



Interactive Infographic for Care of Children with Medical Complexities



The Department of Emergency Medicine at the University of North Carolina in Chapel Hill has worked to create a semi-interactive document that allows for easier access to resources, information, and instructions on how to treat children with medical complexities.



Always treat the child, not the equipment.

Treat the "ABC's" first. Prioritize getting the child in stable condition before starting equipment diagnostics.

Caregivers are your best resource. Always speak with the child's family or caretakers prior to treatment. They are the experts. Family can offer information about medications, allergies, baseline vital signs and other medical history.

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Procedures for respiratory distress



CENTRAL LINES

Any emergency involving central lines



GASTROSTOMY TUBES

Any emergency involving G-tubes

TRACHEOSTOMY TUBES

ASSESS: Is the tube in place? Are all necessary elements present (i.e. stylet, inner canula, speaking valve)?

BREATHING: Check rate, auscultation, effort, and adequacy of chest rise. Respiratory distress?

PROCEDURE: Mucous or debris in the tube is very common. Attempt to suction the trach tube. *If unable to suction, the tube should be replaced. Allow family to assist you.

[Click to watch the video on pediatric trach suctioning:](#)



[HTTPS://YOUTU.BE/SB84014D71C](https://youtu.be/SB84014D71C)



General Information:

There are three types of central venous catheters:

- Tunneled catheter – Broviac or Hickman
- Implanted catheter – Mediport
- Peripheral inserted catheter – PICC

Most emergencies with central lines include: blockages, complete or partial accidental removal, or complete or partial laceration of the line.

***REMEMBER:** Children are especially at risk for blood stream and catheter infections. Be sure to use strict sterile techniques when the catheter is involved.

****ALWAYS** ask parents or caretakers for full medical history about the child's underlying condition.

IF LINE IS BLOCKED:

[Click to watch the video on central lines:](#)

DO NOT attempt to force catheter open.

IF LINE IS LACERATED:

Clamp proximal to laceration utilizing a padded clamp.

IF LINE IS LACERATED:

DO NOT attempt to push the line back in. Stop any infusions and apply direct pressure to the skin site. Bring all equipment with you to the hospital.



[HTTPS://YOUTU.BE/ORJVBDTJVUG](https://youtu.be/ORJVBDTJVUG)

D isplaced, dislodged, damaged

Stop infusing and do not use direct pressure if bleeding from site. Clamp or tie tubing if bleeding from catheter.

O bstructed (blood clot or medication)

Stop infusing and do not use direct pressure if bleeding from site. Clamp or tie tubing if bleeding from catheter.

P ulmonary Embolism

Clamp catheter and lie patient on left side with head down.

E quipment failure (bent tubing, pump malfunction)

If tube flushes easily, the problem is probably with the pump.

GASTROSTOMY TUBES

Types of Non-surgical feeding tubes:

- **Nasogastric Tube (NG):** Runs through the nose into the stomach
- **Nasojejunal Tube (NJ):** Runs through nose into small intestine
- **Orogastric Tube (OG):** Runs through mouth into the stomach

Types of surgical feeding tubes:

- **Gastronomy Tube (GT):** Passes through the abdomen into the stomach
- **Jejunostomy Tube (JT):** Passes through the abdomen into the small intestine

OBSTRUCTION

Obstruction requires transport, but is not usually an emergency.

DISLODGE MENT

Dislodgment is not life threatening, but the tube should be replaced as soon as possible.

PROCEDURES:

- Keep child lying flat to prevent leakage of gastric fluid.
- If a new tube is available and the stoma is open, attempt reinsertion.
- STOP if any resistance is met; control site bleeding appropriately.
- If the new tube passes easily, secure with sterile dressing. DO NOT reinflate balloon.
- If no new gastronomy tube is available, the same or one size smaller foley catheter can be used. Follow above recommendations.

FLUIDS

If the tube is infusing formula, determine the nature of the fluids and when they were started and stopped.

Also assess for dehydration or hypoglycemia. Treat as necessary.

NON-SURGCAL TUBES

Assess respiratory symptoms which could be a sign of displacement. If respiratory symptoms worsen, remove the tube and treat accordingly.

***If parent has replacement tubes, bring tubes with you.**

Click [here](#) to watch a helpful video about G-tubes.

<https://youtu.be/mK3szZufzTY>



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VENTILATORS

Any emergency involving ventilators



APNEA MONITORS

Any emergency involving apnea monitors



CSF SHUNTS

Any emergency involving CSF shunts

VENTILATORS

General Information:

- Children on mechanical ventilators may experience sudden increased oxygen demand, increased respiratory rate, or change in mental status.
- Parents and caregivers can provide information regarding "normal" respiratory rates for children.

ASSESS

Possible causes of distress:

- detached oxygen source
- dislodged or obstructed trach tube
- detached ventilator circuit

VENTILATOR MALFUNCTION

- In the event of a ventilator malfunction, treat the patient by manually bagging with a secure oxygen source.



Always treat the child, not the equipment.

TRANSPORT

- Obtain complete relevant medical history from parents/caregivers before transport.
- Make sure to transport the ventilator with the child.
- Ask caregivers about the availability of a "go bag". Take this bag with you during transport.

Ventilator Troubleshooting:

ALARMS	POSSIBLE CAUSES	INTERVENTIONS
Low Pressure/ Apnea	Loose or disconnected circuit, leak in circuit, leak around trach site	Ensure all circuits are connected. Check trach balloon. Ensure trach is well seated.
Low power	Internal battery is depleted	Plug the ventilator into a power outlet.
High pressure	Plugged or obstructed airway; Coughing/bronchospasm	Clear obstruction, suction tracheostomy. Administer bronchodilators.
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.

Click [here](https://www.urmc.rochester.edu/childrens-hospital/tracheostomy-ventilator-program/emergency-situations.aspx) for a resource on emergency ventilator care.

<https://www.urmc.rochester.edu/childrens-hospital/tracheostomy-ventilator-program/emergency-situations.aspx>

APNEA MONITORS

ASSESS: ABCs, pulse oximetry, circulation, perfusion. Determine alarm code on the monitor, check that the electrodes are placed properly and the monitor is powered on without low battery.

PROCEDURE: If the child has no pulse, start chest compressions immediately. Ask the caregiver for baseline vitals. If you determine that the child is in respiratory distress or cardiac arrest, call for advanced life support (ALS) and follow the appropriate algorithms.

TRANSPORT: Bring the apnea monitor and any emergency medical records, supplies or "go bag" to the hospital with the child.

CSF SHUNTS

General Information:



- CSF shunt: a cerebral spinal fluid shunt is a catheter inserted into the ventricles within the brain and threaded under the skin from the skull to the right atrium (VA shunt) or the peritoneum of the abdomen (VP shunt).
- CSF shunts are meant to drain extra CSF that would otherwise build up in the brain.
- Children with CSF shunts are vulnerable to brain infections and shunt obstructions. Be sure to use sterile processes at all times.

SYMPTOMS

The following are obstruction symptoms:

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

PROCEDURES

- Establish responsiveness
- Assess ABCs
- Maintain a patient airway
- Provide high flow oxygen
- Check pulse
- No pulse? Begin chest compressions
- Assess circulation and perfusion
- Ask caregiver for baseline vitals
- Assess for signs and symptoms of obstruction or infection
- Obtain complete medical history
- Provide rapid transport to appropriate facility

Focus on stabilizing the patient. CSF shunt emergencies should be treated at the ED.

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INTERNAL PACEMAKERS/DEFIBRILLATORS

Any emergency involving pacemakers or defibrillators



VAGAL NERVE STIMULATORS

Any emergency involving vagal nerve stimulators



COLOSTOMIES/ ILEOSTOMIES

Any emergency involving colostomies/ ileostomies

INTERNAL PACEMAKERS

Important Questions for caregivers:

A pacemaker is an implanted device that helps regulate heart rate.

- 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 3-5 yr battery life)



INTERNAL DEFIBRILATOR

- 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 patient 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 shocks.
- When was the defibrillator implanted?
 - They have a 3-5 year battery life.



COMMON PROBLEMS/TIPS

- Never place defibrillator paddles, or pacing patches directly over the internal pacemaker or defibrillator generator. These devices can usually be felt near the clavicle or the abdomen in small children.
- Battery life is 3-5 years.
- Failure is a common problem:
 - Assess heart rate and perfusion
 - Treat for shock
 - Follow ABCs
 - Transport

VAGAL NERVE STIMULATORS

General Information:

A vagal nerve stimulator (VNS) is a device that is surgically implanted into a patient's chest, under the skin with electrodes to the vagus nerve on the left side of the neck. The device produces electrical energy which works to dissipate seizures.

Important questions for caregivers:

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- Any recent trauma to the device site?
 - Has the patient noticed anything different about 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 changes in your child's seizures recently?
 - Increased intensity?
 - Increase in frequency?

Transport to appropriate facility for additional care.

COLOSTOMIES/ ILEOSTOMIES

General Information:

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

ASSESS

- Assess for signs of dehydration or shock. Especially with history of diarrhea or decreased oral intake.
- Check the site for signs of infection or irritation:
 - Red, warm, tender skin spreading outward from site
 - Increased tenderness in the area
- If there are any concerns or signs of infection/ irritation; transport for further evaluation.



If the ostomy bag breaks:

- Ask caregiver to help with replacement.
- If no other bag is available:
 - Surround the ostomy with moist gauze and attach any available bag that can serve as a substitute until the proper replacement is obtained.



Click to watch the video on changing ostomy bags.

https://youtu.be/bbuHJMgJJ_Y

