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Developmental Differences in Infants and Children

**Newborns and infants**
- Birth to 1 year of age
  - Minimal stranger anxiety
  - Do not like to be separated from parents
  - Do not want to be suffocated by an oxygen mask
  - Need to be kept warm
  - Breathing rate best obtained at a distance
  - Examine heart and lungs first, head last

**Toddlers**
- 1 to 3 years of age
  - Do not like to be touched
  - Do not like being separated from parents
  - Do not like having clothing removed
  - Do not like to be suffocated by an oxygen mask
  - Assure child that he was not bad. Children think their illness/injury is punishment
  - Afraid of needles
  - Fear of pain
  - Should be examined with trunk-to-head approach

**Preschool children**
- 3 to 6 years of age
  - Do not like to be touched
  - Do not like being separated from parents
  - Do not like having clothing removed. Remove, exam, replace.
  - Do not want to be suffocated by an oxygen mask
  - Assure child that he was not bad. Children think that the illness/injury is a punishment
  - Afraid of blood
  - Fear of pain
  - Fear of permanent injury
  - Modest
Developmental Differences in Infants and Children

- School-age children
  - 6 to 12 years of age
    - Afraid of blood
    - Fear of pain
    - Fear of permanent injury
    - Modest
    - Fear of disfigurement

- Adolescents
  - 12 to 18 years of age
    - Fear of permanent injury
    - Modest
    - Fear of disfigurement
    - Treat them as adults
    - These patients may desire to be assessed privately, away from parents or guardians

The Airway

- Anatomic and physiologic concerns
  - Small airways throughout the respiratory system are easily blocked by secretions and airway swelling
  - Tongue is large relative to small mandible and can block airway in an unresponsive infant or child
  - Positioning the airway is different in infants and children; do not hyperextend the neck
The Airway

- Anatomic and physiologic considerations
  - Infants are obligate nose breathers
    - Suctioning a secretion-filled nasopharynx can improve breathing problems in an infant
  - Children can compensate well for short periods of time
    - Compensate by increasing breathing rate and increased effort of breathing
    - Compensation is followed rapidly by decompensation due to rapid respiratory muscle fatigue and general fatigue of the infant

The Airway

- Opening the airway
  - Position to open airway is different—head-tilt chin-lift; do not hyperextend
  - Jaw thrust with spinal immobilization

The Airway

- Suctioning
  - Sizing
  - Depth
  - Technique
The Airway

- Using airway adjuncts
  - Oropharyngeal airway
    - Adjunct, not for initial artificial ventilation
    - Should not have a gag reflex
    - Sizing

The Airway

- Using airway adjuncts
  - Technique for insertion
    - Use tongue depressor
    - Insert tongue blade to the base of tongue
    - Push down against the tongue while lifting upward
    - Insert oropharyngeal airway directly in without rotation
Video Clip: Inserting the Oral Airway in Infants and Children

The Airway

- Using airway adjuncts
  - Nasopharyngeal airways
    - Adjunct, not for initial artificial ventilation
    - Sizing

The Airway

- Using airway adjuncts
  - Technique for insertion
  - Should not be used in cases of head trauma
Video Clip: Technique for Inserting a Nasopharyngeal Airway

Oxygen Therapy
- Blow-by oxygen
  - Hold tubing 2" from face
  - Insert tubing into a paper cup
  - Parents may assist
- Nonrebreather masks
  - Preferred method for delivery
  - Use correct size mask

Artificial Ventilation
- Pop-off valves
- Mask sizing/bag sizing
- Trauma considerations
- Mask seal
- Two hand
- One hand
Artificial Ventilation

- Mouth-to-mask artificial ventilations

Artificial Ventilation

- Use of bag-mask
  - Squeeze bag slowly and evenly enough to make chest rise adequately
  - Rates for children are 12-20 breaths/minute
  - Rates for infants is 20 breaths/minute
  - Provide oxygen at 100% concentration by using an oxygen reservoir

Assessment

- General impression of well versus sick child can be obtained from overall appearance
  - Assess mental status
  - Effort of breathing
  - Color
  - Quality of cry/speech
  - Interaction with environment and parents
  - Emotional state
  - Response to the EMT-Basic
  - Tone/body position
Assessment

- Approach to evaluation
  - Begin from across the room
  - Mechanism of injury
  - Assessment of surroundings
  - General impression of well versus sick
  - Respiratory assessment
    - Note chest expansion/symmetry
    - Effort of breathing
    - Nasal flaring
    - Stridor, crowing, or noisy
    - Retractions
    - Grunting
  - Respiratory rate
  - Perfusion assessment—skin color

Assessment

- Hands-on approach to infant or child patient assessment
  - Assess breath sounds
    - Present
    - Absent
    - Stridor
    - Wheezing

Assessment

- Hands-on approach
  - Assess circulation
  - Assess brachial or femoral pulse
  - Assess peripheral pulses
  - Assess capillary refill
  - Assess blood pressure in children older than 3 years; use appropriate size cuff
  - Assess skin color, temperature, and moisture
Assessment

- Hands-on approach to infant or child patient assessment
  - Detailed physical exam—begin with a trunk-to-head approach
    - Situation- and age-dependent
    - Should help reduce the infant’s or child’s anxiety

Common Problems in Infants and Children

Airway Obstruction

- Small removable parts can easily obstruct the infant’s or child’s airway
Airway Obstruction

- Partial obstruction
  - Infant or child who is alert and sitting
  - Stridor, crowing, or noisy
  - Retractions on inspiration
  - Pink
  - Good peripheral perfusion
  - Still alert, not unresponsive

Airway Obstruction

- Partial obstruction
  - Emergency care
    - Allow position of comfort, assist younger child to sit up; do not lay down. May sit on parent’s lap
    - Offer oxygen
    - Transport
    - Do not agitate child
    - Limited exam. Do not assess blood pressure

Airway Obstruction

- Complete obstruction
  - Altered mental status or cyanosis and partial obstruction
  - No crying or speaking and cyanosis
    - Child’s cough becomes ineffective
    - Increased respiratory difficulty accompanied by stridor
    - Victim loses responsiveness
    - Altered mental status
Airway Obstruction

- Complete obstruction
  - Emergency care—responsive patient

Video Clip: Care for Complete Airway Obstruction in a Responsive Infant

Video Clip: Care for a Complete Airway Obstruction in a Responsive Child
Airway Obstruction

- Complete obstruction
  - Emergency care—unresponsive patient

Video Clip: Care for a Complete Airway Obstruction in an Unresponsive Infant

Video Clip: Care for a Complete Obstruction in an Unresponsive Child
Respiratory Emergencies

- Recognize the difference between upper airway obstruction and lower airway disease
  - Upper airway obstruction—stridor on inspiration
  - Lower airway disease
    * Wheezing and breathing effort on exhalation
    * Rapid breathing (tachypnea) without stridor

Respiratory Emergencies

- Complete airway obstruction
  - No crying
  - No speaking
  - Cyanosis is present
  - No coughing

Respiratory Emergencies

- Respiratory distress
  - Nasal flaring
  - Retractions
  - Stridor
  - Audible wheezing
  - Grunting
Respiratory Emergencies

- Respiratory failure
  - Respiratory rate >60/min
  - Cyanosis
  - Decreased muscle tone
  - Severe use of accessory muscles
  - Poor peripheral perfusion
  - Altered mental status
  - Grunting

- Respiratory arrest
  - Breathing rate <10/min
  - Limp muscle tone
  - Unresponsive
  - Slower, absent heart rate
  - Weak or absent distal pulses

Emergency Care for Respiratory Emergencies

- Respiratory distress
  - Provide oxygen and monitor
  - Prevent respiratory failure

- Respiratory failure
  - Provide oxygen and assist ventilation
  - Prevent respiratory arrest

- Respiratory arrest
  - Provide oxygen and assist ventilation
Seizures

- Seizures in children who have chronic seizures are rarely life-threatening
- Seizures, including febrile, should be considered life-threatening by the EMT

Seizures

- May be brief or prolonged
- Assess for presence of injuries that may have occurred during seizures
- Caused by fever, infections, poisoning, hypoglycemia, trauma, or decreased oxygen levels
- Could be idiopathic in children

Seizures

- Focused assessment
  - Has the child had prior seizure(s)?
  - If yes, is this the child’s normal seizure pattern?
  - Has the child taken his or her antiseizure medications?
Emergency Care for Seizures
- Ensure airway position and patency
- Position patient on side if no possibility of cervical spine trauma
- Have suction ready
- Provide oxygen and ventilate as needed
- Transport

Although brief seizures are not harmful, there may be a more dangerous underlying condition.

Altered Mental Status
- Caused by a variety of conditions
  - Hypoglycemia
  - Poisoning
  - Post seizure
  - Infection
  - Head trauma
  - Decreased oxygen levels
  - Hypoperfusion (shock)

Emergency Care for Altered Mental Status
- Ensure patency of airway
- Be prepared to artificially ventilate
- Be prepared to suction
- Transport
Poisoning

- Common reason for infant and child ambulance calls
- Identify suspected container through adequate history
- Bring container to receiving facility if possible

Emergency Care for Poisoning

- Responsive patient
  - Contact medical control
  - Consider need to administer activated charcoal
  - Provide oxygen
  - Transport
  - Continue to monitor patient—may become unresponsive

Emergency Care for Poisoning

- Unresponsive patient
  - Ensure patency of airway
  - Be prepared to artificially ventilate
  - Provide oxygen if indicated
  - Call medical control
  - Transport
  - Rule out trauma; trauma can cause altered mental status
Fever

- Common reason for infant or child ambulance call
- Many causes—rarely life-threatening
- A severe cause is meningitis
- Fever with a rash is a potentially serious consideration

Emergency Care for Fever

- Administer oxygen
- Transport
- Be alert for seizures

Shock

- Rarely a primary cardiac event
- Common causes
  - Diarrhea and dehydration
  - Trauma
  - Vomiting
  - Blood loss
  - Infection
  - Abdominal injuries
- Less common causes
  - Allergic reactions
  - Poisoning
  - Cardiac
Shock

- Signs and symptoms
  - Rapid respiratory rate
  - Pale, cool, clammy skin
  - Weak or absent peripheral pulses
  - Delayed capillary refill
  - Decreased urine output
    - Measured by asking parents about diaper wetting and by looking at diaper
  - Mental status changes
  - Absence of tears, even when crying

Emergency Care for Shock

- Ensure airway/oxygen
- Be prepared to artificially ventilate
- Manage bleeding if present
- Elevate legs
- Keep warm
- Transport

Near Drowning

- Artificial ventilation is top priority
- Consider possibility of trauma
- Consider possibility of hypothermia
- Consider possible ingestion, especially alcohol
Emergency Care for Near Drowning

- Protect airway
- Suction if necessary
- Be alert for secondary drowning syndrome
  - Deterioration after breathing normally from minutes to hours after event
  - All near-drowning victims should be transported to the hospital

Sudden Infant Death Syndrome (SIDS)

- Sudden death of infants in first year of life
- Causes are many and not clearly understood
- Infant most commonly discovered in the early morning

Emergency Care for SIDS

- Try to resuscitate unless there is rigor mortis
- Parents will be in agony from emotional distress, remorse, and imagined guilt
- Avoid any comments that might suggest blame to the parents
Trauma

- Injuries are the leading cause of death in infants and children
- Blunt injury is most common
- The pattern of injury will be different from adults

Trauma

- Motor vehicle crashes
  - Motor vehicle passengers
    - Unrestrained passengers have head and neck injuries
    - Restrained passengers have abdominal and lower spine injuries

Trauma

- Struck while riding bicycle
  - Head injury
  - Spinal injury
  - Abdominal injury
- Pedestrian struck by vehicle
  - Abdominal injury with internal bleeding
  - Possible painful, swollen, deformed thigh
  - Head injury
- Falls
- Burns
- Sports injuries
  - Head and neck
- Child abuse
Head Injury

- The single most important maneuver is to ensure an open airway by means of the modified jaw thrust.
- Children are likely to sustain head injury along with internal injuries.
- Signs and symptoms of shock (hypoperfusion) with a head injury should cause you to be suspicious of other possible injuries.

Respiratory arrest is common secondary to head injuries and may occur during transport.

- Common signs and symptoms are nausea and vomiting.
- The most common cause of hypoxia in the unresponsive head injury patient is the tongue obstructing the airway. Jaw thrust is critically important.

Emergency Care for Head Injury

- Ensure an open and patent airway.
- Immobilize the spine.
  - Do not use sandbags to stabilize the head. The weight on a child’s head may cause injury if the board needs to be turned because of vomiting.
- Be alert for vomiting and have suction ready.
Chest Injury

- Children have very soft, pliable ribs
- There may be significant injuries without external signs

Emergency Care for Chest Injury

- Ensure adequate oxygenation
- Immobilize and transport

Abdominal Injury

- More common site of injury in children than adults
- Often a source of hidden injury
- Always consider abdominal injury in the multiple-trauma patient who is deteriorating without external signs
- Air in stomach can distend abdomen and interfere with artificial ventilation efforts
Burns

- Assess criticality of burns
- Transport to appropriate facility

Emergency Care for Burns

- Ensure airway patency
- Provide oxygen
- Cover with sterile dressings (nonstick if possible, sterile sheets may be used)
- Identify candidates for burn centers per local protocol
- Immobilize if indicated

Other Trauma Considerations

- Pneumatic antishock garments (PASGs)
  - Use only if child fits; do not place infant in one leg of trouser
  - Indications
    - Trauma with signs of severe hypoperfusion and pelvic instability
    - Do not inflate abdominal compartment
Child Abuse and Neglect

- Abuse
  - Improper or excessive action so as to injure or cause harm

- Neglect
  - Giving insufficient attention or respect to someone who has a claim to that attention

Child Abuse and Neglect

- The EMT-Basic must be aware of condition to be able to recognize the problem

- Physical abuse and neglect are the two forms of child abuse that the EMT-Basic is likely to suspect

Child Abuse and Neglect

- Signs and symptoms of child abuse and neglect
  - Signs and symptoms of abuse
    - Multiple bruises in various stages of healing
    - Injury inconsistent with mechanism described
    - Repeated calls to the same address
    - Fresh burns
    - Parents seem inappropriately unconcerned
    - Conflicting stories
    - Fear on the part of the child to discuss how the injury occurred
**Child Abuse and Neglect**

- Signs and symptoms of neglect
  - Lack of adult supervision
  - Malnourished-appearing child
  - Unsafe living environment
  - Untreated chronic illness (e.g., asthmatic with no medications)

**Child Abuse and Neglect**

- CNS injuries are the most lethal—shaken baby syndrome

**Emergency Care for Abuse and Neglect**

- Care for the child is most important
- Do not accuse in the field
  - Accusation and confrontation delay transportation
- Bring objective information to the receiving facility
- Reporting required by state law
  - Objective—report what you see and what you hear—NOT what you think
Infants and Children with Special Needs

- Can include many different types of children
- Premature babies with lung disease
- Babies and children with heart disease
- Infants and children with neurologic disease
- Children with chronic disease or altered function from birth
- Often these children will be at home, technologically dependent

Tracheostomy Tube

- Various types
- Complications
  - Obstruction
  - Bleeding
  - Air leak
  - Dislodged
  - Infection

Emergency Medical Care

- Maintain an open airway
- Suction
- Maintain position of comfort
- Transport
Home Mechanical Ventilator

- Various types
- Parents familiar with operation

Emergency Medical Care

- Ensure airway
- Artificially ventilate with oxygen
- Transport

Central Lines

- Intravenous lines (IVs) that are placed near the heart for long-term use
- Complications
  - Cracked line
  - Infection
  - Clotting off
  - Bleeding
Emergency Medical Care

- If bleeding, apply pressure
- Transport

Gastrostomy Tubes and Gastric Feeding

- Tube placed directly into stomach for feeding
- Comes in many shapes
- These patients usually cannot be fed by mouth
- Be alert for breathing problems

Emergency Medical Care

- Ensure adequate airway
- Have suction available
- If a diabetic patient, be alert for altered mental status. Infants will become hypoglycemic quickly if they cannot be fed
- Provide oxygen
- Transport
  - Sitting
  - Lying on right side, head elevated
Shunts

- Device running from brain to abdomen to drain excess cerebrospinal fluid
- Often has reservoir on side of skull
- Change in mental status
- Prone to respiratory arrest

Emergency Medical Care

- Manage airway
- Ensure adequate artificial ventilation
- Transport

Reactions to Ill and Injured Infants and Children

- The family’s reaction
  - A child cannot be cared for isolated from the family; you have multiple patients
  - Striving for calm, supportive interaction with family will result in improved ability to deal with the child
  - Calm parents = calm child; agitated parents = agitated child
Reactions to Ill and Injured Infants and Children

- The family's reaction
  - Anxiety arises from concern over child's pain; fear for child's well-being
  - Worsened by sense of helplessness
  - Parents may respond to EMT-Basic with anger or hysteria

Reactions to Ill and Injured Infants and Children

- Parents should remain part of the care unless child is not aware or medical conditions require separation
- Parents should be instructed to calm child; can maintain position of comfort and/or hold oxygen
- Parents may not have medical training, but they are experts on what is normal or abnormal for their children and what will have a calming effect

Reactions to Ill and Injured Infants and Children

- The EMT's reaction
  - Anxiety from lack of experience with treating children as well as fear of failure
  - Skills can be learned and applied to children
  - Stress from identifying patient with their own children
Reactions to Ill and Injured Infants and Children

- The EMT’s reaction
  - Realize that much of what you learned about adults applies to children
  - Infrequent encounters with sick children; advance preparation is important (practice with equipment and examining children)

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