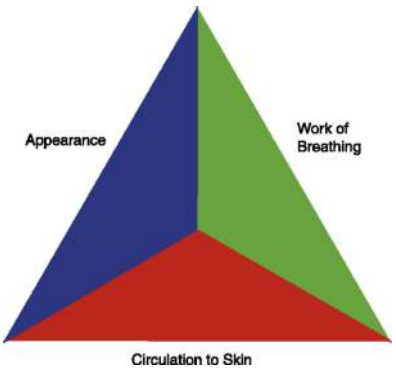




Specific Pathophysiology, Assessment And management – Part B

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Thank you Missah!

In this lesson, we will continue with pathophysiology concentrating on neurology, gastrointestinal, and toxicology conditions. We end with a discussion on Sudden Infant Death Syndrome and pediatric trauma.

Good studying

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NEUROLOGY | INTRODUCTION

- Most defects are congenital
- Some may develop after birth
- Will be diagnosed at different times
- Exact underlying cause may be hard to find
- Occur due to abnormalities in brain and nervous system



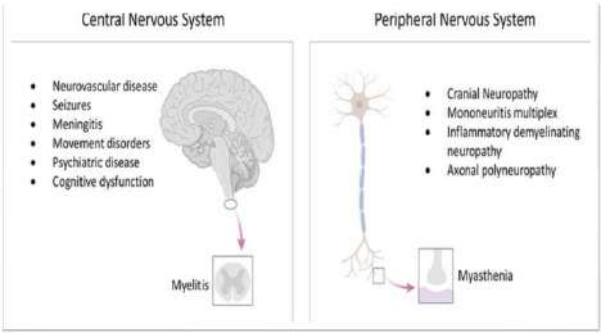
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Many neurological defects in children are congenital, which means, they are present from birth. Some neurological conditions though may also develop later in life.

The exact underlying cause of these neurological conditions and their reason for occurrence is still being researched, but there are certain events like seizures, migraines, movement disorders, and more that can trigger them. Typically, these disorders occur when something is abnormal in the brain, nervous system, or the associated muscle cells.

NEUROLOGY | PATHOPHYSIOLOGY

- Depends to some extent on the nerve connections made after birth.
- Can be detected much later in life
- Autism, meningitis, epilepsy, cerebral palsy, brain and neural damage, dyspraxia, ADHD, dyslexia, and headaches are the possible neurological complications
- You will encounter cases of epilepsy, meningitis, and brain injury



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The brain and nervous system start developing when the child is in the womb. It continues after birth and all the way through adolescence. Typically, the brain cells are formed before birth, but the nerve connections develop much later. The way the brain makes these nerve connections can lead to neurological disorders, and in turn, they can have a severe impact as nerves control the movement, vision, and hearing abilities of a child. Also, the symptoms and exact conditions will depend on the connections made.

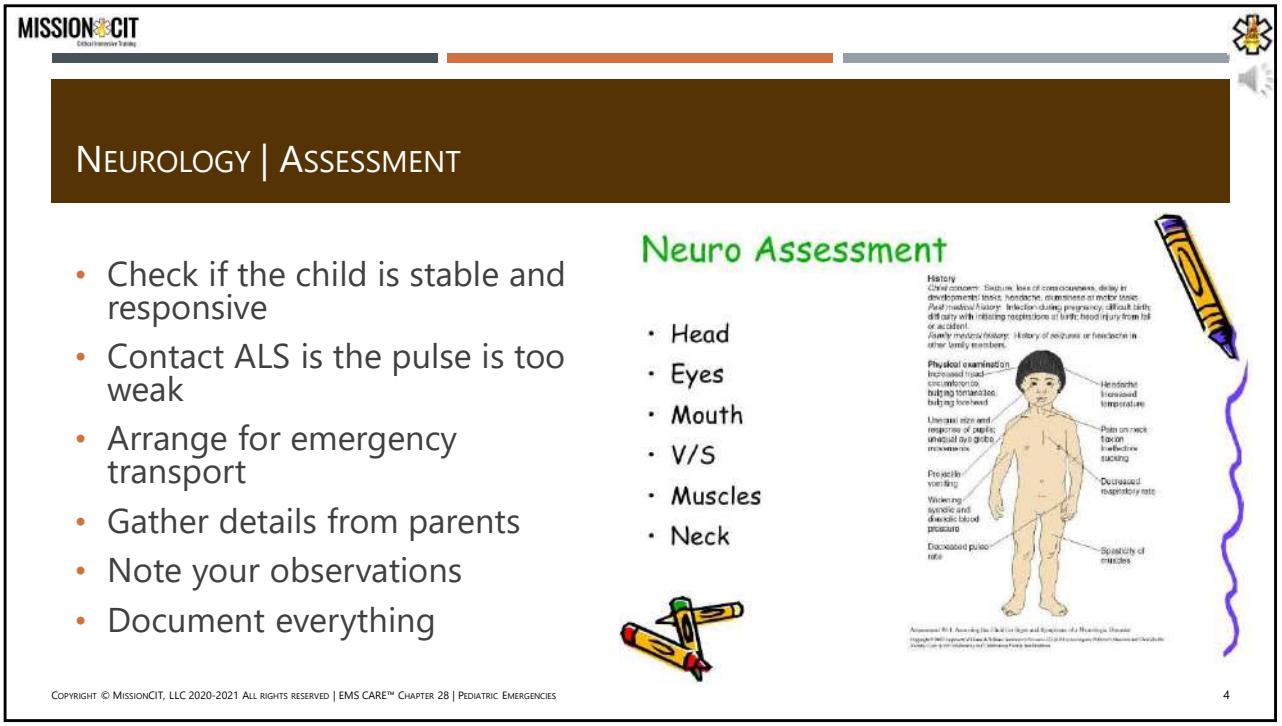
Sometimes, the defects may exist from the time of birth,

but they will be detected only much later.

Some of the possible neurological conditions that can affect children are:

- Autism
- Meningitis
- Epilepsy
- Cerebral palsy
- Brain and neural damage due to injury
- Dyspraxia
- ADHD
- Dyslexia
- Headaches

Out of these, you are more likely to encounter epilepsy, meningitis, and brain injury in your role as a first responder.



Your assessment begins with checking if the child is stable and responsive. If the heart rate is low, pulse is weak, or if the child is not responding, contact A L S right away. Arrange for emergency transportation based on the input from medical control room.

Once the child is stable, talk to the parents and caregivers about the child's medical history, including any medications. Ask about the frequency of such incidents and the treatments, if any, that were done for the same. Include your observations about the child's condition and behavior as well. Specifically, make a note

of the appearance, activity levels, speech or crying state, etc.

Gather as much information as possible, so it can help the healthcare providers.

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NEUROLOGY | SPECIFIC CONDITIONS

- Meningitis – Inflammation of brain and spinal cord. Caused by an infection.
- Seizures – Sudden and uncontrolled electrical disturbance
- Altered mental status – Hard to detect. Based on the child's behavioral changes.
- Closed head injury – No evident or bleeding signs. Injury doesn't go through skull.



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There are a few special conditions that might require immediate action. They are Meningitis, Seizures, Altered Mental Status, and Closed head injury.

Meningitis is an inflammation of the brain and spinal cord membranes, often caused by an infection. The symptoms include headache, fever, and stiff neck.

A seizure, on the other hand, is a sudden and uncontrolled electrical disturbance in the brain. It causes sudden and severe changes in the movements, behavior, and level of consciousness of a child. If a patient has two or more seizures or tends to have recurrent seizures, this

condition is called epilepsy. When a seizure occurs due to prolonged fever, it is a febrile seizure, and other causes are grouped under afebrile seizures.

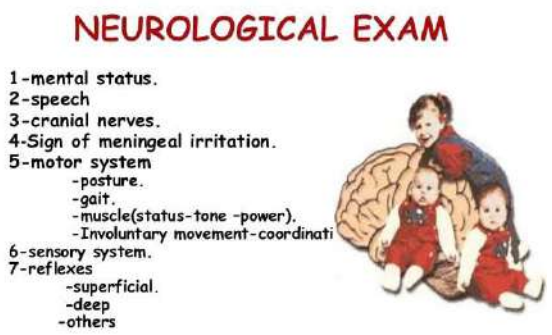
Next, altered mental status is hard to diagnose in small children. So, the parents can give you clues about changes in the child's behavior, such as sleepiness, increased anger or irritability, and decreased interaction.

Closed head injuries are common, challenging problems to identify because there is no evident bleeding or signs such as a raised or swollen bump. Still, there has been an impact on the brain and the nervous system. The best way to identify it is through the parents' observations.

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NEUROLOGY | MANAGEMENT

- If seizures, assess whether they are febrile or afebrile.
- Stabilize the child
- Arrange ALS intercept if seizures last for more than 15 minutes
- Do a SAMPLE history
- Note the current symptoms and signs
- Gather information from parents / caregivers



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If you're dispatched to handle a child with seizures, assess if it is a febrile or afebrile one. The child will need ALS care if the seizure episodes are longer than 15 minutes, includes focal features, recurs within 24 hours, and if the patient has a known history of neurological problems. When you're in doubt, call A L S right away.

In the case of all neurological problems, do a thorough SAMPLE history. In particular, gather information about the child's development, including the current signs and symptoms. Talk to the parents about the child's exposure to anyone with a serious illness such as

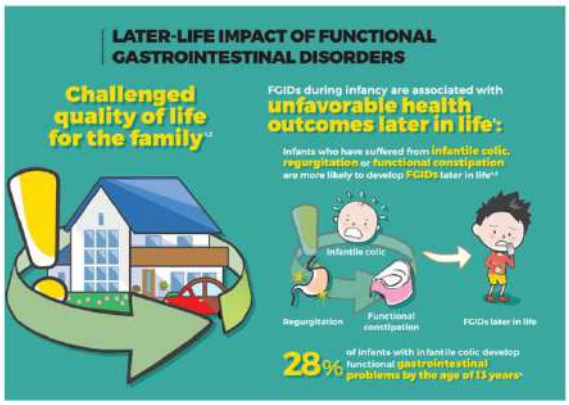
meningitis, as it is contagious. Or if the child is lethargic or confused, it could be a sign of meningitis.

As for closed head injury, it is hard to provide any treatment away from the hospital, so stabilize the patient as much as you can, and arrange for emergency transportation.

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GASTROINTESTINAL | INTRODUCTION

- Fairly common. Affects all ages. Ranges from mild to severe.
- Vomiting, diarrhea, and abdominal pain
- Lead to loss of fluids and hypovolemic shock
- Dehydration is common



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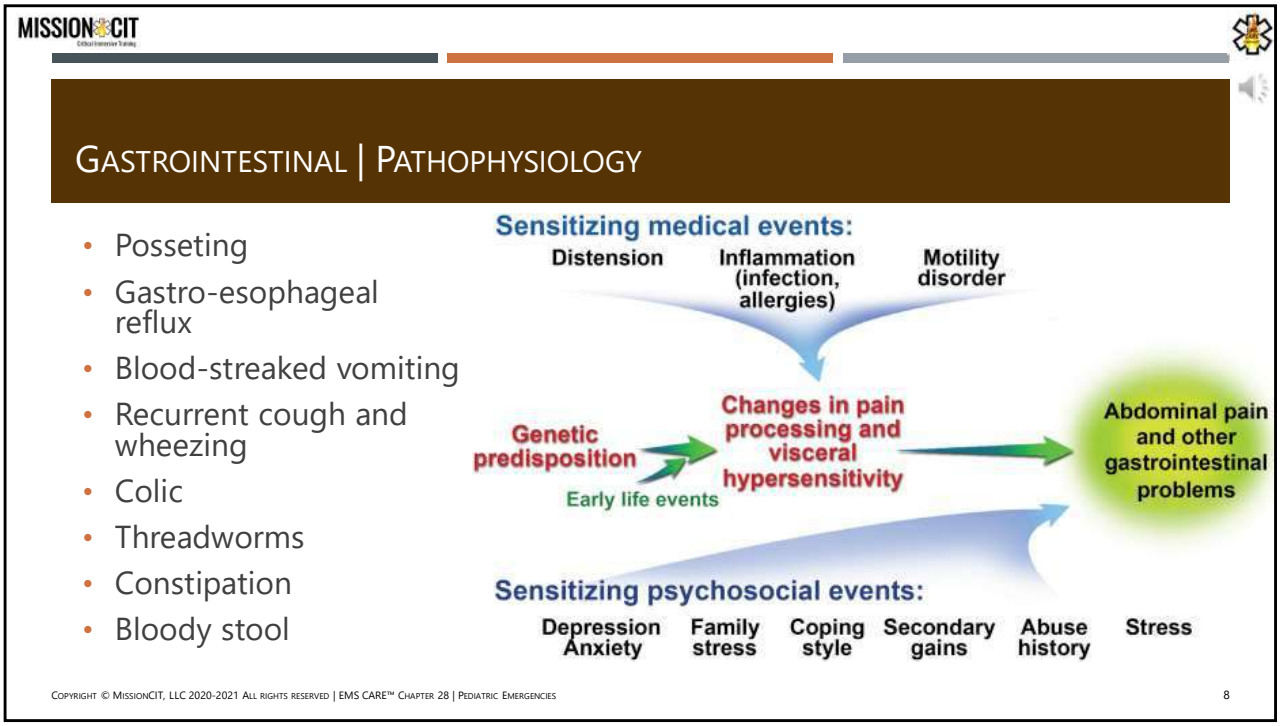
Gastrointestinal problems are fairly common in children of all ages and range from mild to severe.

Vomiting, diarrhea, and abdominal pain are the common symptoms of gastrointestinal problems, and the good news is that they are self-limiting most times.

That said, continuous vomiting or diarrhea can lead to a loss of fluids that in turn, can lead to hypovolemic shock. Dehydration and associated symptoms are also possible.

So, some of the aspects to consider while evaluating a gastrointestinal problem is the chronicity or duration of

the symptoms, medical history of the child, problems in growth and development, changes in sleep schedule, and interruptions to normal activities like schooling. Depending on what you gather, you can take appropriate actions.



From a pathophysiological standpoint, there are two possible causes of gastrointestinal problems: infections and immaturity of the gastrointestinal tract.

Besides these two causes, stress can lead to nervous vomiting, which largely stems from a lack of parent-child interactions.

Other possible causes include,

- Posseting or splitting up in infants, which is nothing but the regurgitation of milk. It improves when the child gets older, but may require a visit to the doctor

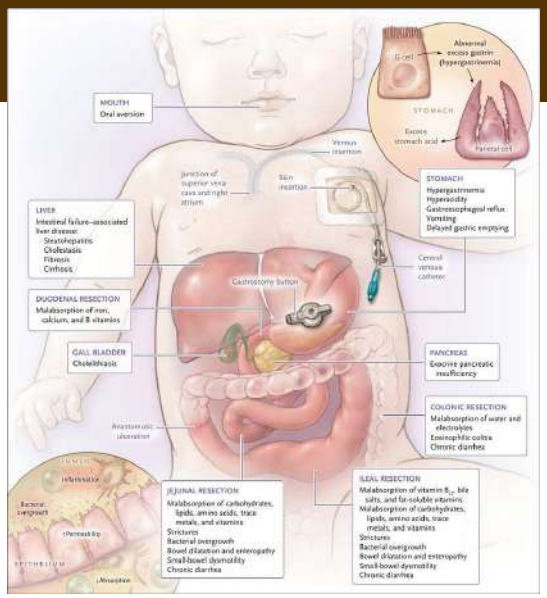
if it impacts the growth of the child.

- Gastro-oesophageal reflux can cause the child to refuse food due to heartburn, leading to weakness and poor growth. Blood streaked vomit, recurrent cough, and wheezing, possible aspiration, and episodes of apnea are commonly associated with it.
- Colic, where the symptoms go away in a few months
- Threadworms tend to cause diarrhea, and the infection can spread quickly from others to the child.
- Constipation, which is the accumulation of stools and the associated stomach pain and uneasiness
- Bloody stool that could be due to chronic diarrhea

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GASTROINTESTINAL | ASSESSMENT AND MANAGEMENT

- Emergencies occur due to a loss of fluid, chronic vomiting, and diarrhea
- Talk to the parents to gather medical history
- Assess vitals and ABCs and perform CPR as needed
- Arrange emergency transport
- Watch out for hypovolemic shock
- Call ALS in case of emergency



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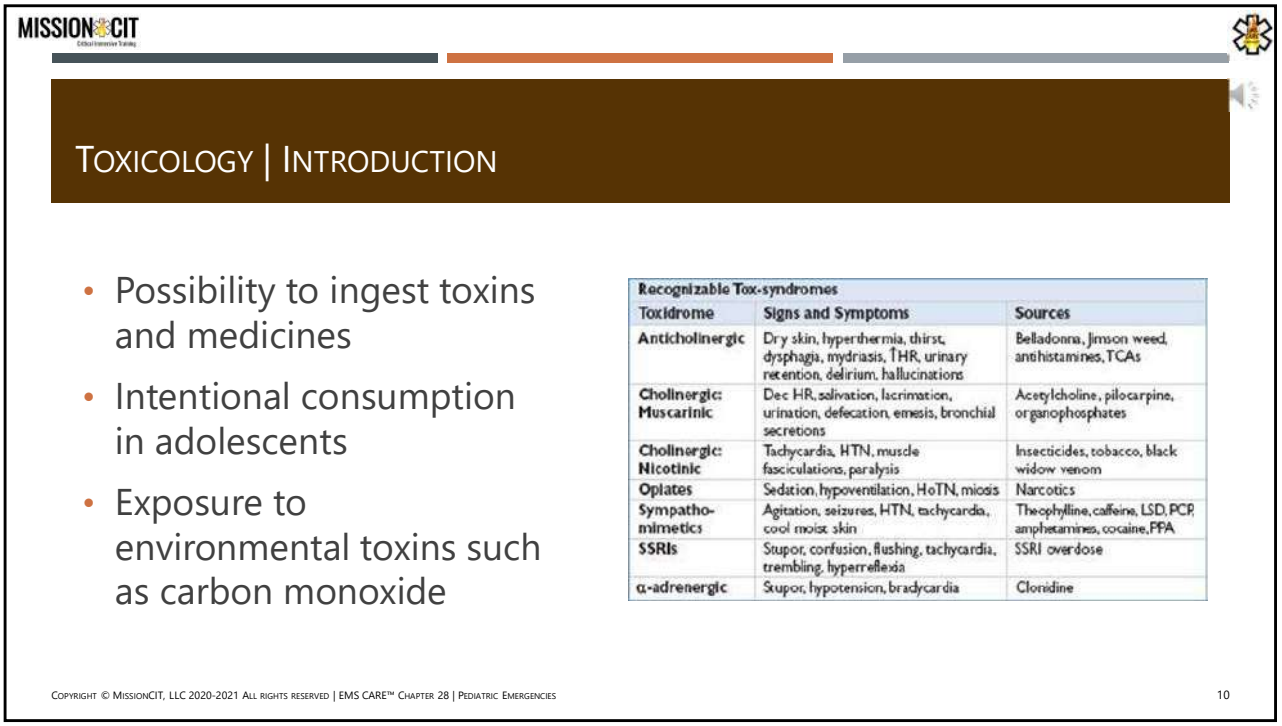
Many times, gastrointestinal emergencies occur due to a loss of fluid or chronic vomiting and diarrhea.

As soon as you walk in, evaluate the situation. Talk to the parents to get an idea of the medical history, duration of the problem, and other pertinent factors, based on which you can decide if the child needs emergency transport. In particular, watch out for hypovolemic shock and call A L S if you think the child is suffering from it.

Assess the vitals and ABCs and

perform CPR as needed

needed to stabilize the child.



Pediatric toxicology is a rather complex problem. First off, young children are curious, so there is a possibility for them to ingest medicines or any other toxins. In the case of older children or adolescents, there is a chance of intentional consumption of toxins as a way to harm themselves.

Besides, children can be exposed to a whole range of toxins such as carbon monoxide that will be hard for an EMT to identify at the earliest.

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TOXICOLOGY | ASSESSMENT AND MANAGEMENT

- Administer activated charcoal if local protocols allow
- Call poison control for help
- Stabilize the patient
- Arrange emergency transport
- Document

LIST OF ADSORBED TOXINS

Agents WELL Adsorbed by Activated Charcoal				Agents POORLY Adsorbed by Activated Charcoal
Acetylsalicylic Acid	Chloroquines	Indomethacin &	Phenylbutazone	Cyanide
Aflatoxin	& Primaquine	other NSAIDs	Phenylpropanolamine	Ethanol
Amphetamines	Cimetidine	Kerosene, Benzene,	Piroxicam	Ethylene Glycol
Antidepressants	Dapsone	Dichloroethane	Phenol Syrup of	Iron
Antiepileptics	DDT	Malathion & other Pesticides	IPECAC constituents	Isopropanol
Antihistamines	Dextropropoxyphene	Meprobamate	Quinidine & Quinine	Lithium
Aspirin/	& other opioids	Nefopam	Strychnine	Methanol
Other Salicylates	Digitalis	Methotrexate	Tetracyclines	Strong Mineral Acids & Alkali
Atropine	DIQUAT &	Mexiletine	Theophylline	
Barbiturates	other Herbicides	NSAIDS	Torbutamide,	
Benzodiazepines	Glycosides Disopyramide	(e.g. Tolfenamin Acid)	Chlorpropamide	
Beta-blockers	Ergot Alkaloids	*Paracetamol	Carbutamide,	
Biphenyls	Furosemide	PARAQUAT	Tolazamide	
Carbamazepine	Glibenclamide & Glipizide Glutethimide	Polychlorinated Phenothiazines		

* In cases of severe paracetamol poisoning concurrent intravenous acetate (N-acetylcysteine)administration and oral Nacit Carbonic is recommended.

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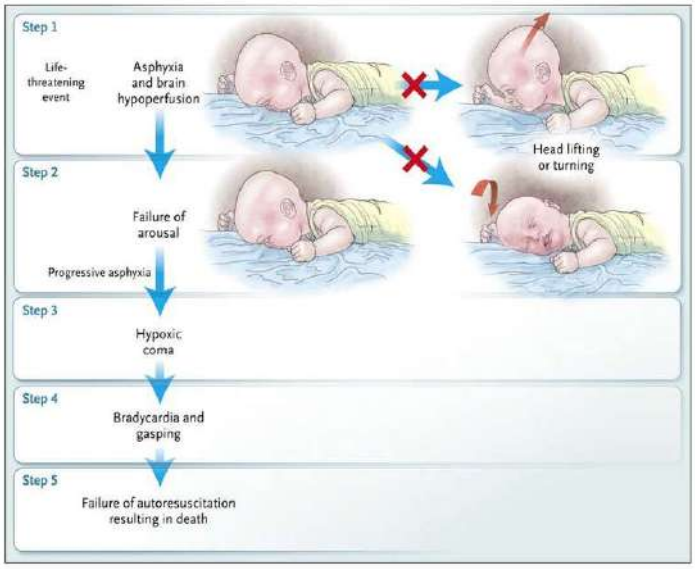
If you know for sure that a child has consumed toxic substances, administer activated charcoal as this can prevent the toxin from getting mixed with the blood. On the other hand, if you're unsure or if the activated charcoal does not seem to improve the patient's condition, call poison control immediately.

In the meantime, arrange emergency transport, and try to stabilize the child, until the responsibility of providing care is handed over to another professional.

MISSION CIT

SIDS | Introduction

- SIDS is the unexplained death of a healthy child
- Crib death as children die in their sleep
- Combination of physical and environmental factors
- Genetic reasons
- Possible defects in the brain areas that control breathing and sleeping.



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Sudden Infant Death Syndrome, or SIDS, is the unexplained death of a seemingly healthy child. It is also known as crib death, since children tend to die while sleeping in their crib. This condition typically affects infants less than one year of age.

SIDS usually results from a combination of physical and environmental factors. The biological factors include defects in the brain, especially in the areas that control sleep and breathing. Low birth weight and respiratory infections can add to the problem.

SIDS risk increases when these physical factors combine

with environmental factors. Contributing agents include putting the baby on its side or stomach instead of the back, using a soft sleeping surface, and overheating.

Some other factors that increase SIDS risk include gender, as boys are more likely to die of SIDS than girls. They are most vulnerable between the ages of two to four months. Other risk factors include Premature babies, family history of SIDS, non-caucasian kids, and babies that grow up in a family of second-hand smoke.

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SIDS | Assessment And Management

- Three important roles
- Medical care including CPR, CAB, and ventilation
- Assess and observe the scene
- Address parents' concern and provide consolation
- Low to zero survival rates
- CPR and resuscitation



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You have to play three essential roles in managing SIDS. The first is to provide the much-needed medical care, including CPR and ventilation needed to stabilize the baby. Next is to assess and observe the scene to get an idea of the problem and the potential underlying causes. Finally, address the parents' concerns and provide consolation and emotional support if required.

Unfortunately, SIDS patients have extremely low survival rates, so you will have to provide CPR and resuscitate the patient on scene. Transporting them may be futile.

When assessing the scene, concentrate on the following:

Signs of illness, including medications, humidifiers, or thermometers.

The general condition of the house.

Signs of poor hygiene.

Family interaction, and

The site where the infant was discovered.

When communicating with the family, we understand that an infant's sudden death is a devastating event for a family. And It also tends to evoke strong emotional responses among health care providers. However, Part of your job at this point is to allow the family to express their grief.

Death of a Child

- Do not speculate on the cause of the child's death.
- The family should be asked whether they want to hold the child and say good-bye.
- Wrap the child in a blanket and stay with the family while they hold the child.
- Do not remove equipment that was used in attempted resuscitation.



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When dealing with a child's death, each situation will be different and extremely difficult for all. First, the family may want you to initiate or continue resuscitation efforts, which may conflict with your local protocols.

Be sure to introduce yourself to the child's parents or caregivers, and ask about the child's date of birth and medical history. Do not, in any case, speculate on the cause of the child's death.

Then, if you are the one informing the family of the child's death:

- Use the child’s name, rather than the impersonal “your child.”
- Speak to family members at eye level, and maintain good eye contact with them.
- Use the word “dead,” or “died” rather than a euphemism like ‘is gone’ or ‘passed away’.
- Offer to call other family members or clergy.
- Keep any instructions short, simple, and basic.
- Offer your support and stay with family or caregivers until other support has arrived.

And be sure to give yourself time to recover after you leave.

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Pediatric Trauma

- Life-threatening injury. #1 killer of children in the U.S
- Require immediate hospitalization and even emergency surgery
- Results in neck and head injuries
- Motor vehicle collision, falls, blunt trauma, and penetrating trauma.
- Chances for survival is less



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Pediatric Trauma is a life-threatening injury and is the number one killer of young children in the U.S. Many times, these injuries require hospitalization, and often even emergency surgery.

Pediatric trauma often results in head and neck injuries when a child is involved in motorcycle collisions, pedestrian-motor vehicle collisions, falls greater than 10 feet, blunt trauma, and penetrating trauma to the head, neck, back, or torso.

The chances for a child to survive this injury is very less, but statistics show that there is a 25% better chance of

survival if they get swift and prompt care at a trauma center. Even if the child survives, it can leave a lasting emotional scar, especially in the minds of older children. So, they may also need psychological help after they recover from the pediatric injury.

If you encounter a pediatric trauma, try to stabilize the child, and get the child to the nearest trauma center right away. And of course, document everything.

This brings us to the next topic of emergency transportation that will be handled by Missah.

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APPARENT LIFE-THREATENING EVENT (ALTE) OR BRIEF, RESOLVED, UNEXPLAINED EVENT (BRUE)

- Infants who are not breathing, cyanotic, and unresponsive sometimes resume breathing and color with stimulation.
- ALTE or BRUE is characterized by:
  - ✓ Absent, decreased, or irregular breathing
  - ✓ Cyanosis or pallor
  - ✓ Altered level of responsiveness, or
  - ✓ Distinct change in muscle tone.



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Some infants have transient events, that may include altered respiration, consciousness, muscle tone, or skin color. These events have been referred to as an "apparent life-threatening event," and may cause caregivers to call for help. However, although a small minority of these infants have a significant underlying disorder, many have neither recurrences nor complications that require emergency care.

As a result, a recent clinical practice guideline from the American Academy of Pediatrics, recommended eliminating the term "life-threatening," so that parents

are not unnecessarily alarmed and clinicians do not feel compelled to do extensive testing, which is unnecessary in many cases. The new term is called "brief, resolved, unexplained event" or B R U E.

B R U E refers to events lasting less than 1 minute in an infant under one year of age, that are associated with one or more of the following:

- Absent, decreased, or irregular breathing
- Cyanosis or pallor
- Altered level of responsiveness, or
- Distinct change in muscle tone.

Also, infants must otherwise appear well to their caregivers after the event. Thus, infants who are febrile, coughing, or showing any signs of distress or other abnormalities, are not considered to have a possible B R U E.

After your assessment, Check with medical control if unsure about transport or next steps.

So, that is the end of this lesson. Missah will be with you shortly to discuss pediatric emergency transport. Good studying.