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UNIT TERMINAL OBJECTIVE

6-2.1 At the completion of this unit, the paramedic student will be able to integrate pathophysiological principles and assessment findings to formulate a field impression and implement a treatment plan for the pediatric patient.

COGNITIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

6-2.2 Discuss the paramedic's role in the reduction of infant and childhood morbidity and mortality from acute illness and injury. (C-1)
6-2.3 Identify methods/ mechanisms that prevent injuries to infants and children. (C-1)
6-2.4 Describe Emergency Medical Services for Children (EMSC). (C-1)
6-2.5 Discuss how an integrated EMSC system can affect patient outcome. (C-2)
6-2.6 Identify key growth and developmental characteristics of infants and children and their implications. (C-2)
6-2.7 Identify key anatomical and physiological characteristics of infants and children and their implications. (C-2)
6-2.8 Describe techniques for successful assessment of infants and children. (C-1)
6-2.9 Describe techniques for successful treatment of infants and children. (C-1)
6-2.10 Identify the common responses of families to acute illness and injury of an infant or child. (C-1)
6-2.11 Describe techniques for successful interaction with families of acutely ill or injured infants and children. (C-1)
6-2.12 Outline differences in adult and childhood anatomy and physiology. (C-3)
6-2.13 Identify "normal" age group related vital signs. (C-1)
6-2.14 Discuss the appropriate equipment utilized to obtain pediatric vital signs. (C-1)
6-2.15 Determine appropriate airway adjuncts for infants and children. (C-1)
6-2.16 Discuss complications of improper utilization of airway adjuncts with infants and children. (C-1)
6-2.17 Discuss appropriate ventilation devices for infants and children. (C-1)
6-2.18 Discuss complications of improper utilization of ventilation devices with infants and children. (C-1)
6-2.19 Discuss appropriate endotracheal intubation equipment for infants and children. (C-1)
6-2.20 Identify complications of improper endotracheal intubation procedure in infants and children. (C-1)
6-2.21 List the indications and methods for gastric decompression for infants and children. (C-1)
6-2.22 Define respiratory distress. (C-1)
6-2.23 Define respiratory failure. (C-1)
6-2.24 Define respiratory arrest. (C-1)
6-2.25 Differentiate between upper airway obstruction and lower airway disease. (C-3)
6-2.26 Describe the general approach to the treatment of children with respiratory distress, failure, or arrest from upper airway obstruction or lower airway disease. (C-3)
6-2.27 Discuss the common causes of hypoperfusion in infants and children. (C-1)
6-2.28 Evaluate the severity of hypoperfusion in infants and children. (C-3)
6-2.29 Identify the major classifications of pediatric cardiac rhythms. (C-1)
6-2.30 Discuss the primary etiologies of cardiopulmonary arrest in infants and children. (C-1)
6-2.31 Discuss age appropriate vascular access sites for infants and children. (C-1)
6-2.32 Discuss the appropriate equipment for vascular access in infants and children. (C-1)
6-2.33 Identify complications of vascular access for infants and children. (C-1)
6-2.34 Describe the primary etiologies of altered level of consciousness in infants and children. (C-1)
6-2.35 Identify common lethal mechanisms of injury in infants and children. (C-1)
6-2.36 Discuss anatomical features of children that predispose or protect them from certain injuries. (C-1)
6-2.37 Describe aspects of infant and children airway management that are affected by potential cervical spine injury. (C-1)

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6-2.38 Identify infant and child trauma patients who require spinal immobilization. (C-1)
6-2.39 Discuss fluid management and shock treatment for infant and child trauma patient. (C-1)
6-2.40 Determine when pain management and sedation are appropriate for infants and children. (C-1)
6-2.41 Define child abuse. (C-1)
6-2.42 Define child neglect. (C-1)
6-2.43 Define sudden infant death syndrome (SIDS). (C-1)
6-2.44 Discuss the parent/ caregiver responses to the death of an infant or child. (C-1)
6-2.45 Define children with special health care needs. (C-1)
6-2.46 Define technology assisted children. (C-1)
6-2.47 Discuss basic cardiac life support (CPR) guidelines for infants and children. (C-1)
6-2.48 Identify appropriate parameters for performing infant and child CPR. (C-1)
6-2.49 Integrate advanced life support skills with basic cardiac life support for infants and children. (C-3)
6-2.50 Discuss the indications, dosage, route of administration and special considerations for medication administration in infants and children. (C-1)
6-2.51 Discuss appropriate transport guidelines for infants and children. (C-1)
6-2.52 Discuss appropriate receiving facilities for low and high risk infants and children. (C-1)
6-2.53 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for respiratory distress/ failure in infants and children. (C-1)
6-2.54 Discuss the pathophysiology of respiratory distress/ failure in infants and children. (C-1)
6-2.55 Discuss the assessment findings associated with respiratory distress/ failure in infants and children. (C-1)
6-2.56 Discuss the management/ treatment plan for respiratory distress/ failure in infants and children. (C-1)
6-2.57 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for hypoperfusion in infants and children. (C-1)
6-2.58 Discuss the pathophysiology of hypoperfusion in infants and children. (C-1)
6-2.59 Discuss the assessment findings associated with hypoperfusion in infants and children. (C-1)
6-2.60 Discuss the management/ treatment plan for hypoperfusion in infants and children. (C-1)
6-2.61 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for cardiac dysrhythmias in infants and children. (C-1)
6-2.62 Discuss the pathophysiology of cardiac dysrhythmias in infants and children. (C-1)
6-2.63 Discuss the assessment findings associated with cardiac dysrhythmias in infants and children. (C-1)
6-2.64 Discuss the management/ treatment plan for cardiac dysrhythmias in infants and children. (C-1)
6-2.65 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for neurological emergencies in infants and children. (C-1)
6-2.66 Discuss the pathophysiology of neurological emergencies in infants and children. (C-1)
6-2.67 Discuss the assessment findings associated with neurological emergencies in infants and children. (C-1)
6-2.68 Discuss the management/ treatment plan for neurological emergencies in infants and children. (C-1)
6-2.69 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for trauma in infants and children. (C-1)
6-2.70 Discuss the pathophysiology of trauma in infants and children. (C-1)
6-2.71 Discuss the assessment findings associated with trauma in infants and children. (C-1)
6-2.72 Discuss the management/ treatment plan for trauma in infants and children. (C-1)
6-2.73 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for abuse and neglect in infants and children. (C-1)
6-2.74 Discuss the pathophysiology of abuse and neglect in infants and children. (C-1)
6-2.75 Discuss the assessment findings associated with abuse and neglect in infants and children. (C-1)
6-2.76 Discuss the management/ treatment plan for abuse and neglect in infants and children, including documentation and reporting. (C-1)
6-2.77 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for SIDS infants. (C-1)

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6-2.78 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for children with special health care needs including technology assisted children. (C-1)
6-2.79 Discuss the pathophysiology of children with special health care needs including technology assisted children. (C-1)
6-2.80 Discuss the assessment findings associated for children with special health care needs including technology assisted children. (C-1)
6-2.81 Discuss the management/ treatment plan for children with special health care needs including technology assisted children. (C-1)
6-2.82 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for SIDS infants. (C-1)
6-2.83 Discuss the pathophysiology of SIDS in infants. (C-1)
6-2.84 Discuss the assessment findings associated with SIDS infants. (C-1)
6-2.85 Discuss the management/ treatment plan for SIDS in infants. (C-1)

AFFECTIVE OBJECTIVES
At the completion of this unit, the paramedic student will be able to:

6-2.86 Demonstrate and advocate appropriate interactions with the infant/ child that conveys an understanding of their developmental stage. (A-3)
6-2.87 Recognize the emotional dependance of the infant/ child to their parent/ guardian. (A-1)
6-2.88 Recognize the emotional impact of the infant/ child injuries and illnesses on the parent/ guardian. (A-1)
6-2.89 Recognize and appreciate the physical and emotional difficulties associated with separation of the parent/ guardian of a special needs child (A-3)
6-2.90 Demonstrate the ability to provide reassurance, empathy and compassion for the parent/ guardian. (A-1)

PSYCHOMOTOR OBJECTIVES
At the completion of this unit, the paramedic student will be able to:

6-2.91 Demonstrate the appropriate approach for treating infants and children. (P-2)
6-2.92 Demonstrate appropriate intervention techniques with families of acutely ill or injured infants and children. (P-2)
6-2.93 Demonstrate an appropriate assessment for different developmental age groups. (P-2)
6-2.94 Demonstrate an appropriate technique for measuring pediatric vital signs. (P-2)
6-2.95 Demonstrate the use of a length-based resuscitation device for determining equipment sizes, drug doses and other pertinent information for a pediatric patient. (P-2)
6-2.96 Demonstrate the appropriate approach for treating infants and children with respiratory distress, failure, and arrest. (P-2)
6-2.97 Demonstrate proper technique for administering blow-by oxygen to infants and children. (P-2)
6-2.98 Demonstrate the proper utilization of a pediatric non-rebreather oxygen mask. (P-2)
6-2.99 Demonstrate proper technique for suctioning of infants and children. (P-2)
6-2.100 Demonstrate appropriate use of airway adjuncts with infants and children. (P-2)
6-2.101 Demonstrate appropriate use of ventilation devices for infants and children. (P-2)
6-2.102 Demonstrate endotracheal intubation procedures in infants and children. (P-2)
6-2.103 Demonstrate appropriate treatment/ management of intubation complications for infants and children. (P-2)
6-2.104 Demonstrate appropriate needle cricothyroidotomy in infants and children. (P-2)
6-2.105 Demonstrate proper placement of a gastric tube in infants and children. (P-2)
6-2.106 Demonstrate an appropriate technique for insertion of peripheral intravenous catheters for infants and children. (P-2)

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6-2.107 Demonstrate an appropriate technique for administration of intramuscular, inhalation, subcutaneous, rectal, endotracheal and oral medication for infants and children. (P-2)
6-2.108 Demonstrate an appropriate technique for insertion of an intraosseous line for infants and children. (P-2)
6-2.109 Demonstrate appropriate interventions for infants and children with a partially obstructed airway. (P-2)
6-2.110 Demonstrate age appropriate basic airway clearing maneuvers for infants and children with a completely obstructed airway. (P-2)
6-2.111 Demonstrate proper technique for direct larnyngoscopy and foreign body retrieval in infants and children with a completely obstructed airway. (P-2)
6-2.112 Demonstrate appropriate airway and breathing control maneuvers for infant and child trauma patients. (P-2)
6-2.113 Demonstrate appropriate treatment of infants and children requiring advanced airway and breathing control. (P-2)
6-2.114 Demonstrate appropriate immobilization techniques for infant and child trauma patients. (P-2)
6-2.115 Demonstrate treatment of infants and children with head injuries. (P-2)
6-2.116 Demonstrate appropriate treatment of infants and children with chest injuries. (P-2)
6-2.117 Demonstrate appropriate treatment of infants and children with abdominal injuries. (P-2)
6-2.118 Demonstrate appropriate treatment of infants and children with extremity injuries. (P-2)
6-2.119 Demonstrate appropriate treatment of infants and children with burns. (P-2)
6-2.120 Demonstrate appropriate parent/ caregiver interviewing techniques for infant and child death situations.(P-2)
6-2.121 Demonstrate proper infant CPR. (P-2)
6-2.122 Demonstrate proper child CPR. (P-2)
6-2.123 Demonstrate proper techniques for performing infant and child defibrillation and synchronized cardioversion.(P-2)

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DECLARATIVE

I. Introduction
- A. Epidemiology of EMS incidents involving pediatric patients
- B. Paramedic role in treating infants and children
  - 1. Care of the pediatric patient
    - a. Prehospital care (primary transport)
    - b. Interfacility transfer (secondary transport)
  - 2. Maintain and improve pediatric knowledge and clinical skills
    - a. Continuing education programs
      - (1) Pediatric Advanced Life Support
      - (2) Pediatric Basic Trauma Life Support
      - (3) Advanced Pediatric Life Support
      - (4) Pediatric Emergencies for Paramedics
      - (5) Regional conferences and seminars
    - b. Clinical application
      - (1) Pediatric emergency department
      - (2) Pediatric hospital
      - (3) Pediatric department of a community hospital
      - (4) Pediatrician office
    - c. Textbooks and journals
    - d. Teaching Resource for Instructors of Prehospital Pediatrics (TRIPP)
  - 3. Reduction of mortality and morbidity
    - a. Educational programs
      - (1) Schools
      - (2) Community
      - (3) Parents
    - b. Prevention
      - (1) Community involvement
      - (2) Safety inspections
    - c. Documentation
      - (1) Prehospital and trauma registries
      - (2) Epidemiological research and surveillance
- C. Emergency Medical Services for Children (EMSC)
  - 1. Coordinated national effort to improve the health of pediatric patients who suffer potentially life-threatening illness or injury
  - 2. Specific areas of pediatric health care concern have been identified
    - a. System approach
    - b. Education
    - c. Data collection
    - d. Quality improvement
    - e. Injury prevention
    - f. Access
    - g. Prehospital care
    - h. Emergency care
    - i. Definitive care
    - j. Rehabilitation
    - k. Finance

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l. On-going health care from birth to young adulthood

D. Definitions
1. Newborn
a. First few hours of life (perinatal period)
b. Resuscitation follows Neonatal Advanced Life Support (NALS) guidelines
2. Infant
a. Neonatal period (first 28 days of life) is included
b. First month after birth to approximately 12 months of age
c. Resuscitation follows Pediatric Advanced Life Support (PALS) guidelines
3. Toddler
a. A child between 12 and 36 months of age
4. Preschool
a. A child between three and five years of age
5. School age
a. The child between 6 and 12 years of age
6. Adolescent
a. The period between the end of childhood and adulthood (18 years)
(1) Early (puberty)
(2) Middle (junior high school/ high school age)
(3) Late (high school/ college age)
b. End of childhood is usually defined as the beginning of puberty
(1) Highly child specific
(2) Male child average 13 years
(3) Female child average 11 years

II. Growth and development review
A. Infant
1. Physical development
a. Neonate (first month of life)
(1) Weight
(2) Crying
(a) Typical causes
(b) Persistent crying may indicate physiologic distress
(3) Movements
(4) Sleep
b. Infant (2-12 months)
(1) Weight
(2) Crying
(a) Gradually decreases throughout infancy
(b) Persistent crying may indicated physiological distress
(3) Movements
(a) Young infant
(b) Older infant
(4) Sleep
2. Cognitive development
a. Neonate (first month of life)
b. Infant (2-12 months)
(1) Young infant

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(2) Older infant
3. Emotional development
   a. Neonate (first month of life)
   b. Infant (2-12 months)
4. Paramedic implications
   a. Keep the patient warm and dry
   b. Handle patient gently, supporting head and neck
   c. Speak quietly
   d. Involve caregivers in treatment whenever possible
   e. Persistent crying, irritability, or inability to console or arouse patient may indicate physiologic distress
   f. Foreign body airway obstruction risk begins at approximately 6 months and increases

B. Toddler
1. Physical development
   a. Weight
   b. Movements
2. Cognitive development
3. Emotional development
4. Paramedic implications
   a. Keep the patient warm
   b. Handle patient gently
   c. Speak quietly and use simple words
   d. Distract patient with interesting objects (toy) during exam
   e. Avoid procedures on the dominant hand/ arm
   f. Involve caregivers in treatment whenever possible
   g. Try not to separate child from the caregiver
   h. Allow child to hold transitional objects (blanket, stuffed animal, etc.)
   i. Persistent irritability, and inability to console or arouse patient may indicate physiologic distress
   j. Foreign body airway obstruction continues to be a risk

C. Preschool
1. Physical development
   a. Weight
   b. Movements
2. Cognitive development
3. Emotional development
4. Paramedic implications
   a. Keep the patient warm
   b. Handle patient gently
   c. Speak quietly in clear and unambiguous language; avoid baby talk
   d. Offer the patient treatment choices if possible
   e. Involve caregivers in treatment whenever possible
   f. Persistent irritability, or inability to arouse patient may indicate physiologic distress
   g. Foreign body airway obstruction risk continues
   h. Respect patient modesty
   i. Avoid frightening or misleading comments

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D. School age
  1. Physical development
    a. Weight
    b. Movement
  2. Cognitive development
  3. Emotional development
  4. Paramedic implications
    a. Keep the patient warm
    b. Speak in clear and unambiguous language
    c. Be honest about procedures inducing pain
    d. Involve the patient in treatment whenever possible
    e. Persistent irritability, or inability to arouse patient may indicate physiologic distress
    f. Respect patient modesty
    g. Reassure patient of body integrity
    h. Address preoccupations about death when appropriate

E. Adolescent
  1. Physical development
  2. Cognitive development
  3. Emotional development
  4. Paramedic implications
    a. Explain things clearly and honestly
    b. Involve the patient in treatment whenever possible
    c. Respect patient modesty
    d. Address patient concerns of body integrity/ disfigurement
    e. Deal with patient tactfully and fairly
    f. Vital signs approach adult values
    g. Consider the possibility of substance abuse, endangerment of self or others

III. Anatomy and physiology review

A. Head
  1. Proportionally larger size
  2. Larger occipital region
  3. Fontanelles open in infancy
  4. Face is small in comparison to size of head
  5. Paramedic implications
    a. Higher proportion of blunt trauma involves the head
    b. Different airway positioning techniques
      (1) Place thin layer of padding under back of seriously injured child < 3 years of age to obtain neutral position
      (2) Place folded sheet under occiput of medically ill child > 3 years of age to obtain sniffing position
    c. Examine fontanelle in infants
      (1) Bulging fontanelle suggests increased intracranial pressure
      (2) Sunken fontanelle suggests dehydration

B. Airway
  1. Narrower at all levels
  2. Infants are obligate nasal breathers

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3. Jaw is proportionally smaller in young children
4. Larynx is higher (C 3-4) and more anterior
5. Cricoid ring is the narrowest part of the airway in young children
6. Tracheal cartilage softer
7. Trachea smaller in both length and diameter
8. Epiglottis
   a. Omega shaped in infants
   b. Extends at a 45 degree angle into airway
   c. Epiglottic folds have softer cartilage, therefore are more floppy, especially in infants
9. Paramedic implications
   a. Keep nares clear in infants < 6 months of age
   b. Narrower upper airways are more easily obstructed
      (1) Flexion or hyperextension
      (2) Particulate matter
      (3) Soft tissue swelling (injury, inflamation)
   c. Differences in intubation technique
      (1) Gentler touch
      (2) Straight blade
      (3) Lift epiglottis
      (4) Uncuffed tube
      (5) Precise placement

C. Chest and lungs
1. Ribs are positioned horizontally
2. Ribs are more pliable and offer less protection to organs
3. Chest muscles immature and fatigue easily
4. Lung tissue is more fragile
5. Mediastinum is more mobile
6. Thin chest wall allows for easily transmitted breath sounds
7. Paramedic implications
   a. Infants and children are diaphragmatic breathers
   b. Infants and children are prone to gastric distention
   c. Rib fractures are less frequent but not uncommon in child abuse and trauma
   d. Greater energy transmitted to underlying organs following trauma, therefore, significant internal injury can be present without external signs
   e. Pulmonary contusions are more common in major trauma
   f. Lungs prone to pneumothorax following barotrauma
   g. Mediastinum has greater shift with tension pneumothorax
   h. Easy to miss a pneumothorax or misplaced intubation due to transmitted breath sounds

D. Abdomen
1. Immature abdominal muscles offer less protection
2. Abdominal organs are closer togther
3. Liver and spleen proportionally larger and more vascular
4. Paramedic implications
   a. Liver and spleen more frequently injured
   b. Multiple organ injuries more common

E. Extremities

1. Bones are softer and more porous until adolescence
2. Injuries to growth plate may disrupt bone growth
3. Paramedic implications
    a. Immobilize any “sprain” or “strain” as it is likely a fracture
    b. Avoid piercing growth plate during intraosseous needle insertion

F. Skin and body surface area (BSA)
1. Thinner and more elastic
2. Thermal exposure results in deeper burn
3. Less subcutaneous fat
4. Larger surface area to body mass
5. Paramedic implications
    a. More easily and deeply burned
    b. Larger losses of fluid and heat

G. Respiratory system
1. Tidal volume proportionally similar to that of adolescents and adults
2. Metabolic oxygen requirements of infants and children are approximately double those of adolescents and adults
3. Proportionally smaller functional residual capacity therefore proportionally smaller oxygen reserves
4. Paramedic implications
    a. Hypoxia develops rapidly because of increased oxygen requirements and decreased oxygen reserves

H. Cardiovascular system
1. Cardiac output is rate dependent in infants and small children
2. Vigorous but limited cardiovascular reserves
3. Bradycardia is a response to hypoxia
4. Can maintain blood pressure longer than an adult
5. Circulating blood volume is proportionally larger than in an adult
6. Absolute blood volume is smaller than in an adult
7. Paramedic implications
    a. Smaller absolute volume of fluid/ blood loss needed to cause shock
    b. Larger proportional volume of fluid/ blood loss needed to cause shock
    c. Hypotension is a late sign of shock
    d. A child may be in shock despite normal blood pressure
    e. Shock assessment is based upon clinical signs of tissue perfusion
    f. Carefully assess for shock if tachycardia is present
    g. Monitor carefully for development of hypotension

I. Nervous system
1. Develops throughout childhood
2. Developing neural tissue is more fragile
3. Brain and spinal cord are less well protected by skull and spinal column
4. Paramedic implications
    a. Brain injuries are more devastating in young children
    b. Greater force transmitted to underlying brain of young children
    c. Spinal cord injury can occur without spinal column injury

J. Metabolic differences
1. Infants and children have a limited glycogen and glucose stores
2. Significant volume loss can result from vomiting and diarrhea

3. Prone to hypothermia due to increased body surface area
4. Newborns and neonates are unable to shiver to maintain body temperature
5. Paramedic implications
   a. Keep child warm during treatment and transport
   b. Cover the head to minimize heat loss

IV. Assessment
- A. General considerations
  1. Many components of the initial patient evaluation can be done by observing the patient
  2. Utilize the parent/ guardian to assist in making the infant or child more comfortable as appropriate
  3. Interacting with parents and family
     - a. Normal responses to acute illness and injury
     - b. Parent/ guardian and child interaction
     - c. Intervention techniques
- B. Physical exam
  1. Scene survey
     - a. Observe the scene for hazards or potential hazards
     - b. Observe the scene for mechanism of injury/ illness
       - (1) Ingestion
         - (a) Pills, medicine bottles, household chemicals, etc.
       - (2) Child abuse
         - (a) Injury and history do not coincide, bruises not where they should be for mechanism of injury, etc.
       - (3) Position patient found
     - c. Observe the parent/ guardian/ caregiver interaction with the child
       - (1) Do they act appropriately
       - (2) Is parent/ guardian/ caregiver concerned
       - (3) Is parent/ guardian/ caregiver angry
       - (4) Is parent/ guardian/ caregiver indifferent
  2. Initial assessment
     - a. General impression
       - (1) General impression of environment
       - (2) General impression of parent/ guardian and child interaction
       - (3) General impression of the patient/ Pediatric Assessment Triangle
         - (a) A structure for assessing the pediatric patient
         - (b) Focuses on the most valuable information for pediatric patients
         - (c) Used to ascertain if any life-threatening condition exists
         - (d) Components
           - i) Appearance
             - a) Mental status
             - b) Muscle tone
           - ii) Work of breathing
             - a) Respiratory rate
             - b) Respiratory effort
           - iii) Circulation
             - a) Skin signs
             - b) Skin color

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(4) Initial triage decisions
  (a) Urgent - proceed with rapid ABC assessment, treatment and transport
  (b) Non urgent - proceed with focused history, detailed physical exam after initial assessment

b. Vital functions
  (1) Determine level of consciousness
    (a) AVPU scale
      i) Alert
      ii) Responds to verbal stimuli
      iii) Responds to painful stimuli
      iv) Unresponsive
    (b) Modified Glasgow Coma Scale
    (c) Signs of inadequate oxygenation
  (2) Airway
    (a) Determine patency
  (3) Breathing
    (a) Adequate chest rise and fall
    (b) Use of accessory muscles
    (c) Nasal flaring
    (d) Tachypnea
    (e) Bradypnea
    (f) Irregular breathing pattern
    (g) Head bobbing
    (h) Grunting
    (i) Absent breath sounds
    (j) Abnormal sounds
  (4) Circulation
    (a) Pulse
      i) Central
      ii) Peripheral
      iii) Quality of pulse
    (b) Blood pressure
      i) Measuring blood pressure is not necessary in children < 3 years of age
    (c) Skin color
    (d) Active hemorrhage
  (5) Vital signs
    (a) Infant
    (b) Toddler
    (c) Preschool
    (d) School aged
    (e) Adolescent

3. Transition phase
  a. Utilized to allow the infant or child to become familiar with you and your equipment
  b. Use of transition phase depends on the seriousness of the patient's condition
  c. For the conscious, non-acutely ill child

d. For the unconscious, acutely ill child do not perform the transition phase but proceed directly to the treatment and transport

4. Focused history
   a. Approach
      (1) For infant, toddler, and preschool age patient, obtain from parent/ guardian
      (2) For school age and adolescent patient, most information may be obtained from the patient
      (3) For older adolescent patient question the patient in private regarding sexual activity, pregnancy, illicit drug and alcohol use
   b. Content
      (1) Chief complaint
         (a) Nature of illness/ injury
         (b) How long has the patient been sick/ injured
         (c) Presence of fever
         (d) Effects on behavior
         (e) Bowel/ urine habits
         (f) Vomiting/ diarrhea
         (g) Frequency of urination
      (2) Past medical history
         (a) Infant or child under the care of a physician
         (b) Chronic illnesses
         (c) Medications
         (d) Allergies
5. Detailed physical exam
   a. Examine all body regions
      (1) Head-to-toe in older child
      (2) Toe-to-head in younger child
   b. Some or all of the following may be appropriate, depending on the situation
      (1) Pupils
      (2) Capillary refill
         (a) Normal - two seconds or less
         (b) Valuable to assess on patients less than six years of age
         (c) Less reliable in cold environment
         (d) Blanch nailbed, base of the thumb, sole of the feet
      (3) Hydration
         (a) Skin turgor
         (b) Sunken or flat fontanelle in an infant
         (c) Presence of tears and saliva
      (4) Pulse oximetry
         (a) Should be utilized on any moderately injured or ill infant or child
         (b) Hypothermia and shock can alter reading
      (5) Cardiac monitor
6. On-going exam - continually monitor the following
   a. Respiratory effort
   b. Color
   c. Mental status

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d. Pulse oximetry
e. Vital signs
f. Patient temperature

C. General management
1. Airway management in pediatric patients
a. Basic airway management
(1) Manual positioning
(a) Allow medical patients to assume position of comfort
(b) Support under the torso for trauma patients less than 3 year old
(c) Occipital elevation for supine medical patients 3 years of age or older
(2) Foreign body airway obstruction - basic clearing methods
(a) Infants
i) Back blows
ii) Chest thrusts
(b) Children
i) Abdominal thrusts
(3) Suction
(a) Avoid hypoxia
(b) Avoid upper airway stimulation
(c) Decrease suction negative pressure (≤100 mm/Hg) in infants
(4) Oxygenation
(a) Non-rebreather mask
(b) Blow-by oxygen if mask is not tolerated
(c) Utilize the parent or guardian to deliver oxygen if patient condition warrants
(d) Maintain proper head position
(5) Oropharyngeal airway
(a) Sizing
(b) Preferred method of insertion uses the tongue blade to depress the tongue and jaw
(6) Nasopharyngeal airway
(a) Sizing
(b) No major differences in sizing or use compared to adults
(7) Ventilation
(a) Bag size
(b) Proper mask fit
(c) Proper mask position and seal (E-C clamp)
(d) Ventilate at age appropriate rate (squeeze-release-release)
(e) Obtain chest rise with each breath
(f) Allow adequate time for exhalation
(g) Assess BVM ventilation
(h) Apply cricoid pressure to minimize gastric inflation and passive regurgitation
b. Advanced airway management
(1) Foreign body airway obstruction - advanced clearing methods
(a) Direct laryngoscopy with Magill forceps
(b) Attempt intubation around foreign body

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(c) Consider needle cricothyroidotomy per medical direction only as a last resort if complete upper airway obstruction is present
(2) Endotracheal intubation in pediatric patients
(a) Laryngoscope and appropriate size blade
i) Length based resuscitation tape to determine size
ii) Straight blade is preferred
(b) Appropriate size endotracheal tube and stylette
i) Sizing methods
a) Length based resuscitation tape
b) Numerical formulas
c) Anatomical clues
ii) Stylette placement
(c) Technique for pediatric intubation
(d) Depth of insertion
(e) Endotracheal tube securing device
(3) Needle cricothyroidotomy in pediatric patients

2. Circulation
a. Vascular access
(1) Intraosseous access in children < 6 years of age in cardiac arrest or if intravenous access fails
b. Fluid resuscitation
(1) 20 ml/kg of lactated ringer's or normal saline bolus as needed
3. Pharmacological
a. Rapid sequence intubation per medical direction
4. Non-pharmacological
a. C-spine immobilization for traumatic cause
5. Transport considerations
a. Appropriate mode
(1) Transport should not be delayed to perform procedures that can be done en route
(2) Proper BLS care must be performed prior to any ALS interventions
b. Appropriate facility
(1) The availability of a receiving hospital with expertise in pediatric care may improve the patient's outcome
6. Psychological support/ communication strategies
a. Utilize the parent/ guardian to assist in making the infant or child more comfortable
b. Encourage parents to help calm the child during painful procedures
c. Infants, toddlers, preschool and school aged patients do not like to be separated from parent/ guardian
d. Infants and children have a natural fear of strangers; for stable patients, allow them to become accustomed to you before your hands-on assessment
e. Give some control of what is going to happen to the patient (which arm to have their IV)
f. When possible and practical, physically position your face at the same level as the patient's face to facilitate communication and minimize fear
g. Use age-appropriate vocabulary
h. Keep patient warm

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i. Allow child to take their favorite toy/ blanket if possible
j. Permit the child to express their feelings (e.g., fear, pain, crying,)
k. Let the child know that certain physical actions (e.g., hitting, biting, spitting) are not permitted

V. Specific pathophysiology, assessment and management
- A. Respiratory compromise
  - 1. Introduction
    - a. Epidemiology
      - (1) Incidence
      - (2) Morbidity/ mortality
      - (3) Risk factors
      - (4) Prevention strategies
    - b. Categories of respiratory compromise
      - (1) Upper airway obstruction
      - (2) Lower airway disease
  - 2. Pathophysiology
    - a. Respiratory illnesses cause respiratory compromise in airway/ lung
      - (1) Severity of respiratory compromise depends on extent of respiratory illness
      - (2) Approach to treatment depends on severity of respiratory compromise
    - b. Severity
      - (1) Respiratory distress
        - (a) Increased work of breathing
        - (b) Carbon dioxide tension in the blood initially decreases, then increases as condition deteriorates
        - (c) If uncorrected, respiratory distress leads to respiratory failure
      - (2) Respiratory failure
        - (a) Inadequate ventilation or oxygenation
        - (b) Respiratory and circulatory systems are unable to exchange enough oxygen and carbon dioxide
        - (c) Carbon dioxide tension in the blood increases, leading to respiratory acidosis
        - (d) Very ominous condition; patient is on the verge of respiratory arrest
      - (3) Respiratory arrest
        - (a) Cessation of breathing
        - (b) Failure to intervene will result in cardiopulmonary arrest
        - (c) Good outcomes can be expected with early intervention that prevents cardiopulmonary arrest
    - c. Assessment
      - (1) Chief Complaint
      - (2) History
      - (3) Physical findings
        - (a) Signs and symptoms of respiratory distress
          - i) Normal mental status => irritability or anxiety
          - ii) Tachypnea
          - iii) Retractions

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iv) Nasal flaring
v) Good muscle tone
vi) Tachycardia
vii) Head bobbing
viii) Grunting
ix) Cyanosis which improves with supplemental oxygen

(b) Signs and symptoms of respiratory failure
i) Irritability or anxiety ==> lethargy
ii) Marked tachypnea ==> bradypnea
iii) Marked retractions ==> agonal respirations
iv) Poor muscle tone
v) Marked tachycardia ==> bradycardia
vi) Central cyanosis

(c) Signs and symptoms of respiratory arrest
i) Obtunded ==> coma
ii) Bradypnea ==> apnea
iii) Absent chest wall motion
iv) Limp muscle tone
v) Bradycardia ==> asystole
vi) Profound cyanosis

(4) On-going assessment - improvement indicated by
(a) Improvement in color
(b) Improvement in oxygen saturation
(c) Increased pulse rate
(d) Increased level of consciousness

d. Management
(1) Graded approach to treatment
(2) Consider separating parent and child
(3) Airway
(a) Manage upper airway obstructions as needed
(b) Insert airway adjunct if needed
(4) Ventilation and oxygenation
(a) Respiratory distress/ early respiratory failure
i) Administer high flow oxygen
(b) Late respiratory failure/ respiratory arrest
i) BVM - ventilate patient with 100% oxygen via age-appropriate sized bag
ii) ETT - intubate patient if positive pressure ventilation does not rapidly improve patient condition
iii) Consider gastric decompression if abdominal distention is impeding ventilation
iv) Consider needle decompression per medical direction if tension pneumothorax is present
v) Consider cricothyroidotomy per medical direction only as a last resort if complete upper airway obstruction is present
(5) Circulation
(6) Supportive care

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(7) Transport considerations
(a) Appropriate mode
(b) Appropriate facility
(8) Psychological support/ communication strategies

3. Upper airway obstruction
a. Croup
(1) Epidemiology
(a) Incidence
i) Very common in infants and children (6 months to 4 years of age)
(b) Risk factors
(c) Prevention strategies
(2) Pathophysiology
(a) An inflammatory process of the upper respiratory tract involving the subglottic region
(b) Main cause is viral infection of the upper airway
(c) Another form is spasmodic croup
i) Occurs mostly in the middle of the night
ii) Usually without prior upper respiratory infection
(3) Assessment
(a) Signs and symptoms of respiratory distress or failure, depending on severity, plus
i) Appears sick
ii) Stridor
iii) Barking (seal or dog-like) or brassy cough
iv) Hoarseness
v) Fever (+/-)
(b) History
i) Usually with history of upper respiratory infection in classic croup (1-2 days)
ii) Rarely progresses to respiratory failure
(4) Management
(a) Airway and ventilation
i) Humidified or nebulized oxygen
ii) Cool mist oxygen at 4-6 L/min
(b) Circulation
(c) Pharmacological
(d) Non-pharmacological
i) Keep child in position of comfort
(e) Transport considerations
(f) Psychological support/ communication strategies
i) Do not agitate the patient (no IVs, blood pressure, etc.)
ii) Keep the parent/ guardian/ caregiver with the infant or child if appropriate
b. Foreign body aspiration
(1) Epidemiology
(a) Incidence
i) Usually occurs in toddlers and pre-schoolers (1 to 4

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years of age, but can occur at any age)
ii) Common
(b) Risk factors
(c) Prevention strategies
(2) Pathophysiology
(a) Partial or complete blockage of the upper airway by a foreign body
(b) Objects are usually food (hard candy, nuts, seeds, hot dog) or small objects (coins, balloons)
(c) If no interventions or if interventions are unsuccessful, respiratory arrest followed by cardiopulmonary arrest will ensue
(3) Assessment
(a) Partial obstruction
i) Signs and symptoms of respiratory distress or failure, depending on severity, plus
a) Appears irritable or anxious, but not toxic
b) Inspiratory stridor
c) Muffled or hoarse voice
d) Drooling
e) Pain in throat
ii) History
a) Usually a history of choking if observed by adult
(b) Complete obstruction
i) Signs and symptoms of respiratory failure or arrest, depending on severity, plus
a) Appears agitated or lethargic
b) No or minimal air movement
ii) History
a) History often lacking
b) Inability to ventilate despite proper airway positioning
(4) Management
(a) Airway and ventilation
i) Partial obstruction
a) Place patient in sitting position
b) Deliver oxygen by non-rebreather mask or blow-by
c) DO NOT ATTEMPT TO LOOK IN MOUTH
d) Interventions other than oxygen and transport may precipitate complete obstruction
ii) Complete obstruction
a) Open airway and attempt to visualize the obstruction
b) Sweep visible obstructions with your finger (do NOT perform blind finger sweeps)
c) Perform BLS FBAO maneuvers
d) Attempt BVM ventilations

e) Perform laryngoscopy if BVM is unsuccessful
f) Remove object if possible with pediatric Magill forceps
g) Intubate if possible
h) Continue BLS FBAO maneuvers if ALS is unsuccessful
i) Consider needle cricothyroidotomy per medical direction only as a last resort

(b) Circulation
(c) Pharmacological
(d) Transport considerations
i) Notify hospital of patient status
ii) Transport expeditiously
(e) Psychological support/ communication strategies
i) Do not agitate patient
a) No IVs or medications
b) Do not look in patient's mouth
ii) Keep caregiver with child, if appropriate

c. Bacterial tracheitis
(1) Epidemiology
(a) Incidence
i) Usually occurs in infants and toddlers (1-5 years old), but can occur in older children
ii) Very uncommon
(b) Risk factors
(c) Prevention strategies
(2) Pathophysiology
(a) Bacterial infection of the upper airway, subglottic trachea, usually following viral croup
(3) Assessment
(a) Signs and symptoms - respiratory distress or failure depending on severity, plus
i) Appears agitated, sick
ii) High-grade fever
iii) Inspiratory and expiratory stridor
iv) Coughing up pus/ mucous
v) Hoarse voice
vi) Pain in throat
(b) History
i) Usually a history of croup in the preceding few days
(c) May progress to respiratory failure or arrest
(4) Management
(a) Assure airway and ventilation
(b) Administer oxygen by non-rebreather or blow-by
(c) Complete obstruction or respiratory failure/ arrest
i) BVM ventilation
ii) May require high pressure to adequately ventilate
iii) Intubate patient

iv) Suction endotracheal tube to reduce pus or mucous
(d) Circulation
(e) Pharmacological
(f) Transport considerations
i) Place patient in sitting position
ii) Notify hospital of patient status as early as possible
iii) Transport quickly
(g) Psychological support/ communication strategies
i) DO NOT AGITATE THE PATIENT - no IVs, no BP, do not look in patient's mouth
ii) Keep caregiver with child if appropriate

d. Epiglottitis
(1) Epidemiology
(a) Incidence
i) Usually occurs in pre-school and school-age children (3-7 years of age) but can occur at any age
ii) Extremely uncommon due to the H. flu vaccine
(b) Risk factors
(c) Prevention strategies
(2) Pathophysiology
(a) Rapidly forming cellulitis of the epiglottis and its surrounding structures
(b) Bacterial infection, usually Hemophilus influenza type B
(c) Can be a true life-threatening emergency
(3) Assessment
(a) Signs and symptoms of respiratory distress or failure depending on severity, plus
i) Appears agitated, sick
ii) Stridor
iii) Muffled voice
iv) Drooling
v) Sore throat
vi) Pain on swallowing
vii) High fever
(b) History
i) Usually no previous history but a rapid onset of symptoms (6-8 hours)
(c) Can quickly progress to respiratory arrest
(4) Management
(a) Airway and ventilation
i) NEVER ATTEMPT TO VISUALIZE THE AIRWAY IF THE PATIENT IS AWAKE
ii) Allow the parent to administer oxygen
iii) If airway becomes obstructed, two rescuer ventilation with BVM is almost always effective
iv) If BVM is not effective, attempt intubation with stylet in place
v) Intubation should not be attempted in settings with

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short transport times
vi) Performing chest compression upon glottic visualization during intubation may produce a bubble at the tracheal opening
vii) Consider needle cricothyroidotomy per medical direction as a last resort if complete upper airway obstruction is present
(b) Circulation
(c) Pharmacological
(d) Transport considerations
i) Allow patient to assume position of comfort
ii) Notify hospital of patient status early
iii) Transport to the hospital without delay, keeping child warm
(e) Psychological support/ communication strategies
i) DO NOT AGITATE THE PATIENT - no IVs, BP, do not look in patient's mouth
ii) Keep the caregiver with the child if appropriate

4. Lower airway disease
a. Asthma
(1) Epidemiology
(a) Incidence
i) Usually occurs in children older than 2 years of age
ii) Very common
(b) Risk factors
i) Typically in child with known history of asthma
ii) Triggered by upper respiratory infections, allergies, changes in temperature, physical exercise and emotional response
iii) Children that experience prolonged asthma attacks tire easily; watch for signs of respiratory failure
(c) Prevention strategies
(2) Pathophysiology
(a) Bronchospasm
(b) Excessive mucous production
(c) Inflammation of the small airways
(3) Assessment
(a) Signs and symptoms - respiratory distress or failure depending on severity, plus
i) Appears anxious
ii) Wheezes
iii) Prolonged expiratory phase
iv) A silent chest means danger
(b) History
i) Usually follows exposure to known trigger
(c) Bronchiolitis and asthma may present very similarly
(4) Management
(a) Airway and ventilation

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i) Administer oxygen by tolerated method
ii) BVM ventilations for respiratory failure/ arrest (progressive lethargy, poor muscle tone, shallow respiratory effort)
iii) Endotracheal intubation for respiratory failure/ arrest with prolonged BVM ventilations, or inadequate response to BVM ventilations
(b) Circulation
(c) Pharmacological
i) Albuterol nebulizer
ii) Subcutaneous epinephrine 1:1000 - only with severe respiratory distress or failure
iii) Medications can be repeated if no effect
(d) Transport considerations
i) Allow patient to assume position of comfort
(e) Psychological support/ communication strategies
i) Keep caregiver with child if appropriate

b. Bronchiolitis
(1) Epidemiology
(a) Incidence
i) Usually occurs in children less than 2 years of age
ii) Very common
(b) Risk factors
i) Usually occurs in winter months
(c) Prevention strategies
(2) Pathophysiology
(a) An inflammatory process of the lower respiratory tract including the terminal airways
(b) Main cause is respiratory syncytial virus infection of the lower airway
(3) Assessment
(a) Signs and symptoms - respiratory distress or failure depending on severity, plus
i) Appears anxious
ii) Wheezing
iii) Rales (diffuse)
(b) History
i) Usually a history of upper respiratory infection symptoms
(c) Bronchiolitis and asthma may present very similarly
(4) Management
(a) Airway and ventilation
i) Administer oxygen by tolerated method
ii) BVM ventilations for respiratory failure/ arrest (progressive lethargy, poor muscle tone, shallow respiratory effort)
iii) Endotracheal intubation for respiratory failure/ arrest with prolonged BVM ventilations, or inadequate

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response to BVM ventilations
(b) Circulation
(c) Pharmacological
i) Albuterol nebulizer
(d) Transport considerations
i) Allow patient to assume position of comfort
(e) Psychological support/ communication strategies
i) Keep caregiver with child if appropriate

c. Pneumonia
(1) Epidemiology
(a) Incidence
i) Usually occurs in infants, toddlers and pre-schoolers (1-5 years of age), but can occur at any age
ii) Common
(b) Risk factors
(c) Prevention strategies
(2) Pathophysiology
(a) Infection of the lower airway and lung
(b) May be caused by bacteria or virus
(3) Assessment
(a) Signs and symptoms - respiratory distress or failure depending on the severity, plus
i) Appears anxious
ii) Decreased breath sounds
iii) Rales
iv) Rhonchi (localized or diffuse)
v) Pain in the chest
vi) Fever
(b) History
i) Usually a history of lower respiratory infectious symptoms
(4) Management
(a) Airway and ventilation
i) Administer oxygen by tolerated method
ii) BVM ventilations for respiratory failure/ arrest (progressive lethargy, poor muscle tone, shallow respiratory effort)
iii) Endotracheal intubation for respiratory failure, prolonged BVM ventilations, or inadequate response to BVM ventilations
(b) Circulation
(c) Pharmacological
(d) Transport considerations
i) Allow patient to assume position of comfort
(e) Psychological support/ communication strategies
i) Keep caregiver with child if appropriate

d. Foreign body lower airway obstruction
(1) Epidemiology

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(a) Incidence
i) Usually occurs in toddlers and preschool age children (1-4 years of age), but can occur at any age
ii) Uncommon
(b) Risk factors
(c) Prevention strategies
(2) Pathophysiology
(a) Foreign body in the lower airway or lung
(b) Objects are usually food (nuts, seeds, etc.) or small objects
(3) Assessment
(a) Signs and symptoms - respiratory distress of failure depending on the severity, plus
i) Appears anxious
ii) Decreased breath sounds
iii) Rales
iv) Rhonchi (localized or diffuse)
v) Pain in the chest
(b) History
i) May be a history of choking if witnessed by an adult
(4) Management
(a) Airway and ventilation
i) Administer oxygen by tolerated method
ii) BVM ventilations for respiratory failure/ arrest (progressive lethargy, poor muscle tone, shallow respiratory effort)
iii) Endotracheal intubation for respiratory failure/ arrest with prolonged BVM ventilations, or inadequate response to BVM ventilations
iv) Do not attempt to retrieve foreign body as it is beyond the reach of Magill forceps
(b) Circulation
(c) Transport considerations
i) Allow patient to assume position of comfort
(d) Psychological support/ communication strategies
i) Keep caregiver with child if appropriate

B. Shock
1. Introduction
a. Epidemiology
(1) Incidence
(2) Morbidity/ mortality
(3) Risk factors
(4) Prevention strategies
b. Categories of shock
(1) Non-cardiogenic
(2) Cardiogenic
2. Pathophysiology
a. An abnormal condition characterized by inadequate delivery of oxygen and metabolic substrates to meet the metabolic demands of tissues

b. Severity
   (1) Compensated (early)
      (a) Patient's blood pressure is normal although signs of inadequate tissue perfusion are present
      (b) Reversible
   (2) Decompensated (late)
      (a) Hypotension and signs of inadequate organ perfusion are present
      (b) Often irreversible

c. Assessment
   (1) Chief complaint
   (2) History
   (3) Physical findings
      (a) Signs and symptoms of compensated shock
         i) Irritability or anxiety
         ii) Tachycardia
         iii) Tachypnea
         iv) Weak peripheral pulses, full central pulses
         v) Delayed capillary refill
         vi) Cool, pale extremities
         vii) Systolic blood pressure within normal limits
         viii) Decreased urinary output
      (b) Signs and symptoms of decompensated shock
         i) Lethargy or coma
         ii) Marked tachycardia or bradycardia
         iii) Marked tachypnea or bradypnea
         iv) Absent peripheral pulses, weak central pulses
         v) Markedly delayed capillary refill
         vi) Cool, pale, dusky, mottled extremities
         vii) Hypotension
         viii) Markedly decreased urinary output

d. Management
   (1) Graded approach to treatment
   (2) Consider separating parent and child
   (3) Airway
      (a) Trauma - immobilize c-spine
   (4) Ventilation and oxygenation
      (a) Compensated shock
         i) Oxygen
      (b) Decompensated shock
         i) BVM - consider ventilating patient with 100% oxygen via appropriate-sized bag
         ii) ETT - consider intubating patient if positive pressure ventilation does not rapidly improve patient's condition
   (5) Circulation
      (a) Compensated shock
         i) Oxygen
      (b) Decompensated shock

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i) Non-cardiogenic
a) Fluid
ii) Cardiogenic
a) No fluid
b) Dysrhythmia management as indicated
(6) Supportive care
(7) Transport considerations
(a) Appropriate mode
(b) Appropriate facility
(8) Psychological support/ communication strategies

3. Noncardiogenic
a. Hypovolemia
(1) Epidemiology
(a) Common
(2) Pathophysiology
(a) Intravascular volume depletion
i) Severe dehydration
a) Vomiting
b) Diarrhea
ii) Blood loss
a) Trauma
b) Other, e.g., GI bleed
(3) Assessment
(a) Signs and symptoms of compensated or decompensated shock depending on severity, plus
i) Blood loss
a) External hemorrhage
b) Major trauma
ii) Dehydration
a) Poor skin turgor
b) Decreased saliva and or tears
c) Sunken fontanelle (infants)
(b) History
(4) Management
(a) Airway and ventilation
i) Oxygen
ii) Trauma - immobilize c-spine
(b) Circulation
i) Compensated shock
a) Oxygen
ii) Decompensated shock
a) Oxygen
b) Vascular access
c) 20 ml/kg of lactated ringers or NS bolus as needed
(c) Supportive care
(d) Transport considerations
(e) Psychological support/ communication strategies

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b. Distributive
- (1) Epidemiology
  - (a) Uncommon
- (2) Etiology
  - (a) Septic
  - (b) Neurogenic
  - (c) Anaphylactic
- (3) Pathophysiology
  - (a) Peripheral pooling due to loss of vasomotor tone
- (4) Assessment
  - (a) Signs and symptoms of compensated or decompensated shock depending on severity, plus
    - i) Septic
      - a) Early - warm skin
      - b) Late - cool skin
    - ii) Neurogenic
      - a) Warm skin
      - b) Bradycardia
    - iii) Anaphylactic
      - a) Allergic rash
      - b) Airway swelling
  - (b) History
- (5) Management
  - (a) Airway and ventilation
    - i) Oxygen
    - ii) Trauma - immobilize c-spine
  - (b) Circulation
    - i) Compensated shock
      - a) Oxygen
    - ii) Decompensated shock
      - a) Oxygen
      - b) Vascular access
      - c) 20 ml/kg of lactated ringers or NS bolus as needed
      - d) Anaphylactic - secure airway
  - (c) Supportive care
  - (d) Transport considerations
  - (e) Psychological support/ communication strategies

4. Cardiogenic

a. Cardiomyopathy
- (1) Epidemiology
  - (a) Infection
  - (b) Congenital abnormalities
- (2) Pathophysiology
  - (a) Mechanical pump failure
  - (b) Usually biventricular
- (3) Assessment
  - (a) Signs and symptoms of compensated or decompensated shock, depending on severity, plus

i) Rales
ii) Jugular venous distention
iii) Hepatomegaly
iv) Peripheral edema
(b) History
(4) Management
(a) Airway and ventilation
i) Oxygen
(b) Circulation
i) Compensated shock
a) Oxygen
ii) Decompensated shock
a) Oxygen
b) Vascular access
c) Restrict fluid
d) Consider diuretic
e) Consider vasopressor
(c) Supportive care
(d) Transport considerations
(e) Psychological support/ communication strategies
b. Dysrhythmias
(1) Epidemiology
(a) Bradydysrhythmias - common
(b) Supraventricular tachydysrhythmias - uncommon
(c) Ventricular tachydysrhythmias - very uncommon
(2) Pathophysiology
(a) Electrical pump failure
(b) Results in cardiogenic shock or cardiopulmonary arrest depending on type
(3) Assessment
(a) Signs and symptoms of cardiogenic shock (compensated or decompensated) or cardiopulmonary arrest, depending on type
(b) History
(4) Management
(a) Specific to each type
C. Dysrhythmias
1. Tachydysrhythmias
a. Supraventricular tachycardia
(1) Epidemiology
(a) Incidence
i) Usually in infants with no prior history
(b) Risk factors
(c) Prevention strategies
(2) Pathophysiology
(a) Stable (compensated shock) - patient will usually remain stable during transport with oxygen
(b) Unstable (decompensated shock) - PATIENT REQUIRES IMMEDIATE TREATMENT
(c) Children may be able to sustain increased rates for a while, but

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after several hours, they will decompensate
(3) Assessment
(a) Signs and symptoms - compensated or decompensated shock, depending on severity, plus
i) Narrow complex tachycardia with rates of greater than 220 beats per minute (too fast to count)
ii) Poor feeding
iii) Hypotension
(b) History
(4) Management
(a) Stable - supportive care
(b) Unstable
i) Airway and ventilation
a) Oxygen
ii) Circulation
iii) Pharmacological
a) Consider adenosine
iv) Non-pharmacological
a) Synchronized cardioversion
v) Transport considerations
vi) Psychological support/ communication strategies

b. Ventricular tachycardia with a pulse
(1) Epidemiology
(a) Incidence
(b) Risk factors
(c) Prevention strategies
(2) Pathophysiology
(a) Stable (compensated shock) - patient will usually not tolerate for long periods of time
(b) Unstable (decompensated shock) - PATIENT REQUIRES IMMEDIATE TREATMENT
(c) Most VT with a pulse is secondary to structural heart disease and responds poorly to lidocaine
(3) Assessment
(a) Signs and symptoms - signs of compensated or decompensated shock, depending on severity, plus
i) Rapid, wide complex tachycardia
ii) Poor feeding
iii) Hypotension
(b) History
(4) Management
(a) Stable - supportive care
(b) Unstable
i) Airway and ventilation
a) Administer high flow oxygen
ii) Circulation
iii) Pharmacological
a) Consider lidocaine
iv) Non-pharmacological

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a) Synchronized cardioversion
v) Transport considerations
vi) Psychological support/ communication strategies

2. Bradydysrhythmias
   a. Epidemiology
      (1) Incidence - most common dysrhythmia in children
      (2) Risk factors
      (3) Prevention strategies
   b. Pathophysiology
      (1) Usually develops as a result of hypoxia
      (2) May develop due to vagal stimulation (rare)
   c. Assessment
      (1) Signs and symptoms - compensated or decompensated shock, depending on severity, plus
         (a) Bradycardia
         (b) Slow, narrow complex heart rhythm, QRS duration may be normal or prolonged
      (2) History
   d. Management
      (1) Stable - supportive care
      (2) Unstable
         (a) Airway and ventilation
            i) Ventilate patient with 100% oxygen via BVM
            ii) Intubate patient if poor response to BVM ventilations
         (b) Circulation
            i) Perform chest compressions if oxygen does not increase heart rate
         (c) Pharmacological
            i) Medications can be given down the endotracheal tube
            ii) Administer epinephrine
            iii) Administer atropine for vagally induced bradycardia
         (d) Non-pharmacological
         (e) Transport considerations
         (f) Psychological support/ communication strategies
3. Absent rhythm
   a. Asystole
      (1) Epidemiology
         (a) Incidence - may be the initial cardiac arrest rhythm
         (b) Risk factors
         (c) Prevention strategies
      (2) Pathophysiology
         (a) Bradycardias may degenerate into asystole
         (b) High mortality rate
      (3) Assessment
         (a) Signs and symptoms
            i) Pulseless
            ii) Apneic
            iii) Cardiac monitor indicating no electrical activity
         (b) History

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(4) Management
- (a) Confirm in two leads
- (b) Airway and ventilation
  - i) Ventilate the patient with 100% oxygen via BVM
  - ii) Intubate patient if poor response to BVM ventilations
- (c) Circulation
  - i) Perform chest compressions
- (d) Pharmacological
  - i) Medications can be given down the endotracheal tube
  - ii) Administer epinephrine
- (e) Non-pharmacological
- (f) Transport considerations
- (g) Psychological support/ communication strategies

b. Ventricular fibrillation/ pulseless ventricular tachycardia

(1) Epidemiology
- (a) Incidence - rare
- (b) Risk factors
- (c) Prevention strategies

(2) Pathophysiology
- (a) Possibly due to electrocution and drug overdoses
- (b) High mortality rate

(3) Assessment
- (a) Signs and symptoms
  - i) Pulseless
  - ii) Apneic
  - iii) Cardiac monitor indicating no organized electrical activity or rapid wide complex tachycardia
- (b) History

(4) Management
- (a) Unmonitored - perform basic life support
- (b) Monitored - defibrillate up to three consecutive shocks
- (c) Airway and ventilation
  - i) Ventilate the patient with 100% oxygen via BVM
  - ii) Intubate patient if poor response to BVM ventilations
- (d) Circulation
  - i) Perform chest compressions
- (e) Pharmacological
  - i) Medications can be given down the endotracheal tube
  - ii) Administer epinephrine
  - iii) Administer lidocaine
  - iv) Administer bretylium
  - v) After administration of a medication, allow it to circulate for one minute before repeat defibrillation
- (f) Non-pharmacological
- (g) Transport considerations
- (h) Psychological support/ communication strategies

c. Pulseless electrical activity

(1) Epidemiology
- (a) Incidence - look for a treatable cause

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(b) Risk factors
(c) Prevention strategies
(2) Pathophysiology
(a) Pneumothorax
(b) Cardiac tamponade
(c) Hypovolemia
(d) Hypoxia
(e) Acidosis
(f) Hypothermia
(g) Hypoglycemia
(3) Assessment
(a) Signs and symptoms
i) Pulseless
ii) Apneic
iii) Cardiac monitor indicating organized electrical activity
(b) History
(4) Management
(a) Resuscitation should be directed toward relieving cause
(b) Airway and ventilation
i) Ventilate the patient with 100% oxygen
ii) Intubate patient
(c) Circulation
i) Perform chest compressions
(d) Pharmacological
i) Medications can be given down the endotracheal tube
ii) Administer epinephrine
(e) Non-pharmacological
(f) Transport considerations
(g) Psychological support/ communication strategies

D. Seizure
1. Epidemiology
a. Incidence
b. Morbidity/ mortality
c. Risk factors
d. Prevention strategies
2. Pathophysiology
a. Types
(1) Generalized
(2) Focal
b. See neonatal section for a more specific listing of signs and symptoms
3. Assessment
a. Signs and symptoms
(1) Generalized
(a) Sudden jerking of both sides of the body followed by tenseness and relaxation of the body
(b) Loss of consciousness
(2) Focal
(a) Sudden jerking of a part of the body (arm, leg)
(b) Lip smacking

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(c) Eye blinking
(d) Staring
(e) Confusion
(f) Lethargy
b. History
4. Management
a. Airway and ventilation
(1) Maintain patent airway
(2) Administer high-flow oxygen
b. Circulation
c. Pharmacological
(1) Consider dextrose if hypogylcemic
(2) Consider benzodiazepine if active seizures are present; anticipate need for ventilatory support
d. Non-pharmacological
(1) Protect patient from further injury
(2) Protect head and cervical spine if injury has occurred
e. Transport considerations
f. Psychological support/ communication strategies
E. Hypoglycemia
1. Epidemiology
a. Incidence
b. Morbidity/ mortality
c. Incidence
d. Risk factors
e. Prevention strategies
2. Pathophysiology
a. Children have limited glucose storage
b. In severe cases, if not treated promptly, can cause brain damage
3. Assessment
a. Signs and symptoms
(1) Mild
(a) Hunger
(b) Weakness
(c) Tachypnea
(d) Tachycardia
(2) Moderate
(a) Sweating
(b) Tremors
(c) Irritability
(d) Vomiting
(e) Mood swings
(f) Blurred vision
(g) Stomach ache
(h) Headache
(i) Dizziness
(3) Severe
(a) Decreased level of consciousness
(b) Seizure

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- b. Measure blood glucose
- c. History

4. Management
   - a. Airway and ventilation
   - b. Circulation
   - c. Pharmacological
     - (1) Administer Dextrose per medical direction
     - (2) Administer Glucagon IM if IV access is not possible per medical direction
     - (3) Repeat blood glucose test 10-15 minutes after dextrose infusion
   - d. Non-pharmacological
   - e. Transport considerations
   - f. Psychological support communication strategies

F. Hyperglycemia

1. Epidemiology
   - a. Morbidity/ mortality
   - b. Incidence
   - c. Risk factors
   - d. Prevention strategies
2. Pathophysiology
   - a. Hyperglycemia leads to dehydration and ketoacidosis
3. Assessment
   - a. Signs and symptoms
     - (1) Early
       - (a) Increased thirst
       - (b) Increased urination
       - (c) Weight loss
     - (2) Late (dehydration and early ketoacidosis)
       - (a) Weakness
       - (b) Abdominal pain
       - (c) Generalized aches
       - (d) Loss of appetite
       - (e) Nausea
       - (f) Vomiting
       - (g) Signs of dehydration except decreased urinary output
       - (h) Fruity breath odor
       - (i) Tachypnea
       - (j) Hyperventilation
       - (k) Tachycardia
     - (3) If untreated, progresses to
       - (a) Coma
       - (b) Deep and slow respirations (Kussmaul)
       - (c) Signs of severe dehydration
   - b. Measure blood glucose
   - c. History
4. Management
   - a. Airway and ventilation
   - b. Circulation
   - c. Pharmacological

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(1) Consider lactated ringers or NS if signs of dehydration are present per medical direction
d. Non-pharmacological
e. Transport considerations
f. Psychological support communication strategies

G. Infection
1. Epidemiology
a. Incidence
b. Morbidity/ mortality
c. Risk factors
d. Prevention strategies
2. Pathophysiology
a. Depends upon the type of infectious organism and extent of infection
3. Assessment
a. Signs and symptoms vary depending upon the infection and the time since the patient was exposed
(1) Fever
(2) Chills
(3) Tachycardia
(4) Cough
(5) Sore throat
(6) Nasal congestion
(7) Malaise
(8) Tachypnea
(9) Cool or clammy skin
(10) Petechia
(11) Respiratory distress
(12) Poor feeding
(13) Vomiting
(14) Diarrhea
(15) Dehydration
(16) Hypoperfusion
(17) Purpura
(18) Seizures
(19) Severe headache
(20) Irritability
(21) Stiff neck
(22) Bulging fontanelle (infant)
b. History
4. Management
a. Body substance isolation precautions must be strictly adhered to due to the unknown etiology of the infection
b. Airway and ventilation
(1) Administer high-flow oxygen
(2) Provide ventilatory support if indicated
c. Circulation
d. Pharmacological
(1) Administer lactated ringers or NS if signs of decompensated shock are present per medical direction

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(2) Administer benzodiazepine per medical direction if active seizure is present
e. Non-pharmacological
f. Transport considerations
g. Psychological support communication strategies

H. Poisoning and toxic exposure
1. Epidemiology
a. Incidence
(1) Children account for the majority of poisoning events
b. Morbidity/ mortality
(1) Major cause of preventable death in children under five years of age
c. Risk factors
d. Prevention strategies
2. Pathophysiology
a. Depends upon the type of poison or toxin and the extent of exposure
3. Common substances of pediatric poisonings
a. Alcohol, barbiturates, sedatives
b. Amphetamines, cocaine, hallucinogens
c. Anticholinergic
d. Aspirin
e. Corrosives
f. Digitalis, beta-blockers
g. Hydrocarbons
h. Narcotics
i. Organic solvents (inhaled)
j. Organophosphate
4. Assessment
a. Signs and symptoms - vary depending upon both the poisoning/ toxic substance and the time since the child was exposed
(1) Respiratory system depression
(2) Circulatory system depression
(3) Central nervous system stimulation or depression
(4) Mind-altering ability
(5) Gastrointestinal system irritation
b. History
5. Management
a. Airway and ventilation
b. Circulation
c. Pharmacological
(1) Contact poison control center or medical direction to obtain directions for specific treatment
d. Non-pharmacological
(1) Take pills, substances, containers to the hospital
e. Transport considerations
f. Psychological support communication strategies

VI. Pediatric trauma
A. Pathophysiology
1. Blunt

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a. Thinner body wall allows forces to be readily transmitted to body contents
b. Predominant cause of injury in children

2. Penetrating
   a. Becoming an increasing problem in adolescents
   b. Higher incidence in the inner city (mostly intentional), but significant incidence in other areas (mostly unintentional)

B. Mechanism of injury
   1. Fall
      a. Single most common cause of injury in children
      b. Serious injury or death resulting from truly accidental falls is relatively uncommon unless from a significant height
      c. Prevention strategies
   2. Motor vehicle crash
      a. Leading cause of permanent brain injury and new cases of epilepsy
      b. Leading cause of death and serious injury in children
      c. Prevention strategies
   3. Pedestrian vehicle crash
      a. Particularly lethal form of trauma in children
      b. Initial injury due to impact with vehicle (extremity/ trunk)
      c. Child is thrown from force of impact causing additional injury (head/ spine) upon impact with other objects (ground, another vehicle, light standard, etc.)
      d. Prevention strategies
   4. Near-drowning
      a. Third leading cause of injury or death in children between birth and 4 years of age
      b. Causes approximately 2000 deaths annually
      c. Severe, permanent brain damage occurs in 5-20% of hospitalized children for near drowning
      d. Prevention strategies
   5. Penetrating injuries
      a. Risk of death from firearm injuries increase with age
      b. Stab wounds and firearm injuries account for approximately 10-15% of all pediatric trauma admissions
      c. Visual inspection of external injuries can not evaluate the extent of internal involvement
      d. Prevention strategies
   6. Burns
      a. The leading cause of accidental death in the home for children under the age of 14 years
      b. Burn survival is a function of burn size and concomitant injuries
      c. Modified “rule of nines” is utilized to determine percentage of surface area involved
      d. Prevention strategies
   7. Physical abuse
      a. Has been classified into four categories - physical abuse, sexual abuse, emotional abuse and child neglect
      b. Social phenomena such as increased poverty, domestic disturbance, younger aged parents, substance abuse, and community violence have been attributed to increase of abuse

c. Document all pertinent findings, treatments and interventions
d. Prevention strategies

C. Special considerations
1. Airway control
a. Maintain in-line stabilization in neutral, not sniffing position
b. Administer 100% oxygen to all trauma patients
c. Patent airway must be maintained via suctioning and jaw thrust
d. Be prepared to assist ineffective respirations
e. Intubation should be performed when the airway remains inadequate
f. Gastric tube should be placed after intubation
g. Needle cricothyroidotomy is rarely indicated for traumatic upper airway obstruction
2. Immobilization
a. Indications for stabilization and immobilization of cervical spine
b. Utilize appropriate sized pediatric immobilization equipment
(1) Rigid cervical collar
(2) Towel/ blanket roll
(3) Child safety seat
(4) Pediatric immobilization device
(5) Vest-type/ short wooden backboard
(6) Long backboard
(7) Straps, cravats
(8) Tape
(9) Padding
c. Maintain supine neutral in-line position for infants, toddlers, and pre-schoolers by placing padding from the shoulders to the hips
3. Fluid management
a. Management of the airway and breathing take priority over management of circulation because circulatory compromise is less common in children than adults
b. Vascular access
(1) Large-bore intravenous catheter should be inserted into a large peripheral vein
(2) Do not delay transport to gain access
(3) Intraosseous access in children < 6 years of age if intravenous access fails
(4) Initial fluid bolus of 20 ml/kg of an lactated ringers or NS
(5) Reassess vital signs and rebolus with 20 ml/kg if no improvement
(6) If improvement does not occur after the second bolus, there is likely to be significant blood loss and the need for rapid surgical intervention
4. Traumatic brain injury
a. Early recognition and aggressive management can reduce mortality and morbidity
b. Severity
(1) Mild - GCS is 13 to 15
(2) Moderate - GCS is 9 to 12
(3) Severe - GCS is less than or equal to 8
c. Signs of increased intracranial pressure
(1) Elevated blood pressure

(2) Bradycardia
(3) Rapid deep respirations (Kussmaul) progressing to slow, deep respirations alternating with rapid deep respirations (Cheyne-Stokes)
(4) Bulging fontanelle (infant)

d. Signs of herniation
(1) Asymmetrical pupils
(2) Posturing

e. Specific management
(1) Administer high concentration of oxygen for mild to moderate head injuries (GCS 9-15)
(2) Intubate and ventilate at normal breathing rate with 100% oxygen for severe head injuries (GCS 3-8)
(a) Use of lidocaine may blunt rise in ICP (controversial)
(b) Consider RSI per medical direction
(3) Indications for hyperventilation
(a) Asymmetric pupils
(b) Active seizures
(c) Neurologic posturing

D. Specific injuries

1. Head and neck injury
a. Larger relative mass of the head and lack of neck muscle strength provides increased momentum in acceleration-deceleration injuries and a greater stress to the cervical spine region
b. Fulcrum of cervical mobility in the younger child is at the C2-C3 level
c. 60% to 70% of pediatric fractures occur in C1 or C2
d. Head injury is the most common cause of death in pediatric trauma victim
e. Diffuse injuries are common in children, focal injuries are rare
f. Soft tissues, skull and brain are more compliant in children than in adults
g. Due to open fontanelles and sutures, infants up to an average age of 16 months may be more tolerant to an increase of intracranial pressure and can have delayed signs
h. Subdural bleeds in a infant can produce hypotension (extremely rare)
i. Significant blood loss can occur through scalp lacerations and should be controlled immediately
j. The Modified Glasgow Coma scale should be utilized for infants and young children

2. Chest injury
a. Chest injuries in children under 14 years of age are usually the result of blunt trauma
b. Due to the compliance of the chest wall, severe intrathoracic injury can be present without signs of external injury
c. Tension pneumothorax is poorly tolerated and is an immediate threat to life
d. Flail segment is an uncommon injury in children; when noted without a significant mechanism of injury, suspect child abuse
e. Many children with cardiac tamponade will have no physical signs of tamponade other then hypotension

3. Abdominal injury
a. Musculature is minimal and poorly protects the viscera
b. Organs most commonly injured are liver, kidney and spleen

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c. Onset of symptoms may be rapid or gradual
d. Due to the small size of the abdomen, be certain to palpate only one quadrant at a time
e. Any child who is hemodynamically unstable without evidence of obvious source of blood loss should be considered as having an abdominal injury until proven otherwise

4. Extremity
   a. Relatively more common in children than adults
   b. Growth plate injuries are common
   c. Compartment syndrome is an emergency in children
   d. Any sites of active bleeding must be controlled
   e. Splinting should be performed to prevent further injury and blood loss
   f. PASG may be useful in unstable pelvic fractures with hypotension
5. Burns
   a. Thermal burns in children
   b. Chemical burns in children
   c. Electrical burns in children
   d. Management priorities
      (1) Prompt management of the airway is required as swelling can develop rapidly
      (2) If intubation is required, an endotracheal tube up to two sizes smaller than what would normally be used may be required
      (3) Thermally burned children are very susceptible to hypothermia; maintain normal body temperature
      (4) Suspect musculoskeletal injuries in electrical burn patients and perform spine immobilization techniques

VII. Sudden Infant Death Syndrome (SIDS)

A. Epidemiology
   1. Incidence
   2. Morbidity/ mortality
   3. Risk factors
      a. Occurs most frequently in the fall and winter months
      b. Minor illness (cold or upper respiratory infection) within two weeks prior to the death
      c. Premature and low birth-weight infants
      d. Infants of young mothers
      e. Infants of mothers who did not receive prenatal care
      f. Infants of mothers who used cocaine, methadone or heroin during pregnancy
   4. Prevention strategies

B. Pathophysiology
   1. Sudden and unexpected death of a seemingly healthy infant, which remains unexplained even after a thorough postmortem examination
   2. No prior symptoms of life-threatening illness
   3. Death usually occurs during sleep
   4. No definitive answer at this time
   5. A small percentage is abuse related
   6. Many victims of SIDS appear to have suffered from long-term underventilation of the lungs, possibly due to poor control of breathing during sleep; prone positioning may be

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a factor
7. Abnormalities in the brainstem

C. Assessment
1. Signs and symptoms
a. No external signs of injury
b. Lividity
c. Frothy blood-tinged drainage from nose/ mouth
d. Rigor mortis
e. Evidence that the baby was very active just prior to the death (i.e. rumpled bed clothes, unusual position or location in the bed)
2. History

D. Management
1. Airway and ventilation
2. Circulation
3. Pharmacological
4. Non-pharmacological
5. Transport considerations
6. Psychological support/ communication strategies
a. Initiate CPR unless the infant is obviously dead (unquestionably dead to a lay person)
b. Perform ALS as indicated
c. Be prepared for the range of possible family emotional reactions
d. Parents/ caregiver should be allowed to accompany their baby in the ambulance
e. Explain that certain information is required regarding the infant's health is necessary to determine the care to be given
f. Utilize the baby's name
g. Questions should be phrased so blame is not implied
h. Debriefing
i. Resources for SIDS families

VIII. Child abuse and neglect

A. Epidemiology
1. Second leading cause of death in infants less than 6 months of age
2. Between 2000 and 5000 children die each year due to abuse and neglect

B. Age considerations
1. Under 18 years of age
2. Physically or mentally handicapped person under 21 years of age

C. Abuse or neglect perpetrators
1. Parent, legal guardian, foster parent
2. Person, institution, agency or program having custody of the child
3. Person serving as a caretaker, i.e. babysitter

D. Abuse
1. Types
a. Physical
b. Emotional
c. Sexual
2. Abuse indicators
a. Historical

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b. Psychosocial
c. Signs of physical abuse
d. Signs of emotional abuse
(1) Physical indicators
(2) Behavioral indicators
e. Signs of sexual abuse

E. Neglect
1. Types
a. Physical
b. Emotional
2. Neglect indicators
a. Behavioral
b. Physical

F. Paramedic role in treating abuse and neglect
1. Assess the injuries/ neglect and render appropriate care
2. Look at the environment for condition and cleanliness
3. Look for evidence of anything out of the ordinary
4. Look and listen to caregiver/ family members
5. Assess whether the explanation fits the injury
6. Document all findings thoroughly
7. Report suspicion
a. Mandated reporter
b. Immunity from liability

G. Resources for abuse and neglect
1. State, regional and local child protection agency
2. Hospital social service department

IX. Infants and children with special needs

A. This can include many different types of children
1. Premature babies
2. Lung disease
3. Heart diseases
4. Neurological diseases
5. Chronic diseases
6. Altered functions from birth

B. Often these children will be at home, technologically dependent
1. Tracheostomy tube
a. Types
b. Complications
(1) Obstruction
(2) Bleeding
(3) Air leak
(4) Dislodged
(5) Infection
c. Treatment
(1) Maintain an open airway
(2) Suction
(3) Maintain position of comfort
(4) Intubation

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(a) Intubate orally in the absence of upper airway obstruction
(b) Intubate via the stoma if there is an upper airway obstruction
(5) Transport

2. Home artificial ventilators
   a. Types
      (1) Parents are usually familiar with the operation
   b. Treatment
      (1) Assure airway
      (2) Artificially ventilate with oxygen
      (3) Transport
3. Central venous lines
   a. Intravenous lines that are placed near the heart for long term use
   b. Complications
      (1) Cracked line
      (2) Infection
      (3) Clots
      (4) Bleeding
      (5) Air embolism
   c. Treatment
      (1) If cracked line, clamp between crack and patient
         (a) If altered mental status following cracked line, position on left side with head down
      (2) If bleeding, apply pressure
   d. Transport
4. Gastrostomy tubes and gastric feeding
   a. Tubes placed directly into stomach for feeding
   b. Come in many shapes
   c. Patients usually cannot be fed by mouth
   d. Be alert for breathing problems
   e. Treatment
      (1) Assure adequate airway
      (2) Administer 100% oxygen
      (3) Suction if needed
      (4) Consider hypoglycemia in diabetic patient who cannot be fed
   f. Transport
      (1) Sitting
      (2) Lying on right side, head elevated
5. Shunts
   a. Device running from the brain to abdomen to drain excess cerebral spinal fluid
      (1) Will find a reservoir on the side of the skull
      (2) Change in mental status
      (3) Prone to respiratory arrest
   b. Treatment
      (1) Manage airway
      (2) Assure adequate artificial ventilation
   c. Transport
      (1) Keep head elevated if possible

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