

Recommended EMS Guidelines for Children and Youth with Special Health Care Needs (CYSHCN)*

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NC EMSC Advisory Committee
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*** These guidelines are meant to provide general guidance only and are not meant to supercede state and local medical protocols. Perform procedures in line with current scope of practice and consult local medical control when necessary.**

I. Important Considerations for Providing Care to Children and Youth with Special Health Care Needs

- Treat ABCs first
 - Treat the child, not the equipment
 - If the emergency is secondary to the child's equipment, use your own equipment
- Remember to always speak with the family since they are the experts on their child. Find out the child's baseline vital signs, medications, allergies, and other medical information, which may not be typical.
 - CYSHCN have many allergies. Ask about LATEX allergy, especially for patients with spina bifida. Make sure latex-free equipment is stocked ahead of time.
 - Ask for help from the parents and home health staff. They are generally trained to troubleshoot equipment and respond to emergencies. Practice TEAM (Trust Every Available Member)
- Physical handicaps do not necessarily imply mental deficits. Remember to communicate with the child. Assess and communicate with the child based on his/her developmental age, not chronological age.
- Ask for the "*go bag*" which generally has the child's spare equipment and supplies and bring this with you during transport. Also, this may have equipment you need on scene.
- Do not use excessive force to straighten or manipulate contracted extremities. The patient may be osteopenic and prone to fractures. (Some CYSHCN will not be able to straighten extremities beyond a nominal degree)
 - A slow, careful transfer with two or more people is preferable.
- Know which children in a given geographic area have special needs
 - Ask if they have a brief emergency medical information form, card, or notebook.
 - KIDBASE form
 - Look for MedicAlert® jewelry
- Transfer the child if possible to their medical "home" hospital.

II. Respiratory Distress in the Child with a Tracheostomy Tube

1. Secure the scene
2. ABCs
 - a. Open the airway using a head tilt/chin lift
3. Assess the tracheostomy tube
 - a. Is the tube in place?
 - b. Has the obturator (stylet) been removed?
 - c. In a double lumen trach tube, is the inner cannula in place?
 - d. Has a decannulation plug or speaking valve been removed?
4. Breathing
 - a. Assess rate, auscultation, inspection, effort and adequacy of chest rise
 - b. ALS: Check pulse oximetry, EtCO₂
 - c. Respiratory distress (retractions, altered mental status, hypoxia, etc.)?
 - i. Mucous or debris obstructing the tracheostomy tube is very common
 - d. Attempt to suction the trach tube.
 - i. Ask if family has a suction catheter. If so, use theirs, as it will be appropriately sized.
 - ii. If no suction catheter, ask family and use the size they generally use.
 - iii. If they do not know size, estimate the suction catheter size by doubling the inner diameter of trach and rounding down to an available catheter size, or use the largest size that will easily pass.
 - iv. Determine suction depth: ask family, or length of spare trach, or no more than 3-6 cm. **Suction with 100 mm Hg and instill 2-3 cc of saline before suctioning if secretions are thick.** Do not suction for more than 10 seconds and attempt to preoxygenate before getting started. **NEVER FORCE THE CATHETER.**
 - v. For a double lumen trach: take inner cannula out to suction then replace before assisted ventilations.
 - e. If unable to pass suction catheter the tracheostomy tube should be changed.
 - i. *Direct Technique:*
 - Allow the family to help change the tracheostomy tube.
 - For a double lumen trach, remove the inner cannula before insertion, and then, once inserted, replace inner cannula before confirming placement with BVM.
 - If the old trach has a cuff, deflate the cuff before removal.
 - Remove the old trach by pulling outward and toward the patient's feet.
 - Gently insert the new tracheostomy tube in the anatomical direction: curve downward and the tube aimed toward the

- ii. *Facilitated Technique:*
 - Allow the family to help change the tracheostomy tube.
 - If the old trach has a cuff, deflate the cuff before removal.
 - Remove the old trach by pulling outward and toward the patient's feet.
 - Before placing the new trach, slide a catheter through the trach.
 - Pass the suction catheter into the stoma and gently advance 3-6 cm
 - Advance the new trach over the suction catheter, using the catheter as a guide.
 - Once the trach is in place, remove the suction catheter.
 - iii. If the new trach tube does not pass, attempt again with a smaller tube.
 - iv. Confirm placement by assessment of breath sounds and adequacy of chest expansion.
 - f. If a new tracheostomy tube cannot be placed, one is not available or it does not advance easily, place a similar or smaller internal-diameter size endotracheal tube (preferably cuffed) and advance only as far as a tracheostomy tube would have been advanced.
 - g. If a new trach or ETT cannot be placed through the stoma, attempt orotracheal intubation if possible.
 - i. If orotracheal intubation is unsuccessful, use mask-to-mouth bag ventilation with stoma occluded.
 - ii. If ventilation still inadequate, attempt infant mask-to-stoma bag ventilation.
 - h. For severe respiratory distress despite suctioning, persistent hypoxia, or respiratory arrest, begin assisted ventilations through trach tube with appropriate ventilation bag with 100% high flow oxygen.
5. Reassess frequently. Monitor pulse oximetry and EtCO₂
 6. If the patient has a trach and bronchospasm present: follow Wheezing protocol.
 7. Assess circulation and follow appropriate protocols.
 8. Keep warm. Expose only if necessary.
 9. Contact Medical Control as necessary.
 10. Remember: DOPE
 - a. D-displaced, dislodged or damaged
 - b. O-obstructed (mucus, food, blood, secretions)
 - c. P-pulmonary problems

- d. E-equipment failure (bent tubing, ventilator malfunction, depleted oxygen supply)

III. Emergencies Involving Indwelling Central Lines

General Information:

- Types of central venous catheter:
 - Tunneled catheter-Broviac or Hickman
 - Implanted catheter-Mediport
 - Peripheral inserted catheter-PICC
 - These catheters are used to deliver nutritional substances or special medications directly into a central vein.
 - Most emergencies with lines include: blockage of the line, complete or partial accidental removal, or complete or partial laceration of the line
 - Children with indwelling catheters are always at risk for blood stream and catheter infections. Always use strict sterile technique when dressing or accessing the catheter.
1. Ask parents/caretakers about child's underlying condition: may be experiencing complications from underlying medical condition
 2. Obtain a complete medical history for the patient, including a history of the present illness and the past medical history
 3. Whenever assessing a child who has a central intravenous catheter, check the site where the tube is placed to see if it appears clean and well maintained.
 4. Identify location of central line:
 - a. Check for blockage of the line
 - b. Check for accidental removal or laceration of the line
 5. ***If line is blocked***, do not attempt to force catheter open
 6. ***If line is lacerated***, clamp proximal to laceration utilizing a padded clamp and do not use.
 7. ***If line is out or partially out:***
 - a. Do not push the line back in
 - b. Apply direct pressure to skin site
 - c. Stop any infusions*
 - d. Always bring line with you to the hospital
 8. Estimate blood loss and assess for signs and symptoms of an air embolism (tachypnea, chest pain, shortness of breath, or loss of consciousness) or blood clots. If an air embolism is suspected, clamp the central line with the clamp on the tube itself, place the child on the left side in a head down position, and administer high flow oxygen.

9. If the indwelling catheter is not damaged, is functioning, and does not have a continuous infusion already running, it may be used for fluid and medication administration.
 - a. Allow caregiver or home health personnel to access implanted catheters.
 - b. Use strict sterile technique when accessing an indwelling catheter.
 - c. In the event of a cardiac arrest, the indwelling central catheter is the preferred route of medication administration.

***There are some infusions that may be detrimental to stop, even briefly. Ask the caregiver if it is all right to stop or change the infusion first. Contact Medical Control for additional instructions.**

Summary:

D	Displaced, dislodged, or damaged	Stop infusing and do not use Direct pressure if bleeding from site Clamp or tie tubing if bleeding from catheter
O	Obstructed (blood clot, medication)	If line does not flush easily it needs to be replaced
P	Pulmonary Embolism	Clamp catheter and lie patient on left side with head down
E	Equipment failure (bent tubing, infusion pump malfunction)	If tube flushes easily the problem is probably with the pump

IV: Emergencies in Children with Gastrostomy Tubes and/or Feeding Tubes

Definitions:

- *Non-surgical feeding tubes:* Used for short term use:
 - Nasogastric tube (NGT): runs through the nose to the stomach
 - Nasojejunal Tube (NJT): runs through the nose into the small intestine
 - Orogastric tube (OGT): runs through the mouth into the stomach
- *Surgical Feeding Tubes:*
 - Gastrostomy Tube (GT): passes through the abdomen into the stomach
 - Jejunostomy Tube (JT): passes through the abdomen into the small intestine

Complications with gastrostomy tubes include: obstruction or dislodgement

1. When examining a child with a surgically implanted feeding tube, check for irritation and bleeding at the site where the tube enters the skin.
 - a. Treat minor bleeding with direct pressure and sterile dressings
 - b. A leaking feeding tube may cause skin irritation.
 - i. If there are any signs of infection at the entry site, the child should be transported for further medical attention.
 - ii. Cover the site with a sterile dressing and assess the abdomen.

2. Obstruction is usually not an emergency but the child requires transport. If the child is dependent on the feeds then the tube will need correction immediately.
3. Dislodgement is not life threatening but the tube should be replaced as soon as possible.
 - a. Keep the child flat on his/her back to prevent gastric fluid from leaking
 - b. If a new gastrostomy tube is available and stoma is open, attempt to reinsert the new tube.
 - c. If any resistance is met when inserting the gastrostomy tube STOP and cover the site with a clean dressing and assess the abdomen
 - d. If the new tube passes easily, secure with sterile dressing and tape BUT DO NOT REINFLATE BALLOON.
 - e. If caregiver is trained to replace gastrostomy tube, assist in placing new tube. If the new gastrostomy tube is successfully placed, DISCUSS TRANSPORT OPTIONS WITH CAREGIVER AND MEDICAL DIRECTOR
 - f. If no new gastrostomy tube is available, a foley catheter (same size or one size smaller) may be used and inserted...please follow same recommendations as above.
 - g. If tube does not pass easily: *Do not attempt to replace the tube; it is not as easy as it seems and there may be other complications.* Bring the dislodged tube with the child to the hospital.
 - h. Remember to cover the site with a clean dressing and control any bleeding with direct pressure
4. If there is formula infusing through the feeding tube, determine the nature of the fluids and the time that the fluids were started and stopped.
5. Assess for dehydration and/or hypoglycemia. Treat as necessary.
6. For non-surgical tubes (nasal or oral), assess for respiratory symptoms which may be a sign of placement in the respiratory tract.
 - a. If respiratory distress severe, remove tube carefully and treat respiratory symptoms.
7. Non-emergent transport to the nearest facility capable of replacing the tube.
8. If the parent has extra replacement tubes, bring these to the hospital.

V. Emergencies in Children on Ventilators

General Information:

- Children on mechanical ventilators may have a sudden or gradual deterioration, cardiac arrest, increased oxygen demand, increased respiratory rate, retractions, or change in mental status. This may be related to malfunction of the ventilator or due to worsening in their underlying disease.
- Common reasons for chronic mechanical ventilation in children include chronic respiratory failure and neurologic disease causing impaired airway control or respiratory effort.

- Some children requiring chronic mechanical ventilation never have a “normal” respiratory exam. Parents and other caregivers can provide information about the child’s baseline exam.

1. Pulse oximetry and End-tidal CO₂
2. If there is no increased respiratory distress, normal pulse oximetry, normal End-tidal CO₂, and normal mental status, the child should be transported on ventilator on current settings.
3. If there is respiratory distress, desaturation below baseline levels, or altered mental status:
 - a) Examine the child quickly for possible causes of distress which can be easily corrected: detached oxygen source, dislodged or obstructed tracheostomy tube, detached ventilator circuit.
 - b) Look at the ventilator and determine alarm code (i.e. apnea, low respiratory rate, low minute ventilation, high pressure, etc.) (See “Ventilator Troubleshooting” below)
 - Do not delay treatment while assessing the ventilator. Treat the patient, not the machine.
 - c) Remove the child from the ventilator and manually bag with a secure oxygen source
 - d) Look for normal chest rise, breath sounds on both sides, and improvement in oxygen saturation.
 - e) If the chest rise is shallow, adjust the patient’s airway position, check to see that the bag-value device is securely connected to the tracheostomy tube, and use higher pressure if necessary.
 - f) Assess and treat problems with tracheostomy according to protocol.
4. Obtain relevant history of the present illness, past medical history and interventions taken to correct the emergency before EMS arrival.
5. Obtain any medical information forms that the caregivers may have for emergency medical providers.
6. Transport the child to the appropriate medical facility. Bring the ventilator to the hospital.
7. Some caregivers carry a “go bag” for their children with extra supplies. Bring this with the child if available.

Ventilator Troubleshooting

<i>Alarm</i>	<i>Possible Causes</i>	<i>Interventions</i>
Low pressure/apnea	Loose or disconnected circuit Leak in circuit Leak around tracheostomy site	Ensure all circuits are connected Check tracheostomy balloon Ensure tracheostomy well seated
Low power	Internal battery depleted	Plug the ventilator into a power outlet
High Pressure	Plugged or obstructed airway	Clear obstruction Suction tracheostomy

	Coughing/bronchospasm	Administer bronchodilator
Setting Error	Settings incorrectly adjusted	Manually ventilate patient Transport ventilator and patient
Power Switchover	Unit switched from AC to internal battery	Press “Alarm silent” button after ensuring battery is powering ventilator

Remember if the problem can not be remedied, EMS provider should remove the child from the ventilator, ventilate the child with a BVM, and take the ventilator with them to the hospital so a more qualified person can troubleshoot.

VI. Emergencies in Children with Urinary Drainage Catheters

General Information:

- Types of Urinary catheters:
 - Foleys: From urethra to bladder
 - Nephrostomy: From skin directly into kidney
 - Suprapubic: From skin directly into bladder
 - Ureterostomy: From skin into ureter
- These catheters are used to drain urine.
- Most emergencies with catheters include: Blockage, bleeding or dislodgement.

1. Ask caretakers about child’s underlying condition: may be experiencing complications from underlying medical condition
2. Obtain a complete medical history for the patient, including a history of the present illness and the past medical history
3. Most skin catheters will make the skin slightly erythematous and encrusted

If catheter is blocked:

- a. Flush once with 5cc of saline.
- b. Do not flush more than once.
- c. If catheter works well after flushing, discuss with caregiver and medical director.
- d. If catheter remains blocked, transport to appropriate medical facility.

If catheter is lacerated:

- a. Do not remove.
- b. Tape in place to avoid dislodgement
- c. Allow to continue to drain
- d. Transport to appropriate medical facility

If catheter is partially out:

- a. Do not push the line back in
- b. Secure to skin to avoid complete dislodgement
- c. Transport to appropriate medical facility

If catheter is completely out:

- a. Cover opening with sterile gauze
- b. Transport to appropriate medical facility

If blood is seen in catheter:

- a. Allow catheter to drain
- b. Secure to skin to prevent dislodgement
- c. Transport to appropriate medical facility

VII. Emergencies in Children with Hemodialysis Lines

General Information:

- Types of hemodialysis catheters:
 - Hemodialysis catheters (External tubing from a large artery to the skin)
 - Hemodialysis grafts (Gortex tubing under skin to artery and vein)
- These catheters are used to filter/clean the blood in patients with renal failure.
- Most emergencies with lines include: Infection of the line, bleeding from the line, and complete or partial dislodgement from trauma
- Children with indwelling catheters are always at risk for blood and catheter infections. Always use strict sterile technique when dressing or accessing the catheter.

1. Ask caretakers about child's underlying condition: may be experiencing complications from underlying medical condition.

2. Obtain a complete medical history for the patient, including a history of the present illness and the past medical history.

3. Whenever assessing a child who has a hemodialysis catheter, check the site where the tube is placed to see if it appears clean and well maintained.

4. Identify location of DIALYSIS LINE:

- a. Check for accidental removal or laceration of the line

5. ***If line is blocked*** DO NOT MANIPULATE

6. ***If line is lacerated***, clamp proximal to laceration utilizing a padded clamp and do not use.

7. ***If line is out or partially out:***

- Do not push the line back in
- Apply direct pressure to skin site
- Stop any infusions*
- Always bring line with you to the hospital

8. Estimate blood loss and assess for signs and symptoms of an air embolism (tachypnea, chest pain, shortness of breath, or loss of consciousness) or blood clots. If an air embolism is suspected, clamp the central line with the clamp on the tube itself, place the child on the left side in a head down position, and administer high flow oxygen.

9. If the indwelling catheter is not damaged, **UNLIKE CENTRAL LINES, do not use for IV access.** Infection and sepsis are frequent in large bore dialysis catheters compared to Broviacs.

10. In a life threatening emergency these large lines are excellent for IV access and can be used.

***There are some infusions that may be detrimental to stop, even briefly. Ask the caregiver if it is all right to stop or change the infusion first. Contact Medical Control for additional instructions.**

Transport all patients with hemodialysis lines to the appropriate medical facility.

VIII. Emergencies in Children with Peritoneal Dialysis Catheters

General Information:

- Peritoneal dialysis catheters run from the skin into the peritoneum.
- Dialysis is done by using the peritoneal lining as the dialysis membrane.
- Fluid is placed into the peritoneum and left for hours or overnight
- It is then drained removing extra electrolytes, acid, etc. from the patient.
- Dialysis is usually done at home by the patient or a nurse.
- Most emergencies with catheters include: Infection of the abdomen (peritonitis), infection of the catheter entry site, fracture of the catheter, bleeding from the catheter, and complete or partial dislodgement.
- Children with indwelling catheters are at risk for catheter infections. Always use strict sterile technique when dressing or accessing the catheter.
- These are not vascular lines and **can not** be used for IV access.

There are two major complications of peritoneal catheters: Infection and Outflow obstruction.

Exit Site Infections:

Drainage with blood and/or pus from the exit site

Associated with redness, tenderness, overgrown granulation tissue and swelling

Peritonitis:

Staphylococcus aureus

Caused by auto-inoculation by touch or contamination with respiratory secretions

Symptoms:

Abdominal pain
Abdominal tenderness
Abdominal distention
Cloudy peritoneal dialysis fluid
Fever
Nausea and vomiting

1. Ask Caretakers about child's underlying condition: may be experiencing complications from underlying medical condition
2. Obtain a complete medical history for the patient, including whether there is fluid presently in the abdomen or if it is drained.
3. Whenever assessing a child who has a peritoneal dialysis catheter, check the site where the tube is placed to see if it appears clean and well maintained.
4. ***If catheter is blocked DO NOT MANIPULATE.***
5. ***If catheter is fractured,*** clamp proximal to fractured utilizing a padded clamp and do not use.
6. ***If catheter is out or partially out:***
 - Do not push back in
 - Apply direct pressure to skin site if bleeding.
 - Stop any infusions
 - Always bring catheter with you to the hospital
7. ***If the catheter is leaking clear fluid:***
 - Cover with sterile gauze.

Transport all patients with peritoneal dialysis catheters to the appropriate medical facility.

IX. Care of the Following Equipment:

- a. Tracheostomy tubes (included in protocol I.)
- b. Central lines (included in protocol III.)
- c. Feeding tubes (included in protocol IV.)
- d. Ventilators (included in protocol V.)
- e. Apnea monitors
- f. VP shunts
- g. Internal pacemakers
- h. Vagal nerve stimulators
- i. Colostomy bags

e. Apnea Monitors

ABCs

Pulse oximetry

If the patient is not breathing, open airway and begin bag-valve ventilation with 100% oxygen

Check the pulse: if no pulse, start chest compressions

Assess circulation and perfusion

Ask the caregiver for baseline vital signs

Look at the apnea monitor and determine the alarm code (i.e. heart rate, apnea etc.)

Check the electrodes or monitor chest belt and ensure proper placement

Make sure the monitor is powered and is not low on batteries

If the child has respiratory distress or cardiac arrest, call for ALS support and follow the appropriate algorithm and transport to the nearest appropriate facility.

Bring any of the child's emergency medical records and supplies or "go bag" with the patient to assist in the care of the child.

Bring the apnea monitor to the hospital with the child, so that it may be evaluated and stored information can be downloaded for analysis.

f. VP shunts

A cerebral spinal fluid shunt (CSF shunt) is a catheter that is inserted into the ventricles within the brain and then threaded under the skin from the skull to the right atrium (VA shunt) or the peritoneum of the abdomen (VP shunt). It drains excess CSF that would otherwise build up in the brain.

The child with a CSF shunt is vulnerable to brain infections. The shunt can develop an obstruction, and if this occurs it can result in any of the following signs & symptoms:

*Have a heightened awareness of the following:**

- Altered mental status
- Irritability
- Listlessness
- Increased sleep
- High-pitched cry
- Nausea and vomiting
- Fever
- Headaches
- Blurred vision
- Difficulty walking
- Apnea
- Bradycardia or other arrhythmias
- Seizures
- Redness along the shunt track
- Rapid worsening of mental status

Prehospital personnel should... Provide appropriate initial intervention and transport:

- Establish responsiveness
- Assess the patient's airway and breathing: ABCs
- Maintain a patent airway
- Provide high flow oxygen, positive pressure with bag-valve-mask mask if necessary
- Check pulse, if no pulse, begin chest compressions
- Assess circulation and perfusion
- Ask caregiver for the child's baseline vital signs
- Assess for signs and symptoms of shunt obstruction or infection*
- Obtain a complete history of present illness and past medical history
- Rapid transport to the appropriate facility

g. Internal Pacemakers

Pacemakers are implanted medical devices that regulate the heart rate.

For the child with an internal pacemaker, the following questions need to be asked:

- What type of heart problem does the child have?
- What is the child's baseline rhythm and rate?
- What type of pacemaker does the child have?
- Is the child dependent on the pacemaker?
- How long has the child had the pacemaker? (Generally 3-5yr battery life)

An internal cardiac defibrillator (ICD) or automatic implantable cardiac defibrillator (AICD) is an electronic device implanted under the skin. It monitors the heart rhythm and can slow down or stop excessively fast rates that originate in the ventricles.

For the child with an internal defibrillator:

- What type of heart problem does the child have?

What is the child's baseline rhythm and rate?

What heart rate causes the defibrillator to fire?

How many shocks has the child felt?

Has the child experienced any of the following?

Felt more than 3 shocks in a row

Unusual symptoms like dizziness or palpitations after a shock

Sensation of dizziness, lightheadedness or palpitations, for a period of time without any shocks

When was the defibrillator implanted? (3-5yr battery life)

EMS Care Tips

The internal pacemaker can easily be felt near the clavicle or in a small child in the abdomen.

Never place defibrillator paddles, or pacing patches directly over the internal pacemaker or defibrillator generator.

Remember the battery life is 3-5 years

Common Problem: Failure

1. Assess heart rate and perfusion
2. Treat for shock
3. Follow ABCs
4. Transport

h. Vagal Nerve Stimulators (VNS)

What is a vagal nerve stimulator? Device that is surgically implanted in the patient's chest, under the skin with the electrodes to the vagus nerve on the left side of the neck. This device produces electrical energy which works to dissipate seizures.

Ask the following questions:

Any recent trauma to the left side of neck or chest over the device?

Has the patient noticed anything different regarding the device?

When was the VNS implanted?

When was the VNS last checked?

What are the current settings?

Is the child having seizures when the device is functioning properly?

If seizures are still present, is the magnet being used?

Have you noticed any change in your child's seizures recently?

Increased intensity?

Increase in frequency?

i. Colostomies and Ileostomies

Colostomy or ileostomy: a portion of the large or small intestine is attached to the abdominal wall and an external bag is in place to collect the digestive waste.

Assess carefully for signs or symptoms of dehydration and/or shock, particularly if there has been any history of diarrhea or decreased oral intake.

Check the ostomy site for signs of infection or irritation:

Signs of infection include: red, warm, tender skin spreading away from the site

Ask the child or parents if the area is more tender than usual.

If any concerns, transport for further evaluation.

If the ostomy bag breaks, the parent or caregiver can usually help and replace it.

If another bag is not available, circle the ostomy with moist gauze and attach any available bag that can serve as a substitute until a proper replacement bag is obtained.

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This document was compiled by the members of the North Carolina Emergency Medical Services for Children Advisory Committee. The main contributors were Donna Moro-Sutherland, MD (Chair of the EMSC Research and Education Committee) and Ben Alexander, MD (Past Chair of the EMSC Advisory Committee).

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