patients are not just small adults...
- Infants and children are anatomically different from adults
- Pediatric injuries have become major concerns.
- Children are at higher risk of injury than adults.
- Children are more likely to be adversely affected by the injuries they receive.

Pediatric Age Classifications

- Newborn First few hours of life
- Neonate First 28 days of life
- Infant Up to 1 year of age
- Toddler 1 to 3 years of age
- Preschooler 3 to 5 years of age
- School age 6 to 12 years of age
- Adolescent The period between the end of childhood (beginning of puberty) and adulthood (18 years of age)

Pediatrics

GENERAL APPROACH TO PEDIATRIC EMERGENCIES

- Consider patient's emotional and psychological development
- Treatment begins with communication and psychological support

- The child's most common reaction to an emergency is fear of:
 - Separation
 - Removal from a family place
 - Being hurt
 - Being mutilated or disfigured
 - The unknown



- Most parents or caregivers are overwhelmed by fear
- Expressions
 - Is my child going to die?
 - Did my child suffer brain damage?
 - Is my child going to be all right
 - What are you doing to my child?
 - Will my child be able to walk?

- Tell them your name and qualifications
- Acknowledge their fears and concerns
- Reassure them that their feelings are valid
- Redirect their energies
- Remain calm and appear in control
- Keep them informed

Pediatrics

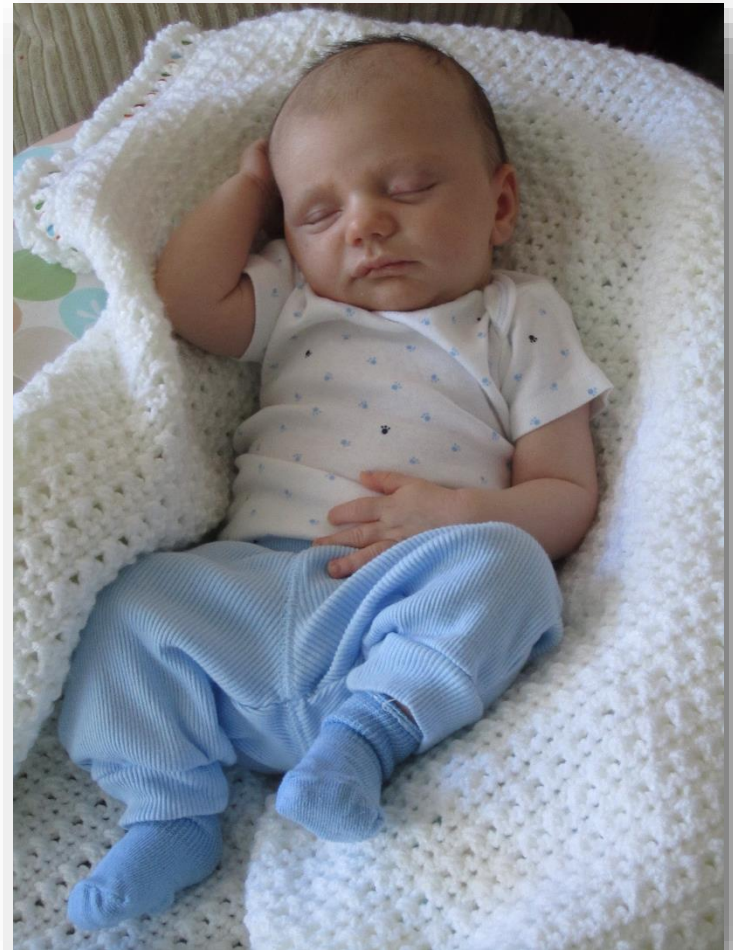
GROWTH AND DEVELOPMENT

- Each age group has specific developmental stages
 - Infants
 - Toddlers
 - Preschoolers
 - School-age children
 - Adolescents
- Characteristics of thinking
- Approach strategies

- First hours after birth
- Newborn
 - Baby in first hours of life
- Neonate
 - Birth to one month of age
- Assessed with APGAR scoring system



- Birth to one month.
- Tend to lose 10% of birth weight
 - Regain in 10 days.
- Development centers on reflexes.
- Personality begins to form.
- Parent can comfort child.



- Common illnesses
 - Jaundice
 - Vomiting
 - Respiratory distress
- Do not develop fever with minor illness
- Allow patient to remain in caregiver's lap



- Ages 6 to 12 months.
- May stand or walk without assistance.
- Follow movements.
- Muscle development develops in cephalo-caudal progression.
- Allow patient to remain in caregiver's lap.



- Infants and young children should be allowed to remain in mothers' arms



- Ages 1 to 3 years.
- Great strides in motor development.
- May stray from parents more frequently.
- Parents are the only ones who can comfort them.
- Language development begins.
- Approach child slowly.



- Examine from head-to-toe.
- Avoid asking “yes” or “no” questions.
- Allow child to hold a favorite blanket or item.
- Tell child if something will hurt.



- Ages 3 to 5 years.
- Increase in fine and gross motor skills.
- Children know how to talk.
- Fear mutilation.
- Seek comfort and support from within home.
- Distorted sense of time.



- Croup
- Asthma
- Poisoning
- Auto accidents
- Burns
- Child abuse
- Scald burns
- Ingestion of foreign bodies
- Drowning
- Epiglottitis
- Febrile seizures
- Meningitis
- Falls

- Ages 6–12 years.
- Active and carefree age group.
- Growth spurts are common.
- Give this age group responsibility of providing history.
- Respect modesty.



- A small toy may calm a child in the 6–10 year age range



- The approach to the pediatric patient should be gentle and slow



- Drowning
- Auto accidents
- Bicycle accidents
- Falls
- Fractures
- Sports injuries
- Child abuse
- Burns
- Influenza
- Common cold

- Ages 13 to 18.
- Begins with puberty, which is very child-specific; are very “body conscious.”
- May consider themselves “grown up.”
- Desire to be liked and included by peers.
- Are generally good historians.
- Relationships with parents may be strained.

- Mononucleosis
- Asthma
- Auto accidents
- Sports injuries
- Drug and alcohol problems
- Suicidal gestures
- Sexual abuse

Pediatrics

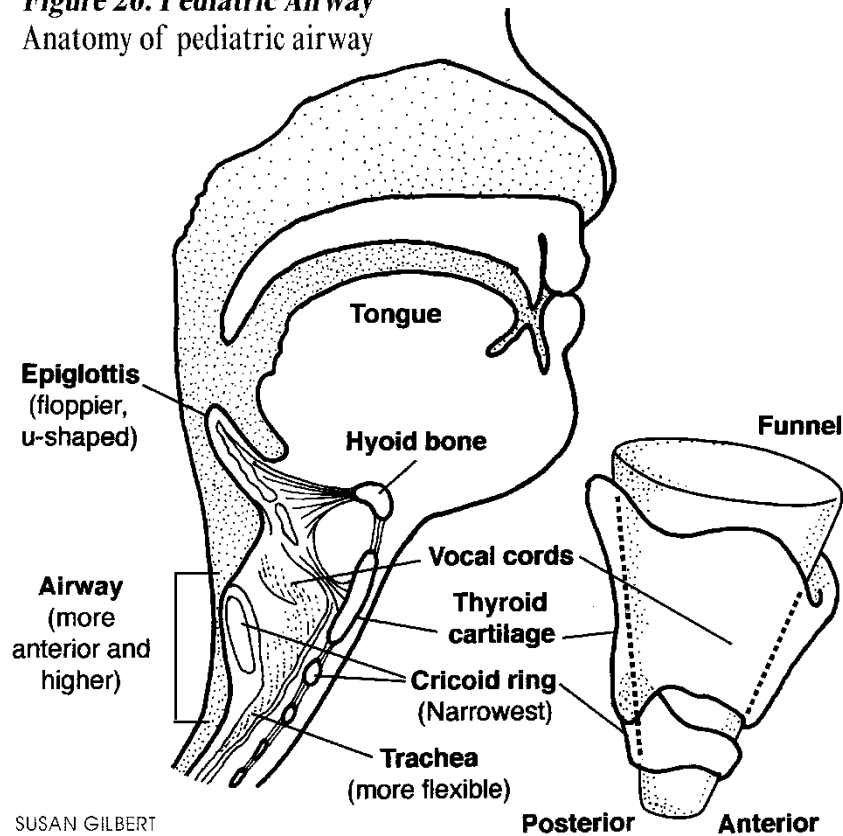
ANATOMY AND PHYSIOLOGY

- Proportionally larger size
- Larger occipital region
- Fontanelles open in infancy
- Face is smaller in comparison to size of head
- The tongue is larger in relation to the rest of the upper airway

- Narrower at all levels
- Infants are obligate nasal breathers
 - You have to learn to breathe through your mouth
 - Nasal secretions can be FBAO
- Jaw is posteriorly smaller in young children
- Larynx is higher (C3 - C4) and more anterior
- Cricoid ring is the narrowest part of the airway in young children
- Tracheal cartilage is softer
- Trachea is smaller in both length and diameter

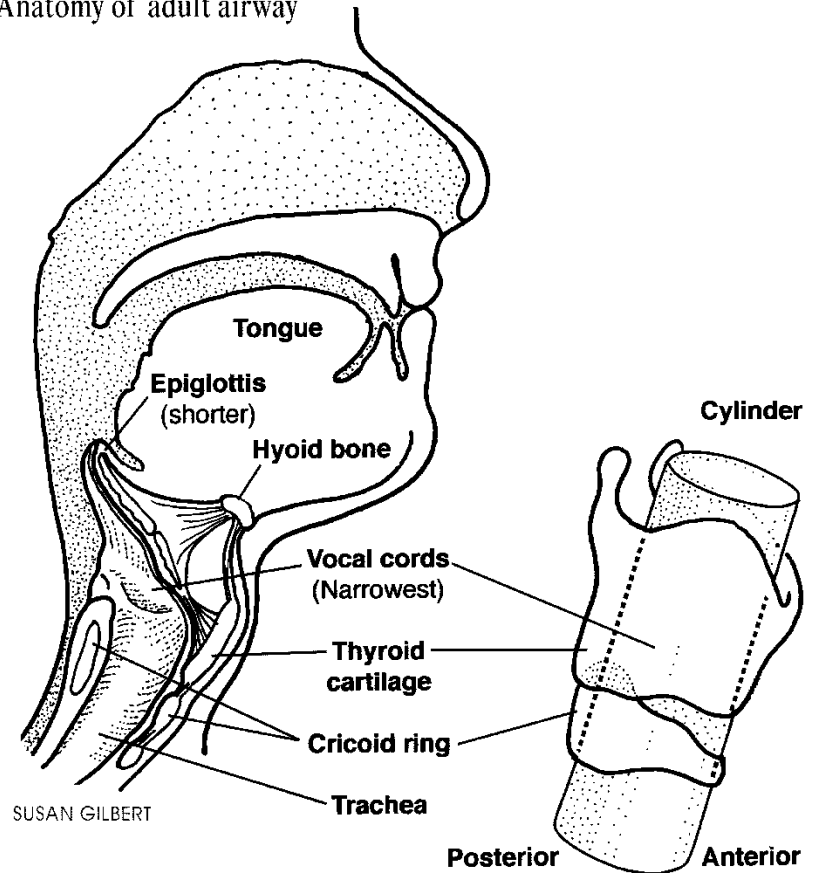
- Epiglottis
 - Omega shaped in infants
 - Extends at a 45° angle into airway
 - Epiglottic folds have softer cartilage; more floppy, especially in children
- The more pliable lower airways are less able to retain their shape
 - are more likely to collapse in the presence of mild-to-moderate pressure changes

Figure 26: Pediatric Airway
 Anatomy of pediatric airway



SUSAN GILBERT

Figure 27: Adult Airway
 Anatomy of adult airway



SUSAN GILBERT

- Ribs are positioned horizontally
- Ribs are more pliable and offer less protection to organs
 - Poorly developed intercostal muscles are less able to assist the diaphragm in the breathing process
 - Is also more pliable and can withstand more force
 - Therefore, may be injured without an overlying rib fracture
- Chest muscles are immature and fatigue easily
- Lung tissue is more fragile
- Mediastinum is more mobile
- Thin chest wall allows for easily transmitted breath sounds

- Internal organs are larger in proportion to their body size
- Packed into a smaller space
- Immature abdominal muscles offer less protection
- Abdominal organs are closer together
- Liver and spleen are proportionally larger and more vascular
 - Often the most common injury with abdominal blunt trauma

- Bones are softer and more porous until adolescence
 - have less calcium and minerals than adult bones
 - injury to a child's bone may be a bend instead of an actual break
- Injuries to growth plate may disrupt bone growth
- Site for IO access

- Skin is thinner and more elastic
- Thermal exposure results in deeper burn
- Less subcutaneous fat
- Larger surface area to body mass

- $\text{Weight} = (\text{age in years} \times 2) + 8$
 - Approximate average weight

- Tidal volume is proportionally smaller to that of adolescents and adults
- Metabolic oxygen requirements of infants and children are about double those of adolescents and adults
- Children have proportionally smaller functional residual capacity, and therefore proportionally smaller oxygen reserves

- Cardiac output is rate dependent in infants and small children
- Vigorous but limited cardiovascular reserve
 - Can \uparrow HR and \uparrow PVR but not SV
- Bradycardia is a response to hypoxia
- Children can maintain blood pressure longer than adults (healthy vessels)
- Circulating blood volume is proportionally larger than adults
- Absolute blood volume is smaller than adults

- Develops throughout childhood
- Developing neural tissue is more fragile
- Brain and spinal cord are less well protected by skull and spinal column
- Open fontanelles in early months

- Infants and children have limited glycogen and glucose stores
- Blood glucose can drop very low in response to stressors
- Significant volume loss can result from vomiting and diarrhea
- Children are prone to hypothermia due to increased body surface area
- Newborns and neonates are unable to shiver to maintain body temperature

- Some childhood diseases and disabilities are predictable by age group
 - Neonate (first 28 days of life)
 - 1 to 5 month old infant
 - 6 to 12 month old infant
 - 1 to 3 year old child
 - 3 to 5 year old child
 - 6 to 12 year old child
 - 12 to 15 year old adolescent

Pediatrics

GENERAL APPROACH TO PEDIATRIC ASSESSMENT

- Many components of the initial patient evaluation can be done by observing the patient
- Use the parent/guardian to assist in making the infant or child more comfortable as appropriate
- Interacting with parents and family
 - Normal responses to acute illness and injury
 - Parent/guardian and child interaction
 - Intervention techniques

- Observe the scene for hazards or potential hazards
- Observe the scene for mechanism of injury/illness
 - Ingestion
 - Pills, medicine bottles, household chemicals, etc.
 - Child abuse
 - Injury and history do not coincide, bruises not where they should be for mechanism of injury, etc.
 - Position patient found

- Take BSI precautions.
- Look for clues to mechanism of injury or nature of illness.
- Allow child time to adjust to you before approaching.
- Speak softly, simply, at eye level.

- General impression
 - General impression of environment
 - General impression of parent/guardian and child interaction
 - General impression of the patient/pediatric assessment triangle
 - A structure for assessing the pediatric patient
 - Focuses on the most valuable information for pediatric patients
 - Used to ascertain if any life-threatening condition exists

Pediatric Assessment Triangle

Appearance

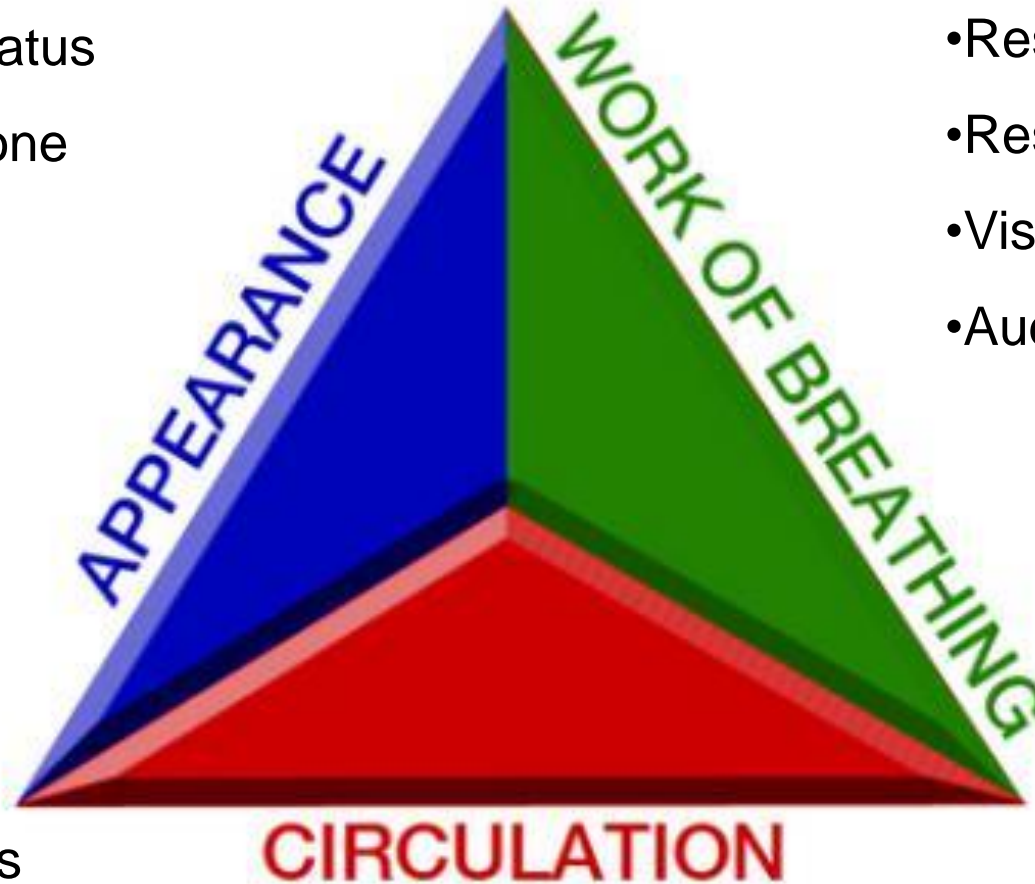
- Mental Status
- Muscle Tone
- Position

Work of Breathing

- Respiratory Effort
- Respiratory Rate
- Visible Movement
- Audible Sounds

Circulation

- Skin Signs
- Skin Color



- Initial triage decisions
 - Emergent/Urgent
 - Proceed with rapid ABC assessment, treatment, and transport
 - Non urgent
 - Proceed with focused history, detailed physical examination after initial assessment

Assessment	Critical (Decompensated Shock)	Unstable (Compensated Shock)	Potentially Unstable (Mechanism for Shock)	Stable
Heart Rate	Tachy or brady	Tachy	Normal	Normal
Pulse Strength	Weak central pulse, absent peripheral pulse	Normal central pulse, weak peripheral pulse	Normal	Normal
Cap Refill	> 5 sec	3 – 5 sec	< 2 – 3 sec	< 2 – 3 sec
BP	Hypotensive	Normal	Normal	Normal
Skin	Very pallid, mottled, or cyanotic; cool	Normal, pallid, or mottled; cool	Normal	Normal
Actions	Open airway, suction, give oxygen, assist ventilation as needed, consider ETI; control hemorrhage, keep child warm, begin fluid resuscitation, and transport; initiate pulse oximetry and cardiac monitoring en route	Give oxygen, reassess frequently; control hemorrhage, keep child warm, begin fluid resuscitation; initiate pulse oximetry and cardiac monitoring; prepare for transport	Give oxygen, control hemorrhage, and transport; consider IV access; initiate pulse oximetry and cardiac monitoring; begin focused history and detailed exam during transport	Begin focused history and physical exam on scene; if no mechanism for shock is found, prepare for routine transport

- Approximate average weight
 - Weight = (age in years X 2) + 8

- Determine level of consciousness
 - AVPU scale
 - Alert
 - Responds to verbal stimuli
 - Responds to painful stimuli
 - Unresponsive
 - Modified Glasgow Coma Scale
 - Signs of inadequate oxygenation

Children					
Eye Opening		Motor Response		Verbal Response	
4	Spontaneous	6	Obeys commands	5	Oriented
3	To Speech	5	Localizes Pain	4	Confused
2	To Pain	4	Withdraws	3	Inappropriate
1	No Response	3	Flexion	2	Incomprehensible
		2	Extension	1	No Response
		1	No Response		
Infants					
4	Spontaneous	6	Spontaneous movements	5	Coos and Babbles
3	To Speech	5	Localizes Pain	4	Irritable, cries
2	To Pain	4	Withdraws	3	Cries to pain
1	No Response	3	Flexion	2	Moans to pain
		2	Extension	1	No Response
		1	No Response		

Airway and Breathing

- Airway
 - Determine patency
- Breathing
 - Should proceed with adequate chest rise and fall
- Signs of respiratory distress
 - Tachypnea
 - Use of accessory muscles
 - Nasal flaring
 - Grunting
 - Bradypnea
 - Irregular breathing pattern
 - Head bobbing
 - Absent breath sounds
 - Abnormal breath sounds

Table 42-3 SIGNS OF INCREASED RESPIRATORY EFFORT

Retraction	Visible sinking of the skin and soft tissues of the chest around and below the ribs and above the collarbone
Nasal flaring	Widening of the nostrils; seen primarily on inspiration
Head bobbing	Observed when the head lifts and tilts back as the child inhales and then moves forward as the child exhales
Grunting	Sound heard when an infant attempts to keep the alveoli open by building back pressure during expiration
Wheezing	Passage of air over mucous secretions in bronchi; heard more commonly upon expiration; a low- or high-pitched sound
Gurgling	Coarse, abnormal bubbling sound heard in the airway during inspiration or expiration; may indicate an open chest wound
Stridor	Abnormal, musical, high-pitched sound, more commonly heard on inspiration

- Pulse
 - Central
 - Peripheral
 - Quality of pulse

- Rate = $150 - (5 \times \text{age in years})$
 - Estimate only for upper limit of HR

- Heart rate
 - Tachycardia in response to stress
 - Bradycardia indicates hypoxia
- Peripheral circulation
 - Loss of central pulses is an ominous sign
- End organ perfusion
 - Skin, kidneys and brain

- Blood pressure
 - Measuring BP is not necessary in children less than 3 years of age
 - A strong central or peripheral pulse should indicate a good BP
 - Estimate Systolic pressure
 - $BP = (2 \times \text{age in years}) + 70$ (Lower end systolic)
 - $BP = (2 \times \text{age in years}) + 90$ (Average systolic)

- Skin color
 - Cap refill
 - Maybe delayed if skin is cool due to environment
 - Attempt more central location
 - Mottled, pale or cool skin may indicate shock
- Active hemorrhage

Normal Vital Signs

Group	Breaths/min	Beats/min	Expected Mean for Blood Pressure (Systolic/diastolic)
Newborn	30-50	120-160	74-100 mm Hg/50-68 mm Hg
Infant	20-30	80-140	84-106 mm Hg/56-70 mm Hg
Toddler	20-30	80-130	98-106 mm Hg/50-70 mm Hg
Preschool	20-30	80-120	98-112 mm Hg/64-70 mm Hg
School age	(12-20)-30	(60-80)-100	104-124 mm Hg/64-80 mm Hg
Adolescent	12-20	60-100	118-132 mm Hg/70-82 mm Hg

- Used to allow the infant or child to become familiar with you and your equipment
- Use depends on the seriousness of the patient's condition
 - For the conscious, non-acutely ill child
 - For the unconscious, acutely ill child do not perform the transition phase but proceed directly to treatment and transport

Pediatrics

FOCUSED HISTORY AND PHYSICAL EXAM

- Nature of illness/injury
- Length of time ill or injured
- Presence of fever
- Effects of illness/injury on behavior
- Feeding/Voiding
 - Bowel/urine habits
 - Presence of vomiting/diarrhea
 - Frequency of urination
- Interaction with parent/surroundings

- Chief complaint
 - Nature of illness/injury
 - How long has the patient been sick/injured
 - Presence of fever
 - Effects on behavior
 - Bowel/urine habits
 - Vomiting/diarrhea
 - Frequency of urination
- Past medical history
 - Still use SAMPLE
 - Infant or child under the care of a physician
 - Chronic illnesses
 - Medications
 - Allergies

- Should proceed from head-to-toe in older children
- Should proceed from toe-to-head in younger children (less than 2 years of age)
- Depending on the patient's condition, some or all of the following assessments may be appropriate:
 - Pupils
 - Capillary refill
 - Hydration (Skin turgor, fontanel, mucous membranes)
 - Pulse oximetry
 - ECG monitoring

- Appropriate for all patients
- Should be continued throughout the patient care encounter
- Purpose is to monitor the patient for changes in:
 - Respiratory effort
 - Skin color and temperature
 - Mental status
 - Vital signs (including pulse oximetry measurements)
- Measurement tools should be appropriate for size of child