

Chapter 4: NICU Procedures

Must write a procedure note in the patient's chart after completing a procedure.
A template is available for each of the NICU procedures.

- **Intubation**

- Tube for tracheal aspirate gram stain and culture

Equipment

- Suction catheter: Use 6-10 F catheter
- Sterile gloves
- Bag and mask, check mask size
- Blow-by Oxygen (5-10L)
- Laryngoscope and blade
 - Term = "1" blade
 - Pre-term = "0" blade
 - Extreme prematurity = "00" blade
- Endotracheal tube

ETT size based on weight and gestational age

Tube Size	Weight	Gestational Age
2.5	< 1000 g	< 28 wks.
3.0	1000-2000 g	28-34 wks.
3.5	2000-3000 g	34-38 wks.
4.0	> 3000 g	> 38 wks.

ETT position at the lip = Nasal-tragal length + 1

- ETT bone and tapes (prepared by nursing)
 - CO2 detector
 - Styilet (optional)

Medications for Non-Emergency Intubation in the NICU

A. Infants with IV access

Medication	Dose	Route	Pharmacodynamics	Notes
Morphine	0.05-0.1 mg/kg	IV	Onset: 1-5 min Duration: 3-5 hours	<ul style="list-style-type: none"> Longer duration than Fentanyl Use with caution for in-out surfactant (INSURE)
Midazolam	0.1 mg/kg	IV	Onset: 1-5 min Duration: 20-30 min	<ul style="list-style-type: none"> May use when considering In-Out Surfactant (INSURE)
Atropine	0.02 mg/kg	IV	Onset: 1-2 min Duration: 15-60 min	<ul style="list-style-type: none"> No minimum dose is required
Optional Agents				
Rocuronium	0.6 mg/kg	IV	Onset: 1-5 min Duration: 30-60 min	<ul style="list-style-type: none"> Use only if needed Attending Neonatologist must be "in-house"

B. Infants with No IV access

Medication	Dose	Route	Pharmacodynamics	Notes
Morphine	0.1 mg/kg	IM	Onset: 15-30 min Duration: 3-5 hours	<ul style="list-style-type: none"> Longer duration than Fentanyl Use with caution for in-out surfactant
	0.3 mg/kg	NG/PO	Onset: 30-60 min Duration: 3-5 hours	
Midazolam	0.1 mg/kg	IM	Onset: 1-5 min Duration: 2 hours	<ul style="list-style-type: none"> Use for in-out surfactant (INSURE)
	0.2 mg/kg	Intra-nasal	Onset: 1-5 min Duration: 30-60 min	<ul style="list-style-type: none"> Use with intranasal atomization device

Surfactant when indicated

- 2.5 ml/kg via ETT (Curosurf® first dose; subsequent doses 1.25 ml/kg every 12 hrs)
- Give in one aliquot via ETT catheter followed by bagged or ventilator breaths

Complications

- Acute
 - Tracheal/hypopharyngeal perforation
 - Hemorrhage
 - Laryngeal edema
 - Vocal cord injury
- Chronic
 - Glottic/subglottic stenosis
 - Subglottic granuloma/cyst

B. Umbilical Catheters Indications

- a). Umbilical Arterial Catheter
 1. Frequent measurements of blood gases
 2. Continuous measurement of arterial blood pressure
 3. Infusion of maintenance fluids
 4. Access for exchange transfusion
 5. Resuscitation (UVC preferred)
- b). Umbilical Venous Catheter
 1. Resuscitation
 2. Exchange transfusion
 3. Intravenous fluids and nutrition ($\geq D_{15}$)
 4. IV medication infusions. e.g. Dopamine, Morphine

Contraindications

1. Evidence of vascular compromise of legs or buttocks (For UAC)
2. Peritonitis
3. NEC
4. Omphalitis
5. Omphalocele/gastroschisis
6. Acute abdomen

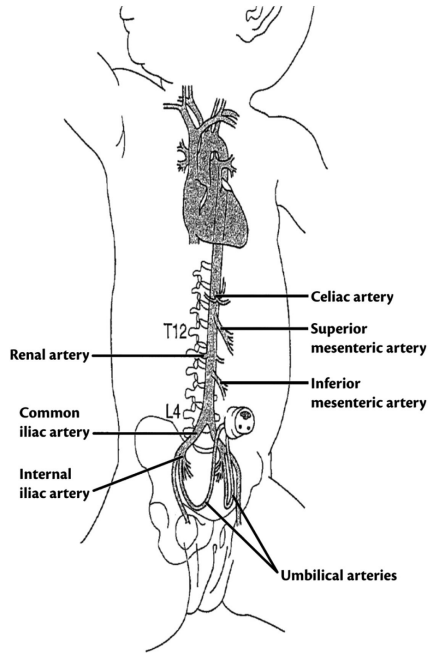
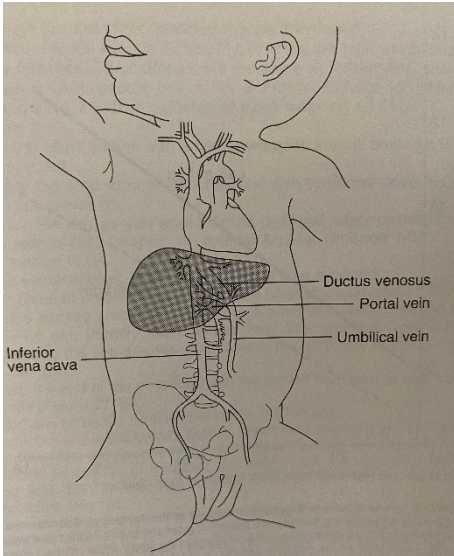
Duration

1. UAC/UVC should be removed after DOL 7-10 due to increased risk of infection

Equipment

- Procedure cart
 - One located in each wing of NICU behind nurses' desk
- Soft infant restraints for wrists and ankles per nursing
- Hat, mask, sterile gown and gloves
- Sterile drapes
- Sterile umbilical catheter tray
 - Contains forceps, scalpel, umbilical cord tie, dilators, needle driver, scissors, hemostats
- Use surgical forceps for ELBW
- One three-way stopcock for each line being placed
- One sterile 10 mL syringe for each line being placed
- Red syringe connector to transfer saline from unsterile syringe to sterile syringe
- Chlorhexadine swabs
- Tubes/culture bottle for labs
- Umbilical venous catheters size
 - 3.5 French for infants < 1200 gm.
 - 5.0 French for infants > 1200 gm.
- Umbilical arterial catheter size
 - 3.5 French for infants > 500 grams
 - May use 2.5 French for infants < 500 grams
- Determine catheter insertion length
- UAC length
 1. $3 \times \text{Birth Wt. (kg)} + 9$
 2. 1.5 times length of shoulder to umbilicus measurement
 3. Catheter tip should be between T6-T9
 4. On x-ray UAC goes caudally into the iliac arteries before heading cranially in the aorta
- UVC length
 1. $1.5 \times \text{Birth Wt. (kg)} + 6$
 2. 2/3 length of shoulder to umbilicus measurement
 3. Catheter tip should be 0.5-1 cm above the diaphragm, T8-T9

Path of umbilical artery and important landmarks



Complications

Umbilical Artery Catheter

- Malposition: Vessel perforation, peritoneal perforation, false aneurysm, misdirection into internal or external iliac arteries
- Vascular accident: thrombosis, embolism/infarction, vasospasm, hypertension, air embolism, loss of extremity
- Equipment related: Transection of catheter, break in catheter
- Other: hemorrhage (including disconnection of UAC), infection, NEC
- b). Umbilical Vein Catheter
- Malposition in heart or great vessels: Cardiac arrhythmia, pericardial effusion, thrombotic endocarditis, hemorrhagic infarction of lung

- Malposition in portal system: NEC, hepatic necrosis (thrombosis of hepatic vein or infusion of hypertonic solution into liver)
- Infection
- Thromboembolism
- Other: Perforation of peritoneum, portal hypertension, pneumo-pericardium

. **Lumbar Puncture Equipment**

- Procedure cart
- Sterile gloves, mask, hat, gown
- Neonatal Lumbar Puncture Tray
 - Contains 1 spinal needle, 4 CSF collection tubes, drapes, syringe, needle, lidocaine, gauze and band-aid
- Chlorhexadine Swabs
- Extra spinal needles: 22 gauge, 1 inch needles
- Patient labels to place on specimen tubes after CSF collection
- Label each tube following the procedure with a patient label and number tubes in order they were collected
 - Tube 1 = CSF PCR BioFire Film Array
 - Tube 2 = CSF gram stain and culture
 - Tube 3 = CSF Glucose, protein
 - Tube 4 = CSF cell count and differential
 - Heelstick or venous tube for serum glucose

Complications

- Hypoxemia from knee-chest positioning
- Infection
- Bleeding: Spinal hematoma (consider platelet count)
- Spinal cord injury/spinal nerve injury
- Intraspinal epidermoid tumor from epithelial tissue introduced into spinal canal herniation

). **Lumbar Puncture Equipment**

Needle Thoracentesis

Equipment:

∴ **Lumbar Puncture Equipment**

Equipment

- Sterile gloves
- Chlorhexadine or betadine swabs
- 25 g butterfly or 18-22 angiocath
- 3-way Stopcock
- 20 ml syringe

Complications

- Pulmonary laceration
- Pneumothorax
- Hemothorax
- Wrong location – due time out to confirm Right vs left
- Puncture diaphragm/spleen/liver