

Paramedic Continuing Education 3 hours – Special patients

Patient Assessment

What You'll Cover

- General approach to pediatric assessment
- Clinical significance of abnormal assessment findings
- Strategies for assessing children of different ages
- Techniques for communicating effectively with children of different ages

Glossary

The following specialized terms are used in this chapter:

anemia—a condition in which oxygen-transporting material in the blood (erythrocytes or hemoglobin) is abnormally low

atelectasis—collapsed lung tissue

carboxyhemoglobin—the resultant product when the oxygen in hemoglobin is displaced by carbon monoxide, so that erythrocytes cannot transport oxygen from the lungs to the tissues

cardiac tamponade—compression of the heart caused by accumulated fluid or blood in the pericardial sac

cranial nerves—the nerves which originate from the brain that control the functions of the muscles of the eyes, face and mouth, and the five senses (taste, smell, hearing, touch, vision)

crepitation—a fine crackling sound resembling that of a hair rubbed between the fingers *or* a grating sensation felt over the seat of a fracture

diaphysis—the shaft of a long bone

epiphysis—the end of a long bone, which is separated from the diaphysis during the years of growth by the epiphyseal plate

epiphyseal plate—growth plate; the site where elongation of the long bones takes place

erythrocyte—red blood cell

hemoglobin—the red oxygen-binding protein of erythrocytes

hypopnea—shallow respiration

hypotonia—decreased muscle tone

ischemia—local anemia and hypoxia caused by a mechanical obstruction of the blood supply

lacrimation—secretion of tears

meconium—greenish fecal material that may be discharged by a fetus into amniotic fluid at or near birth, usually in response to fetal distress

methemoglobin—a compound formed when the iron in hemoglobin is oxidized by certain toxic chemicals, so that erythrocytes cannot transport oxygen from the lungs to the tissues

mucosa—mucous membrane

necrosis—death of cells or tissues due to irreversible damage

nuchal—pertaining to the nape of the neck

tracheobronchial—relating to the trachea and bronchi

Interventions described in this chapter are recommendations based on the medical literature, national pediatric prehospital protocols, and expert opinion. They are not intended to serve as a standard of care. Interventions for individual patients must adhere to regional protocols and medical direction.

Learning Objectives and Key Points

The following learning objectives are covered in this chapter. Key points are discussed in more detail within the chapter text.

state 3 assessment findings that normally vary according to the child's age

Normal muscle tone and coordination, social interaction, heart rate, and respiratory rate all change as a child grows older. You must take these age-related factors into account when evaluating assessment findings.

describe 2 ways in which the basic approach to assessment must be adapted for young patients

Young children are often frightened by the presence of strangers. Abruptly approaching a child who is already distressed due to illness or injury can increase the child's agitation, potentially exacerbating the child's clinical condition. Therefore, you should form a first impression by visually assessing the patient's condition *before* you approach. Maintain a calm, reassuring manner whenever you assess a very young patient.

list 3 assessment points for forming a first impression of a child's condition

The first impression is based on 3 major points illustrated in the pediatric assessment triangle: *appearance*, including the child's mental status, muscle tone, and body position; *breathing*, including visible movement at the chest or abdomen and work of breathing; and *circulation*, as indicated by the child's skin color.

state the primary reason you might not form a complete a first impression

If at any point during the first impression you identify a significant clinical problem, *immediately* discontinue your visual assessment, approach the child, and begin the hands-on initial assessment, applying appropriate interventions as you go. As long as there are no significant findings, however, it is better to proceed at a moderate pace, evaluating the child's condition through observation and gathering background information as you establish rapport with the child and parents.

list 3 major points covered during the initial assessment

The initial assessment involves evaluating (1) the airway (look, listen, and feel for air movement); (2) breathing (work of breathing, sounds, rate, and central skin color at the lips and tongue); (3) circulation (heart rate and quality of pulses, skin color at the extremities, skin temperature, capillary refill time, and blood pressure in children older than 3 years); and (4) mental status (AVPU and brief neurologic assessment).

describe 2 assessment steps to perform on site in children who have a stable CUPS status

For children with no significant initial assessment findings and a stable CUPS status, proceed with the focused history and detailed physical examination before initiating transport. If you discover abnormal findings during these secondary assessments, modify the child's CUPS status and transport immediately.

describe 2 considerations when evaluating a febrile infant or child

While fever rarely requires field treatment, it may make infants and children irritable or somnolent, which can affect AVPU findings and CUPS assessment. In young children, a high fever can cause tachypnea and tachycardia. In rare cases, a rapid elevation in temperature may precipitate a seizure.

list 2 monitoring devices that may be used to obtain additional assessment information

Apply pulse oximetry and cardiac monitoring to obtain additional assessment information when indicated. Unless monitoring is essential to determine treatment options, start it only after the initial assessment and necessary interventions have been performed. Do not delay lifesaving interventions to initiate monitoring.

list 2 indications for initiating pulse oximetry and cardiac monitoring in pediatric patients

Initiate pulse oximetry and cardiac monitoring in all infants and children who display abnormalities involving respiratory rate or work of breathing, heart rate, perfusion, blood pressure, or mental status. Additional indications for pulse oximetry include a history of respiratory difficulty or chronic pulmonary disease, such as asthma. Additional indications for cardiac monitoring include a history of tachycardia, cardiac disease, or syncope. Correlate the results with other clinical findings to guide management decisions.

list 1 limitation of pulse oximetry and 1 situation in which a pulse oximeter will give inaccurate information

While pulse oximetry helps to evaluate oxygenation, it does not measure the adequacy of ventilation and may not provide accurate readings in the presence of shock. Hypothermia, significant anemia, or abnormal hemoglobin can also result in unreliable readings.

describe 1 indication and 2 methods for measuring a child's temperature

Generally, you will measure a child's temperature only if regional protocols include this as a standard procedure. However, if the child is at risk for hyperthermia or a serious bacterial infection, a documented temperature measurement may help direct appropriate interventions. Using proper techniques, body temperature can be accurately measured at the axillary, oral, rectal, temporal or tympanic site.

list 2 advantages in using the Glasgow Coma Scale to assess pediatric patients with potential brain injury

For patients with potential brain injury, the Glasgow Coma Scale allows a more precise assessment of neurologic status than the AVPU method. A modified version of the scale has been adapted for assessing infants and young children who lack the developmental maturity to

speak or respond to commands. The resultant score provides a basis for management decisions and can be recalculated to detect changes in the child's condition over time. It also allows an objective comparison of values when care is turned over to other providers.

describe 2 benefits in using a length-based resuscitation tape to determine proper equipment sizes and drug dosages

Consult a length-based resuscitation tape (such as the Broselow tape) whenever infants or children require interventions involving drugs or specially sized equipment. The tape lists appropriate pediatric equipment sizes and precalculated drug dosages according to the child's length, reducing the need for memorization and minimizing a potential source of management errors.

explain the importance of reassessment

It is critical to reassess the child repeatedly until care is transferred. Children who look well early in an emergency call sometimes deteriorate abruptly. Watch continually for changes in the patient's ABCs, mental status, and vital signs, as these factors provide the earliest and most reliable indicator of changes in the child's overall condition. Use your findings to modify the child's CUPS status. Revise treatment and transport plans as indicated.

state 2 assessment strategies that can help put a young child at ease

To assess younger children, have a parent hold the child or allow the child to sit on a parent's lap if possible. Encourage the parent to participate in the examination. Allow infants to suck on a pacifier or gloved finger. Distract the toddler or preschooler with a toy or penlight. These measures help minimize the child's anxiety.

NSC Objectives

Information in this chapter supports the following objectives from the paramedic *National Standard Curriculum*:

- 6-2.6 Identify key growth and developmental characteristics of infants and children and their implications. (C-2)
- 6-2.7 Identify key anatomical and physiological characteristics of infants and children and their implications. (C-2)
- 6-2.8 Describe techniques for successful assessment of infants and children. (C-1)
- 6-2.12 Outline differences in adult and childhood anatomy and physiology. (C-3)
- 6-2.13 Identify "normal" age-group-related vital signs. (C-1)
- 6-2.14 Discuss the appropriate equipment utilized to obtain pediatric vital signs. (C-1)
- 6-2.86 Demonstrate and advocate appropriate interactions with infants and children to convey an understanding of their developmental stage. (A-3)
- 6-2.87 Recognize the emotional dependence of the infant/child to the parent/guardian. (A-1)

Introduction

A fundamental concept in pediatric emergency care is that children are *not* simply scaled-down adults and cannot be treated as such. This concept holds true for assessment as well as management.

For example, when you assess pediatric patients, you must take changing anatomic and physiologic factors into account to evaluate your findings accurately. Normal muscle tone, coordination, and social interaction all change as a child acquires new developmental milestones. Normal heart rates and respiratory rates also change as a child grows older, affecting your interpretation of vital signs.

Developmental considerations affect your assessment techniques and general approach to pediatric patients. With infants and younger children, it is important to form a rapid first impression *before* you approach to begin the hands-on assessment process. While older children and adolescents can often be approached more directly, you must still modify your interactions and communication techniques to account for specific age-related concerns. Your understanding of these issues forms the cornerstone for successful prehospital care of children.

Using this chapter

For simplicity, this chapter describes pediatric assessment as a linear process, beginning with the first impression and continuing through the detailed physical examination, reassessment, and transport. However, some steps may be performed simultaneously, particularly if additional rescuers are working with you. Bear in mind, as well, that you should move the child to the ambulance and begin transport early in the process if the child's condition is obviously urgent. It is more important to get the child to definitive care than to complete a focused history or detailed physical examination in the prehospital setting.

In pediatric prehospital care, you should always adopt a “treat-as-you-go” approach, applying appropriate interventions for abnormal findings before proceeding to the next assessment point. To focus more effectively on the elements of pediatric assessment, however, interventions are not discussed in this chapter. Refer to the other core sections (*Respiratory*, *Circulatory*, and *Trauma*) for detailed descriptions of management actions.

Observe body substance isolation procedures (universal precautions) before performing any action that may involve contact with blood, emesis, or secretions.

Scene Safety

On arrival, take a moment to survey the scene for hazards that might endanger you, your patient, or other emergency personnel. Observe the following points:

- Control hazards or separate the patient from them *only* if you can accomplish this without risk to anyone on the scene, including yourself.

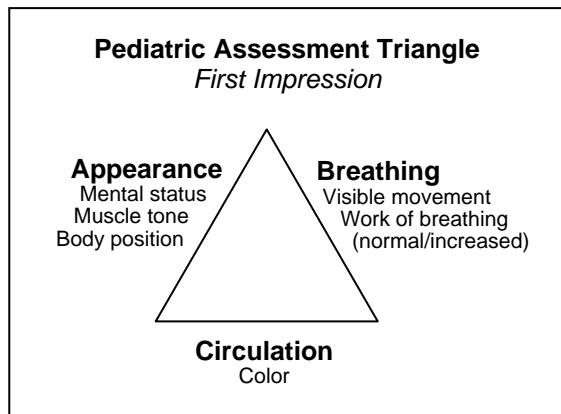
- Decide whether backup services are required, including law enforcement, fire equipment, extrication equipment, special rescue services, additional medical personnel, or special transport services (air evacuation), and call to request these services if time allows.
- As you leave the ambulance, consider what special equipment may be needed based on the initial emergency call and observation of the scene. Bring this equipment with you.

First Impression

Overview

What is a first impression assessment? Sometimes referred to as the *doorway assessment*, it involves pausing a little distance from the patient and taking a *quick* look to establish whether there are significant life-threatening problems that require immediate interventions. Your observations will determine whether you approach the child immediately or work at a more moderate pace.

This step is unique to the assessment of young children. It may not be needed when you are called to assist older children or adolescents, who can often be approached as you would an adult. Young children, however, are usually afraid of strangers. Abruptly approaching a child who is already distressed due to illness or injury can increase agitation, potentially exacerbating the child's condition, particularly if respiratory problems are present. Therefore, you should pause for a moment to size up the child's condition *before* you approach.



The Pediatric Assessment Triangle (*Figure 1*) provides the basis for forming the first impression. This device has become virtually the standard in pediatric resuscitation courses across the country. The 3 sides of the triangle can help you remember the major assessment points, while the congruency of the figure reminds you that these elements are inextricably interrelated. With practice, your assessment of these points will become virtually simultaneous, allowing you to form an accurate first impression in less than a minute.

Figure 1

If you identify a significant clinical problem at any point during the first impression, suspend your visual assessment *immediately* and approach the child to begin the hands-on initial assessment, applying appropriate interventions as you go. For example, if severe trauma is immediately evident, or if a child who is clearly not asleep appears completely unresponsive, there is no reason to continue observing the child from a distance (see Figures B1 and B3).

If you find the child alert and responsive, however, continue to proceed at a moderate pace (see Figures B2 and B4). Evaluate the child's condition initially through observation and gather relevant information as you establish rapport with the child and parents. Whatever the child's condition, you should maintain a calm, reassuring manner throughout assessment and management, briefly explaining your actions to the patient and parents in clearly understandable terms.

Before you begin, ask the parents to remove sufficient clothing or coverings so that you can see skin color and determine whether the child is conscious and breathing. Children lose body heat quickly, so it is important to remove coverings only as needed to perform assessments, then replace them promptly. Keep in mind that a child who appears unresponsive could be sleeping; ask if the parents have tried to rouse the child so that you can assess the child's best mental status.

Points for Forming a First Impression

The first impression is based on 3 major assessment points:

- *Appearance*: the child's mental status, muscle tone, and body position
- *Breathing*: visible movement at the chest or abdomen and work of breathing
- *Circulation*: adequacy of perfusion as indicated by the child's skin color

Appearance

Mental status. Three points help to determine the patient's mental status: level of consciousness, interaction with parents, and response to others present.

- *Level of consciousness:* Is the patient alert? Most healthy children interact constantly with their surroundings. If the child is alert, continue your visual evaluation. If the child exhibits agitation, marked irritability, or reduced responsiveness, proceed immediately with the initial assessment.
- *Interaction with parents:* For children older than 6 to 8 months, ask the parents to call the child's name. Does the child respond? Children should recognize their parents, and younger children will generally cling to them, seeming to feel consoled and safe when held in a parent's arms. If the child responds immediately when the parent calls, continue your visual evaluation. A slow or absent response, inconsolable crying, or failure to recognize a parent indicates an urgent condition requiring immediate hands-on assessment.
- *Response to others:* Has the child recognized your presence? If so, continue your visual evaluation; if not, consider the condition urgent and proceed immediately with the initial assessment.

Muscle tone and body position. Observe the child's muscle tone and body position. When assessing infants, note that clinically well infants keep their extremities comfortably flexed. When they are awake, they should exhibit equal movement in all extremities. When sleeping in the prone position, they generally keep their legs flexed and snug against the torso with their buttocks upended. A moderately ill infant tends to lie flat, whether prone or supine, with the extremities extended and flaccid.

Around the age of 4 to 6 months, babies begin developing the ability to sit up; an infant older than 6 to 8 months should be able to sit without assistance. Since children develop at different rates, however, always ask the parents whether the child's capabilities seem normal. Also note that when children are ill, injured, or frightened, they may regress emotionally to an earlier age when they felt more secure, assuming developmental capabilities of a younger child.

If you observe normal muscle tone and body position for the child's age, continue your visual evaluation. If you note any abnormal findings (hypotonia, rigidity, inability to sit), proceed immediately with the initial assessment.

The mnemonic *TICLS* (pronounced *tickles*) can help you remember the characteristics for assessment of the child's appearance (see Table 1).

Table 1. TICLS Assessment Mnemonic

Tone—Is there vigorous movement with good muscle tone, or is the child limp?

Interactivity—Is the child alert and attentive to surroundings, or apathetic? Will the child reach for a toy?
Does the child respond to people, objects, and sounds?

Consolability—Does comforting the child alleviate agitation and crying?

Look/Gaze—Do the child's eyes follow your movement, or is there a vacant gaze?

Speech/Cry—Are vocalizations strong, or are they weak, muffled, or hoarse?

Adapted from *Textbook of Pediatric Education for Prehospital Professionals*, American Academy of Pediatrics. 2000:36. Used with permission.

Breathing

You have 2 goals during the visual assessment of breathing: to confirm that the child *is* breathing, and to note significant abnormalities in the work of breathing. With practice you can learn to spot more subtle signs, such as tachypnea or bradypnea, but these are less critical points.

Visible movement. Observe the chest and abdomen for movement. In infants and young children, respiratory movement is more noticeable in the abdominal region. This is because their intercostal muscles are relatively weak, and their ribs are horizontally aligned, extremely compliant and cannot adequately support lung expansion; so they rely on diaphragmatic contraction to pull air into the lungs. As the child grows older, the ribs become less flexible and the chest muscles strengthen, so that chest expansion rather than abdominal expansion is more noticeable.

If you see normal respiratory movement, continue your visual evaluation. Lack of visible movement indicates an urgent condition requiring immediate hands-on assessment.

Work of breathing. While observing the chest and abdomen, assess work of breathing. If normal effort is apparent, continue your visual evaluation. Greatly increased or decreased work of breathing indicates an urgent condition requiring immediate hands-on assessment.

Circulation

Assess the child's circulatory status by noting skin color at the lips and tongue, the palms, or the soles of the feet, whichever area can be readily observed. If the color is pink, consider the child's condition noncritical and move on to the initial assessment at a moderate pace. Abnormal skin color (pallor, mottling, or cyanosis) indicates an urgent condition, dictating a more rapid approach (see Figure A2).

Initial Assessment

Overview

After forming a first impression of the child's condition, proceed with a complete initial assessment of airway, breathing, circulation, and mental status (also referred to as *disability*). If trauma is possible, observe appropriate stabilization measures throughout the hands-on

assessment.

The initial assessment builds on information you gathered as you formed your first impression. Always treat as you go, identifying life-threatening conditions and performing appropriate interventions before moving to the next step.

Throughout the initial assessment, continue to think in terms of whether the child's condition appears critical or noncritical, keeping in mind that even a well-appearing child can deteriorate abruptly at any time. You may need to backtrack if a new problem arises. For example, if you are assessing circulation in an apparently stable child and the child begins to choke, immediately return to airway assessment and perform appropriate interventions. This child's condition would now be considered critical, with rapid transport the primary goal.

But as long as the child's condition continues to appear stable you should maintain a moderate pace, explaining your actions and taking time to ask and answer questions.

How children respond to you as the examination progresses depends on the child's age as well as the seriousness of the illness or injury. The young infant may reach out and want to be held, while older infants may cry when you approach. Toddlers may wish to interact with you, and by age 4 or 5, children are often eager to cooperate. A child who is listless and apathetic during the examination is cause for concern, as this may indicate serious illness or injury.

Responsiveness Check

In some cases, you will need to briefly assess responsiveness before proceeding with airway assessment and management. If the child was alert or responsive to verbal stimuli during the first impression, this step is not necessary. If the child was unresponsive, try touching or gently shaking the child to establish a more exact level of consciousness. This factor is important in determining necessary airway interventions.

Airway

To determine airway patency, look for movement of the chest or abdomen, listen for breath sounds, and feel for air movement at the child's mouth or nose (see Figure B39).

- If movement and normal breath sounds are noted, the airway is patent. In alert children, vocalization, speech, crying, or coughing indicates a patent airway, although partial obstruction may be present.
- Stridor, hoarseness, snoring, or gurgling sounds indicate partial airway obstruction. Stridor may mean that the tongue, secretions, edema, or a foreign body is partially blocking the airway. Gurgling sounds may indicate the presence of secretions or blood.
- If you see no chest or abdominal movement and you cannot hear or feel breathing, the airway is completely obstructed.

A child who exhibits abnormal assessment findings, including little or no air movement or abnormal breath sounds, requires immediate interventions for partial or complete airway obstruction as detailed in the *Respiratory* section. After initiating these interventions, proceed with breathing assessment.

Breathing

Assessment of breathing builds on airway assessment and management.

If the child was apneic during airway assessment and is undergoing assisted ventilation, breathing assessment consists of monitoring chest rise and breath sounds while watching for the return of spontaneous breathing.

If the child is breathing spontaneously, evaluate work of breathing and listen for breath sounds. Count the respiratory rate, assess respiratory depth and pattern, check central color at the lips, tongue, and oral mucosa, and inspect for chest trauma.

Work of breathing. Look for signs that indicate increased work of breathing. These include retractions on inspiration in the suprasternal, supraclavicular, intercostal, or subcostal areas; nasal flaring on inspiration (most frequently seen in infants and toddlers); and head bobbing, in which the head lifts and tilts during inspiration, then falls forward during expiration. Nasal flaring and retractions are common signs of respiratory distress. Head bobbing may indicate respiratory failure (see Figure B6).

Increased work of breathing speeds airflow through the tracheobronchial tree, causing turbulence. Turbulence increases resistance to airflow, which increases work of breathing, contributing to a cycle of deterioration. More information appears in *Respiratory Emergencies*.

Sounds. Without a stethoscope, listen for sounds that indicate increased work of breathing, including stridor on inspiration; wheezing, usually heard on expiration; crackles on inspiration; grunting, which sounds like a whine on expiration; and gurgling on inspiration or expiration.

Breath sounds can help you evaluate the seriousness of the child's condition. Stridor and wheezing are signs of respiratory distress. Grunting is also a sign of respiratory distress, and may indicate that respiratory failure is imminent. Crackles may accompany asthma or pneumonia. Gurgling sounds may indicate secretions or blood that requires suctioning.

Rate. Count the respiratory rate over a *30-second* period, then double this figure to find the rate per minute. Counting for shorter periods (10 to 15 seconds) will not yield accurate results, because in children the normal respiratory pattern involves periodic breathing. Pediatric respiratory rates are summarized in Table 2.

Table 2. Pediatric Respiratory Rates

Age	Rate (breaths per minute)
Infant (birth–1 y)	30–60
Toddler (1–3 y)	24–40
Preschooler (3–6 y)	22–34
School-aged (6–12 y)	18–30
Adolescent (12–18 y)	12–16

As you evaluate your findings, keep in mind that pain, fear, or fever can increase the respiratory rate. In the newly born, exposure to cold can also increase the respiratory rate and may cause respiratory distress. Either bradypnea or tachypnea can lead to hypoxemia.

Depth and pattern. While counting the rate, observe respiratory depth and pattern. Note hypopnea, which indicates weak work of breathing. Watch for periodic apnea or other irregularities. Observe the chest wall for equal bilateral movement and equal time spent on inspiration and expiration.

If the expiratory phase of respiration is longer than the inspiratory phase, the cause is likely to be a lower airway problem, such as asthma, pneumonia, or a foreign body. If the inspiratory phase is longer, the cause is likely to be an upper airway problem, such as partial obstruction from croup, a foreign body, tracheitis, or other causes.

Color. Check the color of the lips, tongue, and oral mucosa. Normal respiratory status is indicated by a pink color. Pallor may indicate respiratory failure, while cyanosis is a sign of significant hypoxemia.

Visible evidence of central cyanosis occurs when the circulating level of deoxygenated hemoglobin reaches about 5 g/dL. In children, whose typical hemoglobin concentration is up to one-third lower than in adults (10–11 g/dL as opposed to 14–5 g/dL), visible cyanosis indicates that the oxygen saturation level has fallen by as much as 50%, well below the level that would be considered significant.

The clinical message is that severe hypoxemia may be present in children before they are visibly cyanotic. Do not rule out hypoxemia on the basis of color alone.

Additional assessments. Place a stethoscope below each axilla in turn and compare breath sounds of the right and left lung fields (see Figure A1). They should be equal. Because children have small chests, you should place the stethoscope near the axillae rather than the nipples when you auscultate breath sounds. This will minimize the transference of sounds across the thorax. During auscultation, inspect the chest for life-threatening injuries that may interfere with ventilation and oxygenation.

A child with signs of respiratory failure and absent unilateral breath sounds may have a tension pneumothorax. Treat abnormal assessment findings and chest injuries as detailed in *Respiratory Emergencies* and *Traumatic Emergencies*.

Circulation

Inspect for evidence of trauma or hemorrhage; rapid hemorrhage, if present, must be controlled as described in *Traumatic Emergencies* before proceeding with the circulation assessment.

Evaluate the central and peripheral pulses, count the heart rate, and evaluate skin color, temperature, and capillary refill rate. Measure blood pressure in children older than 3 years. It is generally impractical to attempt blood pressure measurement in children younger than this, both because the patient is unlikely to keep still and because the systolic and diastolic sounds are difficult to hear. An automated blood pressure device may work if an appropriate cuff size is available, but it is easier to simply evaluate the central pulse and general perfusion, which are good indicators of blood pressure.

Central pulse. Palpate the central pulse. Recommended sites for this assessment vary according to age:

- In the newly born, check the pulse by palpating the base of the umbilical cord between your thumb and index finger.
- In infants and young children, the brachial or femoral pulse is usually easiest to palpate. These are the best locations to check when you suspect that a child younger than 1 year may be pulseless (see Figures B40 and A20).
- In older children, the carotid artery is a good source for a central pulse. This site is not used in infants because the short, fleshy neck makes it difficult to palpate the carotid pulse.

If the central pulse is evident, evaluate its strength. A weak central pulse can be a sign of decompensated shock.

Heart rate. While evaluating the quality of the central pulse, count the rate for 30 seconds, then double this figure to find the rate per minute. The heart rate normally slows on inspiration and accelerates on expiration, so measuring the rate for at least 30 seconds improves accuracy. If the child is uncooperative, count the heart rate by auscultating with a stethoscope over the left side of the chest between the sternum and nipple.

Depending on age and activity level, normal pediatric heart rates can fall between 60 and 160 beats per minute. Rates falling outside the normal range for the child's age should be treated as described in the *Circulatory* section. Note that in children, pain, fear, or fever can increase the heart rate. Normal pediatric heart rates are summarized in Table 3.

Table 3. Average Pediatric Heart Rates by Age*

Age	Low	High
Infant (birth—1 year)	100	160
Toddler (1—3 years)	90	150
Preschooler (3—6 years)	80	140
School-age (6—12 years)	70	120
Adolescent (12—18 years)	60	100

*Pulse rates for a child who is sleeping may be 10 percent lower than the low rate listed.

If a table of pediatric heart rates is not available, use the following equation to estimate the upper limit for a child's normal heart rate: $HR=150-(5H)$ (age in years). In other words, multiply the child's age by 5, then subtract the result from 150. For example, in a 7-year-old child, the upper limit would be $150-(5 \times 7)$, or 115.

Perfusion

Perfusion is evaluated by assessing the peripheral pulse, skin color and temperature, and capillary refill time.

- **Peripheral pulses.** Keeping 1 hand on the central pulse point, palpate the peripheral pulse with the other hand at either the radial or pedal site. If you are assessing the central pulse at the brachial or femoral site, check the peripheral pulse in the same extremity. Compare the peripheral and central pulses; the rate and strength should be similar. Peripheral pulses that are weak or irregular indicate poor peripheral perfusion, a sign of shock or hemorrhage.
- **Skin color.** Peripheral skin color should be pink. In children with darker skin tones, assess peripheral color at the lips, palms, or soles of the feet. Pallid, mottled, or cyanotic skin may indicate poor perfusion (See A2).
- **Skin temperature.** Check skin temperature. Cold skin may indicate either poor peripheral perfusion or exposure to cold ambient temperatures, while hot skin may indicate fever, infection, or hyperthermia caused by very warm ambient temperatures, such as a child would experience in a closed car on a hot day.
- **Capillary refill.** To check capillary refill time, firmly press the skin on the forehead, chest, abdomen, or fleshy part of the palm, then release. Color should return within 2 to 3 seconds. In a young child who is alert, it may be less agitating to perform this test on the palm or sole of the foot, but for best accuracy the chosen site should be the warmest point on the child's body. Delayed capillary refill may indicate poor perfusion or exposure to cool ambient temperatures. If you find delayed capillary refill in the hand or fingers, recheck it in a more central location, such as the chest (see Figures B8 and B9).

Pallid or mottled skin, cool skin temperature, or a delayed capillary refill time suggests inadequate circulation to skin, a sign of shock. In evaluating your findings, however, be sure to account for environmental temperature, as exposure to cold ambient temperatures can cause similar findings.

Blood pressure. Measure blood pressure only if time allows after you have completed the rest of the circulatory assessment. Obtaining an accurate blood pressure measurement can be time-consuming, particularly in younger children; transport of critical patients should not be delayed for this assessment. Children often become agitated and tearful during blood pressure measurement, increasing respiratory and heart rates and potentially affecting reassessment of vital signs.

In children aged 3 years or younger, a strong central pulse is an acceptable sign of adequate blood pressure. For children older than 3 years, select a blood pressure cuff about two-thirds as wide as the length of the upper arm or thigh. You will get a more accurate reading at the upper extremity. Follow the same technique used in adults. A young child may feel less anxious if you say you're going to give the child's arm a hug. Systolic blood pressure rates for children are summarized in Table 4.

Table 4. Low-Normal Pediatric Systolic Blood Pressure

Age*	Low-Normal
Infant (birth-1 y)	greater than 60*
Toddler (1-3 y)	greater than 70*
Preschooler (3-6 y)	greater than 75
School-aged (6-12 y)	greater than 80
Adolescent (12-18 y)	greater than 90

*In infants and children aged 3 years or younger, evaluate the central pulse instead of measuring blood pressure.

If a table of pediatric blood pressure rates is not available, use the following equation to estimate the lower limit for a child's normal systolic blood pressure: $BP = (2 \times \text{Age in years}) + 70$. In other words, double the child's age in years and add 70. For example, a 7-year-old child's low-normal blood pressure would be $(2 \times 7) + 70$, or 84. To find the average systolic pressure, rather than the lower limit, add 90 instead of 70.

When evaluating your findings, keep in mind that children can maintain normal blood pressure and a strong central pulse well after developing compensated shock. Additionally, pain or fear can raise a child's blood pressure. Initiate appropriate interventions in *any* child who is at risk for shock, even if the blood pressure measurement is normal.

Treat abnormal assessment findings as detailed in the *Circulatory* section.

Mental Status

Complete the initial assessment with a brief evaluation of mental status and neurologic function. In some systems, this is referred to as a *disability* assessment (i.e., A,B,C, **D**).

Use the AVPU method to determine mental status:

- **Alert:** The child is active and appropriately responsive to parents and external stimuli.
- **Verbal:** The child responds only when the parents call the child's name.
- **Painful:** The child responds only to a painful stimulus, such as pinching the nail bed.
- **Unresponsive:** The child does not respond to any stimulus.

Although your observations will have furnished some of this information, reassessing the AVPU can illuminate trends in the child's condition as well as response to interventions you have performed. Note any changes from earlier assessment findings.

To perform a brief neurologic assessment, check pupil size and reactivity to light, then check all extremities for sensation and movement. For patients with head injury, calculate the child's Glasgow Coma Scale score as described under *Further Assessments*.

Treat abnormal findings as detailed in other core chapters and in *Altered Mental Status*. In trauma patients with potential spinal injury, you should quickly assess the patient's back at this time for tenderness, ecchymoses, and crepitation, then place the patient on a spine board before proceeding.

Additional assessment measures, such as pulse oximetry, cardiac monitoring, and glucose testing, may be undertaken as indicated if regional protocols allow.

CUPS Assessment

Determine CUPS status after completing the initial assessment and providing appropriate treatment for life-threatening problems. The CUPS assessment scale classifies patients as

- Critical
- Unstable
- Potentially unstable
- Stable

CUPS assessment can help determine the rapidity of transport as well as the destination if a choice is available. Table 5 summarizes typical pediatric CUPS assessments and appropriate actions.

Table 5. Pediatric CUPS Assessment

Category	Assessment	Actions	Example
Critical	Absent airway, breathing, or circulation	Perform rapid initial interventions and transport simultaneously; reassess frequently	Severe traumatic injury with respiratory arrest or cardiac arrest
Unstable	Compromised airway, breathing, or circulation with altered mental status	Perform rapid initial interventions and transport simultaneously; reassess frequently	Significant injury with respiratory distress, hemorrhage, or shock; near-drowning; unresponsiveness
Potentially unstable	Normal airway, breathing, circulation, and mental status BUT significant mechanism of injury or illness	Perform initial assessment with interventions; transport promptly; perform focused history and physical exam during transport if time allows	Minor fractures; pedestrian struck by car but with good appearance and normal initial assessment; febrile infant aged 2 mo or younger
Stable	Normal airway, breathing, circulation, and mental status; no significant mechanism of injury or illness	Perform initial assessment with interventions; perform focused history and detailed physical exam; routine transport	Minor lacerations, abrasions, or ecchymoses; mildly febrile infant older than 2 mo

Based on CUPS Assessment Table ©1997 ND Sanddal, et al. *Critical Trauma Care by the Basic EMT*, 4th ed.

Focused History

Overview

When you treat a pediatric patient whose condition is urgent, your priority is to provide initial interventions, then transport the patient promptly to definitive care. Try to collect important background information from the child's parents during transport if time allows, but do not delay treatment or transport to obtain a complete medical history.

In noncritical cases, you can take more time to focus on the child's medical history. In younger children, much of the information will come from the parents, but any child who is old enough to speak and understand simple phrases should be included in the process as much as possible.

SAMPLE

Begin with a SAMPLE history. The mnemonic stands for

- Signs/symptoms—assessment findings and history
- Allergies—particularly drug allergies
- Medications the child is currently taking
- Past medical problems
- Last food or liquid the child has taken
- Events leading to the illness or injury

Based on the chief complaint, assessment findings, and SAMPLE history, focus additional questions on applicable areas below. If any significant finding is revealed as you conduct your interview, modify the child's CUPS assessment and reevaluate management actions. Additional information on most of these topics appears in the medical/trauma sections.

Mental Status

Ask whether changes have occurred in the child's behavior and mental status. Reassess the child's mental status frequently during examination and transport.

Airway and Breathing

Ask whether there have been changes in the child's respiration and central color, including periods of apnea or cyanosis. Make a note if the child has chronic pulmonary disease, such as asthma; if the child depends on a home ventilator or other assistive device; or if the child has a tracheostomy. Monitor the child's respiration carefully during examination and transport.

Circulation

If there is a history of external hemorrhage, ask the parents how much blood they think the child lost. They may find it easier to think about this in terms of household measurements, such as tablespoons or cups. Their estimate may not be very accurate, but you should document it for reference. If there is a history of emesis or diarrhea, ask how often and for how long it has continued and whether the child is able to drink fluids. Try to find out when the child last urinated. Children who have lost fluids should be reassessed frequently for signs of poor perfusion and shock.

Trauma

If there is any history of injury, find out how and when it occurred; for example, if the child fell, record the distance and the type of surface on which the child landed. If the child was in a motor vehicle crash, note whether the child was appropriately restrained and whether the child was struck by an air bag. If the child was struck by a car and thrown while walking, roller-skating, or bicycling, note whether a helmet and other protective gear was worn. Try to find out approximately how far the child was thrown and how fast the car was moving at impact. Also ask whether the child lost consciousness or showed signs of respiratory problems following the

injury.

Monitor any injured child for changes involving respiration, circulation, or level of consciousness. Note the possibility of child abuse if the parents' explanation for the incident does not seem to fit the injury and the child's abilities, but do not delay transport or confront the parents.

Neurologic and Developmental History

If the child experienced seizures, note their duration and frequency. Get a description of the child's behavior during the event. Ask about fever if a child younger than 5 years has experienced seizures. Make a note if the child has a past history of seizures and find out how recent seizure activity compares with prior episodes.

Try to get a description of the child's usual behavior and developmental abilities: How well does the child generally move, sit, and talk? Has there been any change in the child's behavior or abilities?

In children with seizures or behavioral changes, monitor the airway and respiration. Note any changes in mental status throughout the emergency call.

Fever

If the parents have taken the child's temperature, record the resultant reading and the method used to obtain it (such as rectal or oral).

Fever in children is defined by a temperature at or above 38°C (100.5°F) when measured at the rectal or tympanic sites. Oral temperature readings are usually about .5°C lower than this, or 37.5°C (99.5°F). Axillary temperatures are 1°C lower, or 37°C (98.5°F).

While fever rarely requires prehospital treatment, it can make infants and children irritable or somnolent, affecting AVPU findings and CUPS assessment. In young children, a high fever can cause tachypnea and tachycardia. In rare cases, a rapid elevation in temperature may precipitate a seizure.

If the child is febrile, ask whether the parents have noted changes in mental status, respiration, muscle tone, or coordination. Focus the past medical history on factors that increase the risk of complications during infection, such as sickle-cell anemia, HIV infection, recent cancer therapy, or other conditions the child's physician may have mentioned to the parents. Febrile infants aged 2 months or younger are also at risk. In the presence of special risk factors, an accurate temperature measurement could influence interventions or transport decisions. Temperature should also be measured when hyperthermia is suspected.

All febrile children should be evaluated by a physician if possible. Particularly when it is combined with another risk factor, fever is sufficient cause to transport. Reassess for changes in

mental status and ABCs during transport.

Poisoning

If a toxic ingestion is suspected, find out when it occurred, how it happened, what substance was involved, how much was ingested, and whether the parents have administered syrup of ipecac or another home remedy. Ask whether the child had seizures, emesis, abdominal pain, rashes, or changes in behavior. Find out whether the incident may have been a suicide attempt. Any child who has experienced a significant poisoning should be transported, together with all medications or other substances the child may have ingested. If gathering these substances would significantly delay transport, have family members bring the items as soon as possible. This is particularly important in suicide attempts.

Burns

Find out what caused the burn (fire, scalding, electrical shock, chemicals), how much time has elapsed since the injury occurred, and what treatment has been given. If the child was in a fire, inspect for carbonaceous material around the nose and mouth and ask about a history of altered mental status. Children with burns from a closed-space fire are at high risk for inhalation injury and respiratory problems from smoke and hot gases. Ongoing respiratory assessments and interventions are particularly important for these children.

Near-drowning

Find out how long the child was submerged and whether there is a possibility of head or neck injury, as in a diving mishap. Ask whether alcohol or other drugs were involved. Find out whether the child was breathing when removed from the water and whether bystander CPR or rescue breathing was attempted. Document resuscitation measures as well as the child's response. Transport any child who has experienced a significant near-drowning incident.

History for the Newly Born

When called to assist with an out-of-hospital delivery, remember the *4 M=s* : *multiple* births; *meconium*; *maternal* drug use; *maturity* of the fetus. Ask whether the mother is expecting multiple births, in which case additional emergency personnel may be needed. Find out whether labor is more than 4 weeks premature. If the amniotic sac has ruptured, ask whether meconium was present. If possible, find out whether the mother has a recent history of substance abuse, particularly heroin or methadone, and when drugs were last used. In any situation involving out-of-hospital birth, transport should be initiated as soon as feasible.

Summary

If the focused history reveals any condition that results in the modification of a stable patient's CUPS status, initiate appropriate interventions and rapid transport without delay. Begin the physical examination during transport if time allows and it does not interfere with ongoing reassessment and management of ABCs. Do not be concerned if you do not have time to complete the examination before reaching the hospital.

Detailed Physical Examination

Overview

When you treat a pediatric patient whose condition is urgent, your priority is to provide initial interventions, then transport the patient promptly to definitive care. During the detailed physical examination, inspect all parts of the body for deformities, ecchymoses, lacerations and abrasions, punctures and penetrating wounds, tenderness, edema, and burns. If possible, try to alleviate the parents' worries about specific problems early in the process, but examine painful areas last and try to avoid moving them.

It will reassure younger children if you encourage the parents to help with the examination; for example, the parents may be able to do some of the exposure and palpation under your direction. Remember that children lose body warmth very rapidly: Remove clothing only as necessary to assess each area, then replace it before continuing.

While the procedure is described below as a head-to-toe process, for infants and young children the sequence of examination should be reversed so that you begin with the lower extremities. These patients find it particularly threatening when strangers touch their faces, so beginning with the extremities and working backward gives you a chance to develop rapport and allay the child's fear. Project a friendly, reassuring demeanor as you proceed. Additional assessment strategies are detailed later in *Communicating with Kids*.

Head

Inspect for ecchymoses. Note blood or cerebrospinal fluid (thin clear watery fluid) draining from the nose or ears. Palpate gently for soft, spongy areas, cranial irregularities, or crepitation. Any of these signs may indicate a cranial fracture and possible brain injury, which requires urgent transport with frequent reassessment of respiration and mental status.

In infants younger than 12 months, carefully palpate the anterior fontanel while the child is sitting upright. An infant's fontanel may feel full when the child is recumbent or crying, but in a calm, sitting child, the area is normally flat. If the fontanel is distended or sunken, reassess the patient's mental status and airway. A bulging fontanel together with a history of trauma indicates increased intracranial pressure; in a febrile infant, a bulging fontanel may indicate meningitis. A sunken fontanel is a sign of dehydration.

Assess the cranial nerves in children who can follow commands by asking them to close their eyes, open their eyes wide, follow a finger with their eyes, open the mouth, and stick out the tongue.

Reassess the size, symmetry, and reactivity of the pupils. Unequal or fixed, dilated pupils in a child with a history of trauma may indicate severe brain injury. Dilated or constricted pupils may be helpful in determining the agent of a poisoning.

Neck

Inspect the position of the trachea. If it has shifted from midline, reassess for unequal breath sounds and evidence of a tension pneumothorax, particularly in a patient with trauma or severe asthma.

Distended jugular veins may occasionally be discernable, but this sign is difficult to assess in very young patients, who have short, fleshy necks. Jugular vein distention may indicate a tension pneumothorax or cardiac tamponade; either condition puts the patient at risk for respiratory failure and shock. Distention will not be visible if the patient is hypovolemic.

If spinal injury has been ruled out, assess for nuchal rigidity, a possible sign of meningitis in ill-appearing, febrile infants. In the trauma patient, gently palpate the back of the neck while holding the head and cervical spine in line to prevent movement. Tenderness or crepitation may indicate serious cervical injury; reassess respiratory function, check for signs of shock, and test for movement in the extremities.

Chest

Note ecchymoses or other marks and reassess for equal bilateral movement during respiration. Palpate for tenderness, crepitation, or excessive costal mobility. Monitor for signs of respiratory difficulty in children with ecchymoses or a history of thoracic trauma.

Because children have soft, pliable ribs, a serious blunt-force injury can damage the internal organs without rib fracture. If there is any evidence of fractured ribs, assume that the mechanism of injury involved high-energy impact and monitor for evidence of a tension pneumothorax, respiratory distress from pulmonary contusion, or shock from a ruptured liver or spleen.

Auscultate the heart and lungs. Note irregularities in the heart sounds or rhythm. Listen carefully for wheezing or coarse, wet, gurgling breath sounds. If these sounds seem louder on one side of the chest, reassess for respiratory problems. Unequal breath sounds can be caused by pneumonia, atelectasis, or a tension pneumothorax.

Abdomen

Inspect for ecchymoses or other marks. Palpate gently for tenderness and note guarding. If these signs are observed, reassess circulatory status for indications of shock. Children with guarding and tenderness may have an infection, such as appendicitis, or they may have intra-abdominal hemorrhage, which can also cause poor perfusion.

Children who have been crying may swallow sufficient air to cause gastric inflation, which is apparent in the left upper quadrant. This can impinge on diaphragmatic excursion, causing respiratory difficulties. More information appears in *Respiratory Emergencies*.

Back

If the child has not been immobilized on a spine board, assess the back for tenderness,

ecchymoses, and crepitation.

Pelvic Area

Gently examine the pelvis for tenderness, edema, ecchymoses, instability, and crepitation. Instability or crepitation suggests a pelvic fracture. In such cases, reassess for signs of internal hemorrhage and shock. Considerable force is required to cause a pelvic fracture. This type of injury usually results from high-impact blunt force, such as that occurring during a car crash at moderate to high speeds or a fall from an extreme height.

If the patient complains of pain, injury, or other problems in the genital area, assess for hemorrhage, ecchymosis, edema, and tenderness.

Extremities

Evaluate sensation, movement, and warmth in each extremity. Unequal movement in the extremities often indicates pain from trauma, though it is sometimes associated with muscle, nerve, or brain damage. Tender areas with edema and discoloration may indicate a fracture, infection, or subcutaneous hemorrhage. Children will not readily move a limb that is fractured or infected.

Check capillary refill in each extremity and palpate peripheral pulses. Compare findings in each limb with the opposite one. If an injured arm or leg has poor capillary refill and lacks a pulse or sensation, try gently straightening or splinting it, then reassess. If the signs do not improve, consider the limb at risk. These findings indicate local ischemia, which may arise when the arterial blood supply to the limb is damaged or compressed by edema in the surrounding tissue. This will lead to necrosis within a few hours.

In children, the long bones are more likely to break at the epiphyseal plate where growth takes place. This area will harden during late adolescence when the child stops growing, becoming as strong as the rest of the bone. Until this time, injuries that occur near the joints are more likely to damage the epiphyseal plate than to tear the tendons or ligaments. Fractures are more likely to occur than sprains or strains.

Skin

Inspect the skin for lacerations and abrasions, burns, rashes, and ecchymoses. If the child complains of pain in areas that are not often injured, such as the inner thigh, genital area, buttocks, or chest, be sure to examine these areas. Ecchymoses in unusual locations or patterns may be signs of either disease or abuse. Evidence of trauma with no clear cause reinforces the suspicion of abuse, particularly if the parents' explanations seem inconsistent with the child's developmental abilities. If you suspect abuse, document your findings and report them to appropriate staff at the receiving facility, but *do not* delay transport or confront the parents.

Test for dehydration by gently pinching and releasing a fold of skin; if it remains "tenting"

(pinched into a fold), the child is dehydrated. Other signs of dehydration include a dry mouth, sunken eyes, and absence of lacrimation when the child cries. If you note any of these signs, reassess for shock.

Further Assessments

ALS Assessment Tools

Pulse oximetry and continuous cardiac monitoring are generally indicated for all infants and children who display abnormal findings involving respiratory rate or work of breathing, heart rate, perfusion, blood pressure, or mental status. Pulse oximetry is also indicated when there is a history of respiratory difficulty or chronic pulmonary disease, such as asthma, while cardiac monitoring is indicated when there is a history of tachycardia, cardiac disease, or syncope. Correlate the results with other clinical findings to guide management decisions.

Unless monitoring is essential to determine treatment options, start it only after the initial assessment and necessary interventions have been performed. Do not delay lifesaving interventions to set up a monitor.

Pulse oximetry

The pulse oximeter provides a continuous measurement of heart rate and arterial oxygen saturation in the peripheral circulation. When correlated with clinical findings, it is a useful indicator of the child's current condition and response to interventions (see Figure A18).

Pulse oximetry has certain limitations: It measures oxygen but not carbon dioxide; therefore it does not measure the adequacy of ventilation. Also, since pulsatile blood flow is necessary for the device to work, it may not provide accurate readings in a child with poor peripheral perfusion. Hypothermia, significant anemia, and carboxyhemoglobin or methemoglobin can also result in unreliable readings.

Information on performing pulse oximetry is detailed in the *Task Analysis* appendix.

Cardiac monitoring

Continuous cardiac monitoring provides an audible signal and numeric display of the child's heart rate while a monitor displays a continuous 3-lead electrocardiogram in real time. To assess this information accurately, you must be familiar with normal heart rates, ECG tracings and artifacts, and common pediatric dysrhythmias (see Figure A21).

Life-threatening cardiac rhythm disturbances are rare in children (see Figure A24). When present, they usually reflect respiratory failure or shock rather than the primary cardiac events prevalent in adults. A pediatric dysrhythmia may require specific interventions as detailed in the *Circulatory* section.

Most cardiac monitors used in prehospital care include a defibrillator and a recorder for paper

tracings. Be sure to familiarize yourself with the specific features of your unit. The procedure for pediatric cardiac monitoring is essentially similar to that used for adults. Information on performing cardiac monitoring is detailed in the *Task Analysis* appendix.

Other Assessment Tools

Temperature measurement

While it is important to note if a child has fever, measuring the degree of fever will rarely affect management actions. Generally, you will measure the child’s temperature only if regional protocols include this as a standard practice. However, if the child is at risk for hyperthermia or a serious bacterial infection, a documented temperature measurement may help direct appropriate interventions. The more reliable methods include oral, rectal, axillary, and tympanic measurement. Accuracy is usually best using the rectal technique. Tympanic measurements are also accurate as long as the probe is placed properly. Information on measuring body temperature is detailed in the *Task Analysis* appendix.

Glasgow Coma Scale

Protocols may dictate that a child with potential brain injury be evaluated using the Glasgow Coma Scale as part of the mental status assessment or detailed physical examination. The scale allows a more precise assessment of neurologic status than the AVPU method. It measures best responses in 3 categories: eye opening, motor response, and verbal response. A modified version of the scale has been adapted for assessing infants and young children (usually up to age 5) who lack the developmental maturity to speak or respond to commands. Table 6 summarizes the elements of these scales.

Table 6. Glasgow Coma Scale (Children)

Eye Opening	Best Motor Response	Best Verbal Response
4 spontaneous	6 obeys commands	5 oriented
3 to speech	5 localizes pain	4 confused
2 to pain	4 withdraws from pain	3 inappropriate words
1 no response	3 abnormal flexion	2 incomprehensible words
	2 abnormal extension	1 no response
	1 no response	
Modified Glasgow Coma Scale (Infants)		
4 spontaneous	6 spontaneous movements	5 coos and babbles
3 to verbal stimulus	5 withdraws to touch	4 irritable cries
2 to pain	4 withdraws from pain	3 cries to pain
1 no response	3 abnormal flexion	2 moans to pain
	2 abnormal extension	1 no response
	1 no response	

A score totaling 8 or less indicates severe brain injury; scores of 9 to 13 indicate moderate brain injury; and a score of 14 or 15 in a child with head trauma indicates the potential for mild brain injury. The score provides a basis for management decisions; for example, many protocols recommend intubation if the score is 8 or lower. It can be recalculated to detect changes in the

child's condition over time, and it allows an objective comparison of values when care is turned over to other providers. The motor section of the score is the best predictor of long-term outcome in brain-injured children. Check the Glasgow Coma Scale score each time vital signs are measured.

Length-based resuscitation tape

Consult a length-based resuscitation tape (such as the Broselow tape, figure A47) whenever infants or young children require interventions involving drugs or specially sized equipment. The tape lists appropriate pediatric equipment sizes and precalculated drug dosages according to the child's length, reducing the need for memorization and minimizing a potential source of management errors.

It is essential that you learn to use the tape correctly and practice periodically to maintain your skill levels. Information on using a length-based resuscitation tape appears in the *Task Analysis* appendix.

Figure 2: Length-based resuscitation

If a length-based resuscitation tape is not available, you can estimate a child's weight based on age. Assume that a newly born full-term infant weighs approximately 3 kg. Infants generally double their birth weight by 6 months and triple it by 12 months, so infants aged 6 months weigh approximately 6 kg, and 1-year-old infants weigh approximately 9 kg. After the first year, add 2 kg for each year up to age 10 (weight = 8 + 2x age in years). For example, a 5-year-old child would be estimated at approximately 17 kg: 9 kg for the first year, plus 2 kg/y for the next 4 years.

Reassessment and Transport

Your immediate goal in pediatric emergency care is to stabilize the child for rapid transport to a well-equipped facility that can provide definitive care. Transport is indicated for any child who has

- abnormalities on initial assessment
- a significant mechanism of injury
- a history of serious medical illness
- physical abnormalities discovered during the detailed physical examination
- significant pain

It is critical to reassess the child repeatedly until care is transferred. Children who look well early in an emergency call may deteriorate abruptly. Watch continually for changes in the patient's ABCs, mental status, and vital signs, as these factors provide the earliest and most reliable indicator of changes in the child's overall condition. Use your findings to modify the child's CUPS status. Revise treatment and transport plans as indicated.

Parents may ask to carry young children in their arms from the site of the emergency call to the ambulance. This should be avoided in children who have traumatic injuries that require immobilization. Also, if you must perform ongoing interventions that require a flat surface, such as assisted ventilation or CPR, the child should be placed on a spine board or stretcher.

Children with less serious conditions who do not require spine board immobilization and ongoing treatment should be transported using a restraint device appropriate for their size and age. Safety seats should be secured in the ambulance facing backward or possibly forward, but not sideways. Parents riding along with the patient should use seat belts or other restraints.

During transport, young children will find it comforting to have their parents close by. Allow the parents to remain in physical contact as long as they are safely secured and not interfering with necessary interventions.

Relay initial assessment findings, vital signs, interventions you have performed, and any other critical information to the receiving facility so that hospital staff will be prepared with appropriate interventions and personnel. This is particularly important for patients with a CUPS status of C or U or whenever abuse is suspected.

Documentation

Documentation helps to ensure prompt, appropriate transfer of care by providing crucial information for health care professionals at the receiving institution. Record all significant findings from the history and physical examination. Note the severity of the patient's condition and the factors that led to this determination. Document any interventions taken, together with the patient's response to them. State information objectively, keeping in mind that health care providers at the receiving facility may use different assessment guidelines and therefore require factual information to determine triage and treatment. If you are concerned about potential child abuse, document your evidence without stating opinions or judgments.

Generally, you should include the following information in documentation:

Environmental conditions on arrival, if relevant to the child's condition

First impression on arrival:

- mental status (level of consciousness, interaction with parents, response to rescuers)
- muscle tone and body position
- work of breathing
- skin color

Initial assessment findings and results of interventions:

- vital signs (respiratory rate, heart rate, capillary refill time, blood pressure)
- significant airway and breathing findings, such as obstruction or apnea
- significant circulatory findings, such as hemorrhage or pulselessness
- interventions and the child's response
- changes in mental status throughout assessment and transport

Focused history (if taken):

- primary complaint or mechanism of injury
- pertinent past medical history, including SAMPLE findings
- reported fever and any other significant findings

Detailed physical examination (if performed):

- findings indicating dehydration
- findings suggesting abuse

- other significant physical findings
- interventions, such as splinting, and the patient's response

Additional assessments

- assessment findings from pulse oximetry and cardiac monitoring
- findings from measurement of blood glucose, temperature, length, or weight
- Glasgow Coma Scale score, if calculated

Communicating With Kids

Communicating effectively with children is often challenging, particularly as you must tailor your approach according to the patient's age. Generally, your interactions with children of all ages will be more successful if you speak quietly and calmly at all times, provide honest information, and use words the child is likely to understand. Table 7 summarizes key points to help you communicate effectively with children of different developmental ages. Detailed information appears in *Developmental Considerations*.

Table 7. Developmental Aspects of Pediatric Patients

Age*	Keys to Successful Interaction	Characteristics
Newborn (birth–3 mo)	Likes to be held and kept warm • May be soothed if allowed to suckle • Warm your stethoscope and hands before touching infant • Avoid loud noises, bright lights	Normally alert, looking around • Focuses well on faces • Flexed extremities
Infant (3–12 mo)	Likes to be held by parent • Place older infants in sitting position • Examine from toes to head • Have parent remove clothing 1 item at a time, then replace • Distract with a toy or penlight • Speak continuously in soft tones • Perform painful procedures last	Normally alert • Eyes follow examiner • Slightly flexed extremities • Can sit unaided by 6B8 mo
Toddler (1–3 y)	Speak to child and parent before physical contact • Engender child’s trust by gaining parent’s cooperation • Allow child to be held by parent • Examine from toes to head • Speak continuously in soft tones • Allow parent to help with examination • Have parent remove clothing as necessary • Respect modesty • Keep wounds covered • Distract with a toy or penlight • Avoid offering choices unless you can follow through • Do not show needles or scissors until necessary • Avoid discussing future events	Normally alert, active • Can walk by 18 mo • Does not like to sit still • May grab at penlight or push hand away
Preschooler (3–6 y)	Explain actions using simple language • Engender child’s trust by gaining parent’s cooperation • Respect modesty • Allow child to handle equipment • Tell child what will happen next • Tell child just before procedure if it will hurt • Keep wounds covered • Allow child to hide face • Distract child with a story • Praise good behavior • Use colorful dressings freely	Normally alert, active • Can sit still on request • Can cooperate with examination • Understands speech • Will make up own explanations for anything not understood
School-aged child (6–12 y)	Speak directly to child • Explain in simple terms what is wrong • Always be truthful • Allow child to participate in examination • Explain procedures immediately before performing them • Let child make treatment choices when possible • Make a contract with child to encourage cooperation • Reassure the child • Respect modesty • Give praise for cooperation	Will cooperate if trust is established • Wants to participate and retain some control
Adolescent (12–18 y)	Speak directly to patient • Obtain history from patient • Explain the process as to an adult • Interview privately when appropriate • Be honest; encourage questions • When possible, reassure patient regarding disfiguring injury • Respect modesty • Ask friends to comfort patient when needed	Has clear concepts of future • Responds positively to attitude of respect • Can make decisions about care

*Note that children who are frightened or in pain may act younger than their age

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Core

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EMSC Resources

Item 0791. *Pediatric Assessment*. (Critical Illness and Trauma Foundation) CD-ROM

Item 0793. *Illinois Prehospital Pediatric Course*. (IL) Disk Set. Instructor Manual: “Pediatric Assessment,” 1-13.

Item 0835. *Red Flags in Pediatric Medical Emergencies*. (AZ) CD-ROM. “Reference Information Pages.”

Item 0868. *JumpSTART: Triage for Kids*. (VA) Videotape.

Item 0871. *Emergency Medical Services for Children Pediatric Emergency Care Course*. (TN and NC)

Additional Reading

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