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CBT/OTEP 537 **Pediatric Emergencies**

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Introduction

Children are not just "little adults" and should not be treated as such. Their bodies respond to significant injury and shock differently than adults. These differences may be subtle, but you must recognize them to provide the best possible care for an ill or injured child.

You must recognize these differences if you are to provide the best possible care for an ill or injured child.

Before You Begin

We recommend that you complete the CBT165 SICK/NOT SICK course before completing this course

This is a continuing education and recertification course for EMTs. It covers some EMT-Basic concepts and terminology as well as advanced material. We highly recommend completing the case studies and practice exam before completing the exam. We also recommend that you review an EMT textbook chapter covering pediatric emergencies as a refresher before taking the exam; for example: Chapters 31 and 32 in *Emergency Care and Transportation of the Sick and Injured*, 9th edition (AAOS).

Practical Skills

To receive CBT or OTEP credit for this course a trained skills evaluator must evaluate your ability to perform the following hands-on practical skills.

- Patient assessment of using the Pediatric Assessment Triangle (medical/trauma)
- Backboarding
- CPR/FBAO skills for pediatric patients
- Oxygen therapy and ventilation with a BVM

Objectives

CBT537 is an EMT continuing education and recertification course. After completing this course you will be able to:

1. Identify the anatomic differences between adult and children.
2. Identify developmental considerations for pediatric age groups.
3. Identify the 3 elements of the Pediatric Assessment Triangle.
4. Identify the 7 aspects of the appearance element of the Pediatric Assessment Triangle.
5. Discriminate between the appearance of SICK and NOT SICK children.
6. Identify 4 indicators of increased work of breathing.
7. Distinguish between respiratory distress and respiratory failure.
8. Identify the 4 aspects of the circulation to the skin element of the Pediatric Assessment Triangle.
9. Identify the signs of shock in a pediatric patient and identify how shock is different in children compared (early vs. late).
10. Identify appropriate emergency care for a pediatric patient with a respiratory, medical or traumatic emergency (including airway management).

Terms

cyanosis — A condition where the skin, lips, nail beds and mucous membranes appears bluish in color due to insufficient air exchange and low levels of oxygen in the blood.

compensated shock — An early stage of shock in which the body is able to compensate for inadequate tissue perfusion. It is characterized by sustained tachycardia, decreased skin perfusion and subtle changes in mental status.

decompensated shock — A later stage of shock in which the body's compensatory mechanisms break down. The signs include decreased blood pressure, further tachycardia and an altered LOC with signs such as agitation, restlessness or confusion.

hypotension — A blood pressure that is lower than the normal range. A systolic blood pressure below $70 + (2 \times \text{age in years})$ is considered hypotension in children.

occiput — The base of the back of the head.

perfusion — Circulation of blood within an organ or tissue in adequate amounts to meet cellular needs.

nasal flaring — As a child breathes out, the nostrils widen. Seen in infants and toddlers—an indicator of increased work of breathing.

NOT SICK — An assessment category for a pediatric patient who you believe is physiologically stable based on observation of appearance, work of breathing and circulation to the skin. Other terms for NOT SICK include stable, non-critical and non-urgent.

SICK — An assessment category for a pediatric patient who you believe to be physiologically unstable based on observation of appearance, work of breathing and circulation to the skin. Other terms for SICK include unstable, critical and urgent.

sniffing position — A position of the head assumed by a patient who is attempting to maximally open his or her airway when an obstruction is present.

New Terms

meningitis — An inflammation of the meninges that covers the brain and spinal cord.

postictal — An altered state of consciousness that occurs after a seizure. A postictal state usually lasts between 5 and 30 minutes and is characterized by confusion, drowsiness and nausea.

respiratory failure — Occurs when a child cannot compensate for inadequate oxygenation and circulatory and respiratory systems begin to collapse.

respiratory distress — Occurs when a child is able to maintain adequate oxygenation of the blood but only by increasing work of breathing.

retractions — A visible sinking-in of the soft tissues in the chest wall or neck muscles seen during respiratory distress.

sustained tachycardia — A persistently fast heart rate of 100 –120 or greater depending on the clinical setting.

vasoconstriction — Constriction of a blood vessel. Often leads to pale, dry skin.

Anatomic Differences

A child's anatomy differs in four significant ways from an adult's. They are:

- Smaller airways
- Less blood volume
- Bigger heads
- Vulnerable internal organs

Smaller Airways

There are several reasons why a child's airway is vulnerable to airway compromise. They are:

- Large tongue in relation to a small oropharynx
- Diameter of the trachea is smaller
- Trachea is not rigid and will collapse easily
- Back of the head is rounder and requires careful positioning to keep airway open

There are several reasons why a child's airway is more vulnerable to obstruction than an adult's. First, the tongue takes up a proportionately large amount of space in the mouth. This makes it easier for the tongue to block the airway.

Next, the diameter of the trachea is smaller than in an adult. In addition, trachea is not as rigid and will collapse easily if the neck is flexed or hyperextended.

Finally, the back of the head is rounder and requires more careful positioning to prevent closing of a child's smaller trachea.

Less Blood Volume

Infants and children have a **relatively smaller blood volume** when compared to that of an adult. A good rule of thumb is that there is approximately 70 cc of blood for every 1kg (2 lbs) of body weight. This means a 20 pound child has about 700 cc of blood—approximately the volume of a medium sized soda.

Bigger Heads

A child's **head size is proportionally larger** than an adult's. Infants and small children have a prominent occiput and a relatively straight cervical spine. When lying supine a child's head flexes forward which can collapse the airway.

Another problem with a large head is that children do not have well developed cervical support. The neck and associated support structures aren't well developed in relation to their big heads. Also, a big head can make spinal immobilization and airway management more difficult. A final problem with a big head is that infants and small children are prone to falling because they are top heavy.

Vulnerable Organs

The internal organs of a child are **not well protected**. The soft bones and cartilage and lack of fat in the rib cage make internal organs susceptible to significant internal injuries. Injury can be seen with very little mechanism and without obvious signs of injury.

Developmental Considerations

A child goes through distinct development stages from newborn to adolescent. You should be familiar with a variety of considerations at each development stage.

Infant: 1 to 12 months

- Active extremity movement
- Tracks object with eyes
- Obstruction of the nose may cause respiratory distress
- Separation anxiety later in this period
- Provide sensory comfort such as a warm stethoscope

Toddler: 1 to 3 years

- Approach slowly & limit physical contact
- Many have stranger anxiety
- Sit down or squat next to and use a quiet voice
- Not good at describing or localizing pain
- Use play and distraction objects
- Have caregiver hold
- Get history from parent

Preschool Age: 3 to 5 years

- Explain procedures in simple terms
- Use games or distractions
- Set limits on behaviors
- Praise good behavior
- Offer a stuffed animal or toy to hold

School Age: 6 to 12 years

- Speak directly to the child
- Be careful not to offer too much information
- Explain procedures immediately before carrying them out
- Don't negotiate unless the child really has a choice

Adolescent: 12 to 15 years

- Explain what you are doing and why
- Show respect
- Get history from patient if possible
- Respect independence; address directly
- Allow parents to be involved in examination if patient wishes
- Consider asking questions about sexual activity, drug/alcohol use privately

SICK

A SICK child is one who you believe is **physiologically unstable** based on observable clinical indicators. This means you see a significant abnormality in appearance, work of breathing or circulation to the skin. A SICK patient requires immediate and aggressive BLS and ALS care.

You must recognize the SICK child within the first minute or so of contact. Much of the information you need to make a decision can be obtained **without touching the patient**.

Pediatric SICK/NOT SICK

The SICK/NOT SICK method of assessment for a pediatric patient is different from an adult. The adult clinical picture includes: chief complaint, MOI or NOI, respirations, pulse, mentation, skin signs, body position or obvious trauma. The pediatric clinical picture is based on appearance, work of breathing and circulation to the skin.

NOT SICK

The NOT SICK child is one who you believe is **physiologically stable**. He or she has no significant abnormality in appearance, work of breathing or circulation to the skin. They do not need immediate ALS intervention--but may require BLS care or an ALS evaluation.

Don't Wait to Decide

The most common mistake EMTs make when deciding SICK or NOT SICK is waiting for paramedics to arrive to make the decision and begin aggressive care. Another mistake is failing to recognize and respond to the decompensating patient or the patient who has changed from NOT SICK to SICK.

Pediatric Triangle

There are three things that you need to assess if a pediatric patient in order to determine SICK or NOT SICK. They include **appearance**, **work of breathing** and **circulation to the skin**.

You can make a SICK/NOT SICK decision based on these three things alone, in many cases without touching the patient. These three clinical indicators reflect the overall status of a child's cardiovascular, respiratory and neurologic systems. Together they are called the **Pediatric Assessment Triangle**.

Appearance

A child's appearance tells you a lot about oxygenation, brain perfusion and central nervous system function. There are seven aspects to appearance:

7 Aspects	Questions to Answer
Alertness	<ul style="list-style-type: none"> ▪ How responsive and interactive is the child with a stranger or other changes in environment? ▪ Is she restless, agitated, or listless? (Children with mild to moderate illness or injury generally remain alert.)
Distractibility	<ul style="list-style-type: none"> ▪ How readily does person, object, or sound draw child's interest or attention? ▪ Will she play with toy or new object?
Consolability	<ul style="list-style-type: none"> ▪ Can she be comforted by the caregiver or responder?
Eye contact	<ul style="list-style-type: none"> ▪ Does the child maintain eye contact with objects or people? ▪ Will she fix her gaze on a face?
Speech/cry	<ul style="list-style-type: none"> ▪ Is the speech / cry strong and spontaneous? ▪ Weak and muffled? ▪ Hoarse?
Spontaneous motor activity	<ul style="list-style-type: none"> ▪ Is she moving and resisting vigorously and spontaneously? ▪ Is there good muscle tone?
Color	<ul style="list-style-type: none"> ▪ Is she pink? Or is he pale, dusky, blue or mottled? ▪ Does the skin coloring or the trunk differ from the extremities?

You can collect all the information you need about appearance through observation.

Work of Breathing

Work of breathing is the second side of the Pediatric Assessment Triangle. An abnormal position, abnormal breath sounds, retractions and nasal flaring are signs of increased work of breathing. Watch the child from a distance and observe for four indicators of increased work of breathing: **abnormal position** (e.g., tripod position), **abnormal breath sounds**, **retractions** and **nasal flaring**.

Abnormal position, abnormal breath sounds, retractions or nasal flaring = high flow oxygen and ALS intervention!

Abnormal Positions

A child in the sniffing position is attempting to maximally open his or her airway when an upper airway obstruction is present, for example, in cases of epiglottitis. The patient in the tripod position is attempting to recruit all of the breathing muscles to move air in and out of the lungs.

In addition to the sniffing and tripod positions, look for signs of extra effort to move air in or out such as head bobbing where the head draws back during inspiration and falls forward during expiration. Nasal flaring is seen in infants and toddlers as an indicator of increased work of breathing. As the child breathes out, the nostrils widen.

Retractions

Observe the chest and abdomen for movement. Retractions in the chest wall or neck muscles mean that the child is using greater muscle effort in order to move air. Retractions are a visible sinking-in of the soft tissues.

Abnormal Breath Sounds

Listen for audible sounds such as rales, rhonchi, stridor or wheezing.

Rales sound like crackles or bubbles. They are created by air bubbles moving through fluids in the airways. They are usually associated with pulmonary edema or pneumonia.

Stridor is a harsh, high-pitched sound heard without a stethoscope on inspiration. It is caused by spasms of the larynx and swelling that contract the vocal cords and narrow the airway. Stridor is common in croup which sounds like the bark of a seal. It can also indicate a life-threatening condition such as epiglottitis or foreign body obstruction.

Wheezes are “musical” high-pitched noises and are described as a whistling sound. They are caused by narrowing of the airways due to bronchospasm, edema or foreign matter. You can hear wheezes in patients with asthma, COPD and anaphylaxis.

Respiratory Distress/Failure

Respiratory distress is a state where a child can maintain adequate oxygenation of the blood only by increasing work of breathing.

Signs of respiratory distress include: extra effort to move air, tachypnea and tachycardia. The varying degrees of respiratory distress are mild, moderate and severe.

Respiratory failure occurs when a child cannot compensate for inadequate oxygenation and the circulatory and respiratory systems begin to collapse.

Signs of respiratory failure include a poor appearance, significant work of breathing, poor tidal volume or apnea. When you see signs of respiratory distress or respiratory failure, immediately choose the SICK category and provide aggressive care including an ALS response.

Circulation to Skin

Skin signs reflect the overall status of the circulatory system. Pink tones point to NOT SICK. Pale, bluish or mottled skin point to SICK. Skin signs include:

- Color
- Temperature
- Capillary refill time
- Pulse quality

A child in shock will maintain blood pressure longer than an adult.

A child can lose up to 1/3 of blood volume before there are any significant changes in blood pressure.

Skin Color and Temperature

Skin color is an important sign. The body shuts down blood flow to the skin in order to maximize flow to the vital organs in conditions such as shock. Abnormal skin colors include mottled (a non-uniform color), pale, grayish and blue. These indicate inadequate tissue perfusion or inadequate oxygenation. Normal skin and mucous membrane color should be pink. Cyanosis is a late sign and indicates impending respiratory failure.

To check skin temperature, feel the skin on a child's calf or forearm. Coolness is an early sign of shock.

Capillary Refill Time

Capillary refill is an indicator of adequate perfusion. Check capillary refill time (CRT) by blanching a distal extremity such as a hand, nail bed or foot and then releasing it. Normal CRT is two seconds or less. A CRT greater than two seconds can indicate that blood is being shunted to the vital organs due to shock or other causes.

Pulse Quality

Check the pulse at the wrist or elbow. If you cannot detect a pulse at either of these sites, it can indicate a problem with circulation. The quality of the pulse may be strong, weak or absent.

Vitals signs can be difficult to interpret since pediatric anatomy and physiology vary greatly — heart rates range from 170 to 60 BPM (infant to 12 years), minimum blood pressure ranges from 60 to 94 mm HG (infant to 12 years). Carry a reference card with you to determine if vital signs are within normal range for specific age groups.

Respiratory Emergencies

Acute obstructive respiratory emergencies are a common cause of EMS calls for children. Their severity ranges from mild to life threatening. These include croup, asthma, bronchiolitis, foreign body airway obstruction and inhalation injuries. Infants and young children pose a particular challenge because decreased activity and an altered level of consciousness may be the only noticeable signs of an impending life-threatening emergency.

Evaluating appearance, work of breathing and circulation to the skin will tell you whether or not a child is SICK. An altered LOC, respiratory distress, respiratory failure and poor color all warrant aggressive treatment and rapid transport.

**Tachypnea is an early sign
of a respiratory problem in children.**

Seizures

Seizures are a result of abnormal electrical discharges of neurons in the brain resulting in the alteration of behavior or function. Physical manifestations can include shaking, twitching, staring or a loss of consciousness. Most persons experience a postictal period of fatigue or unresponsiveness. Complications can include brain damage due to hypoxia, or even cardiac arrest.

Pediatric seizures can be either a symptom of an underlying problem or without a known cause. Seizures may be caused by:

- Infection
- Head trauma
- Epilepsy
- Electrolyte imbalance
- Hypoglycemia
- Toxic ingestion or exposure
- Birth injury

A child's medical history can help identify a cause. Fever that accompanies a rash can indicate meningitis.

Febrile Seizure

Most seizures in children 6 months to 6 years of age are due to fever; however, it can indicate a serious problem such as meningitis. A febrile seizure is characterized by a generalized tonic-clonic seizure less than 15 minutes in length with a short postictal period. You will often find these patients alert and oriented when you arrive.

A period of seizure activity of 30 minutes or less is usually not in itself harmful, but a longer seizure (status epilepticus) or multiple seizures without a return to consciousness is a medical emergency. A persistent fever can induce repeated seizures.

Meningitis

Meningitis is an inflammation of the meninges that covers the brain and spinal cord. If not treated, it can cause permanent brain damage and death. The signs and symptoms vary according to age, but an altered level of consciousness and fever are common in all patients. Signs and symptoms can include:

- Altered LOC
- Fever
- Seizures
- Stiff neck
- Pain on moving of the head
- Small, red spots or purplish rash
- Irritability in infants
- Bulging fontanelles

**Consider all suspected meningitis patients highly contagious--
take applicable infectious disease prevention measures. ***

*May include mask, eye protection, gown and gloves.

Poisoning

Poisoning occurs through ingestion, inhalation, injection or absorption. Ingestion is the most common form of poisoning. Poisoning by mouth can produce immediate effects such as burns from a cleaning solution or the effects may be delayed for several hours, for example, with some plant ingestions. Common sources of poisons include:

- Alcohol
- Pills
- Cleaning products
- Houseplants
- Vitamins

Trauma

Trauma kills more children and young adults than all other causes combined. It includes drowning, burns, abuse, neglect and trauma from firearm injuries, motor vehicle passenger injuries, pedestrian injuries and bicycle injuries.

Your ability to rapidly assess and begin treatment can have an enormous impact on survival and recovery for an injured child. Use appearance, work of breathing and circulation to the skin as the basis for your assessment. Also, mechanism of injury is an important factor.

Drowning

Drowning is a leading cause of injury death of infants and younger children. Children are attracted to water and easily become submerged in swimming pools, lakes, bathtubs and buckets among other hazards. A brief submersion in water robs the lungs of oxygen causing respiratory arrest, permanent brain damage, cardiac arrest and eventually death. Hypothermia can occur in cold water settings, too.

The most important factors in drowning are the duration and severity of hypoxia. Therefore, restoring the ABCs is vital.

Near Drowning and Salt Versus Fresh Water

The medical community is discontinuing the use of the term near drowning. Also, they are deemphasizing the importance of differentiating between salt water and fresh water drowning because the distinction is not clinically significant.

Burns

Burn injuries result from thermal, electrical or chemical sources. Scald burns and contact burns are common. Be aware of suspicious burn patterns in children.

Assessment and management of burns are the same as for an adult patient. Be certain to check for possible involvement of the airway. Make a quick estimate of the burned body surface area. Administer high flow oxygen to all patients with burns that are not localized scald or contact burns.

Cover the burned areas with dressings according to your local protocol. A common problem related to burns is infection. Take care to avoid further contamination of burn injuries by wearing gloves and carefully dressing the wounds.

Abuse and Neglect

The term child abuse includes physical injury, emotional injury, negligent treatment, maltreatment and sexual exploitation of a child. In many cases, it is done by someone related to the child—90% of the time the abuser is the person who provides primary care to the child. Also, it may be a sibling, the mother's boyfriend or an unrelated caregiver. Child abuse is seen in all socioeconomic classes.

There are many general signs of abuse. Some are harder to detect than others. Take the time to observe the child's behavior and the environment where the injury occurred, as well as his or her physical injuries. The general indicators of abuse include:

- Passive and withdrawn behavior
- Bruises on soft parts of body
- Burns in patterns or unusual locations
- Facial or head injuries
- Multiple injuries at various stages of healing
- Poor hygiene (physical, dental) or poor nutrition
- Drug/alcohol abuse

Behavior of the Parents

How a child's parents act may give you a clue about when to suspect abuse or neglect. Be suspicious when parents do not want their child to go to the hospital or to a hospital where the child has been seen before. Also, you should be wary of incompatible or changing explanations of the child's injury or a history that does not account for injury.

Ask the parent to describe in detail how the injury occurred. Watch the parent's reaction to your questions. Observe the environment or mechanism of injury where the child was hurt. The parents' story can later be compared to that told to hospital staff. Suspicious situations include:

- Delay in seeking medical treatment
- Suggestion by the child that someone hurt them intentionally
- Anger, hostility or lack of appropriate concern by a parent
- Immaturity, quick temper and rigid behavioral standards demonstrated by a parent

Never voice your suspicions to the parents or accuse them of anything. If the parents do not want the child transported, insist that the child's injury cannot be evaluated in the field. Remember, you cannot legally take a child against a parent's wishes.

Injury Patterns

Injury patterns can suggest if a child's injuries were accidental.

Accidental Injury Patterns

- Injury usually on bony prominence
- One injury or set of injuries usually occurs with resolution rather than repeatedly the same injury
- Lacerations more common
- One body plane usually affected

Intentional Injury Patterns

- Injury usually on soft parts of body
- Pattern injury (finger, bite marks, cord and strap marks)
- Injuries at various stages of healing
- Lacerations uncommon
- Injuries on multiple body planes

Signs of Physical Abuse

Suspicious injuries include those scattered on several areas of the body, bruises or burns in patterns that suggest intentional injury, fractures in children under age two and injuries at various stages of healing. Look for three types of suspicious injuries:

Suspicious Bruises

- Buttocks or back
- Genital or thigh
- Swollen ear due to slapping
- Bruises resembling finger or hand marks
- Human bite marks
- Bruises over soft tissue areas

Suspicious Burns*

- Palms, soles of feet or belly
- Genital or thigh
- Scalding of hands, feet or buttocks (often involves both extremities or buttocks)

*Burn pattern is a more important indicator of intentional injury than location.

Suspicious Welts

- Strap marks
- Bizarre shaped marks (e.g., shoe)
- Choke marks, bite marks
- Welts caused by a rope or cord
- Swelling around the cheek or eye

Pediatric Shock

Shock is circulatory failure that results in the inadequate delivery of blood to the body's tissues. This lack of blood flow inhibits delivery of oxygen and removal of waste products from the body's organs. A hypotensive pediatric patient is one who is approaching cardiac arrest and must be treated aggressively. Never wait for a drop in blood pressure to begin treating for shock.

Hypotension in a child is a late sign of shock.

Signs of Shock

In adults, the progression of shock usually includes a steady loss of blood pressure with an increase in heart rate. By contrast, children maintain blood pressure by increasing their heart rate and vasoconstriction--even with a significant loss of blood volume. This means that **blood pressure does not drop until much later** in the progression of shock. A child can lose up to one third of blood volume before a significant drop in blood pressure occurs. Use appearance and circulation to the skin to assess for shock.

Early Signs of Shock

- sustained tachycardia **
- delayed capillary refill > 2 seconds
- tachypnea
- anxiousness, combativeness, agitation
- peripheral constriction, cold clammy extremities

** May be the only suggestive finding.

Late Signs of Shock

- weak or absent peripheral pulses
- decreased LOC – unconsciousness
- hypotension (a very late and ominous sign)

Airway Management

A leading cause of preventable death in children is airway obstruction. Airway management requires you to position the child to keep the airway open. You must protect the airway from obstruction.

You may need to position the head in a **neutral position** with a towel under the shoulders. Take care to not flex or extend the head, which can easily collapse the trachea.

Use the **head tilt-chin lift maneuver** when there is no trauma involved. Use the **jaw-thrust maneuver** in cases where trauma was involved. Be prepared to suction the airway to remove foreign objects or fluids.

While maintaining an open airway, take no more than 10 seconds to look, listen and feel for breathing: look for chest and abdominal movement, listen for breath sounds at the nose and mouth and feel for exhaled air.

Choking—Infant

Obstructions from a foreign body range from mild to severe. When an airway obstruction is mild, the infant should be able to cough and make sounds. Do not interfere with these efforts. If an obstruction is severe and the infant is responsive, perform the following steps to relieve the obstruction.

Responsive Infant – Severe Obstruction

1. Kneel or sit with the infant in your lap and bare the infant's chest.
2. **Hold the infant prone** with the head slightly lower than the chest. Support it with your arm. Support the head with your hand.
3. Deliver up to **5 backslaps** with the heel of your hand, between the shoulder blades.
4. Place the infant face up supporting it with your arm.
5. Deliver up to **5 quick chest thrusts** just below the nipple line.
6. Do steps 3 – 5 repeatedly until the object is expelled or the infant becomes unresponsive.

Unresponsive Infant – Severe Obstruction

If the infant is unresponsive:

1. Open the airway.
2. Remove the object only if you see it. (No blind finger sweeps)
3. Begin CPR with an airway check.
4. Look for the obstruction each time you open the airway to ventilate.

Mild vs. Severe

A **mild** airway obstruction has these signs:

- Adequate air exchange
- Responsive and can cough forcefully
- May wheeze between coughs

A **severe** airway obstruction has these signs:

- Poor or no air exchange
- Weak or ineffective cough
- No cough
- High-pitched noises while inhaling
- No noises
- Unable to cry

Choking—Child

It is important to recognize an airway obstruction quickly and distinguish it from a seizure, syncope, cardiac arrest or overdose. When an airway obstruction is mild, a victim should be able to talk, cough or make sounds. Do not intervene when an obstruction appears to be mild.

Responsive Child – Severe Obstruction (age 1 to adolescent [12-14])

If the obstruction is severe and the child is responsive, perform abdominal thrusts.

Unresponsive Child – Severe Obstruction

If the obstruction is severe and the child is unresponsive, perform the same procedure as for an adult:

1. Open the airway.
2. Remove the object if you see it (No blind finger sweeps)
3. Begin CPR with an airway check.
4. Look for the obstruction each time you open the airway to ventilate.

Oxygen Therapy

Every child with a respiratory emergency or significant trauma should receive high flow oxygen. Use the appearance, work or breathing and circulation to the skin as a guide for determining a child's oxygen needs and which delivery device to use. You may need to assist respirations. Delivery device options are:

- Blow-by oxygen
- Pediatric non-rebreathing mask (NRM)
- Bag-valve mask (BVM)

Healthcare providers often deliver excessive ventilation during CPR, particularly when an advanced airway is in place. Excessive ventilation is detrimental because it impedes venous return and therefore decreases cardiac output, cerebral blood flow and coronary perfusion. It also increases the risk of regurgitation and aspiration. Do not over-ventilate.

BMV Effectiveness

Bag-valve mask ventilation can be as effective as endotracheal intubation. However, it requires mastery of the following skills:

- Selecting the correct mask size
- Opening the airway
- Make a tight seal between the mask and face
- Delivering effective ventilation
- Assessing the effectiveness of that ventilation

Seizures

Your main objective in care of a seizure patient is protection of the airway. This means assessing for adequate respirations, maintaining an open airway, preparing to suction and proper positioning. Other care may include:

- Protecting the actively seizing patient from trauma
- Administering oxygen therapy
- Assisting ventilations
- Monitoring vital signs
- Cooling measures
- ALS response

Recovery Position

For children who are actively seizing or in a postictal state, consider using the recovery position. This will help prevent the tongue from blocking the airway.

Drowning

When attempting to rescue a drowning victim, you should get to the victim as quickly as possible using a safe method such as a boat, raft, surfboard or flotation device. Once you are in position to safely do so:

1. Open the airway and begin **rescue breathing** as soon as possible.
2. Next, begin **chest compressions** on a victim with no pulse.
3. If vomiting occurs, tilt the victim's head to the side and remove the vomitus using your finger or suction.*

*If there is no potential for c-spine injury.

Take steps to ensure rescuer safety.

Management of Drowning

1. Open the airway and begin rescue breathing as soon as possible.

There is no need to drain or clear the airway of water, because most drowning victims ingest little water and it is rapidly absorbed into the central circulation. Provide rescue breathing even before the victim is pulled from the water if possible.

2. Next, begin chest compressions on a victim with no pulse.

Once the victim is out of the water, if the victim is unresponsive and not breathing, pulseless and after delivery of 2 rescue breaths, attach an AED and attempt defibrillation.

3. If vomiting occurs, tilt the victim's head to the side and remove the vomitus using your finger or suction.

In situations where there is a potential spinal cord injury, logroll the victim so that the head, neck, and torso are turned as a unit.

Changes in Emphasis of C-Spine Care

Recent evidence indicates that routine cervical spine stabilization is not necessary unless the circumstances leading to the drowning indicate trauma. Manual cervical spine stabilization and spine immobilization may impede maintenance of the airway and delay the delivery of rescue breaths. These circumstances include:

- History of diving
- Use of a water slide
- Signs of injury
- Signs of alcohol intoxication

Follow your local protocols in such situations.

Summary

The anatomic differences between adult and children are **smaller airways, less blood volume, bigger heads** and **vulnerable internal organs**.

The 3 elements of the Pediatric Assessment Triangle are **appearance, work of breathing** and **circulation to the skin**.

The 7 aspects of the **appearance** element of the Pediatric Assessment Triangle are:

- Alertness
- Distractibility
- Consolability
- Eye contact
- Speech/cry
- Spontaneous motor activity
- Color

The SICK child is one who you believe is **physiologically unstable** based on observable clinical indicators. Physiologic instability means that you see a significant abnormality in either appearance, work of breathing or circulation to the skin.

The NOT SICK child is one who you believe is **physiologically stable** and has no significant abnormality in appearance, work of breathing or circulation to the skin.

The appearance of a SICK child can include:

- Motionless
- Mottled, dusky
- Cyanotic
- Fixed gaze
- Limp and listless
- Weak cry
- Hoarse, stridor

The appearance a NOT SICK can include:

- Restless and agitated
- Alert
- Interactive
- Attentive
- Playful, active
- Screaming
- Consolable by caregiver
- Maintains good eye contact
- Good muscle tone, pink skin color

Indicators of **increased work of breathing** include:

- Abnormal position
- Abnormal breath sounds
- Retractions
- Nasal flaring

Signs of **respiratory distress** include:

- Alert
- Good muscle tone
- Agitated
- Use of accessory muscles
- Grunting
- Retractions
- Nasal flaring
- Pink

Signs of **respiratory failure** include:

- Limp
- Motionless
- Diminished LOC
- Absent respirations
- Slowed breathing
- Exhausted
- Poor air exchange
- Paleness
- Cyanosis

The overall status of the circulatory system is reflected in circulation to the skin.

Skin signs include:

- Color
- Temperature
- Capillary refill time
- Pulse quality

Signs of **early shock** include:

- Sustained tachycardia
- Delayed capillary refill > 2 seconds
- Tachypnea
- Anxiousness, combativeness, agitation
- Peripheral constriction, cold clammy extremities

Signs of **late shock** include:

- Weak or absent peripheral pulses
- Decreased LOC – unconsciousness
- Hypotension (a very late and ominous sign)

Emergency Care

Do not intervene when an airway obstruction appears to be mild.

In children you may need to position the head in a **neutral position** with a towel under shoulders

For a responsive **infant with a severe FBAO**:

- Give 5 backslaps, 5 chest thrusts, repeat

For a responsive **child with a severe FBAO**:

- Give abdominal thrusts

Unresponsive Infant or Child – Severe Obstruction

1. Open the airway
2. Remove the object if you see it (No blind finger sweeps)
3. Begin CPR
4. Look for the obstruction each time you open the airway to ventilate.