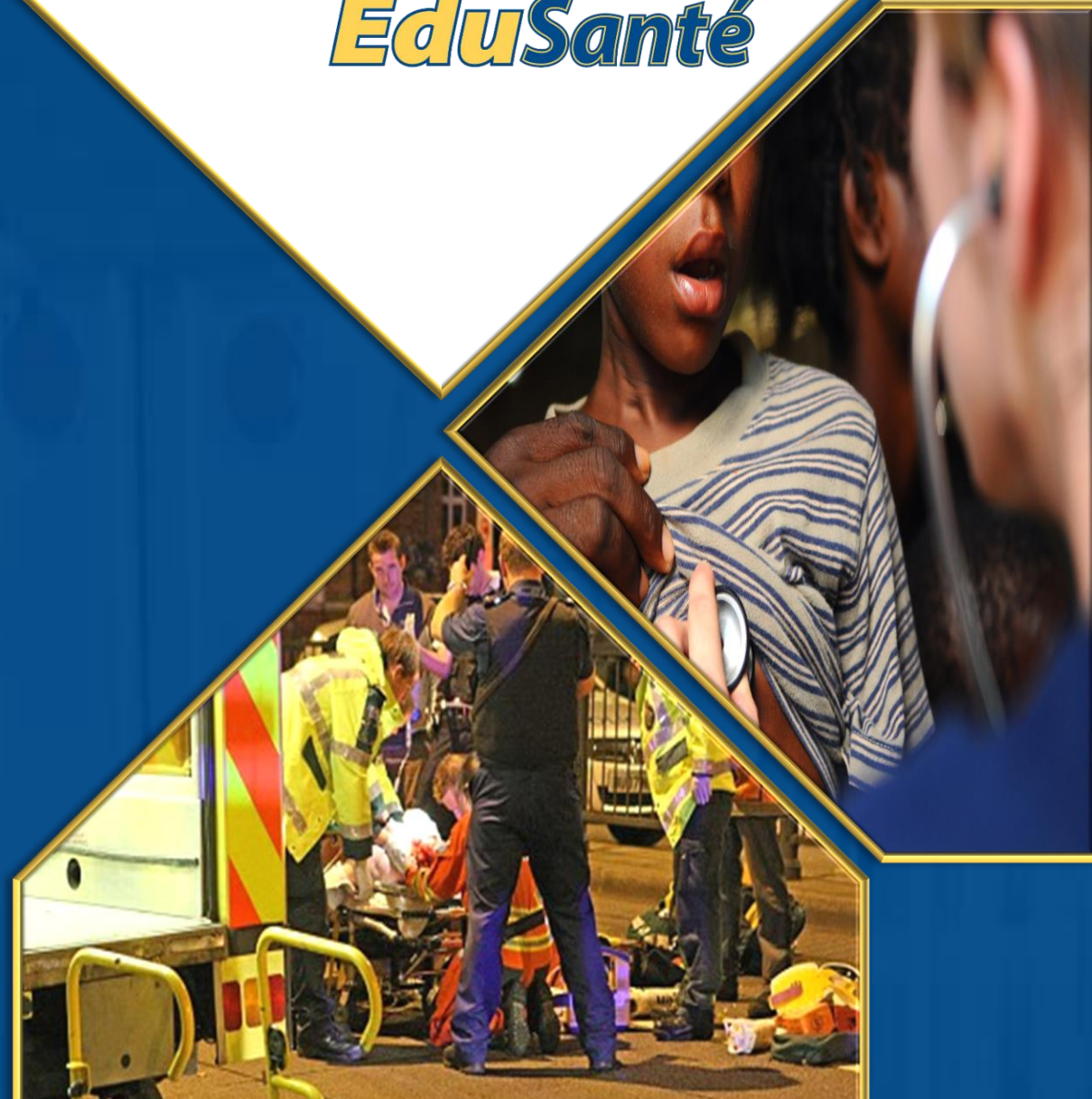


# PEDIATRIC ASSESSMENT

Primary Care Paramedicine

Module: 09

Section: 05



## School Bus

EMERGENCY DOOR

- 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.

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# **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

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# **GROWTH AND DEVELOPMENT**

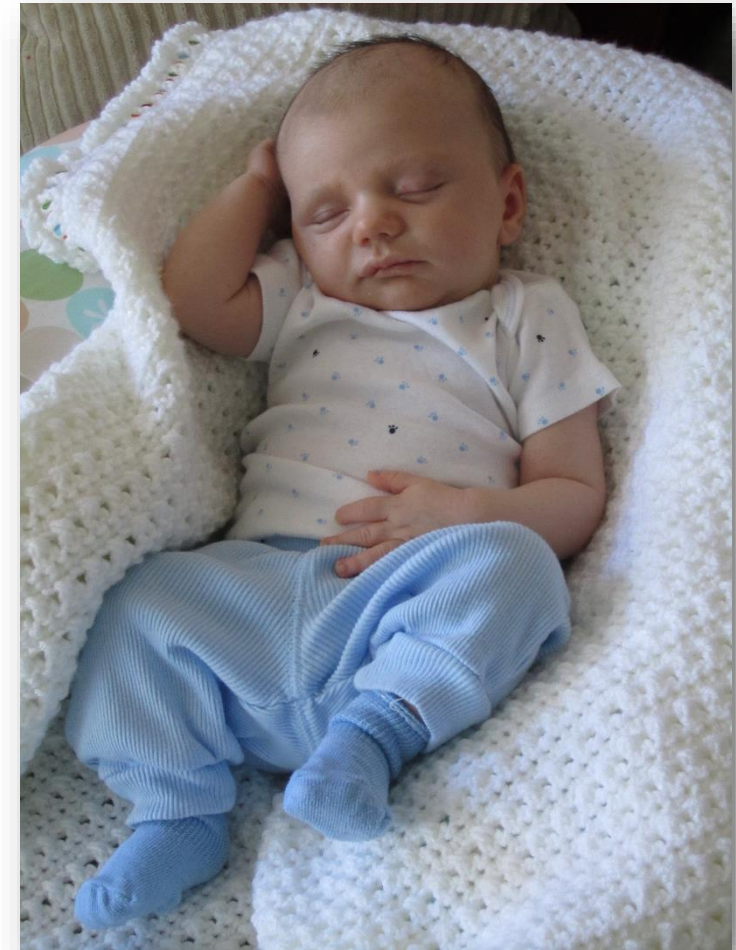


- Each age group has specific developmental stages
  - Infants
  - Toddlers
  - Preschoolers
  - School-age children
  - Adolescents
- Characteristics of thinking
- Approach strategies

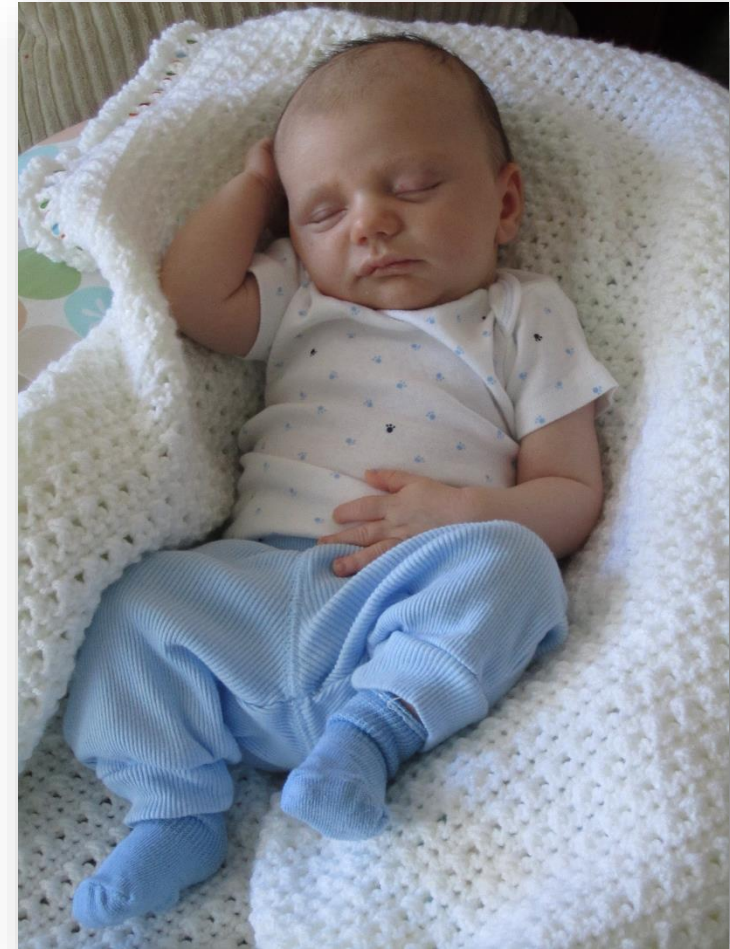
- First hours after birth
- Newborn
  - Baby in first hours of life
- Neonate
  - Birth to one month of age
- Assessed with APGAR scoring system



- 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.

# Common Adolescent Illness and Injuries

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



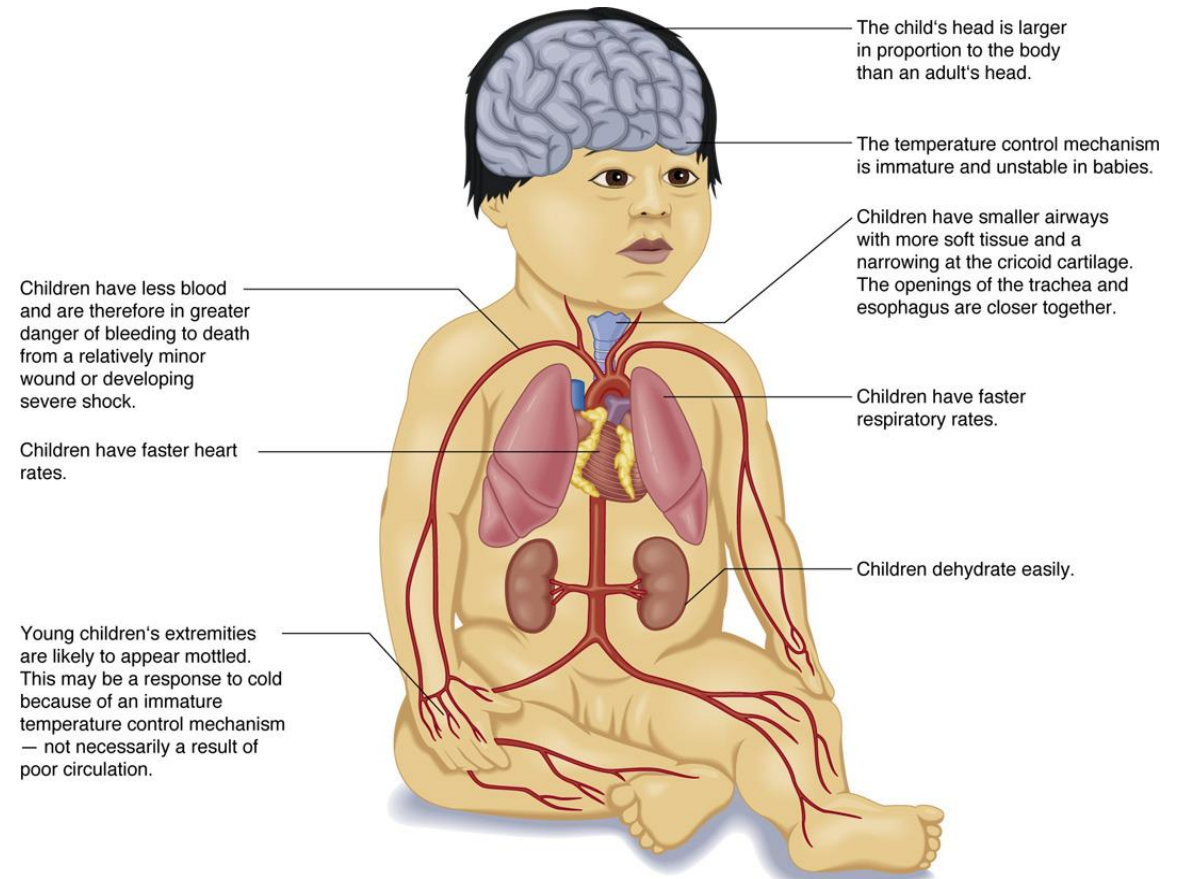
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# **ANATOMY AND PHYSIOLOGY**

**Table 42-1 ANATOMICAL AND PHYSIOLOGICAL CHARACTERISTICS OF INFANTS AND CHILDREN**

Differences in Infants and Children as Compared to Adults	Potential Effects That May Impact Assessment and Care
<p>Tongue proportionately larger</p> <p>Smaller airway structures</p> <p>Abundant secretions</p> <p>Deciduous (baby) teeth</p> <p>Flat nose and face</p> <p>Head heavier relative to body and less-developed neck structures and muscles</p> <p>Fontanelle and open sutures (soft spots) palpable on top of young infant's head</p>	<p>More likely to block airway</p> <p>More easily blocked</p> <p>Can block the airway</p> <p>Easily dislodged; can block the airway</p> <p>Difficult to obtain good face mask seal</p> <p>Head may be propelled more forcefully than body producing a higher incidence of head injury in trauma</p> <p>Bulging fontanelle can be a sign of increased intracranial pressure (but may be normal if infant is crying); shrunken fontanelle may indicate dehydration</p>
<p>Thinner, softer brain tissue</p> <p>Head larger in proportion to body</p>	<p>Susceptible to serious brain injury</p> <p>Tips forward when supine; possible flexion of neck, which makes neutral alignment of airway difficult</p>
<p>Shorter, narrower, more elastic (flexible) trachea</p> <p>Short neck</p>	<p>Can close off trachea with hyperextension of neck</p> <p>Difficult to stabilize or immobilize</p>
<p>Abdominal breathers</p> <p>Faster respiratory rate</p> <p>Newborns breathe primarily through the nose (obligate nose breathers)</p>	<p>Difficult to evaluate breathing</p> <p>Muscles easily fatigue, causing respiratory distress</p> <p>May not automatically open mouth to breathe if nose is blocked; airway more easily blocked</p>
<p>Larger body surface relative to body mass</p> <p>Softer bones</p>	<p>Prone to hypothermia</p> <p>More flexible, less easily fractured; traumatic forces may be transmitted to internal organs, causing injuring without fracturing the ribs; lungs easily damaged with trauma</p>
<p>Spleen and liver more exposed</p>	<p>Organ injury likely with significant force to abdomen</p>

- Anatomical and physiological considerations in the infant and child



- Narrower airways at all levels
  - Cricoid ring the narrowest part
  - More easily obstructed
- Tongue takes up more space in mouth
- Obligate nose breathers
- Trachea is softer and more flexible
- Larynx is higher
- Horseshoe shaped, floppy epiglottis

# Air positioning in the infant or child



- Diaphragmatic breathers
- Prone to gastric distension
- 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
- 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
- Growth plate
  - Area just below the head of the long bone in which growth in bone length occurs.
- During the early stages of development, injuries to the growth plate by an intraosseous needle may disrupt bone growth



- Thinner
- Less cutaneous fat
- Larger BSA to weight ratio
- Greater risk of injury from temperature or thermal exposure
- Lose fluids and heat more easily

- Infants and children require double the metabolic oxygen as adults.
- They also have proportionately smaller oxygen reserves

- Infants and children increase their cardiac output by increasing their heart rate.
- Circulating blood volume is proportionally larger than adults
- They have a very limited capacity to increase their stroke volume.
- A smaller absolute volume of fluid/blood loss is needed to cause shock.
- Bradycardia is a response to hypoxia

- A larger proportional volume of fluid/blood loss is needed to cause shock
- Hypotension
  - Ominous sign of imminent cardiac arrest
- A child may be in shock despite a normal blood pressure.
  - Suspect shock if tachycardia is present.
- Monitor the pediatric patient carefully for the development of hypotension.

- Develops throughout childhood
- Developing neural tissue is more fragile
- The skull and spinal column offer less protection of the brain and spinal cord.
- Open fontanelles in early months

- Infants and children have a limited store of glycogen and glucose.
- Pediatric patients are prone to hypothermia because of their greater BSA-to-weight ratio.
- Significant volume loss can result from vomiting and diarrhea.
- Newborns and neonates lack the ability to shiver.

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# **GENERAL APPROACH TO PEDIATRIC ASSESSMENT**

- Much of the initial patient assessment can be done during visual examination of the scene.
- Involve the caregiver or parent as much as possible.
- Allow to stay with child during treatment and transport.



- 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

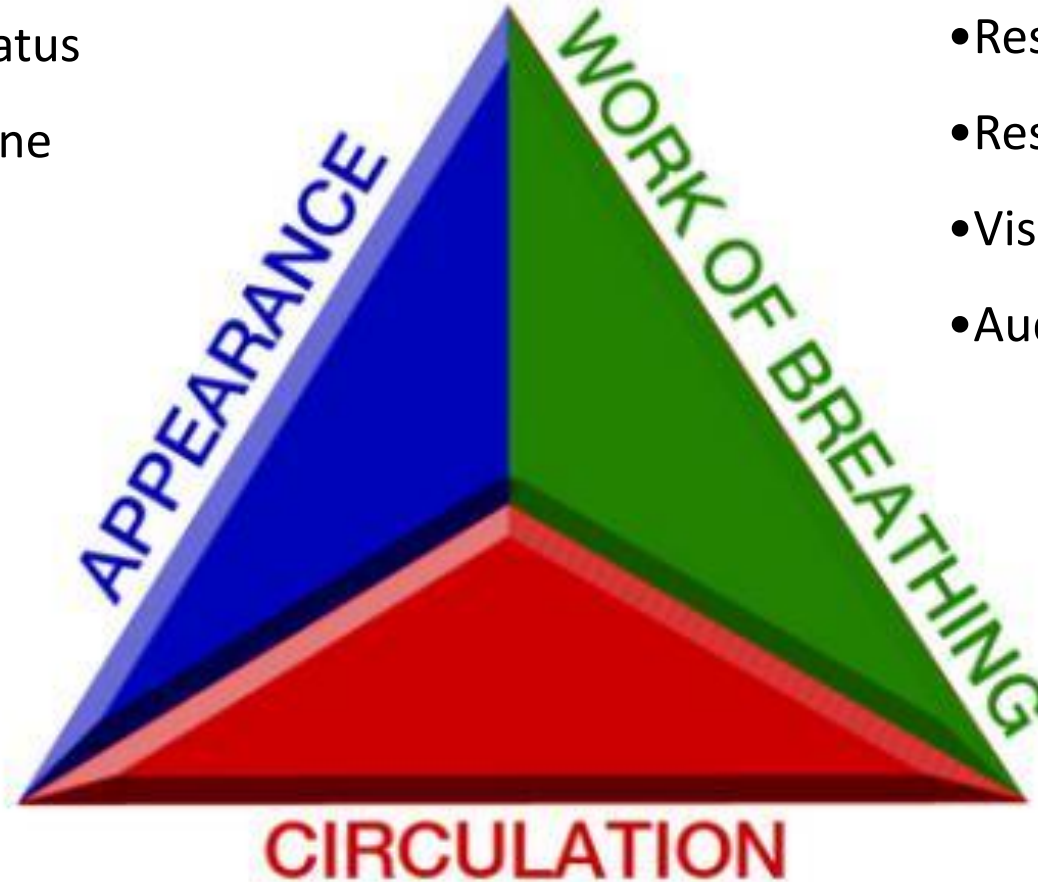
- Mental Status
- Muscle Tone
- Position

## 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

- Approximate average weight

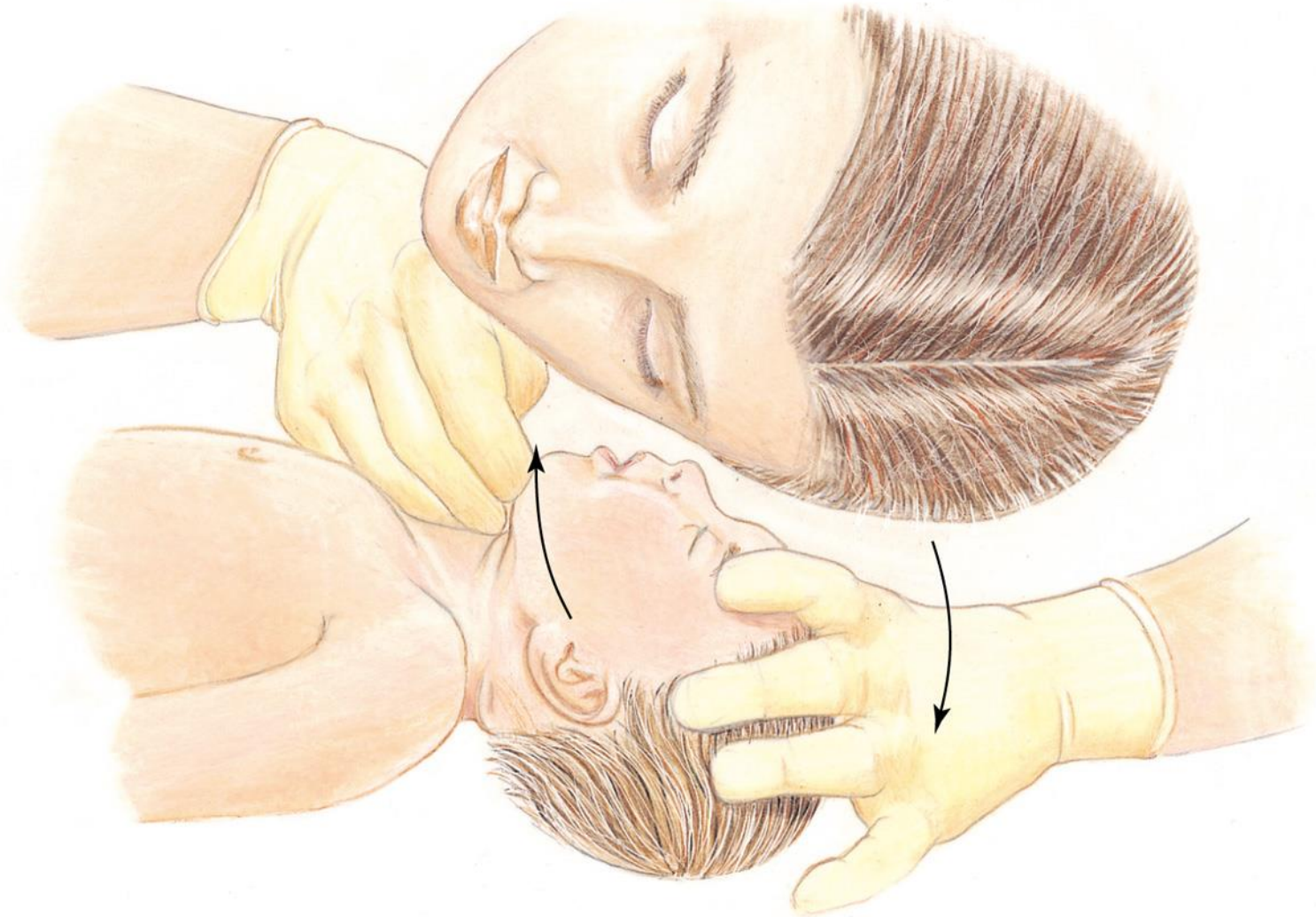
$$\text{Weight} = (\text{age in years} \times 2) + 8$$

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

- Airway and respiratory problems are the most common cause of pediatric cardiac arrest
  - Is the airway patent?
  - Is the airway maintainable with positioning or adjuncts?
  - Is the airway not maintainable?



# Assessing the airway

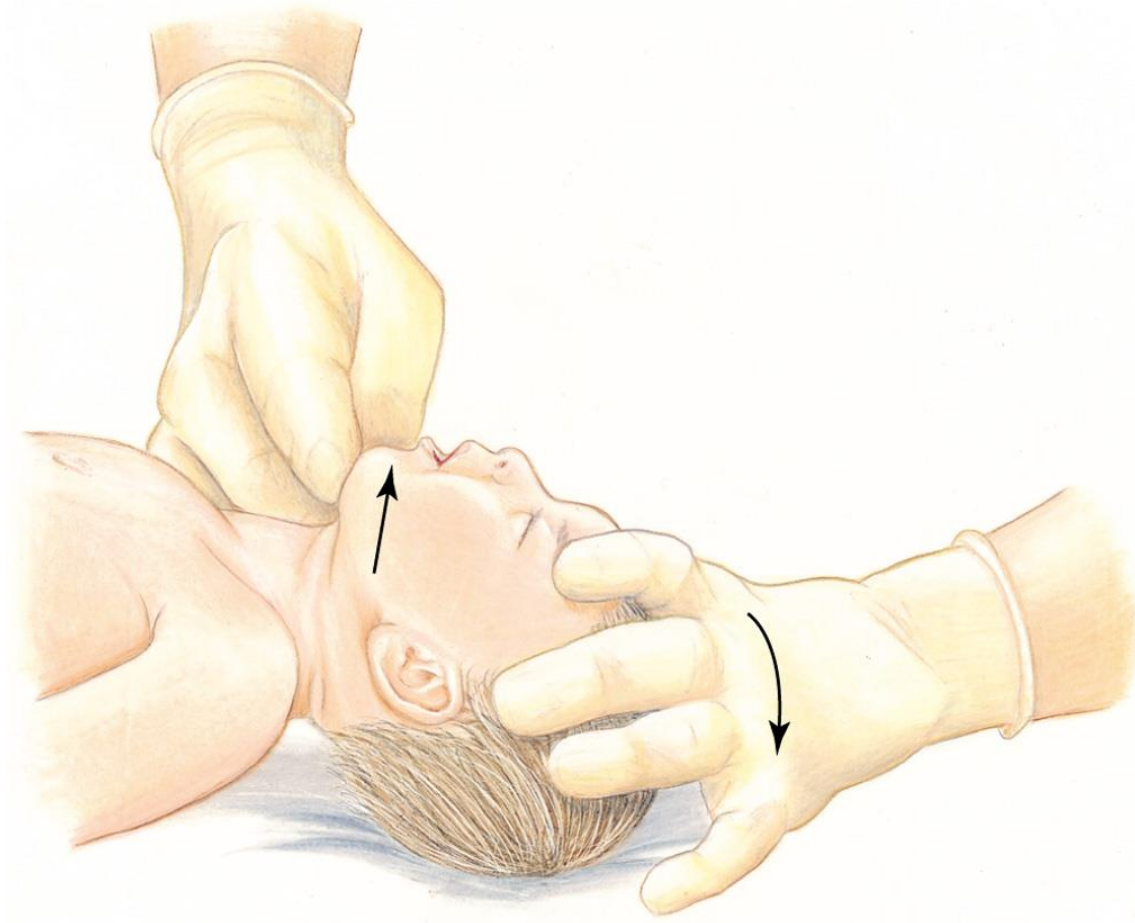


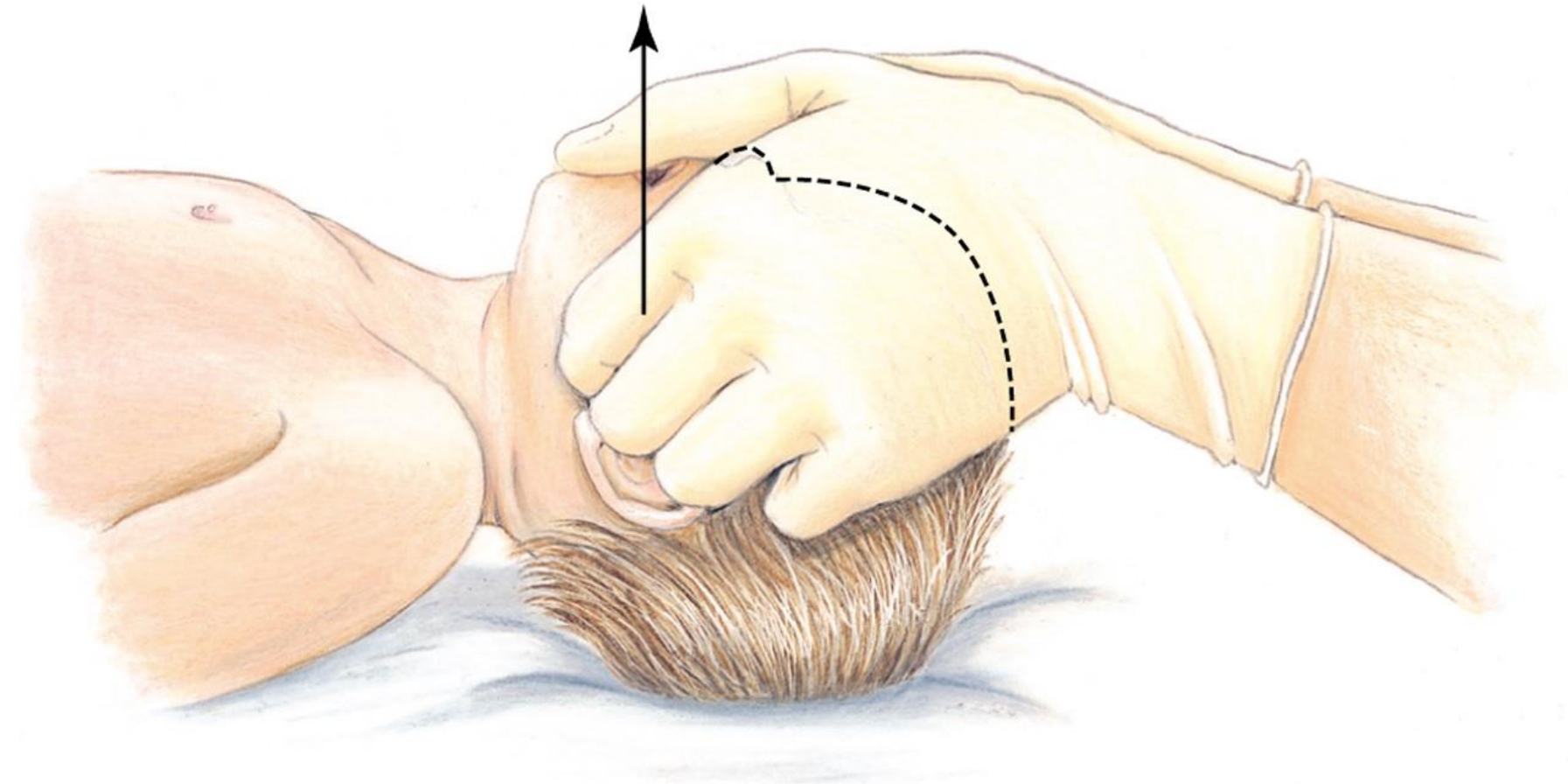
# Opening the airway in a child



Never shake an infant or child.

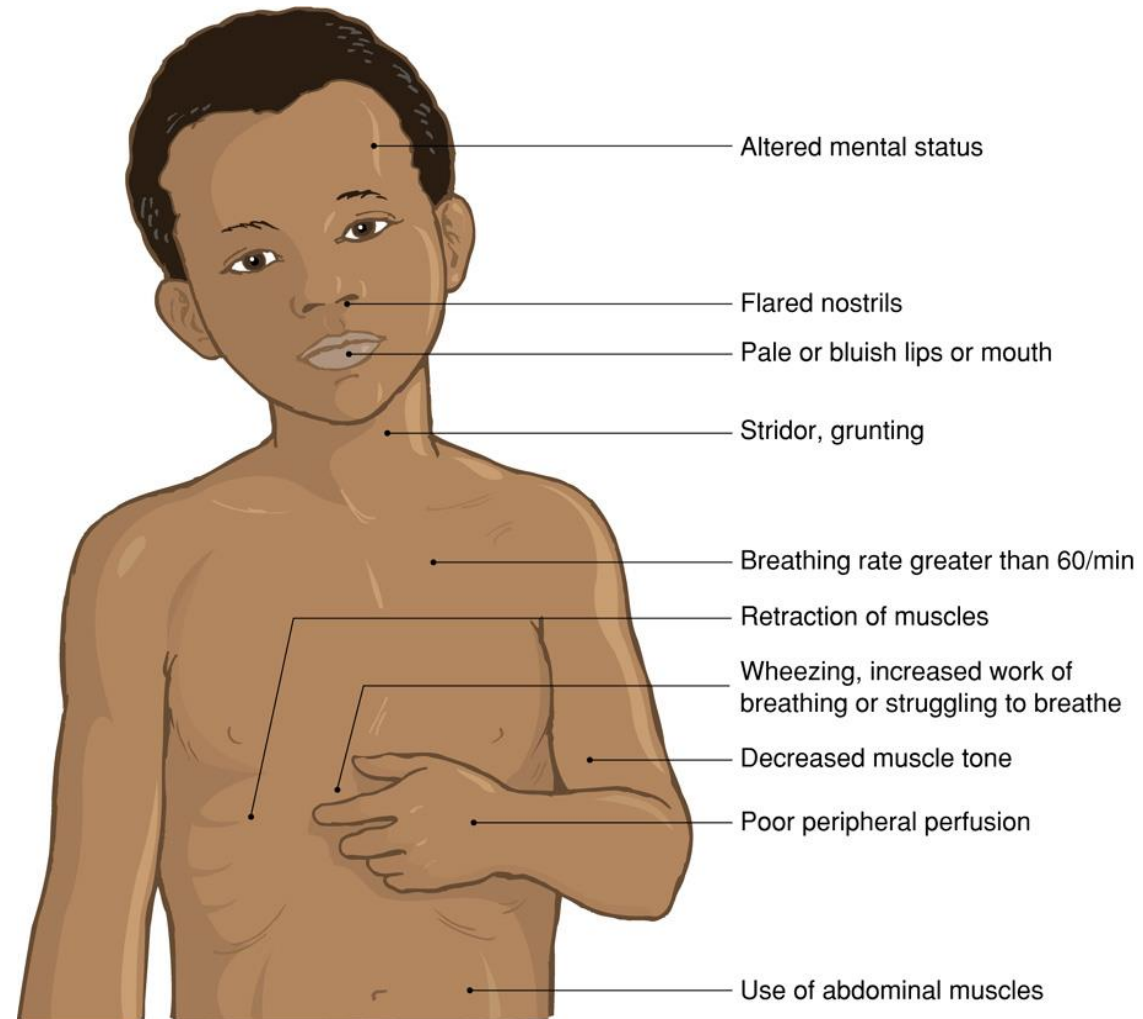
# Head-tilt/chin lift method





- Patients have small chests
  - Keep stethoscope near armpits to reduce transmitted sounds
- Tachypnea
  - First manifestation of respiratory distress
  - Eventually will tire and fail

# Signs of respiratory distress



**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

- 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

- Respiratory rate greater than 60
- Heart rate  $>180$  or  $<80$  (under 5 years)
- Heart rate  $>180$  or  $<60$  (over 5 years)
- Respiratory distress
- Trauma
- Burns
- Cyanosis
- Altered level of consciousness
- Seizures
- Fever with petechiae

- Depends on seriousness of patient's condition
- Intended for the non-acutely ill patient
- Allows patient to become familiar with you and your equipment

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

- Pupils
- Capillary refill
- Hydration
- Pulse oximetry

- Should be modified for pediatric patients
- Scoring determines severity
  - GCS 13–15 = Mild
  - GCS 9–12 = Moderate
  - GCS < 8 = Severe



Table 42-4

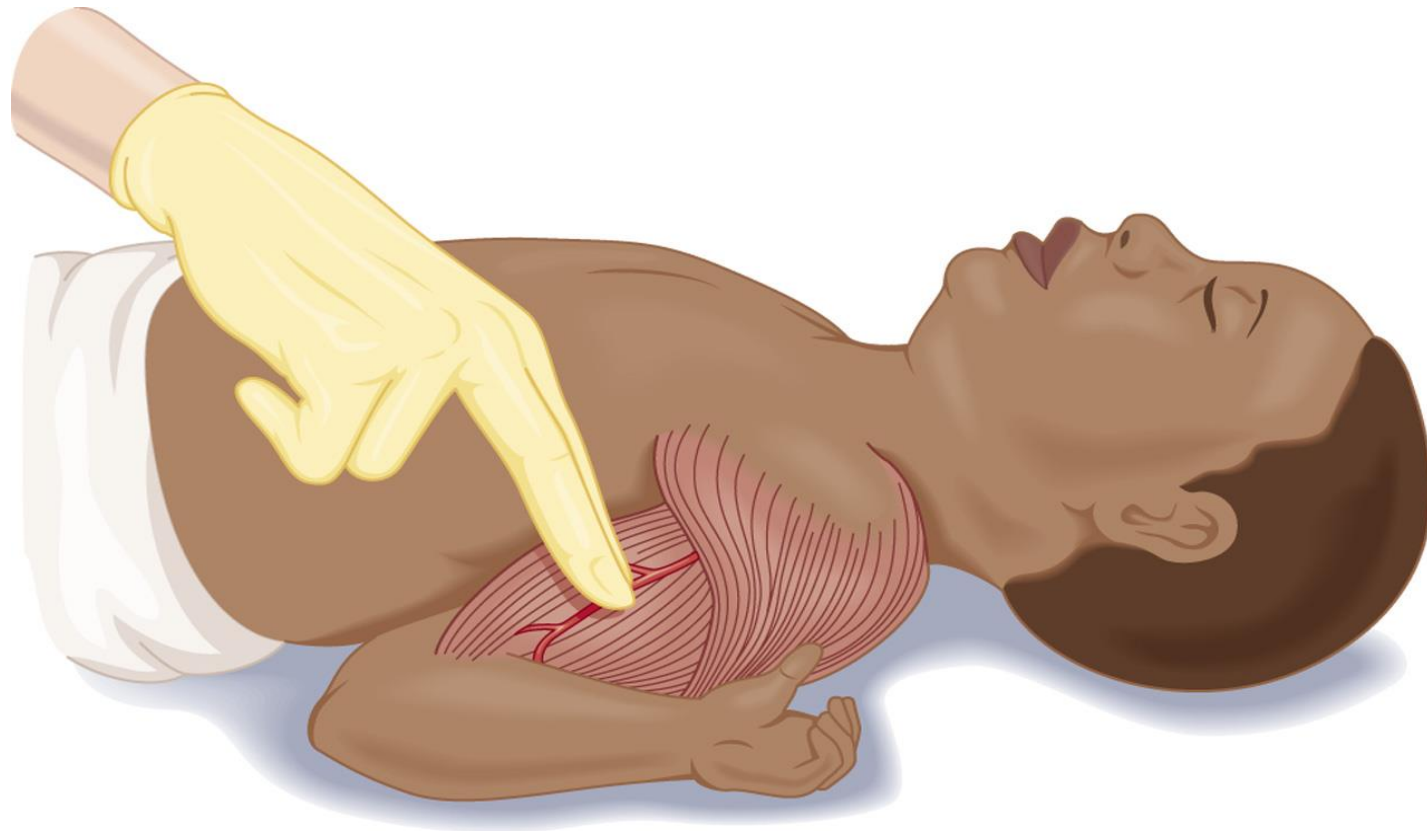
**GLASGOW COMA SCALE MODIFICATIONS  
 FOR INFANTS**

Category	Response	Score
Verbal	Happy, coos, babbles, or cries spontaneously	5
	Irritable crying, but consolable	4
	Cries to pain, weak cry	3
	Moans to pain	2
	None	1
Motor	Spontaneous movement	6
	Withdraws to touch	5
	Withdraws to pain	4
	Abnormal flexion	3
	Abnormal extension	2
	None	1
Eye Opening (same as adult)	Spontaneous	4
	To speech	3
	To pain	2
	None	1

Source: Adapted from James, H.E., (1986): "Neurological evaluation and support in the child with acute brain insult," *Pediatric Annals*, 15(1): 17.

- Take vitals with patient as close to resting state as possible
- Use appropriate sized BP cuffs
- Feel for peripheral brachial and radial pulses
- Make good estimate of child's weight
- Observe respiratory rate
- Measure temperature early and repeat
- Constantly observe LOC

# Taking the Brachial Pulse



# Taking the Femoral Pulse



**Table 42-2 NORMAL VITAL SIGNS: INFANTS AND CHILDREN\***

**Normal Pulse Rates (Beats per Minute, at Rest)**

Newborn	100 to 180
Infant (0–5 Months)	100 to 160
Infant (6–12 Months)	100 to 160
Toddler (1–3 Years)	80 to 110
Preschooler (3–5 Years)	70 to 110
School Age (6–10 Years)	65 to 110
Early Adolescence (11–14 Years)	60 to 90

**Normal Respiration Rates (Breaths per Minute, at Rest)**

Newborn	30 to 60
Infant (0–5 Months)	30 to 60
Infant (6–12 Months)	30 to 60
Toddler (1–3 Years)	24 to 40
Preschooler (3–5 years)	22 to 34
School Age (6–10 Years)	18 to 30
Early Adolescence (11–14 Years)	12 to 26

**Normal Blood Pressure Ranges (mmHg, at Rest)**

	Systolic	Diastolic
	Approx. 90 plus 2 × age	Approx. 2/3 systolic
Preschooler (3–5 Years)	average 98 (78 to 116)	average 65
School age (6–10 Years)	average 105 (80 to 122)	average 69
Early Adolescence (11–14 Years)	average 114 (88 to 140)	average 76

\*Adolescents ages 15 to 18 approach the vital signs of adults.

Note: A high pulse in an infant or child is not as great a concern as a low pulse. A low pulse may indicate imminent cardiac arrest. Blood pressure is usually not taken in a child under 3 years of age. In cases of blood loss or shock, a child's blood pressure will remain within normal limits until near the end, then fall swiftly.

- Reassess the patient since conditions can change rapidly.
- Reassess every 15 minutes in stable patients.
- Reassess every 5 minutes in unstable patients.