Firefighter Pre-Hospital Care Program
Module 21

Pediatric Emergencies
Firefighter Pre-Hospital Care Program
Module 21

At the end of the lesson and upon completion of the FETN post test quiz, the participant will demonstrate an understanding of how to:

• accurately assess a pediatric patient,
• determine priorities related to an illness in or the injury of a pediatric patient,
• provide emergency patient care for a pediatric patient in a safe manner, consistent with local standards and Base Hospital direction,
• evaluate the effectiveness of treatment measures,
• perform ongoing assessments and interventions in response to the patient’s presentation, changing treatment requirements and environmental variables, and
• communicate effectively with the pediatric patient and the parent/guardian.
Family Matters

- When a child is ill or injured, you may have several patients.
- Caregivers often need support when medical emergencies occur.
- Children often mimic the behavior of their caregivers.
- Be calm, professional, and sensitive.
Age Parameters

- Neonate - the first twenty-four hours after birth
- Infant - is the first year of life
- Toddler - period following infancy until 3 years of age
- Preschool children - between 3 to 6 years of age
- School age children - between 6 to 12 years of age
- Adolescents - between 12 to 18 years of age
Neonate

- Their head is disproportionately large compared to older children and adults
  → affecting airway management and ↑ heat loss
- They spend most of their time sleeping or eating
- Not able to distinguish between parents, caregivers or strangers
- Need to be kept warm, dry and fed
- Being held, cuddled or rocked soothes the neonate
- Hearing is well developed at birth, so a calm voice is helpful
Infant

- They respond mainly to physical stimuli.
- Crying is a form of expression.
- < 6 months often okay with strangers and > 6 months often afraid of strangers
- May be afraid of simple items (O₂ mask)
- Will lose heat to environment very quickly
- They may prefer to be with parent, so if possible have parent hold the infant as you start your examination
Toddler

- They begin to walk and explore the environment
- They may resist separation from parents
- Do not like being touched by strangers
- They are curious and adventuresome
- Make any observations you can before touching a toddler
Preschool

- They can use simple language effectively.
- They can understand directions.
- They can identify painful areas when questioned.
- They can understand when you explain what you are going to do using simple descriptions.
- They can be distracted by using toys
- Interested in their environment and will interact when not critically ill or injured
School Age

- They can be included with the parent when taking medical history
- They may be familiar with physical exam
- They may be able to make choices
- High degree of modesty; care should be taken during the exam
- Will often attempt to delay procedures; be firm and complete in a timely fashion
- Very concerned with permanent disability or disfigurement
Adolescent

- They are very concerned about appearance and disfigurement
- They may have strong feelings about being observed
- Respect an adolescent’s privacy; interview separate from parents if possible
- They understand pain
- Explain any procedure that you are doing
- Not as mature as adults, want to be treated as adults
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Pediatric Assessment
Pediatric Assessment

- Caring for sick and injured children presents special challenges
- Firefighters may find themselves anxious when dealing with critically ill or injured children
- Treatment is the same as that for adults in most emergency situations.
Doorway Assessment

- Also known as assessing the Pediatric Triangle

- As you enter a location where a sick or injured pediatric patient is located, quickly visualize the:
  - appearance of the pediatric patient
  - work of breathing
  - circulation to the skin
Pediatric Assessment Triangle

- **Appearance**
  - Awake
  - Aware
  - Upright

- **Work of breathing**
  - Retractions
  - Noises

- **Skin circulation**

![Diagram of Pediatric Assessment Triangle](image)
Appearance

In your doorway assessment consider the following:

- is child interacting with environment?
- does child recognize parents?
- is child quiet and limp?
- is child or infant agitated or combative?
- is infant able to be consoled?
- is the skin pale, cyanotic, or sweaty?
Work of Breathing

- Observe chest rise in older children.
- Observe abdominal rise and fall in younger children or infants.
- Skin color indicates amount of oxygen getting to organs.
Respirations

- Abnormal respirations are a common sign of illness or injury
- Count respirations for 30 seconds; multiply by two
- In children less than 3 years, count the rise and fall of the abdomen
- Note effort of breathing
- Listen for noises
Circulation to Skin

- Assess brachial pulse in neonates and infants

- Assess carotid pulse in children
Circulation to Skin

- An important sign of perfusion
- When cardiac output falls, blood is shunted from less vital areas (skin) to more vital areas (heart, brain)
- Feel for temperature and moisture
- Assess capillary refill
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Pediatric Considerations
Airway Differences

- Larger tongue relative to the mouth
- Larger epiglottis
- Less well-developed rings of cartilage in the trachea
- Narrower and shorter trachea
- Chest wall more pliable
- Larynx more anterior
Breathing Differences

- Infants breathe faster than children or adults
- Infants use the diaphragm when they breathe
- Sustained, laboured breathing may lead to respiratory failure
Circulation Differences

• The heart rate increases for illness and injury.
• Vasoconstriction keeps vital organs nourished.
• Constriction of the blood vessels can affect blood flow to the extremities.
Skeletal Differences

- Bones are weaker and more flexible. They are prone to fracture with stress.
- Infants have two small openings in the skull called fontanels. Fontanels close by 18 months.
Physical Differences

- Children and adults suffer different injuries from the same type of incident

- Children’s bones are less developed than an adult’s

- A child’s head is larger than an adult’s, which greatly stresses the neck in deceleration injuries
Psychological Differences

- Children are not as psychologically mature.
- They are often injured due to their undeveloped judgment and lack of experience.
Children With Special Needs

- Children born prematurely who have associated lung problems
- Small children or infants with congenital heart disease
- Children with neurologic diseases
- Children with chronic diseases or with functions that have been altered since birth
Shunts

- Tubes that drain excess fluid from around brain
- If shunt becomes clogged, changes in mental status may occur
- If a shunt malfunctions, the patient may go into respiratory arrest
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Recruit Presentation

Emergencies Specific to the Pediatric Population
Respiratory Emergencies

The pediatric population does not compensate well when they become hypoxic. Hypoxia is one of the leading causes of death in this population group.

Respiratory concerns include:

- **Croup** - a viral infection of the airway below the level of the vocal cords that can be characterized by a “barking” cough

- **Epiglottitis** - an infection of the soft tissue in the area above the vocal cords and can be associated with excessive drooling
Respiratory Emergencies

- **Airway Obstructions** caused by items such as, but not restricted too, hot dogs, grapes, small toys, latex balloons

- **Asthma**, which is a narrowing of respiratory passages and buildup of mucus causing poor air exchange. Primary causes in this population group includes allergens, viruses, and genetic factors

- **Bronchitis**, which is an acute or chronic inflammation of the lung
Signs & Symptoms of Respiratory Emergencies

- Respirations < 10 bpm or > 60 bpm
- Decreased or absent breath sounds
- Grunting Respirations
- Nasal Flaring
- Mottled Skin / Cyanosis
- Intercostal, subcostal, and subclavicular retractions
- Difficulty Speaking / Crying / Coughing
- Tripod position in older children
Head Injuries

• Common injury among children as the head is larger in proportion to an adult

• Head and neck injuries can occur from high-speed collisions, during contact sports, or attempting new activities

• Nausea/vomiting indicative of pediatric head injury
Automobile Collisions

- The exact area of impact will depend on the child’s height.
- A car bumper dips down when it stops suddenly, causing a lower point of impact.
- Children often sustain high-energy injuries.
Chest Trauma

- Most chest injuries in children result from blunt trauma.

- Children have soft, flexible ribs, which can deform and transmit forces to internal organs.

- The absence of obvious external trauma does not exclude the likelihood of serious internal injuries.
Shock

- Could be due to blood loss or other causes. All relate to the circulatory system being unable to deliver sufficient blood to organs.

- Patients may have increased heart rate, respirations, and pale or mottled skin.

- It’s important to remember that children **DO NOT** show decreased blood pressure until shock is severe (they compensate well and decompensate quickly).

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Greater than 25% blood volume loss significantly increases risk of shock.
Abdominal Trauma

• Abdominal injuries are very common in children

• Children compensate for blood loss better than adults but go into shock more quickly

• Things to watch for include a weak and rapid pulse; cold and clammy skin; poor capillary refill
Extremities Trauma

- Children have immature bones with active growth centres
- Children’s bones bend more easily than adults’ bones
- Incomplete or greenstick fractures can occur
Medical Considerations

• **Dehydration** can be caused by vomiting or diarrhea and is a greater risk than adults. If the child still wears diapers, inquire how many wet diapers they have during the day? (6 to 10 is normal)

• **Fevers** are rarely life threatening but can cause a febrile seizure if they spike rapidly such as in an ear infection
Medical Considerations

• **Meningitis** is an inflammation of the tissue that covers the spinal cord and brain and is caused by an infection. If left untreated can lead to brain damage or death.

• **Poisoning** is very common and signs and symptoms vary widely pending on the substance and weight and age of the child. It is important to determine what substances were involved.
Febrile Seizures

- Febrile seizures are most common in children from 6 months to 6 years and generally last less than 15 minutes.

- Febrile seizures are caused by a rapidly increasing fever.

- A postictal period of extreme fatigue or unresponsiveness usually follows seizure.
Burns

- Most common burns involve exposure to hot substances
- Suspect internal injuries from chemical ingestion when burns are present around lips and mouth
- Infection is a common problem with burns
- Consider the possibility of child abuse
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Care and Treatment Considerations
• Remember to always start with your Doorway Assessment (Pediatric Triangle)

• As you enter a location where a sick or injured pediatric patient is located, quickly visualize the:
  • appearance of the pediatric patient
  • work of breathing
  • circulation to the skin
Determine Level of Responsiveness

- Gently tap on shoulders and speak calmly
- If responsive, place in position of comfort
- Assess and manage the patient
- Communicate with and support the family
- Assess the surroundings for any clues to the cause of injury to the child (i.e. spilled cleaning bottle = poisoning)
Pediatric Airway

- Position the airway in a neutral sniffing position

- Sniffing position can be determined by an imaginary line through the middle of the child’s ear to the top of their clavicle

- Place padding (approx. 2 inches thick) under shoulders and upper torso in order to maintain an open airway
Basic Airway Management

- Head tilt / Chin Lift (no spinal concerns)
- Sniffing position with padding under shoulders and upper torso
- Jaw-thrust maneuver (spinal injury suspected)
Breathing

• Assess by using look, listen, and feel technique

• If child is breathing, note the following:
  ✓ Accessory muscle use (retraction of muscles above clavicles)
  ✓ Retractions (drawing in muscles around ribs)
  ✓ Head bobbing (the head lifts and tilts back during inspirations)
  ✓ Nasal flaring (nose widens on inspiration)

• If the child is breathing adequately or in mild distress, supply supplemental oxygen

• If the child is not breathing or in respiratory distress, assist ventilations with BVM at a rate of one breath every 3 – 5 seconds
Oropharyngeal Airways

- Appropriately size the airway
- Use a tongue depressor to lift the tongue up and away from the airway
- Insert the airway as it would rest within the oropharynx and until flange rests against lips
- Reassess airway
Oxygen Delivery

- Provide supplemental oxygen in the most comfortable manner
- Place child in position of comfort which may be in caregiver’s lap
- If patient is in respiratory failure, begin assisted ventilation immediately
Oxygen Delivery Devices

- Pediatric Non-Rebreather will deliver 90% oxygen at a flow rate of 10 lpm

- For anxious children, blow-by oxygen will deliver greater than 21% oxygen to the patient. Ideal for the anxious child. Remove tubing from oxygen mask and place in bottom of cup, taped to favorite stuffed toy, etc
Responsive Choking - Infant

- Hold the infant facedown while supporting head
- Deliver five back slaps
- Bring infant upright on the thigh
- Give five quick downward chest thrusts
- Repeat sequence until object is cleared or infant becomes unresponsive
Responsive Choking - Child

• Kneel behind the child

• Give the child repeated abdominal thrusts with the intent to clear the object

• Repeat until object comes out, child begins to breath or becomes unresponsive

• Once airway is clear, complete the primary assessment
Unresponsive Choking – Infant & Child

• Place the infant / child on a firm, flat surface

• Open airway using head tilt-chin lift maneuver. Inspect the upper airway and remove any visible object

• Attempt rescue breathing

• If unsuccessful, reposition head and try again
Unresponsive Choking – Infant & Child

- If ventilation is still unsuccessful begin CPR

- After chest compressions, visualize the airway and remove any seen objects

- Attempt two ventilations. If they do not enter, repeat above steps

- If they do enter continue with pulse check
Circulation

- Assess circulation after airway is open and two rescue breaths have been given
- Check for pulse and evaluate for other signs of circulation such as skin colour (cyanosis)
- A pulse check should take no more than 10 seconds
- If infant or child is not breathing, the pulse is often too slow or absent. CPR will be required.
Infant CPR

- Place infant on firm surface
- Compress the chest 1/3 to 1/2 the depth of the chest at a rate of 100 compressions per min

One Rescuer CPR
- 30 compressions : 2 ventilations
- Use two fingers in the middle of sternum

Two Rescuer CPR
- 15 compressions : 2 ventilations
- Use encircling technique for chest compressions
Child CPR

- Place child on firm surface
- Compress chest 1/3 to 1/2 the depth of the chest at a rate of 100/min
- Place heel of other hand over the sternum

One Rescuer CPR
- 30 compressions : 2 ventilations
- Use heel of one or two hands based on the size of the child

Two Rescuer CPR
- 15 compressions : 2 ventilations
Traumatic Injuries

- Be alert for airway problems on all children with traumatic injuries

- Give supplemental oxygen to all children with possible:
  - Head injuries
  - Chest injuries
  - Abdominal injuries
  - Shock

- If ventilation is required, provide at 12 to 20 breaths/min
Spinal Immobilization

- Any child with a head or back injury should be immobilized
- Young children may need padding beneath their torso
- Children may need padding along the sides of the backboard
Immobilization in a Child Safety Seat

• Assess child for injuries and seat for visible damage

• If child is injured or seat is damaged, remove child to another transport device

• Apply padding around child to minimize movement
Removing a Child from a Child Safety Seat

- Remove both the child and the seat from the vehicle
- Place immobilization device behind the child
- Slide child into place on device
- Be sure to apply padding to all natural voids.
- Secure the child to the device
Care of a Seizure

• Perform primary assessment, focusing on the ABCs

• Securing and protecting the airway is the priority. Be ready to suction

• Place patient in the recovery position when the seizure is complete

• Deliver oxygen by pediatric non-rebreather mask or blow-by

• Begin BVM ventilation if there are no signs of improvement
Remember, Family Matters!

• When a child is ill or injured, you have several patients, not just one

• Be calm, professional and sensitive

• Be sure to communicate with the family about the care you are providing
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Death of a Child
Scene Assessment

• Carefully view the environment as you enter the location of the patient

• Concentrate on signs of illness, general condition of the house, family interaction and site where infant was discovered
Apparent Life-Threatening Event

- Infant found not breathing, cyanotic, and unresponsive but resumes breathing with stimulation
- Very frightening event for care givers even if child looks well when rescuers arrive
- Complete a careful primary assessment
- Pay strict attention to airway management
Death of a Child

- Be prepared to support the family
- Family may insist on resuscitation efforts
- Introduce yourself to the child’s caregivers
- Do not speculate on the cause of death
- Be prepared to answer questions posed by child’s caregivers
- Seek professional help for yourself if you notice signs of post traumatic stress
Sudden Infant Death Syndrome (SIDS)

- Unexpected death in infants less than one year of age
- Cause is currently not known

Known risk factors may include:

- Mother younger than 20 years old
- Smoking during pregnancy
- Low birth weight
- Cause usually not apparent to rescuers
Communication and Support

• The death of a child is very stressful for the family and the rescuers

• Provide support in whatever ways you can to the family, paramedics and police

• If you can, be sure to use the infant’s name
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Child Abuse
Abuse vs Neglect

Abuse

• Represents an action against a child and is considered an act of commission
• A physical or mental injury is inflicted on a child

Neglect

• Represents a lack of action for a child and is considered an act of omission
• There is failure to meet the basic needs of the child such as food, supervision, shelter, guidance, clothing, medical care…
Child Abuse

- Child abuse refers to any improper or excessive action that injures or harms a child or infant

- This includes physical abuse, sexual abuse, neglect, and emotional abuse

- Be aware of signs of child abuse and report suspicions to authorities
Mnemonic for Assessing Abuse

C onsistency of the injury with the child's developmental age

(child injured in activity which the child not yet old enough to do)

H istory inconsistent with injury

I nappropriate parental concerns

L ack of supervision

D elay in seeking care
Mnemonic for Assessing Abuse

A - Affect
   (lack of parental concern, or defensiveness)

B - Bruises of varying ages

U - Unusual injury patterns
   (hand marks or other injuries with a recognizable pattern – cigarette burns, belt buckles, etc.)

S - Suspicious circumstances

E - Environmental clues
Shaken Baby Syndrome

- Life threatening head trauma that results from an infant being shaken or struck on the head
- Causes bleeding within the head and possible cervical spine damage
- Infant is found unresponsive, often without evidence of external trauma
- Patient may be found not breathing or is unresponsive
Sexual Abuse

- Children of any age or either gender can be victims
- Limit examination
- Try not to allow the child to wash, urinate, or defecate in order to preserve evidence for police
- Maintain professional composure
Emergency Patient Care

- If you suspect abuse, care for the patient ensuring all life threatening injuries are being maintained.

- Take care in moving items, removing clothes, etc in order to assist authorities with any investigations.

- Firefighters must report all suspected cases of child abuse to authorities.
For All Questions Pertaining to this Module,
Contact Your E.M.S. Command Coordinator.

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