Children And Their High Tech "Toys"

What EMS Providers need to know

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We may not know what caregivers are saying...
What we will cover

✧ General Stuff
✧ CSF Shunts
✧ Feeding Tubes
✧ Ventilators
✧ Pulmonary Hypertension
✧ Insulin Pumps and More
✧ Car Seats
What we will cover

- General Stuff
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- Feeding Tubes
- Ventilators
- Pulmonary Hypertension
- Insulin Pumps and More
- Car Seats

AKA

- General Stuff
- Brain Drains
- Fun Things to Tug
- Beeps, Bells and Whistles
- The Missing Link
- Gizmos and Gadgets
- Baby Buckets
General Care

- Treatment of ABC’s first
  - Treat Child—Not Equipment
  - If the problem is secondary to the equipment, use your equipment

- Always remember to speak with the family or primary care giver-Family Centered Care
  - Baselines, SAMPLE, etc...

- Remember that children do not always have mental impairment just because of physical impairment
General Care

- Ask Caregiver if they have a “GO BAG”... Most do
  - This would include equipment that may be useful to you on scene.

- Contractures or Immobilized Extremities

- Transport to “Home Hospital” whenever possible
General Care

Diagram showing:
- General Appearance
- Work of Breathing
- Circulation to the Skin
Sick vs. Not Sick

TEST TIME
Sick vs. Not Sick
Sick vs. Not Sick
A.L.T.E.

Apparent Life Threatening Event
ALTE

Definition:

A sudden event, often characterized by apena, change in color, or muscle tone, coughing or gagging.

Usually occurs in children less than one

Hard to track because many are not seen at the ED

LISTEN TO THE CAREGIVERS!!!
ALTE

- Premature infants, those with RSV, and those that undergo anesthesia are at greater risk for ALTE.

- Infants that feed too rapidly, cough frequently, or choke during feeding.

- Boys more than girls
ALTE-Findings

- Idiopathic—50%
- GI—Reflux, swallowing abnormalities
- Neurologic—Seizure disorder, febrile seizure, CNS bleeding, Hydrocephalus, VP Shunt malfunction
- Respiratory—Vocal cord abnormalities, Laryngotracheomalacia, obstructive sleep apnea, croup
- Cardiac—Long QT syndrome, WPW, Myocarditis, Cardiomyopathy
- Less than 5% include—Metabolic, child abuse, allergies
ALTE

- Description of the event
  - Condition of child
  - Activity
  - Breathing Efforts
  - Color
  - Movement
  - Coughing/Airway noises
  - Duration
ALTE

- Interventions
  - None
  - Gentle Stimulation
  - Vigorous Stimulation
  - Rescue breathing
  - CPR

- HPI
  - Ill
  - Fever
  - Rash
  - Change in mentation
  - Contact with anyone else who was sick
ALTE

- Medical History
  - Premature
  - Issues at birth
  - Feeding history
  - Developmental milestones
  - Possibility of trauma

- Family History
  - Congenital problems
  - Smoking
  - Cardiac
  - SIDS
CSF Shunt

♦ Cerebral Spinal Fluid Shunt
  ♦ Inserted into infants and children who have some type of swelling to the brain.
  ♦ Drains fluid into the stomach most of the time
CSF Shunt

Notice the bulge
CSF Shunt

♦ Problems
  ♦ Most usual problem that is run into with these is that thy become blocked
    ♦ Although 1 out of every 3 visits to ER finds they are working fine
  ♦ Can become dislodged
  ♦ Can rupture with penetrating trauma to any area where it is placed
CSF QUIZ

What complications can arise from patients who have problems with these devices?
What complications can arise from patients who have problems with these devices?

- Nausea
- High pitched cry
- Vomiting
- Headaches
- ICP
- Seizures
- Airway
- And it goes on.................
Indwelling Catheters

- Tunneled- Hickman
- Implanted- Mediport
- Peripheral inserted catheter- PICC

- Most emergencies are due to blockages, complete or partial removal, or laceration of the line

- Use sterile technique as much as possible
Indwelling Catheters

♦ If line is blocked….Leave it alone and transport

♦ If lacerated… Clamp proximal to laceration using a padded clamp if available. Shut off infusion

♦ If line is out or partially out:
  ♦ Do not push back in
  ♦ Apply direct pressure
  ♦ Stop infusion
  ♦ ALWAYS BRING LINE AND PUMP WITH YOU TO THE HOSPITAL
Indwelling Catheters

- If the catheter is functioning properly and there are no signs of damage, as well as, no medications running....It may be used for fluid and medication administration

- In the event of a cardiac arrest, the indwelling catheter is the preferred route of medication administration

DOPE WORKS HERE

- D-Displacement-Stop infusion if allowed
- O-Obstructed- Unable to flush-Needs replacement
- P-Pulmonary Embolism-Clamp and lie pt left side head down
- E-Equipment Failure-If tube flushes easily the problem is with the pump
Gastrostomy Tubes/Feeding Tubes

- NGT-Nasogastric tube-Nose to stomach
- NJT-Nasojejunal tube-Nose to small intestine
- OGT-Orogastric tube-Mouth to stomach
- GT-Gastrostomy tube-Abdomen into stomach
- JT- Jejunostomy tube-Abdomen to small intestine
Feeding Tubes-WRONG!!!!!!!
Gastrostomy Tubes/Feeding Tubes

- Check for bleeding where site enters skin
- Any signs of infection could be due to leaking tube and should be transported
- Dislodgement is not life threatening unless the child is dependant on the feedings
  - Keep child flat if possible to prevent gastric leakage
  - Ask parents if they have tried to reinsert, if not allow them to if it passes easily. Possibly still need ED follow up
  - Assess for dehydration and/or hypoglycemia
  - Nearest hospital with capabilities (most)
Feeding tubes
Tracheostomy

- An airway device that is used in patients who are unable to maintain their own airways due to a number of conditions.
Tracheostomy

- Normally not a problem
- Most common problem is obstruction or removal
- KNOW THESE DEVICES
Transparent and flexible adjustable flange

Flexible wings to allow access to the stoma for cleaning

Tube dimension featured for easy identification

open

closed

I.D. 9.0mm
O.D. 13.3mm

PORTEX
UniPerc
Trach Care

- Have suction unit available
  - Soft suction
  - Many patients have this by their bedside
  - Parents/caregivers are usually well trained
    - Then why are we there?
- Have BVM Ready
  - Trach’s have standard adapter 15/22mm adapter
Trach Care

- Assess the trach tube
  - Is it in place
  - Is obturator in place – It should not be
  - Has the decannulation plug been removed
Trach Care

- Breathing
  - Rate, Rhythm, and quality
  - SaO₂ and EtCO₂
  - Mucous Plugs are most common
  - SUCTION
    - Use one that the family has as it is already sized
    - Two times ID of inner trach and round down for suction cath size or largest that will pass easily
    - Measure depth using spare trach
    - Use 2-3 cc sterile saline if secretions are thick
- If the trach is a double lumen
  - Remove inner cannula and suction. Replace before BVM
Trach Care

- IF UNABLE TO PASS SUCTION....TRACH TUBE NEEDS TO BE REPLACED

- Two techniques
  - Direct
  - Facilitated

- With both allow family to assist as they have been trained
Direct Technique

- Remove inner cannula then reinsert
- Deflate cuff if applicable
- Remove by pulling outward and towards patient's feet
- Gently insert new tube using anatomical curve, aiming downward and toward the feet.
- Make sure obturator is in place and then remove
Direct Technique
Facilitated Technique

- Deflate cuff if applicable
- Remove in same way as before
- Before placing new trach, pass a catheter through it
- Gently pass the catheter into the stoma advancing 3-6 cm
- Advance using catheter as a guide
- Do not use a bougie device as it is too rigid
Figure 56: Tracheostomy Tube Placement

a. Insertion of suction catheter through tracheostomy tube

b. Insertion of suction catheter through stoma into airway

c. Placement of tracheostomy tube in airway

d. Tracheostomy tube in airway
Trach Care

- Confirm placement by normal methods
  - EtCO2 adapter will fit

- If new tube is unable to be inserted or unavailable, try using a ET tube of equal or smaller ID only to the depth that the tracheotomy went

- If all above interventions fail
  - Oral intubation sometimes possible, remember to cover stoma
  - Mask to mouth or mask to stoma
Trach Care

Treat issues using

- D- Displaced, Dislodged or Damaged
- O- Obstructed (mucus, food, blood, secretions)
- P- Pulmonary problems
- E- Equipment failure (bent tubing, vent malfunctions, depleted oxygen supply)
Ventilators
Ventilators
## Table 1: Ventilator Modes

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
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</thead>
</table>
| Assist Control (AC)                | ▷ A minimum number of breaths are delivered by the ventilator (e.g., 12/min)   
▷ Additional patient partial inspirations triggers ventilator to deliver a full breath     
▷ Can precipitate tachypnea and respiratory alkalosis                                    |
| Synchronized Intermittent Mandatory Vent (SIMV) | ▷ A minimum number of breaths are delivered by the ventilator   
▷ Additional patient partial inspirations do not trigger ventilator assistance   
▷ Can precipitate respiratory fatigue                                                   |
| Pressure Support Vent (PSV)        | ▷ No minimum number of breaths are delivered by the ventilator   
▷ Ventilator supports each breath initiated by the patient   
▷ Can lead to hypoventilation                                                         |
| Continuous Positive Airway Pressure (CPAP) | ▷ Patient breathes on their own, but the ventilator delivers CPAP   
▷ Can help overcome ETT resistance   
▷ Can produce hypotension                                                             |
Ventilators

♦ Breathing machines

♦ Again...parents and caregivers are well trained on these

♦ Most come cause for EMS to be summoned is malfunction.
  ♦ Does the pt need to go to the ED?
  ♦ Which one if you say yes
Ventilators

- Take machine with you or have parent bring.
- The patient will most likely need to be ventilated still via BVM.
- If patient is able, and yes some are, allow them to vent themselves.
  - If not the be gentle with them and assist as they breathe.
<table>
<thead>
<tr>
<th>ALARM</th>
<th>POSSIBLE CAUSES</th>
<th>INTERVENTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Pressure/Apena</td>
<td>Loose or disconnected circuit</td>
<td>Ensure all circuits are connected</td>
</tr>
<tr>
<td></td>
<td>Leak in circuit</td>
<td>Check trach balloon</td>
</tr>
<tr>
<td></td>
<td>Leak around trach site</td>
<td>Ensure trach is well seated</td>
</tr>
<tr>
<td>Low Power</td>
<td>Internal battery depleted</td>
<td>Plug ventilator into power source</td>
</tr>
<tr>
<td>High Pressure</td>
<td>Plugged or obstructed airway</td>
<td>Clear obstruction</td>
</tr>
<tr>
<td></td>
<td>Coughing/bronchospasm</td>
<td>Suction tracheostomy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Administer bronchodilator</td>
</tr>
<tr>
<td>Setting Error</td>
<td>Settings incorrectly adjusted</td>
<td>Manually ventilate patient</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TRANSPORT VENTILATOR AND PATIENT</td>
</tr>
<tr>
<td>Power Switchover</td>
<td>Unit switched from AC to internal battery</td>
<td>Press “Alarm silent” button after ensuring battery is powering ventilator</td>
</tr>
</tbody>
</table>
New "Toys"
Vagal Nerve Stimulators (VNS)

- Seizure disorders
- Under chest ➔ Left side of patients neck
- Used to dissipate seizure activity
Vagal Nerve Stimulators

- Questions to be asked
  - Any recent trauma
  - Noticed anything different with device
  - When was it implanted
  - When was it last checked
  - Current settings
  - Any changes in seizure activity
Vagal Nerve Stimulator
Vagal Nerve Stimulator

- Always sending electrical impulses
- Placing or “waving” magnet over device increases impulses
- Only works about 25% of patients to shorten seizure
  - Not a “on/off” switch
“This is a complex partial seizure that did not respond to VNS activation. After about the first minute I activated her VNS, she seems to almost come out of it but the seizure starts again and lasts an additional 3 minutes. I had to stop the video and give her ativan in her g-tube to stop the seizure.”
Diabetics

- Pumps
- Continuous monitors
Diabetics

- Trauma to insertion sites
- Loose catheters
- Pump malfunctions
Diabetics
SO, YOU WANNA KNOW MY SECRET?
IT'S NO SECRET!
IT'S THE PUMP!

IT LOOKS LIKE A PAGER, BUT INSIDE'S A RESERVOIR THAT SUPPLIES THE INSULIN!

SEE? AN ADHESIVE PATCH HOLDS IT IN PLACE, LIKE SO!
FIGURE 1. Continuous insulin infusion and a subcutaneous depot of insulin (inset) are the mainstays of CSII therapy.
Diabetics
Pulmonary Hypertension

- High blood pressure in the arteries of the lungs
Pulmonary Hypertension

- Shortness of breath
- Fainting
- Brief Cyanosis
Pulmonary Hypertension
FAMILY CENTERED CARE

- Do not ever forget to listen
  - It’s a learning opportunity for you and them
- Pediatric Centers/Hospitals
- Caregiver in back of ambulance?
Car Seats in ambulances

- A child should NEVER be allowed to sit on parents lap while in ambulance
- Car seats should be secured to stretcher or captains seat in rear of unit
- Never transport in lateral position
- Do not use car seat if involved in MVC
- Ask if they patients car seat is available as it is already fitted
Car seats in ambulances
Car seats in ambulances
Car seats in ambulances
Case Study #1

- Dispatched at 9PM to single family dwelling for a 5 year old with vomiting and headaches

- Mother meets you at door and rushes you in to child bedroom where you find above patient in the midst of a seizure.

- Parents advise you that the child has a CSF shunt and has had seizures in the past
Case Study #1

♦ General Impression
  ♦ Seizure ends as you approach and you are told that it lasted 30 seconds
  ♦ Pt laying on his side with eyes closed, limp, and very lethargic
  ♦ Breathing: Visible chest rise
  ♦ Circulation: Extremities and lips appear pale

♦ SICK or NOT SICK
♦ WHAT ARE YOUR MAIN PRIORITIES
Case Study #1

♦ Vitals
  ♦ Airway: Patent with exception of some secretions
  ♦ Breathing: 42 breaths, irregular with periods of apnea
  ♦ SaO2 90%
  ♦ HR: 110 during normal periods of breathing but decrease to 70 during apneic periods
  ♦ B/P 134/88 with good capillary refill
  ♦ Family relates temp of 102 for 24 hrs
Case Study #1

- Treatment plan?
- What’s this patients problem?
- Intubation?
Case Study #2

- Dispatched to 3 year old having respiratory distress
- Upon your arrival you find the patient with a trach and on a home ventilator

- Father leads you into the room where the patient is in a hospital type bed on a home ventilator. You hear a rhythmic pattern and an occasional high pitched alarm. Both the mother and the child appear very anxious.

- Hx: Born at 26 weeks. Has severe lung disease and brain damage
Case Study #2

- Breathing appears to have minimal chest rise with suprasternal and subcostal retractions along with nasal flaring.
- Color is pale with cyanosis around lips and nail beds

- SICK vs NOT SICK
- What do you want to know
Case Study #2

- The patient is very anxious when you approach
- You hear no abnormal sounds

- As you move the patient over to stretcher the vent line get caught and the trach comes out

- WHAT NOW?
u has betrayed my tiny trust
Summary

- Use parents and caregivers as help. They usually know more than you.
- Always think of how you would treat a patient without all the “Toys”.
- Treat the patient not the machine.
- Use “Home” hospital if possible and appropriate.
- Parents and caregivers are well trained and if everything was normal with the patient... Why was EMS called?
NAEMT EPC COURSE

- 2 DAY OR 1 DAY HYBRID
- 16 HOURS CON-ED
- MEDICAL
- TRAUMA
- INTERACTIVE LEARNING STATIONS
Molly
I believe in Molly
EMS STACHETOBER
www.gofundme.com/4kjpe8

Questions?
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