Chapter 32
Pediatric Emergencies

Unit Summary

After students complete this chapter and the related course work, they will understand the anatomy and physiology of the child as compared to the adult. They will learn the appropriate assessment and care for the types of illness and injury affecting children of all ages, injury patterns based on size, and special body system injuries. They will also learn the indicators of abuse and neglect, and the medical and legal responsibilities of an EMT.

National EMS Education Standard Competencies

Special Patient Populations

Applies a fundamental knowledge of the growth, development, and aging and assessment findings to provide basic emergency care and transportation for a patient with special needs.

Pediatrics

Age-related assessment findings, and age-related assessment and treatment modifications for pediatric-specific major diseases and/or emergencies:

ÅUpper airway obstruction (pp 1153ï 1162, 1168ï 1171)

ÅLower airway reactive disease (pp 1153ï 1162, 1168ï 1173)

ÅRespiratory distress/failure/arrest (pp 1168ï 1180)

ÅShock (pp 1180ï 1181)

ÅSeizures (pp 1181ï 1182)

ÅSudden infant death syndrome (pp 1196ï 1199)

Age-related assessment findings, and developmental stageï related assessment and treatment modifications for pediatric-specific major diseases and/or emergencies:

ÅUpper airway obstruction (pp 1153ï 1162, 1168ï 1171)

ÅLower airway reactive disease (pp 1153ï 1162, 1168ï 1173)

ÅRespiratory distress/failure/arrest (pp 1168ï 1180)

ÅShock (pp 1180ï 1181)

ÅSeizures (pp 1181ï 1182)

ÅSudden infant death syndrome (pp 1196ï 1199)

ÅGastrointestinal disease (pp 1155ï 1156)

Patients With Special Challenges

ÅRecognizing and reporting abuse and neglect (pp 1194ï 1196 and Chapter 33, ñGeriatric Emergenciesò)

Health care implications of:

ÅAbuse (pp 1194ï 1196 and Chapter 33, ñGeriatric Emergenciesò)

ÅNeglect (pp 1194ï 1196 and Chapter 33, ñGeriatric Emergenciesò)

ÅHomelessness (Chapter 34, ñPatients With Special Challengesò)

ÅPoverty (Chapter 34, ñPatients With Special Challengesò)

ÅBariatrics (Chapter 34, ñPatients With Special Challengesò)

ÅTechnology dependency (Chapter 34, ñPatients With Special Challengesò)

ÅHospice/terminally ill (Chapter 34, ñPatients With Special Challengesò)

ÅTracheostomy care/dysfunction (Chapter 34, ñPatients With Special Challengesò)

ÅHome care (Chapter 34, ñPatients With Special Challengesò)

ÅSensory deficit/loss (Chapter 34, ñPatients With Special Challengesò)

ÅDevelopmental disability (Chapter 34, ñPatients With Special Challengesò)

Trauma

Applies fundamental knowledge to provide basic emergency care and transportation based on assessment findings for an acutely injured patient.

Special Considerations in Trauma

Recognition and management of trauma in the:

ÅPregnant patient (Chapter 31, ñObstetrics and Neonatal Careò)

ÅPediatric patient (pp 1156ï 1168, 1186ï 1194)

ÅGeriatric patient (Chapter 33, ñGeriatric Emergenciesò)

Pathophysiology, assessment, and management of trauma in the:

ÅPregnant patient (Chapter 31, ñObstetrics and Neonatal Careò)

ÅPediatric patient (pp 1156ï 1168, 1186ï 1194)

ÅGeriatric patient (Chapter 33, ñGeriatric Emergenciesò)

ÅCognitively impaired patient (Chapter 34, ñPatients With Special Challengesò)

Knowledge Objectives

1. Explain some of the challenges inherent in providing emergency care to pediatric patients and why effective communication with both the patient and his or her family members is critical to a successful outcome. (p 1148)
2. Discuss the physical and cognitive developmental stages of an infant, including signs that may indicate illness and patient assessment considerations when caring for an infant patient. (pp 1149ï 1150)
3. Discuss the physical and cognitive developmental stages of a toddler, including health risks, signs that may indicate illness, and patient assessment. (pp 1150ï 1151)
4. Discuss the physical and cognitive developmental stages of a preschool-age child, including health risks, signs that may indicate illness, and patient assessment. (p 1151)
5. Discuss the physical and cognitive developmental stages of a school-age child, including health risks, signs that may indicate illness, and patient assessment. (pp 1151ï 1152)
6. Discuss the physical and cognitive developmental stages of an adolescent, including health risks, patient assessment, and privacy issues. (pp 1152ï 1153)
7. Describe differences in the anatomy, physiology, and pathophysiology of the pediatric patient as compared to the adult patient and their implications for the health care provider, with a focus on the following body systems: respiratory, circulatory, nervous, gastrointestinal, musculoskeletal, and integumentary. (pp 1153ï 1156)
8. Describe the steps in the primary assessment for providing emergency care to a pediatric patient, including the elements of the pediatric assessment triangle (PAT), hands-on ABCs, transport decision considerations, and privacy issues. (pp 1156ï 1165)
9. Discuss the steps in the secondary assessment of a pediatric patient, describing what the EMT should look for related to different body areas and the method of injury. (pp 1166ï 1167)
10. Describe the different causes of pediatric respiratory emergencies, the signs and symptoms of increased work of breathing, the difference between respiratory distress and respiratory failure, and the emergency medical care strategies used in the management of each. (pp 1168ï 1180)

11. List the possible causes of an upper and a lower airway obstruction in a pediatric patient and the steps in the management of foreign body airway obstruction. (pp 1169ï 1171)
12. Describe asthma, its possible causes, signs and symptoms, and steps in the management of a patient who is experiencing an asthma attack. (pp 1171ï 1172)
13. Explain how to determine the correct size of an airway adjunct intended for a pediatric patient during an emergency. (pp 1173ï 1176)
14. List the different oxygen delivery device options that are available for providing oxygen to a pediatric patient, including the indications for the use of each and precautions the EMT must take to ensure the patientôs safety. (pp 1176ï 1179)
15. Discuss the most common causes of shock (hypoperfusion) in a pediatric patient, its signs and symptoms, and emergency medical management in the field. (pp 1180ï 1181)
16. Discuss the most common causes of altered mental status (AMS) in a pediatric patient, its signs and symptoms, and emergency medical management in the field. (p 1181)
17. List the common causes of seizures in a pediatric patient, the different types of seizures, and their emergency medical management in the field. (pp 1181ï 1182)
18. List the common causes of meningitis, patient groups who are at the highest risk for contracting it, its signs and symptoms, special precautions, and emergency medical management in the field. (pp 1182ï 1183)
19. Discuss the types of gastrointestinal disease emergencies that might affect pediatric patients and their emergency medical management. (p 1183)
20. Discuss poisoning in pediatric patients, including common poison sources, signs and symptoms of poisoning, and its emergency medical management. (p 1184)
21. Discuss dehydration emergencies in pediatric patients, including how to gauge their severity based on key signs and symptoms, and emergency medical management. (p 1185)
22. Discuss the common causes of a fever emergency in a pediatric patient and the role of the EMT regarding patient management. (pp 1185ï 1186)
23. Discuss the common causes of drowning emergencies in pediatric patients, their signs and symptoms, and emergency medical management. (p 1186)
24. Discuss the common causes of pediatric trauma emergencies and differentiate between injury patterns in adults, infants, and children. (pp 1186ï 1194)
25. Discuss the significance of burns in pediatric patients, their most common causes, and general guidelines an EMT should follow when assessing patients who have sustained burns. (p 1192)
26. Explain the four triage categories used in the JumpSTART system for pediatric patients during disaster management. (p 1194)
27. Describe child abuse and neglect and its possible indicators, and then describe the medical and legal responsibilities of an EMT when caring for a pediatric patient who is a possible victim of child abuse. (pp 1194ï 1196)
28. Discuss sudden infant death syndrome (SIDS), including its risk factors, patient assessment, and special management considerations related to the death of an infant patient. (pp 1196ï 1198)
29. Discuss the responsibilities of the EMT when communicating with a family or loved ones following the death of a child. (pp 1197ï 1199)
30. Discuss some positive ways an EMT may cope with the death of a pediatric patient and why managing posttraumatic stress is important for all health care professionals. (pp 1197ï 1199)

Skills Objectives

1. Demonstrate how to position the airway in a pediatric patient. (pp 1160ï 1161, Skill Drill 32-1)
2. Demonstrate how to palpate the pulse and estimate the capillary refill time in a pediatric patient. (pp 1162ï 1163)

3. Demonstrate how to use a pediatric resuscitation tape measure to size equipment appropriately for a pediatric patient. (p 1173)
4. Demonstrate how to insert an oropharyngeal airway in a pediatric patient. (pp 1173ï 1174, Skill Drill 32-2)
5. Demonstrate how to insert a nasopharyngeal airway in a pediatric patient. (pp 1174ï 1176, Skill Drill 32-3)
6. Demonstrate how to administer blow-by oxygen to a pediatric patient. (p 1176)
7. Demonstrate how to apply a nasal cannula to a pediatric patient. (p 1177)
8. Demonstrate how to apply a nonrebreathing mask to a pediatric patient. (p 1177)
9. Demonstrate how to assist ventilation of an infant or child using a bag-mask device. (pp 1177ï 1179)
10. Demonstrate how to perform one-rescuer bag-mask device ventilation on a pediatric patient. (pp 1178ï 1179, Skill Drill 32-4)
11. Demonstrate how to perform two-rescuer bag-mask device ventilation on a pediatric patient. (p 1179)
12. Demonstrate how to immobilize a pediatric patient who has been involved in a trauma emergency. (pp 1187ï 1189, Skill Drill 32-5)
13. Demonstrate how to immobilize a pediatric patient who has been involved in a trauma emergency in a car seat. (pp 1189ï 1190, Skill Drill 32-6)
14. Demonstrate how to immobilize a pediatric patient who has been involved in a trauma emergency out of a car seat. (pp 1189ï 1191, Skill Drill 32-7)

Lecture

I. Introduction

A. Pediatric patients have their own set of health-related problems that are unique to their population.

1. Many problems that are common in adults do not occur in children.
   a. It is important to remember that children are not small adults.
   b. Management can be difficult for health care providers.
      i. Pediatrics is a specialized medical practice devoted to the care of the young.

B. Many EMTs experience a level of discomfort in responding to and caring for pediatric patients in distress.

1. Pediatric patients differ in how they respond physiologically and emotionally to stressful events.
2. With proper training and an understanding of this patient population, you will learn the tools necessary to form a baseline assessment and plan of care.
   a. In most situations, caring for an infant child also requires caring for the parents or caregivers.
   b. Once you learn how to manage emergency treatment with children, you will learn how rewarding it can be.

II. Communication With the Patient and the Family

A. You may interact with more than one patient.

1. Family members or caregivers often need help and support.

B. A calm parent contributes to a calm child.

1. An agitated parent means the child will act the same way.

C. Remain calm, efficient, professional, and sensitive.

III. Growth and Development

A. There is no specific age at which “childhood” ends.

1. Between birth and adulthood, many physical and emotional changes occur.
2. The thoughts and behaviors of children as a whole are often grouped into stages:
    a. Infancy: first year of life
    b. Toddler: 1 to 3 years
    c. Preschool-age child: 3 to 6 years
    d. School-age child: 6 to 12 years
    e. Adolescents: 12 to 18 years

B. Infants

1. Infancy is usually defined as the first year of life.
    a. The first month after birth is called the neonatal or newborn period.
2. 0 to 2 months
    a. Infants less than 2 months spend most of their time sleeping or eating.
    b. They respond mainly to physical stimuli, such as light, warmth, hunger, and sound.
    c. Infants sleep for up to 16 hours a day between feeding times and caregiver interactions.
        i. Infants should be aroused easily from a sleeping state.
    d. Head control is limited.
    e. Have a sucking reflex for feeding
    f. Also predisposed to hypothermia
    g. Crying is one of the main modes of expression.
    h. Infants cannot tell the difference between parents and strangers.
    i. Their basic needs consist of being warm, dry, and fed.
    j. Hearing is well developed at birth.
        i. Calm, reassuring talk is helpful in soothing.
3. 2 to 6 months
    a. Infants at this stage are more active.
        i. Makes them easier to evaluate
    b. They spend more time awake and recognize caregivers.
    c. Will often have a strong sucking reflex, active extremity movement, and a vigorous cry
    d. May follow objects with their eyes
    e. Have increased awareness of surroundings
        i. Will use both hands to examine objects
    f. Will begin to roll over at this stage
    g. Persistent crying, irritability, or lack of eye contact can be an indicator of serious illness, depressed mental status, or a delay in development.
4. 6 to 12 months
    a. During this stage, infants begin to babble.
    b. By their first year, they say their first word.
    c. Learn to sit without support
    d. Begin to crawl and finally begin to walk
        i. Predisposes this age group to increased exposure to physical danger
    e. Infants in this group also begin teething and are prone to putting objects in their mouths.
        i. Higher risk of foreign body aspirations and poisonings
    f. Persistent crying or irritability can be a symptom of serious illness.
    g. May show signs of preferring to be with their parents or caregivers and may cry if separated
        i. Called separation anxiety
5. Infant assessment
    a. Begin assessment by observing the infant from a distance.

b. Let the caregiver continue to hold baby during the assessment.
c. Provide as much sensory comfort as possible.
    i. Warm your hands and the end of the stethoscope.
d. Do any painful procedures at end of the assessment process.

C. Toddlers

1. After infancy, until 3 years of age, a child is called a toddler.
   a. Toddlers experience rapid changes in growth and development.
2. 12 to 18 months
   a. Toddlers begin to walk and explore during this period.
      i. They are able to open doors, drawers, boxes, and bottles.
   b. Injuries in this age group increase because of the toddlerôs exploratory nature and fearlessness.
   c. Toddlers begin to imitate the behaviors of older children and parents.
   d. Know major body parts when you point to them
   e. May speak 4 to 6 words
   f. Because of a lack of molars, they may not be able to fully chew their food, leading to increased risk of aspiration.
3. 18 to 24 months
   a. The toddlerôs mind is developing rapidly at this stage.
      i. Vocabulary will increase from 10ï 15 words to about 100 words.
      ii. They will be able to name a common object that you point to.
   b. Toddlers begin to understand cause and effect.
   c. Balance and gait improve rapidly at this stage
      i. Running and climbing improve.
   d. Toddlers at this stage tend to cling to their parents or caregivers and often have an object that comforts them.
4. Toddler assessment
   a. May have stranger anxiety
   b. May resist separation from caregiver
      i. Allow them to hold any special object for comfort.
   c. May be hard to restrain
   d. Toddlers can have a hard time describing pain.
   e. They can be distracted by a toy.
   f. Persistent crying or irritability can be a symptom of serious illness or injury.
   g. Previous medical experiences may lead to hesitation toward you.

D. Preschool-age children (3 to 6 years)

1. Able to use simple language effectively
   a. The most rapid increase in language occurs during this stage.
2. Children begin to run, start throwing, catching, and kicking during play.
3. Toilet training is mastered at this stage.
4. Learn which behaviors are appropriate and inappropriate
   a. Tantrums may occur.
5. Foreign body aspiration continues to be at high risk.
6. Preschool-age assessment
   a. Can understand directions and be specific in describing painful areas
   b. Much of the history must still be obtained from the caregivers.
   c. Appeal to the childôs imagination to help facilitate the examination process.
   d. Do not lie to a patient of this ageð hard to regain lost trust.

e. The patient may be easily distracted by games or a toy, or conversation.
f. Begin the assessment at the feet and move toward the head.
g. Use adhesive bandages to cover the site of an injection or other small wound.
h. Modesty is developing, so keep the child covered as much as possible.

E. School-age children (6 to 12 years)

1. Children at this age are beginning to act more like adults.
   a. They can think in concrete terms.
   b. They can respond sensibly to questions.
   c. They can help take care of themselves.
2. School is important at this stage, and concerns about popularity and peer pressure begin.
   a. Children with chronic illness or disabilities can become self-conscious about fitting in.
3. At this stage, children begin to understand death, which may increase anxiety about illness and injury.
4. School-age assessment
   a. Assessment begins to be more like an adult assessment.
   b. Talk to the child, not just the caregiver.
   c. Start with head and work toward the feet, as in an adult assessment.
   d. If possible, give the child choices. For example:
      i. Would you like to sit up or lie down?
      ii. Would you like to take off your clothes yourself?
   e. Ask only the type of questions that let you control the answer. For example:
      i. Would you like me to take the blood pressure on your right or left arm?
   f. Allow the child to listen to his or her own heartbeat through the stethoscope.
   g. These children can understand the difference between physical and emotional pain.
   h. Give them simple explanations about what is causing their pain and what will be done about it.
   i. Ask the parentôs or caregiverôs advice about which distraction will work best.

F. Adolescents (12 to 18 years)

1. Most adolescents are able to think abstractly and can participate in decision making.
   a. Personal morals begin to develop.
   b. Are able to discriminate between what is right and wrong
   c. Are able to incorporate their own values and beliefs into their daily decision-making process
2. Physically similar to adults, but they are still children on the emotional level
   a. Gradually shift from relying on family to relying on friends for psychological support, social development, and acceptance from their peers.
   b. Interest in romantic relationships begins.
   c. This is the stage when puberty begins.
      i. Makes the adolescent very concerned about body image and appearance
      ii. May have very strong feelings about being observed during procedures
   c. Adolescence is a time of experimentation and risk-taking behaviors.
      i. Adolescents often feel ñindestructible.ò
      ii. They struggle with independence, loss of control, body image, sexuality, and peer pressure.
      iii. They may have mood swings or depression, or when ill/injured, may act younger than their age.
3. Adolescent assessment
   a. Respect the adolescentôs privacy.
      i. Adolescents can often understand very complex concepts and treatment options.
         (a) Provide them with information when they request it.
   b. Allow adolescents to be involved in their own care.

i. Provide choices, while lending guidance.

c. An EMT of the same gender should perform the assessment, if possible.

d. Allow the adolescent to speak openly and ask questions.

e. Risk-taking behaviors are common at this age.

i. Some risks can ultimately facilitate development and judgment and shape their identity as an adult.

ii. Risks can also result in unintentional trauma, dangerous sexual practices, and teen pregnancy.

f. Female patients may be pregnant.

i. Important to report this information to the receiving facility

ii. Adolescent may not want parents to know this information.

(a) Try to interview the adolescent without the caregiver present if you suspect she is withholding information.

IV. Anatomy, Physiology, and Pathophysiology

A. The body is growing and changing very rapidly during childhood.

1. Changes can create difficulties during assessment if you do not expect them.

a. For example, children are more susceptible to blunt trauma because their head is proportionally larger than adultôs head.

B. Respiratory system

1. Anatomy of pediatric airway differs from adults.

a. Pediatric airway is smaller in diameter and shorter in length.

b. Lungs are smaller.

c. Heart is higher in a childôs chest.

d. Vocal cords are higher and positioned more anteriorly, and the neck appears to be nonexistent.

e. As children develop, the neck gets proportionally longer as the vocal cords and epiglottis achieve anatomically correct adult position.

f. Occiput is larger and rounder, which requires more careful positioning of the airway.

g. Tongue is larger relative to the size of the mouth and in a more anterior location in the mouth. Childôs tongue can easily block the airway.

h. Long, floppy, U-shaped epiglottis in infants and toddlers is larger than adultôs.

i. Rings of cartilage in the trachea are less well developed and may easily collapse if the neck is flexed or hyperextended.

j. The upper airway has a narrowing funnel shape compared to the cylinder shape of the lower airway.

k. Diameter of trachea in infants is about the same as a drinking straw.

i. Airway is easily obstructed by secretions, blood, or swelling.

ii. Infants are nose breathers and may require suctioning and airway maintenance.

iii. A respiratory rate of 30 to 60 breaths/min is normal for a newborn.

(a) A respiratory rate of 12 to 20 breaths/min is normal for a teenager.

l. Children have an oxygen demand twice that of an adult.

i. This higher demand combined with a smaller oxygen reserve increases the risk of hypoxia.

m. The muscles of the diaphragm dictate the amount of oxygen a child inspires.

i. Anything that places pressure on the abdomen of a young child can block the movement of the diaphragm and cause respiratory compromise.

ii. Must use caution when applying the straps of the spinal immunization device because it may hinder the tidal volume.

n. Breath sounds are more easily heard because of their thinner chest walls.

o. Gastric distention can interfere with movement of the diaphragm and lead to hypoventilation.

p. Muscle fatigue from breathing hard occurs quickly and may lead to respiratory failure.

2. Pathophysiology
    a. Respiratory problems are the leading cause of cardiopulmonary arrest in pediatric population.
        i. Failure to recognize and treat declining respiratory status will lead to death.
    b. During respiratory distress, the pediatric patient is working harder to breathe and will eventually go into respiratory failure.
    c. Respiratory failure occurs when the pediatric patient has exhausted all compensatory mechanisms.
    d. Waste products collect leading to respiratory arrest.
        i. Respiratory arrest is a total shutdown of the respiratory system.

C. Circulatory system

1. Pulse rates differ from adults.
    a. An infantôs heart can beat 160 times or more per minute.
        i. This is the primary method the body uses to compensate for decreased perfusion.
    b. The ability of children to constrict their blood vessels also helps them compensate for decreased perfusion.
        i. Pale skin is an early sign that the pediatric patient may be compensating for decreased perfusion.
    c. Signs of vasoconstriction include weak distal pulses in the extremities, delayed capillary refill, and cool hands or feet.
2. Pathophysiology
    a. Pediatric patients are more dependent on the actual cardiac output of the heart (amount of blood being pumped out of the heart in 1 minute).
    b. Pediatric patient may be in shock despite normal blood pressure.
        i. It may only take a small amount of blood loss for the pediatric patient to go into shock.

D. Nervous system

1. Compared to an adult nervous system, the pediatric nervous system is immature, underdeveloped, and not well protected.
    a. Head-to-body ratio of infant and young child is disproportionately larger.
        i. More prone to head injuries from falls or motor vehicle collisions
    b. Occipital region of the head is larger, which increases the momentum of the head during a fall.
    c. The subarachnoid space is relatively smaller, leaving less cushioning for the brain.
    d. The brain tissue and cerebral vasculature are fragile and prone to bleeding from shearing forces.
        i. Such as during an incidence of shaken baby syndrome
2. Pediatric brain also requires a higher amount of cerebral blood flow, oxygen, and glucose than adult brain tissue.
    a. This means that the pediatric brain is at risk for secondary brain damage from hypotension and hypoxic events.
3. Spinal cord injuries are less common in pediatric patients.
    a. If cervical spine is injured, it is more likely to be an injury to the ligaments because of a rapid movement in the neck.
4. Pathophysiology
    a. Altered mental status (AMS) may result from hypoglycemia, hypoxia, seizure, or ingestion of drugs or alcohol.
    b. Parent or caregiver is important resource when you are gathering information.
    c. A pediatric patient with an AMS may appear sleepy, lethargic, combative, or even unresponsive to tactile stimulus.
    d. Be diligent about assessing and managing airway.
        i. Large tongues may obstruct airway.

E. Gastrointestinal system

1. Abdominal muscles are less developed in pediatric patients.
    a. Less protection from trauma
    b. Liver, spleen, kidneys are proportionally larger and situated more anteriorly, so they are prone to bleeding and injury.

i. Because organs are positioned closer to each other, there is a higher risk for multiple organ injury caused by minimal direct impact.

2. Pathophysiology
   a. Signs and symptoms of abdominal injuries or complaints may be vague in nature.
   b. Abdominal walls are underdeveloped.
   c. Patient may not be able to pinpoint exact site where the pain or discomfort originates but will have complaints of diffuse tenderness.
   d. Take complaints of abdominal pain seriously.
      i. Large amount of bleeding may occur within the abdominal cavity without any signs of shock.
   e. Liver and splenic injuries are common in this age group.
   f. Pediatric patient needs to be monitored for signs and symptoms of shock, which include an AMS, tachypnea, tachycardia, and bradycardia.

F. Musculoskeletal system

1. Open growth plates allow bones to grow during childhood.
   a. As a result of open growth plates, childrenôs bones are softer and more flexible, making them prone to stress fractures.
   b. Bone length discrepancies can occur if there is injury to a growth plate.
      i. Important to immobilize sprains and strains
2. The bones of an infantôs head are flexible and soft.
   a. Soft spots are located at the front and back of the head
      i. Referred to as fontanelles
      ii. Will close at particular stages of development
      iii. Fontanelles of an infant can be a useful assessment tool.
         (a) Bulging fontanelles can indicate increased intracranial pressure.
         (b) Sunken fontanelles can indicate dehydration.
3. The thoracic cage in children is highly elastic and pliable because it is primarily composed of cartilaginous connective tissue.
   a. The ribs and vital organs are less protected by muscle and fat.
4. Pathophysiology
   a. Muscles and bones grow well into adolescence.
      i. Adolescents are prone to fractures of the extremities.
   b. The younger the child, the more vulnerable the bone structures are to trauma.
      i. Sprains are uncommon because the ligaments are more developed than the large long bones.
      ii. Femur fractures in pediatric patients are rare but a source of major blood loss.
      iii. Older children are prone to long bone fractures due to taking more risks during physical activity.
      iv. The goal for care and treatment in this circumstance is to immobilize and stabilize the injured extremity.

G. Integumentary system

1. The integumentary system of the pediatric population differs in a few ways:
   a. The skin is thinner with less subcutaneous fat.
   b. Higher ratio of body surface area to body mass can lead to larger fluid and heat losses.
   c. Composition of skin is thinner and tends to burn more deeply and easily with less exposure.
2. Pathophysiology
   a. Thermoregulator system in pediatric body is immature.
      i. Makes the pediatric population more prone to hypothermic events
      ii. They lack the ability to shiver from cold in order to generate heat.
      iii. Infants and young children should be kept warm during transport.
         (a) Head should be covered to avoid heat loss

iv. Without recognition and treatment of a hypothermic event, the patient may progress to an unconscious state and lapse into convulsive seizure activity.

V. Patient Assessment

A. Scene size-up

1. Assessment begins at the time of initial dispatch.
   a. Prepare mentally for approaching and treating an infant or child.
   b. Plan for pediatric scene size-up, pediatric equipment, and age-appropriate physical assessment.
   c. If possible, collect age and gender of child, location of the scene, and NOI or MOI from dispatch.
2. Scene safety
   a. Ensure appropriate safety precautions have been taken.
   b. Note the position in which the patient is found.
   c. Look for possible safety threats, such as
      i. Spilled toxins
      ii. Open containers of alcohol
      iii. Drug paraphernalia
      iv. Weapons
      v. Fire
   d. Bring medications that could have been ingested by the patient to the emergency department.
   e. Patient may be a safety threat if they have an infectious disease.
   f. Next, do an environmental assessment.
      i. Will give important information on the chief complaint, number of patients, MOI or NOI, and ongoing health risks
      ii. Includes an inspection of the physical environment and interactions with caregivers/family
         (a) For example, dangerous scene conditions and inappropriate statements from caregivers
3. Mechanism of injury/nature of illness
   a. Imperative that you gather this information from the patient, parent, caregiver, or any bystanders
   b. Assume the injury was significant enough to cause head or neck injuries.
   c. Full spinal protocol with a cervical collar should be performed if you suspect the MOI to be severe.
      i. Remember to pad under the childôs head and/or shoulder to facilitate a neutral position for airway management.

B. Primary assessment

1. Form a general impression.
   a. Use the pediatric assessment triangle (PAT) to perform a general impression.
      i. The PAT is a 15- to 30-second structured assessment tool that allows you to rapidly form a general impression without touching the patient.
      ii. PAT consists of three elements and requires no equipment:
         (a) Appearance (muscle tone and mental status)
         (b) Work of breathing
         (c) Circulation to the skin
   b. PAT steps:
      i. Appearance
         (a) Note the level of consciousness or interactiveness and muscle tone.
         (b) An infant or child with a normal level of consciousness will act appropriately for his or her age, exhibiting good muscle tone and maintaining good eye contact.
         (c) Poor muscle tone or poor eye contact can mean an abnormal level of consciousness.
         (d) TICLS mnemonic can help determine if the patient is sick:

(1) Tone
(2) Interactiveness
(3) Consolability
(4) Look or gaze
(5) Speech or cry

ii. Work of breathing
(a) Increases as the body attempts to compensate for abnormalities in oxygenation and ventilation
(b) Increased work of breathing often manifests as:
(1) Tachypnea
(2) Abnormal airway noise
(3) Retractions of the intercostal muscles or sternum

iii. Circulation to the skin
(a) When cardiac output fails, the body shunts blood from areas of lesser need (such as skin) to areas of greater need (such as organs).
(b) Pallor of the skin and mucous membranes may be seen in compensated shock.
(1) May also be a sign of anemia or hypoxia
(c) Mottling is another sign of poor perfusion.
(d) Cyanosis reflects a decreased level of oxygen in the blood.
(1) Is a late sign of respiratory failure or shock
(2) Never wait for the development of cyanosis before administering oxygen.

iv. Determine whether to stay or go.
(a) From the PAT findings, you will decide if the pediatric patient is stable or requires urgent care.
(1) If the patient is unstable, assess the ABCs, treat any life threats, and transport immediately.
(2) If the patient is stable, continue with the remainder of the patient assessment process.

2. Hands-on ABCs
a. Next, you will perform a hands-on ABCs assessment:
i. Airway
ii. Breathing
iii. Circulation
iv. Disability
v. Exposure

b. Airway
i. If airway is open and patient can adequately keep it open, assess respiratory adequacy.
ii. If patient is unresponsive or has difficulty keeping the airway clear, ensure that it is properly positioned and that it is clear of mucus, vomitus, blood, and foreign bodies.
(a) If trauma has been ruled out, use head tiltï chin lift to open the airway.
(b) If trauma is suspected, use the jaw-thrust maneuver to open the airway.
iii. Always position the airway in a neutral sniffing position (see ***Skill Drill 32-1***).
(a) Keeps the trachea from kinking
(b) Maintains proper alignment should you have to immobilize the spine
iv. Establish whether the patient can maintain his or her own airway.

c. Breathing
i. Look, listen, feel technique
ii. Place both hands on the patientôs chest to feel for the rise and fall of the chest wall.
iii. Belly breathing in infants is considered adequate because of the soft pliable bones of the chest and the strong muscular diaphragm.
iv. While observing respiratory effort, note signs of increased work of breathing, including:

(a) Accessory muscle useð contractions of the muscles above the clavicles
(b) Retractionsð drawing in of the muscles between the ribs or of the sternum during inspiration
(c) Head bobbingð head lifts and tilts back during inspiration and then moves forward during expiration
(d) Nasal flaringð nares widen
(e) Tachypneað increased respiratory rate

v. Bradypnea (decrease in respiratory rate) is an ominous sign and indicates impending respiratory arrest.

d. Circulation
i. Must determine if the patient has a pulse, is bleeding, or is in shock
(a) Infants and children can tolerate only a small amount of blood loss before circulatory compromise occurs.
ii. In infants, palpate the brachial pulse or femoral pulse.
iii. In children older than 1 year, palpate the carotid pulse.
iv. Strong central pulses usually indicate that the child is not hypotensive.
v. Weak or absent peripheral pulses indicate decreased perfusion.
(a) Absence of a central pulse indicates the need for CPR.
vi. Tachycardia may be an early sign of hypoxia or shock or a less serious condition such as fever, anxiety, pain, or excitement.
vii. Interpret the pulse within the context of the overall history of the patient.
viii. A trend of an increasing or decreasing pulse rate may suggest worsening hypoxia or shock or improvement after treatment.
When hypoxia or shock becomes critical, bradycardia occurs.
Bradycardia in a pediatric patient often indicates impending cardiopulmonary arrest.
ix. Feel the skin for temperature and moisture.
x. Estimate the capillary refill time.
(a) Color should return within 2 seconds.

e. Disability
i. Use the AVPU scale or the pediatric Glasgow Coma Scale to assess level of consciousness.
ii. Check the responses of pupils.
(a) A normal pupil constricts after a light stimulus.
(b) Pupillary response may be abnormal in the presence of drugs, ongoing seizures, hypoxia, or brain injury.
iii. Look for symmetric movement of the extremities.
iv. Pain is present with most types of injury.
(a) Inadequate treatment of pain has many adverse effects on the pediatric patient.
v. Assessment of pain must take into consideration the developmental age of the patient.
(a) The ability to recognize pain will improve as the patient becomes older.
(b) The Wong-Baker FACES Scale is helpful in assessing level of pain.

f. Exposure
i. The hands-on ABCs requires that the caregiver remove part of the pediatric patientôs clothing to allow observation of the face, chest wall, and skin.
(a) Be careful to avoid heat loss by covering the patient as soon as possible.

3. Transport decision
a. Immediate transport to the hospital is indicated if any of the following conditions exist:
i. A significant MOI with the addition of:
(a) Any fall from a height equal to or greater than a pediatric patientôs height, especially with a headfirst landing
(b) Bicycle crash
ii. A history compatible with a serious illness

iii. A physiologic abnormality noted during the primary assessment
iv. A potentially serious anatomic abnormality
v. Significant pain
vi. Level of consciousness that is not normal for the pediatric patient, AMS, and/or any signs or symptoms of shock

b. Also consider the following when making a transport decision:
i. The type of clinical problem
ii. The expected benefits of ALS treatment in the field
iii. Local EMS system treatment and transport protocols
iv. The comfort level of the EMT
v. Transport time to the hospital

c. If the condition is nonurgent, obtain a history and perform a secondary assessment at the scene.

d. Pediatric patients weighing less than 40 lb should be transported in a car seat.
i. A seat should be chosen to fit the appropriate weight of the pediatric patient.

e. To mount a car seat to a stretcher:
i. Place the head of the stretcher in an upright position.
ii. Place the car seat so it is against the back of the stretcher.
iii. Secure one of the stretcher straps from the upper portion of the stretcher through the seatbelt positions on the car seat and strap it tightly to the stretcher.
iv. Repeat on the lower portion of the stretcher.
v. Push the car seat into the stretcher tightly and retighten the straps.

f. Follow the seat manufacturerôs instructions to secure a car seat to a captainôs chair.
i. Patients younger than 1 year must be transported in a rear-facing position because of the lack of neck muscles.

g. In cases of spinal immobilization or cardiopulmonary arrest, it is not appropriate to secure a patient in a car seat.

D. History taking

1. Investigate chief complaint.
a. Your approach to the history will depend on the age of the pediatric patient.
i. Historic information for an infant, toddler, or school-age child will have to be obtained from the parent or caregiver.
ii. When dealing with an adolescent, most information will be obtained from the patient.
(a) Sexual activity, possibility of pregnancy, and drug or alcohol use should be obtained from patient in private.

b. Questioning of the parents or child about the immediate illness or injury should be based on the childôs chief complaint.

c. When interviewing the parent/caregiver or older child about the chief complaint, obtain the following:
i. NOI or MOI
ii. How long the pediatric patient has been sick or injured
iii. The key events leading to the injury or illness
iv. Presence of fever
v. Effects of the illness of injury on the pediatric patientôs behavior
vi. Pediatric patientôs activity level
vii. Recent eating, drinking, and urine output
viii. Change in bowel or bladder habits
ix. Presences of vomiting, diarrhea, abdominal pain
x. Presence of rashes

d. Obtain name and phone number of caregiver if they are not able to come to the hospital with you.

2. SAMPLE history
    a. SAMPLE history for pediatric patient is the same as an adultôs.
    b. Questions should be based on pediatric patientôs age and developmental stage of life.

E. Secondary assessment

1. Physical examinations
    a. A full-body scan should be used when pediatric patients have the potential for hidden illnesses or injuries (unresponsive or have a significant MOI).
        i. Check for DCAP-BTLS.
    b. A focused assessment should be performed on pediatric patients without life-threatening illnesses or injuries.
        i. Focus your physical examination on the area(s) of the body affected by the illness or injury.
    c. Infants, toddlers, and preschool-age children should be assessed starting at the feet and ending at the head.
    d. School-age children and adolescents can be assessed using the head-to-toe approach.
    e. Physical examination may include the following:
        i. Head
            (a) The younger the patient, the larger the head is in proportion to the rest of the body.
            (b) Look for bruising, swelling, and hematomas.
                (1) Significant blood can be lost between the skull and scalp of an infant
            (c) Assessment of the fontanelle may suggest elevated intracranial pressure caused by meningitis, encephalitis, or intracranial bleeding.
            (d) A sunken fontanelle suggests dehydration.
        ii. Nose
            (a) Young infants prefer to breathe through their nose so nasal congestion with mucus can cause respiratory distress.
            (b) Gentle bulb or catheter suction of the nostrils may bring relief.
        iii. Ears
            (a) Look for drainage from the ear canals.
                (1) Leaking blood suggests a skull fracture.
            (b) Check for bruises behind the ears or Battleôs sign
                (1) Late sign of skull fracture
            (c) Presence of pus may indicate an ear infection or perforation of the ear drum.
        iv. Mouth
            (a) In the trauma patient, look for active bleeding and loose teeth.
            (b) Note the smell of the breath.
        v. Neck
            (a) Examine the trachea for swelling or bruising.
            (b) Note if pediatric patient cannot move neck and has a high fever, as this may indicate bacterial or viral meningitis.
        vi. Chest
            (a) Examine the chest for penetrating injuries, lacerations, bruises, or rashes.
            (b) If the patient is injured, feel the clavicles and every rib for tenderness and/or deformity.
        vii. Back
            (a) Inspect the back for lacerations, penetrating injuries, bruises, or rashes.
        viii. Abdomen
            (a) Inspect the abdomen for distention.
            (b) Gently palpate the abdomen and watch for guarding or tensing of abdominal muscles, which could suggest infection, obstruction, or intra-abdominal injury.
            (c) Note any tenderness or masses.

(d) Look for any seatbelt abrasions.

ix. Extremities

(a) Assess for symmetry.

(b) Compare both sides for color, warmth, size of joints, swelling, and tenderness.

(c) Put each joint through a full range of motion while watching the eyes for signs of pain.

2. Vital signs

a. Some of the guidelines used to assess adult circulatory status have important limitations in pediatric patients.

i. Normal heart rates vary with age in pediatric patients.

ii. Blood pressure is usually not assessed in pediatric patients younger than 3 years.

(a) Offers little information about the patientôs circulatory status and is difficult to obtain.

b. Assessment of the skin is best indication of a pediatric patientôs circulatory status.

c. When equipment is used, it is important to use appropriately sized equipment when assessing a pediatric patientôs vital signs.

i. To obtain accurate blood pressure reading, use a cuff that covers two thirds of the pediatric patientôs upper arm.

(a) Cuff that is too small will give a falsely high reading.

(b) Cuff that is too large will give a falsely low reading.

d. The formula 70 + (2 × childôs age in years) = systolic blood pressure is a useful tool to determine blood pressure in children 1 to 10 years of age.

e. Respiratory rates may be difficult to interpret.

i. Count the respirations for at least 30 seconds and then double that number (if counted for 30 seconds).

ii. In infants and children younger than 3 years, evaluate respirations by assessing the rise and fall of the abdomen.

iii. Assess the pulse rate by counting at least 1 minute, noting quality and regularity.

f. Normal vital signs in pediatric patients vary with age.

i. Assess respirations and then pulse, and assess blood pressure last.

(a) Warm stethoscope before placing it on the skin.

g. Evaluate pupils in the child using a small pen light.

i. Be sure to compare the size of the pupils against each other.

h. Use appropriate monitoring devices.

i. It is recommended that you obtain the patientôs first blood pressure manually with a sphygmomanometer and a stethoscope.

ii. A pulse oximeter is a valuable tool to measure the oxygen saturation in a pediatric patient with respiratory problems.

F. Reassessment

1. Repeat the primary assessment

a. Obtain vital signs every 15 minutes for a child in stable condition.

b. Obtain vital signs every 5 minutes for a child in unstable condition.

c. Continually monitor respiratory effort, skin color and condition, and level of consciousness or interactiveness.

i. Frequently reassess vital signs and temperature.

2. Interventions

a. Always consider getting help from the parent or caregiver of the patient.

i. Able to calm and reassure child

3. Communication and documentation

a. Communicate and document all relevant information to staff at receiving hospital.

A. Respiratory emergencies

1. Respiratory illnesses were among the top 10 reasons for emergency department visits in children younger than 17 years in the United States.
   a. Asthma is the most common cause of respiratory emergencies in children.
   b. Foreign bodies and trauma can also cause respiratory emergencies.
2. Signs and symptoms of increased work of breathing:
   a. Nasal flaring
   b. Grunting respirations
   c. Wheezing, stridor, other abnormal sounds
   d. Accessory (intercostal) muscle use
   e. Retractions, or movements of childôs flexible rib cage
   f. In older children, tripod position
3. As the pediatric patient progresses to possible respiratory failure:
   a. Efforts to breath decrease.
   b. The chest rises less with inspiration.
   c. The body has used up all its available energy stores and cannot continue to support the extra work of breathing.
      i. Cyanosis may develop.
   d. Changes in behavior will also occur until the pediatric patient reaches an altered level of consciousness.
   e. Patient may also experience periods of apnea.
   f. As the lack of oxygen becomes more serious, the heart muscle becomes hypoxic and slows down.
      i. Leads to bradycardia
         (a) Almost always an ominous sign in pediatric patients
      ii. If the heart rate is slow, you must begin CPR immediately.
         (a) Will quickly progress to cardiopulmonary arrest
   g. Respiratory failure does not always indicate airway obstruction.
      i. It may indicate trauma, nervous system problems, dehydration, or metabolic disturbances.
   h. A pediatric patientôs condition can progress from respiratory distress to respiratory failure at any time.
      i. You must reassess the pediatric patient frequently.
   i. A child or infant in respiratory distress needs supplemental oxygen.
   j. Allow the pediatric patient to remain in a comfortable position, usually on the lap of the caregiver or parent.

B. Airway obstruction

1. Children can obstruct their airway with any object they can fit into their mouth.
2. In cases of trauma, teeth may have been dislodged into the airway.
3. Blood, vomitus, or other secretions can also cause mild or severe airway obstruction.
4. Infections, including pneumonia, croup, epiglottitis, and bacterial tracheitis can also cause airway obstructions.
   a. Croup is an infection in the airway below the level of the vocal cords.
      i. Usually caused by a virus
   b. Epiglottitis is an infection of the soft tissue in the area above the vocal cords.
   c. Infection should be considered as a possible airway obstruction if the child has congestion, fever, drooling, and cold symptoms.
5. Obstruction by a foreign object may involve the upper or lower airway.
   a. Signs and symptoms frequently associated with an upper airway obstruction include decreased or absent breath sounds and stridor.
      i. Stridor is usually caused by swelling of the area surrounding the vocal cords or upper airway obstruction.
   b. Signs and symptoms of a lower airway obstruction include wheezing and/or crackles.
      i. Wheezing is a whistling sound caused by air traveling through narrowed air passages within the bronchioles.

ii. Crackles are caused by the flow of air through liquid, present in the air pouches and smaller airways in the lungs.

6. The best way to auscultate breath sounds in a pediatric patient is to listen on both sides of the chest at the level of the armpit.
7. Treatment of a pediatric patient with an airway obstruction must begin immediately.
   a. If the patient is conscious and coughing forcefully and someone saw him or her ingest a foreign object, encourage the child to cough to clear the airway.
      i. If this does not remove the object, do not intervene, except to provide supplemental oxygen.
      ii. Allow the patient to remain in whatever position is most comfortable, and monitor his or her condition.
   b. Clear the airway immediately if you see any of the following signs of a severe airway obstruction:
      i. Ineffective cough (no sound)
      ii. Inability to speak or cry
      iii. Increasing respiratory difficulty, with stridor
      iv. Cyanosis
      v. Loss of consciousness
   c. Use head tiltï chin lift and finger sweep to remove a visible foreign body in an unconscious pediatric patient.
   d. Chest compressions are recommended to relieve a severe airway obstruction in an unconscious pediatric patient.
      i. Increases pressure in chest, creating an artificial cough that may force a foreign body from the airway.

C. Asthma

1. Asthma is an acute spasm of the bronchioles associated with excessive mucous production and with swelling of the mucous lining of the respiratory passages.
2. One of the most common illnesses seen by EMS providers
   a. Almost 5 million children in the United States are affected.
   b. Common causes for an asthma attack include upper respiratory infection, exercise, exposure to cold air, emotional stress, and passive exposure to smoke.
3. A true emergency if not promptly identified and treated
4. Signs and symptoms of asthma
   a. Characteristic wheezing as patients attempt to exhale through partially obstructed lower air passages
   b. In other cases, the airway is so blocked that no air passes through.
   c. Cyanosis and respiratory arrest may quickly develop.
   d. Tripod position allows for easier breathing.
      i. If possible, let the pediatric patient assume a position of comfort in a parentôs lap.
5. Treatment of pediatric patient with asthma
   a. Administer supplemental oxygen via route that is tolerated by the child.
   b. A bronchodilator via a metered-dose inhaler with a spacer mask device may be administered based on local protocols.
      i. Often the parents or caregivers have attempted multiple dosages of albuterol.
         (a) In this case, meet ALS providers en route for advanced care.
   c. If you must assist ventilations, use slow, gentle breaths.
      i. Resist the temptation to squeeze the reservoir bag hard and fast.
   d. A prolonged, unrelieved asthma attack may progress into status asthmaticus.
      i. A true emergency
      ii. Patient must be given oxygen and transported immediately to the emergency department.
   e. If patient becomes exhausted from trying to breath, he or she is not recovering and is likely to stop breathing.
      i. Manage airway aggressively, administer oxygen, and transport promptly.
      ii. ALS support should be considered.

D. Pneumonia

1. According to the World Health Organization, pneumonia is the leading cause of death in children worldwide.
2. Pneumonia is a general term that refers to an infection of the lungs.
    a. Often a secondary infection, meaning it begins after an upper respiratory infection such as a cold or sore throat
    b. Can also occur from chemical ingestion or a direct lung injury from near drowning
    c. Diseases causing immunodeficiency in children also increase the predisposal for pneumonia.
    d. Incidence is greatest during fall and winter months.
3. Presentation in the pediatric patient
    a. Unusual rapid breathing, or will breathe with grunting or wheezing sounds
    b. Nasal flaring
    c. Tachypnea
    d. Crackles
    e. Hypothermia or fever
    f. Unilateral diminished breath sounds
4. Treatment of pneumonia in the pediatric patient
    a. Primary treatment will be supportive.
    b. Monitor the patientôs airway and breathing status.
    c. Administer supplemental oxygen if required.
5. Diagnosis of pneumonia must be confirmed in the hospital.

E. Bronchiolitis

1. Specific viral illness of newborns and toddlers, often caused by respiratory syncytial virus (RSV)
    a. Causes inflammation of the bronchioles
    b. RSV is highly contagious and spread through coughing or sneezing.
    c. Virus can survive on surfaces.
    d. Virus tends to spread rapidly through schools and in child care centers.
2. More common in premature infants and results in copious secretion that may require suctioning
    a. Occurs during the first 2 years of life and is more common in males
    b. Most widespread in winter and early spring
3. Look for signs of dehydration, shortness of breath, and fever.
4. Treatment of bronchiolitis in the pediatric patient
    a. Display a calm demeanor when approaching.
    b. Allow patient to remain in position of comfort.
    c. Treat airway and breathing problems as appropriate.
    d. Humidified oxygen is helpful if available.
    e. Consider ALS backup .

F. Airway adjuncts

1. Devices that help to maintain the airway or assist in providing artificial ventilation, including:
    a. Oral and nasal airways
    b. Bite blocks
    c. Bag-mask devices
2. Oropharyngeal airway
    a. Designed to keep the tongue from blocking the airway and makes suctioning easier
    b. Should be used for pediatric patients who are unconscious and in possible respiratory failure
        i. Should not be used in conscious patients or those who have a gag reflex.
    c. See ***Skill Drill 32-2***.
3. Nasopharyngeal airway
    a. Usually well tolerated and not as likely to cause vomiting

b. Used for conscious pediatric patients or those with altered levels of consciousness
c. Used in association with possible respiratory failure
d. Rarely used in infants younger than 1 year
e. Should not be used in pediatric patients with nasal obstruction or head trauma
f. See ***Skill Drill 32-3***.
g. Potential problems:
    i. Small diameter of tube may become clogged with mucus, blood, vomitus, or the soft tissues of the pharynx.
    ii. If the airway is too long, it may stimulate the vagus nerve and slow the heart rate, or enter the esophagus causing gastric distention.
    iii. May cause a spasm of the larynx and result in vomiting if inserted into responsive patient.

G. Oxygen delivery devices

1. In treating infants and children who require more than the usual 21% oxygen found in room air, you have several options.
    a. Blow-by technique at 6 L/min provides more than 21% oxygen concentration.
    b. Nasal cannula at 1 to 6 L/min provides 24% to 44% oxygen concentration.
    c. Nonrebreathing mask at 10 to 15 L/min provides up to 90% oxygen concentration.
    d. Bag-mask device at 10 to 15 L/min provides 90% oxygen concentration.
2. Use of a nonrebreathing mask, a nasal cannula, or a simple face mask is indicated only for pediatric patients who have adequate respirations and/or tidal volumes.
    a. Children with respirations of less than 12 breaths/min or more than 60 breaths/min, and altered level of consciousness, and/or an inadequate tidal volume should receive assisted ventilations with a bag-mask device.
3. Blow-by method
    a. The blow-by method is not nearly as effective as a face mask or nasal cannula for delivering oxygen.
    b. Does not provide high concentration of oxygen, but it is better than no oxygen
    c. Administering blow-by oxygen:
        i. Place oxygen tubing through a small hole in the bottom of a 6- to 8-oz cup.
        ii. Connect tubing to an oxygen source set at 6 L/min.
        iii. Hold the cup approximately 1 inch to 2 inches away from the childôs nose and mouth.
4. Nasal cannula
    a. Some pediatric patients prefer the nasal cannula; others find it uncomfortable.
    b. Applying a nasal cannula:
        i. Choose the appropriately sized pediatric nasal cannula. The prongs should not fill the nares entirely.
        ii. Connect the tubing to an oxygen source set at 1 to 6 L/min.
5. Nonrebreathing mask
    a. Delivers up to 90% oxygen to the pediatric patient and allows them to exhale all carbon dioxide without rebreathing it.
    b. Applying a nonrebreathing mask
        i. Select the appropriately sized pediatric nonrebreathing mask. The mask should extend from the bridge of the nose to the cleft of the chin.
        ii. Connect the tubing to an oxygen source set at 10 to 15 L/min.
        iii. Adjust oxygen flow as needed to match the respiratory rate and depth.
6. Bag-mask device
    a. Indicated for pediatric patients who have respirations that are either too slow or too fast, who are unresponsive, or who do not respond in a purposeful way to painful stimuli.
    b. Assisting ventilation using a bag-mask device:
        i. Ensure that you have the appropriate equipment in the right size. Mask should extend from the bridge of the nose to the cleft of the chin.
        ii. Maintain a good seal with the mask on the face.

iii. Ventilate at the appropriate rate and volume using a slow, gentle squeeze. Stop squeezing and begin to release the bag as soon as the chest wall begins to rise, indicating that the lungs are filled to capacity.

7. One-rescuer bag-mask device ventilation
   a. See ***Skill Drill 32-4*** to perform one-rescuer bag-mask device ventilation.
8. Two-rescuer bag-mask device ventilation
   a. This procedure is similar to one-rescuer ventilation except that one rescuer will hold the mask to the patientôs face and maintain the head position and the other will ventilate.
   b. Usually more effective in maintaining a tight seal
   c. Use you thumb and index finger to gently apply pressure over the area just below the Adamôs apple.
      i. This will decrease the risk of gastric distention and aspiration of vomitus.

H. Cardiopulmonary arrest

1. Cardiac arrest in infants and children is most often associated with respiratory failure and arrest.
   a. Children are affected differently than adults when it comes to decreasing oxygen concentration.
      i. Adults become hypoxic and the heart gets irritable, and sudden cardiac death occurs from an arrhythmia.
         (a) This is often in the form of ventricular fibrillation.
         (b) AED is the treatment of choice.
      ii. Children become hypoxic and their hearts slow down, becoming more bradycardic.
         (a) The heart will beat slower with each beat until no pulse is left.
         (b) Prehospital survival rate from cardiac arrest is 3% to 5%.
         (c) Prehospital survival rate from respiratory arrest is 75%.
         (d) A child who is breathing very poorly with a slowing heart rate must be ventilated with high concentrations of oxygen early to prevent cardiac arrest.

VII. Circulation Emergencies and Management

A. Shock

1. Shock is a condition that develops when the circulatory system is unable to deliver a sufficient amount of blood to the organs of the body.
   a. Results in organ failure and eventually cardiopulmonary arrest
      i. Compensated shock is the early stage of shock, when the body can still compensate for the blood loss.
      ii. Decompensated shock is the later stage of shock, when the blood pressure is falling.
2. In pediatric patients, the most common causes of shock include:
   a. Traumatic injury with blood loss
      i. Especially abdominal
   b. Dehydration from diarrhea or vomiting
   c. Severe infection
   d. Neurologic injury
      i. Such as severe head trauma
   e. A severe/allergic reaction/anaphylaxis to an allergen
      i. Insect bite or food allergy
   f. Diseases of the heart
   g. A collapsed lung
      i. Pneumothorax
   h. Blood or fluid around the heart
      i. Cardiac tamponade
      ii. Pericarditis
3. Infants and children have less blood circulating than adults.
   a. Even a small amount of loss may lead to shock.

4. Pediatric patients also respond differently than adults to fluid loss.
    a. They may respond by increasing their heart rate, increasing respirations, and showing signs of pale or blue skin.
5. Signs of shock in children are as follows:
    a. Tachycardia
    b. Poor capillary refill time (> 2 seconds)
    c. Mental status changes
6. Begin treating shock by assessing the ABCs, intervening as required.
    a. In assessing circulation, pay attention to the following:
        i. Assess rate and quality of pulses. A weak, ñthreadyò pulse is a sign of a problem. Anything over 160 beats/min suggests shock.
        ii. Assess temperature and moisture of hands and feet.
        iii. A 2-second capillary refill time is normal.
        iv. Assess skin color.
    b. Changes in pulse rate, color, skin signs, and capillary refill time are all important clues suggesting shock.
    c. Blood pressure is difficult to measure in pediatric patients.
        i. Cuff must be proper size.
        ii. Blood pressure may be normal with compensated shock.
        iii. Low blood pressure is a sign of decompensated shock.
            (a) Requires ALS care and immediate transport
    d. Assessment should also include determining when the signs and symptoms first appeared and whether any of the following have occurred:
        i. Decrease in urine output
            (a) With infants, are there fewer than 6 to 10 wet diapers?
        ii. Absence of tears, even when the child is crying
        iii. A sunken or depressed fontanelle (infant patient)
        iv. Changes in level of consciousness and behavior
    e. Ensure the airway is open and prepare for artificial ventilation.
    f. Control bleeding.
    g. Give supplemental oxygen by mask or blow-by method.
    h. Continue to monitor airway and breathing.
    i. Position the pediatric patient with the head lower than the feet by elevating the feet with blankets.
    j. Keep the patient warm with blankets and by turning up the heat in the patient compartment.
    k. Provide immediate transport.
    l. Contact ALS backup as needed.
7. Anaphylactic shock
    a. Anaphylaxis is a major allergic reaction that involves a generalized, multisystem response to an antigen.
        i. Airway and cardiovascular system are important sites of this potentially life-threatening reaction.
        ii. Common causes are an insect sting or a food allergy.
    b. Signs and symptoms of anaphylactic shock in the pediatric patient:
        i. Hypoperfusion
        ii. Stridor and/or wheezing
        iii. Increased work of breathing
        iv. Altered appearance
        v. Restlessness, agitation, and sometimes a sense of impending doom
        vi. Hives are usually present.
    c. Treatment of pediatric patient with anaphylactic shock
        i. Maintain the airway and administer oxygen via a tolerated route.

ii. In stable patients, allow the parent or caregiver to assist in the positioning of the patient, oxygen delivery, and keeping the patient calm.
iii. Based on protocol, assist with epinephrine auto-injector, if available.
iv. Transport promptly.

B. Bleeding disorders

1. Hemophilia is a congenital condition in which the patient lacks one or more of the normal clotting factors of blood.
   a. Most forms are hereditary and are severe.
   b. Predominantly found in male population.
   c. Bleeding may occur spontaneously.
   d. All injuries become serious because blood does not clot.
      i. Transport immediately.

VIII. Neurologic Emergencies and Management

A. Altered mental status (AMS)

1. AMS is an abnormal neurologic state in which the pediatric patient is less alert and interactive than is age appropriate.
   a. Understanding normal developmental or age-related changes in behavior and listening carefully to the caregiverôs opinion are key.
   b. The mnemonic AEIOU-TIPPS reflects the major causes of AMS
      i. Alcohol
      ii. Epilepsy, endocrine, electrolytes
      iii. Insulin
      iv. Opiates and other drugs
      v. Uremia
      vi. Trauma, temperature
      vii. Infection
      viii. Psychogenic
      ix. Poison
      x. Shock, stroke, space-occupying lesion, subarachnoid hemorrhage
   c. Signs and symptoms vary from simple confusion to coma.
   d. Management focuses on the ABCs and transport.
      i. If level of consciousness is low, the pediatric patient may not be able to protect his or her airway.
         (a) Ensure a patent airway and adequate breathing through a nonrebreathing mask or a bag-mask device.

B. Seizures

1. A seizure is the result of disorganized electrical activity in the brain.
   a. Common causes of seizures
      i. Child abuse
      ii. Electrolyte imbalance
      iii. Fever
      iv. Hypoglycemia
      v. Infection
      vi. Ingestion
      vii. Lack of oxygen
      viii. Medications
      ix. Poisoning
      x. Seizure disorder

xi. Recreational drug use
xii. Head trauma
xiii. Idiopathic (no cause can be found)

b. May manifest in a variety of ways, depending on the age of the child
c. Seizures in infants can be very subtle, consisting only of an abnormal gaze, sucking motions, or ñbicyclingò motions.
d. In older children, seizures are more obvious and typically consist of repetitive muscle contractions and unresponsiveness.
   i. Once a seizure stops, the patientôs muscles relax, becoming almost flaccid or floppy, and the breath becomes labored.
      (a) This is the postictal state.
   ii. The longer and more intense the seizures are, the longer it will take for this imbalance to correct itself.
      (a) Once the pediatric patient regains a normal level of consciousness, the postictal state is over.
e. Seizures that continue every few minutes without regaining consciousness or last longer than 30 minutes are referred to as status epilepticus.
f. Recurring or prolonged seizures should be considered potentially life threatening.
   i. If the patient does not regain consciousness or continues to seize, protect the patient from harming himself or herself and call for ALS backup.
      (a) These patients need advanced airway management and medication to stop the seizure.

2. Management
   a. Securing and protecting the airway are your priorities.
      i. Position the head to open the airway.
      ii. Clear the mouth with suction.
      iii. Consider placing the pediatric patient in the recovery position if he or she is vomiting and suction is inadequate.
   b. Provide 100% oxygen by nonrebreathing mask or blow-by method.
      i. Begin bag-mask device ventilations if there are no signs of improvement.

C. Febrile seizures

1. Febrile seizures are common in children between the ages of 6 months and 6 years.
   a. Most pediatric seizures are the result of fever alone, which is why they are called febrile seizures.
   b. Typically occur on the first day of a febrile illness
   c. Characterized by generalized tonic-clonic seizure activity
      i. Rhythmic back and forth motion of an extremity
      ii. Body stiffness
   d. Last less than 15 minutes with little or no postictal state
   e. May be a sign of a more serious problem, such as meningitis
2. Assess ABCs, provide cooling measures with tepid water, and provide prompt transport.
   a. All patients with febrile seizures need to be seen in the hospital setting.

D. Meningitis

1. Inflammation of tissue (meninges) that covers the spinal cord and brain
   a. Caused by an infection by bacteria, viruses, fungi, or parasites
   b. If left untreated, it can lead to brain damage or death.
2. Being able to recognize a pediatric patient with meningitis is an important skill to have.
   a. Some individuals are at greater risk:
      i. Males
      ii. Newborn infants
      iii. Geriatric population

iv. Compromised immune systems by AIDS or cancer
v. People who have any history of brain, spinal cord, or back surgery
vi. Children who have had head trauma
vii. Children with shunts, pins, or other foreign bodies within their brain or spinal cord
(a) Especially children with ventriculoperitoneal (VP) shunts

3. Signs and symptoms of meningitis vary, depending on age of the patient
   a. Fever and altered level of consciousness are common symptoms in all ages.
      i. Changes in the level of consciousness can range from a mild or severe headache to confusion, lethargy, and/or an inability to understand commands or interact appropriately.
   b. Child may also experience a seizure, which may be the first sign of meningitis
   c. Infants younger than 2 to 3 months can have apnea, cyanosis, fever, a distinct high-pitched cry, or hypothermia.
   d. ñMenigeal irritationò or ñmeningeal signsò are terms used by doctors to describe the pain that accompanies movement.
      i. Often results in characteristic stiff neck
   e. One sign of meningitis in an infant is increasing irritability and a bulging fontanelle without crying.
4. Neisseria *meningitidis* is a bacterium that causes a rapid onset of meningitis symptoms, often leading to shock and death.
   a. Children with *N meningitidis* typically have small, pinpoint, cherry-red spots or a larger purple/black rash on the face or body.
      i. These children are at serious risk of sepsis, shock, and death.
5. These patients are highly contagious and infectious.
   a. Use standard precautions when dealing with pediatric patients with possible meningitis.
   b. If exposed to saliva or respiratory secretions, you should receive antibiotics.
6. Treatment of child with suspected meningitis:
   a. Provide with supplemental oxygen and assist with ventilations if needed.
   b. Reassess vital signs frequently during transport to highest level of service available.

IX. Gastrointestinal Emergencies and Management

A. Complaints of gastrointestinal origin are very common in pediatric patients.

1. May be from ingestion of certain foods or unknown substances.
2. In most cases, the pediatric patient will be experiencing abdominal discomfort with nausea, vomiting, and/or diarrhea.
   a. Vomiting and diarrhea can cause dehydration.
3. Appendicitis is also a possibility.
   a. If untreated, can lead to peritonitis or shock
      i. Peritonitis is inflammation of the peritoneum, which lines the abdominal cavity.
   b. Will typically present with a fever and pain on palpation of the right lower abdominal quadrant
   c. Rebound tenderness is a common sign associated with appendicitis.
4. If you suspect appendicitis, transport to the hospital for further care.
5. Obtain a thorough history from the primary caregiver. In particular, ask questions such as:
   a. How many wet diapers has the child had today?
   b. Is your child tolerating liquids, and is he or she able to keep them down?
   c. How many times has your child had diarrhea and for how long?
   d. When he or she cries, are tears present?

X. Poisoning Emergencies and Management

A. Poisoning is common among children.

1. Can occur by ingesting, inhaling, injecting, or absorbing a toxic substance
2. Common sources of poisoning in children are:
    a. Alcohol
    b. Aspirin and acetaminophen
    c. Household cleaning products such as bleach and furniture polish
    d. Houseplants
    e. Iron
    f. Prescription medications of family members
    g. Street drugs
    h. Vitamins
3. Signs and symptoms of poisoning vary widely, depending on the substance and the age and weight of the child.
    a. The patient may appear normal at first, or may be confused, sleepy, or unconscious.
4. Be alert for signs of abuse.
5. After you have completed your primary assessment, ask the parent or caregiver the following questions:
    a. What is the substance(s) involved?
    b. Approximately how much of the substance was ingested or involved in the exposure?
    c. What time did the incident occur?
    d. Are there any changes in behavior or level of consciousness?
    e. Was there any choking or coughing after the exposure?
6. Treatment of a poisoned pediatric patient:
    a. First perform decontamination.
        i. Remove tablets or fragments from the patientôs mouth.
        ii. Wash or brush poison from the skin.
    b. Assess and maintain ABCs.
        i. Provide oxygen and perform ventilations if necessary.
    c. If child demonstrates signs of shock, position supine, keep the child warm, and transport promptly.
    d. In some cases, give activated charcoal, according to medical control or local protocol.
        i. Not indicated for pediatric patients who have ingested an acid, an alkali, or a petroleum product
        ii. Not recommended for pediatric patients who have a decreased level of consciousness and cannot protect their own airway, or who are unable to swallow
        iii. Some common trade names for the suspension form are Insta-Char, Actidose, and Liqui-Char.
        iv. The usual dose for a child is 1 g of activated charcoal per kilogram of body weight.

XI. Dehydration Emergencies and Management

A. Dehydration occurs when fluid losses are greater than fluid intake.

1. Vomiting and diarrhea are the most common causes of dehydration.
    a. If left untreated, dehydration can lead to shock and death.
2. Infants and children are at greater risk than adults for dehydration because their fluid reserves are smaller than those in adults.
    a. Life-threatening dehydration can overcome an infant in a matter of hours.
3. Dehydration can be mild, moderate, or severe.
4. Signs of mild dehydration
    a. Dry lips and gums
    b. Decreased saliva
    c. Few wet diapers
5. Signs of moderate dehydration
    a. Sunken eyes

b. Sleepiness
c. Irritability
d. Loose skin

6. Signs of severe dehydration
   a. Cool, clammy skin
   b. Delayed capillary response time
   c. Increased respirations
   d. Sunken fontanelles

B. Treating dehydration in the pediatric patient

1. Assess ABCs, obtain baseline vital signs.
   a. If dehydration is severe, ALS backup may be necessary for IV access.
2. Transport to the emergency department if signs are moderate to severe.

XII. Fever Emergencies and Management

A. Simply defined, a fever is an increase in body temperature, usually in response to an infection.

1. Temperatures of 100.4°F (38°C) or higher are considered abnormal.
2. Fever is rarely life threatening, but fever with a rash can be the sign of a serious condition, such as meningitis.
3. Common causes of fever in pediatric patients include:
   a. Infection
   b. Status epilepticus
   c. Neoplasm (cancer)
   d. Drug ingestion (aspirin)
   e. Arthritis
   f. Systemic lupus erythematosus (rash across nose)
   g. High environmental temperature
4. Fever is the result of an internal body mechanism in which heat generation is increased and heat loss is decreased.
5. An accurate body temperature is an important vital sign for pediatric patients.
   a. A rectal temperature is the most accurate for infants to toddlers.
   b. Older children will be able to follow directions for placing a thermometer under the tongue or arm.
6. Depending on the source of infection, the pediatric patient may present with signs of respiratory distress, shock, a stiff neck, a rash, skin that is hot to the touch, flushed cheeks, seizures, and, in infants, bulging fontanelles.
   a. Assess the patient for other signs and symptoms such as nausea, vomiting, diarrhea, decreased feedings, and headache.
7. Transport and manage the patientôs ABCs.
   a. Follow standard precautions if you suspect the patient may have a communicable disease.

XIII. Drowning Emergencies and Management

A. In drowning emergencies, you must always take steps to ensure your own safety.

1. Drowning is the second most common cause of unintentional death among children in the United States.
   a. Children younger than 5 years are at particular risk.
   b. Older adolescents, who account for the most drownings after toddlers, drown when swimming or boating; alcohol is usually a factor.
2. Principal condition that results from drowning is lack of oxygen.
   a. Even a few minutes without oxygen affects the heart, lungs, and brain.
      i. Causes life-threatening problems such as cardiac arrest, respiratory difficulty, and coma.
   b. Submersion in icy water can rob the body of heat, causing hypothermia.

i. Most people in this situation die.

c. Diving into water increases the risk of neck and spinal cord injuries.

3. Signs and symptoms will vary based on type and length of submersion.
   a. A pediatric patient may present with coughing; choking; airway obstruction; difficulty breathing; AMS; seizure activity; unresponsiveness; fast, slow, or no pulse; pale, cyanotic skin; and abdominal distention.

B. Management of drowning emergencies

1. Safety is critical. Donôt become a victim yourself
2. Assess and manage ABCs.
3. Contact ALS crew to intervene if needed.
4. Administer 100% oxygen via nonrebreathing mask or bag-mask device if assisted ventilations are necessary.
5. If trauma is suspected, apply a cervical collar and place the patient on a long board.
   a. Pad all open spaces under the pediatric patient before securing the patient onto the board.
6. Perform CPR on unresponsive patient in cardiopulmonary arrest.

XIV. Pediatric Trauma Emergencies and Management

A. Trauma is the number one killer of children in the United States.

1. More children die of injuries in 1 year than of all other causes combined.
2. Quality of care in the first few minutes after a child has been injured can have an enormous impact on that childôs chances for recovery.
3. Infants and toddlers are most commonly hurt as a result of falls or abuse.
4. Older children and adolescents are usually injured as a result of mishaps involving automobiles.
   a. Automobile accidents, including those involving bicycles and pedestrians, are the most significant threat to the well-being of a child.
5. Other common causes of traumatic injury and death include gunshot wounds, blunt injuries, sport activities, and child abuse.

B. Physical differences

1. Children are smaller than adults, and therefore the location of their injuries may differ from that of an adultôs for the same type of accident.
2. Childrenôs bones and soft tissues are less well developed than those of an adultôs, and therefore the force of an injury affects these structures differently.
   a. Because a childôs head is proportionally larger than an adultôs, it exerts greater stress on the neck structures during a deceleration injury.

C. Psychological differences

1. Children are often injured because of their underdeveloped judgment and their lack of experience.
2. Always assume the child has serious head and neck injuries.

D. Injury patterns

1. It is important for the EMT to understand the special physical and psychological characteristics of children and what makes them more likely to have certain kinds of injuries.
2. Vehicle collisions
   a. Children playing or riding a bicycle can dart out in front of motor vehicles without looking.
      i. The area of greatest injury varies, depending on the size of the child and the height of the bumper at the time of impact.
   b. Children involved in these types of injuries typically sustain high-energy injuries to the head, spine, abdomen, pelvis, or legs.
3. Sport activities
   a. Children, especially those who are older or adolescents, are often injured in organized sports activities.

b. Head and neck injuries can occur after high-speed collisions in contact sports such as football, wrestling, ice hockey, field hockey, soccer, or lacrosse.

c. Remember to stabilize the cervical spine when caring for children with sport-related injuries.

i. Be familiar with your local protocols for helmet removal.

E. Injuries to specific body systems

1. Head injuries

a. Head injuries are common in children because the size of a childôs head in relation to the body is larger than that of an adult.

b. An infant also has a softer, thinner skull, which may result in injury to the brain tissues.

c. The scalp and facial vessels can bleed very easily and may cause a great deal of blood loss if not controlled.

d. Nausea and vomiting are common signs and symptoms of a head injury in children.

i. Easy to mistake for abdominal injury or illness

ii. You should suspect a serious head injury in any child who experiences nausea and vomiting after a traumatic event.

e. Immobilization

i. Immobilization is necessary for all children who have possible head or spinal injuries after a traumatic event.

ii. See ***Skill Drill 32-5***.

iii. Immobilization can be difficult because of the childôs body proportions.

(a) Young children require padding under the torso to maintain a neutral position.

(b) At around 8 to 10 years of age, children no longer require padding underneath the torso. They can lie supine on the board.

(c) Padding may be needed along the sides so the child can be properly secured on an adult-sized long board.

iv. See ***Skill Drill 32-6*** for steps to immobilize a pediatric patient in a car seat.

v. See ***Skill Drill 32-7*** for steps to immobilize a pediatric patient out of a car seat.

2. Chest injuries

a. Usually the result of blunt rather than penetrating trauma

b. Chest wall flexibility in children can produce a flail chest.

i. Keep this in mind as you assess a child who has sustained high-energy blunt trauma to the chest.

ii. Even though there may be no external sign of injury, there may be injuries within the chest.

iii. Pediatric patients are managed in the same manner as adults.

3. Abdominal injuries

a. Abdominal injuries are very common in children.

i. Children can compensate for significant blood loss better than adults without signs or symptoms of shock developing.

ii. Children can have a serious injury without early external evidence of a problem.

b. All children with abdominal injuries should be monitored for signs and symptoms of shock, including a weak, rapid pulse; cold, clammy skim; decreased capillary refill; confusion; and decreased systolic blood pressure.

c. If the patient shows signs and symptoms of shock, prevent hypothermia by keeping the patient warm with blankets.

i. If the patient has bradycardia, ventilate.

d. Monitor during transport.

4. Burns

a. Burns to children are generally considered more serious than burns to adults.

i. Infants and children have more surface area relative to total body mass, which means greater fluid and heat loss.

ii. Children also do not tolerate burns as well as adults do.

iii. Children are also more likely to go into shock, develop hypothermia, and experience airway problems.

b. The most common ways in which children are burned are:
   i. Exposure to hot substances, such as scalding water in the bathtub
   ii. Hot items on a stove
   iii. Exposure to caustic substances such as cleaning solvents or paint thinners
      (a) You should expect possible internal injuries when you see a child with burns around the mouth and face.

c. Infection is a common problem following a burn injury in a child.
   i. Burned skin cannot resist infection as effectively as normal skin can.
   ii. Sterile techniques should be used in handling the skin of children with burn wounds.

d. You should consider the possibility of child abuse in any burn situation.
   i. Make sure you report any information about suspicions to the appropriate authorities.

e. Severity of burns
   i. Minor: Partial-thickness burns involving less than 10% of body surface
   ii. Moderate: Partial-thickness burns involving 10% to 20% of body surface
   iii. Critical: Any full-thickness burn, a partial-thickness burn involving more than 20% of body surface, or any burn involving the hands, feet, face, airway, or genitalia

f. Pediatric patients are managed in the same manner as adults.
   i. If the patient shows signs and symptoms of shock, prevent hypothermia by keeping him or her warm with blankets.
   ii. If the patient has bradycardia, ventilate.
   iii. Monitor the patient during transport.

5. Injuries of the extremities
   a. Children have immature bones with active growth centers.
   b. Growth of long bones occurs from the ends at specialized growth plates.
      i. Growth plates are potential weak spots.
      ii. Incomplete or greenstick fractures can occur.
   c. Generally, extremity injuries in children are managed in the same manner as those in adults.
      i. Painful deformed limbs with evidence of broken bones should be splinted.
         (a) Specialized splinting equipment should only be used if it fits the pediatric patient.
         (b) You should not attempt to use adult immobilization devices on a pediatric patient unless the pediatric patient is large enough to properly fit.

6. Pain management
   a. You are limited to the following pain interventions:
      i. Positioning
      ii. Ice packs
      iii. Extremity elevation
   b. These interventions will decrease the pain and swelling to the injury site.
      i. Additional ALS interventions may be needed.
   c. Kindness and providing emotional support can go a long way in the treatment of the pediatric patient.

XV. Disaster Management

A. The JumpSTART triage system was developed for pediatric patients.

1. Intended for patients younger than 8 years and weighing less than 100 lb.
2. There are four triage categories in the JumpSTART system, designated by colors corresponding to different levels of urgency.
3. Decision points include:

a. Able to walk (except in infants)
   i. Green: minor, not in need of immediate treatment
b. Presence of spontaneous breathing, with a peripheral pulse, and appropriately responsive to painful stimuli
   i. Yellow: delayed treatment
c. Respirations of less than 15 or greater than 45 breaths/min, apnea responsive to positioning or rescue breathing, respiratory failure, breathing but without a pulse, or inappropriate painful response
   i. Red: immediate response
d. Apneic and without pulse, or apneic and unresponsive to rescue breathing
   i. Black and considered deceased or expectant deceased

XVI. Child Abuse and Neglect

A. Child abuse means any improper or excessive action that injures or otherwise harms a child or infant.

1. Includes physical abuse, sexual abuse, neglect, and emotional abuse.
2. More than 2 million cases of child abuse are reported annually.
   a. Many of these children suffer life-threatening injuries and some die.
   b. If suspected child abuse is not reported, the abuse is likely to happen again, perhaps causing permanent injuries or even death.
      i. Must be aware of the signs of child abuse and neglect
      ii. It is your responsibility to report it to law enforcement or child protection agencies.

B. Signs of abuse

1. As an EMT you will be called to homes because of reported injury to a child.
2. Child abuse occurs in every socioeconomic status, so you must be aware of the patientôs surroundings and document your findings objectively.
3. Ask yourself the following questions:
   a. Is the injury typical for the developmental level of the child?
   b. Is the MOI reported consistent with the injury?
   c. Is the caregiver behaving appropriately?
   d. Is there evidence of drinking or drug use at the scene?
   e. Was there a delay in seeking care for the child?
   f. Is there a good relationship between the caregiver and the child?
   g. Does the child have multiple injuries at different stages of healing?
   h. Does the child have any unusual marks or bruises that may have been caused by cigarettes, grids, or branding injuries?
   i. Does the child have several types of injuries?
   j. Does the child have any burns on the hands or feet that involve a glove distribution?
   k. Is there an unexplained decreased level of consciousness?
   l. Is the child clean and an appropriate weight for his or her age?
   m. Is there any rectal or vaginal bleeding?
   n. What does the home look like? Clean or dirty? Is it warm or cold? Is there food?
4. The mnemonic CHILD ABUSE may help you remember the points to look for. See Table 32-15.
5. Bruises
   a. Observe the color and location of any bruises.
      i. New bruises are pink or red.
      ii. Over time, bruises turn blue, then green, then yellow-brown and faded.
      iii. Note the location of bruises.
         (a) Bruises to the back, buttocks, or face are suspicious and are usually inflicted by a person.
6. Burns

a. Burns to the penis, testicles, vagina, or buttocks are usually inflicted by someone else.
b. Burns that encircle a hand or foot to look like a glove are usually inflicted by someone else.
    i. You should suspect abuse if the child has cigarette burns or grid pattern burns.

7. Fractures
    a. Fractures of the humerus or femur do not normally occur without major trauma.
    b. Falls from a bed are not usually associated with fractures.
        i. You should maintain some index of suspicion if an infant or young child sustains a femur fracture.
8. Shaken baby syndrome
    a. Infants may sustain life-threatening head trauma by being shaken or struck in the head.
        i. This life-threatening condition is called shaken baby syndrome.
        ii. There is bleeding within the head and damage to the cervical spine as a result of intentional, forceful shaking.
        iii. The infant will be found unconscious, often without evidence of external trauma.
            (a) Infant may appear to be in cardiopulmonary arrest
    b. Shaking tears blood vessels in the brain, resulting in bleeding around the brain.
        i. The pressure from the blood results in an increased cranial pressure, leading to coma and/or death.
9. Neglect
    a. Neglect is refusal or failure on the part of the caregiver to provide life necessities.
        i. Examples are water, clothing, shelter, personal hygiene, medicine, comfort, and personal safety.
    b. Children who are neglected are often dirty or too thin or appear developmentally delayed because of lack of stimulation.
        i. You may observe such children when you are making calls for unrelated problems.
        ii. Report all suspected cases of neglect.

C. Symptoms and other indicators of abuse

1. Abused children may appear withdrawn, fearful, or hostile.
    a. You should be concerned if a child does not want to discuss how an injury occurred.
2. Occasionally, the parent or caregiver will reveal a history of ñaccidents.ò
    a. Be alert for conflicting stories or a lack of concern from the caregiver.
    b. The abuser may be a parent, caregiver, relative, or friend of the family.
3. EMTs in all states must report suspected abuse.
    a. Most states have special forms to do so.
    b. Supervisors are generally forbidden to interfere with the reporting of suspected abuse.
    c. Law enforcement and child protection services will determine whether there is abuse.
        i. It is not your job to prove that there is abuse.

D. Sexual abuse

1. Children of any age and of either gender can be victims of sexual abuse.
    a. Most victims of rape are older than age 10 years.
        i. Younger children may be victims as well.
2. Assessment
    a. Should be limited to determining the type of dressing any injuries require
    b. Treat any bruises or fractures as well.
    c. Do not examine the genitalia of a young child unless there is evidence of bleeding or there is any injury that must be treated.
    d. Do not allow the child to wash, urinate, or defecate before a physician completes a physical exam.
        i. Difficult step, but important to preserve evidence
    e. If the victim is a girl, ensure that a female EMT or police officer remains with the child, unless locating one will delay transport.

f. Maintain professional composure the entire time.
   i. Assume a concerned, caring approach.
   ii. Shield the child from onlookers and curious bystanders.
g. Obtain as much information as possible from the child and any witnesses.
   i. Child may be hysterical or unwilling to say anything.
   ii. You are in the best position to obtain the most accurate firsthand information.
      (a) Record any information carefully and completely on the patient care report.
h. Cooperate with law enforcement officials in their investigations.
   i. Sexual abuse is a crime.

XVII. Sudden Infant Death Syndrome

A. The death of an infant or a young child is called sudden infant death syndrome (SIDS) when, after a complete autopsy, the death remains unexplained.

1. SIDS is the leading cause of death in infants younger than 1 year.
   a. Most cases occur in infants younger than 6 months.
2. Although it is impossible to predict SIDS, risk factors include:
   a. Mother younger than 20 years old
   b. Mother smoked during pregnancy
   c. Low birth weight
3. Death as the result of SIDS can occur at any time of day
4. You will be faced with three tasks:
   a. Assessment of the scene
   b. Assessment and management of the patient
   c. Communication and support of the family

B. Patient assessment and management

1. An infant who has been a victim of SIDS will be pale or blue, not breathing, and unresponsive.
2. Other causes for such a condition include the following:
   a. Overwhelming infection
   b. Child abuse
   c. Airway obstruction from a foreign object or as a result of infection
   d. Meningitis
   e. Accidental or intentional poisoning
   f. Hypoglycemia (low blood glucose level)
   g. Congenital metabolic defects
3. Begin with assessment of the ABCs.
   a. Provide interventions as necessary.
   b. Depending on how much time has passed, patient may show signs of postmortem changes, including:
      i. Stiffening of the body, called rigor mortis
      ii. Dependent lividity, which is pooling of the blood in the lower parts of the body or those that are in contact with the floor or bed
   c. If child shows these signs, call medical control.
      i. In some EMS systems, a victim of SIDS may be declared dead on the scene.
      ii. Deciding whether to start CPR on a child with rigor mortis or dependent lividity can be very difficult.
         (a) Family members may consider anything less to be withholding critical care.
      iii. Best solution may be to begin CPR and transport child and family to local facility.
   d. If there is no sign of postmortem changes, begin CPR immediately.

4. As you assess the patient, pay special attention to any marks or bruises on the child before performing any procedures.
    a. Note any intervention that was done before your arrival.

C. Communication and support of the family

1. The sudden death of an infant is a very stressful event for a family.
    a. It also tends to evoke strong emotional responses among health care providers.
    b. Part of your job at this point is to allow the family to express their grief.
2. Family members may ask specific questions about the event.
    a. Let them know that their concerns will be addressed but that answers are not immediately available.
    b. Always use the infantôs name.
    c. Allow the family to spend time with the infant and to ride in the ambulance to the hospital.

D. Scene assessment

1. Carefully inspect the environment, noting the condition of the scene where the infant was found.
2. Your assessment of the scene should concentrate on the following:
    a. Signs of illness, including medications, humidifiers, or thermometers
    b. The general condition of the house
        i. Note any signs of poor hygiene.
    c. Family interaction
        i. Do not allow yourself to be judgmental about family interactions at this time.
        ii. Do note and report any behavior that is clearly not within the acceptable range, such as physical and verbal abuse.
    d. The site where the infant was discovered
        i. Note all items in the infantôs crib or bed, including all pillows, stuffed animals, toys, and small objects.

E. Apparent life-threatening event

1. Infants who are not breathing and are cyanotic and unresponsive when found sometimes resume breathing and color with stimulation.
    a. These children have had what is called an apparent life-threatening event (ALTE).
        i. Called ñnear-miss SIDSò in the past
    b. Classic ALTE is characterized by
        i. Cyanosis
        ii. Apnea
        iii. A distinct change in muscle tone
        iv. Choking or gagging
    c. After the event, the child may appear healthy and show no signs of illness or distress.
        i. Must still complete a careful assessment and provide immediate transport to the emergency department
    d. Pay strict attention to airway management.
    e. Assess the infantôs history and environment.
    f. Allow caregivers to ride in the back of the ambulance.
    g. Doctors will have to determine the cause.

XVIII. Death of a Child

A. The death of a child from any causes poses special challenges for EMS personnel.

1. In addition to medical care, you must provide the family with support and understanding.
    a. Family may insist on CPR even though the child is clearly deceased.
        i. Initiate CPR in this case and transport.
    b. Always introduce yourself and ask about the childôs date of birth and medical history.

c. Do not speculate on the cause of the childôs death.
   i. Parents may be experiencing strong feelings of denial.
d. The following interventions are helpful in caring for the family at this time:
   i. Learn and use the childôs name rather than the impersonal ñyour child.ò
   ii. Speak to family members at eye level, maintaining good eye contact.
   iii. Use the word ñdeadò or ñdiedò when informing the family of the childôs death; euphemisms such as ñpassed awayò or ñgoneò are not effective.
   iv. Acknowledge the familyôs feelings, but never say, ñI know how you feel.ò
   v. Offer to call other family members or clergy if the family wishes.
   vi. Keep any instructions short, simple, and basic.
   vii. Ask each adult family member individually if he or she wants to hold the child.
   viii. Wrap the dead child in a blanket and stay with the family while they hold the child. Ask them not to remove tubes or other equipment that was used in an attempted resuscitation.

2. Each individual and each culture expresses grief in a different way.
   a. Some will require intervention.
   b. Most caregivers feel directly responsible for the death of a child.
      i. This does not mean they are actually responsible.
      ii. Although you should keep the possibility of neglect or abuse in mind, your role is not that of investigator.
      iii. Further inquiry is the responsibility of law enforcement.
3. Some EMS systems arrange for home visits after a childôs death so that EMS providers and family members can come to some sort of closure.
   a. You need special training for such visits.
4. A childôs death can be difficult for health care providers.
   a. Take time before going back to the job.
   b. Talk with other EMS colleagues.
   c. Be alert for signs of posttraumatic stress in yourself and others.
      i. Nightmares
      ii. Restlessness
      iii. Difficulty sleeping
      iv. Lack of appetite
      v. A constant need for food
   d. Consider the need for professional help if these signs occur.

XIX. Summary

A. Children are not only smaller than adults and more vulnerable, they are also anatomically, physiologically, and psychologically different from adults in some important ways.

B. Infancy is the first year of life. The toddler is 1 to 3 years of age. Preschool-age children are 3 to 6 years of age. School-age children are 6 to 12 years of age. Adolescents are 12 to 18 years of age.

C. General rules for dealing with pediatric patients of all ages include appearing confident, being calm, remaining honest, and keeping parents or caregivers together with the pediatric patient as much as possible.

D. The growing bodies of the pediatric patient create some special considerations.

E. The tongue is large relative to other structures, so it poses a higher risk of airway obstruction than in an adult.

F. An infant breathes faster than an older child. Breathing requires the use of chest muscles and the diaphragm.

G. The airway in a child has a smaller diameter than the airway in an adult and is therefore more easily obstructed.

H. A rapid heartbeat and blood vessel constriction help pediatric patients to compensate for decreased perfusion.

I. Children's internal organs are not as insulated by fat and may be injured more severely, and children have less circulating blood. Therefore, although children exhibit the signs of shock more slowly, they go into shock more quickly, with less blood loss.

J. Children's bones are more flexible and bend more with injury, and the ends of the long bones, where growth occurs, are weaker and may be injured more easily.

K. Because a young child might not be able to speak, your assessment of his or her condition must be based in large part on what you can see and hear yourself. Families may be helpful in providing vital information about an accident or illness.

L. Use the pediatric assessment triangle to obtain a general impression of the infant or child.

M. You will need to carry special sizes of airway equipment for pediatric patients. Use a pediatric resuscitation tape measure to determine the approximately sized equipment for children.

N. The three keys to successful use of the bag-mask device in a child are (1) have the appropriate equipment in the right size; (2) maintain a good face-to-mask seal; and (3) ventilate at the appropriate rate and volume.

O. Signs of shock in children are tachycardia, poor capillary refill time, and mental status changes. You must be very alert for signs of shock in a pediatric patient because they can decompensate rapidly.

P. Febrile seizures may be a sign of a more serious problem such as meningitis.

Q. The most common cause of dehydration in children is vomiting and diarrhea. Life-threatening diarrhea can develop in an infant in hours.

R. Fever is a common reason why parents or caregivers call 9-1-1. Body temperatures of 100.4°F (38°C) or higher are considered to be abnormal.

S. Trauma is the number one killer of children in the United States.

T. A victim of sudden infant death syndrome (SIDS) will be pale or blue, not breathing, and unresponsive. He or she may show signs of postmortem changes, including rigor mortis and dependent lividity; if so, call medical control to report the situation.

U. Carefully inspect the environment where a SIDS victim was found, looking for signs of illness, abusive family interactions, and objects in the child's crib.

V. Provide support for the family in whatever way you can, but do not make judgmental statements.

W. Any death of a child is stressful for family members and for health care providers. In dealing with the family, acknowledge their feelings, keep any instructions short and simple, use the child's name, and maintain eye contact.

X. Be prepared to respond to philosophical as well as medical questions, in most cases by indicating concern and understanding; do not be specific about the cause of death.

Y. Be alert for signs of posttraumatic stress in yourself and others after dealing with the death of a child. It can help to talk about the event and your feelings with your EMS colleagues.

Post-Lecture

Unit Assessment

1. Which age group commonly has stranger anxiety?

2. How does the airway of the child differ from that of the adult?

3. What are the three elements of the pediatric assessment triangle?

4. What signs and symptoms indicate that a pediatric patient is having an increased work of breathing?

5. Where should you obtain a pulse rate in an infant?

6. What device should you use in patients with a respiratory rate of less than 12 breaths/min or more than 60 breaths/min?

7. What are the common causes of pediatric seizures?

8. A childôs ribs are softer than an adultôs. How does this affect the pediatric trauma patient?

9. What is the definition of child abuse?

10. What are the risk factors for SIDS?

Knowledge Objectives