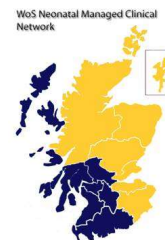


# MCN for Neonatology

## West of Scotland

### Neonatal Guideline



## Umbilical Catheters

### **Introduction**

This guideline is applicable to all medical staff, ANNPs or extended role practitioners placing umbilical catheters in neonates. Reference should also be made to separate guidelines for aseptic technique, the priming and calibration of arterial catheter sampling devices and guidance on arterial blood sampling techniques. Users should also refer to pharmacy monographs for heparinised saline and other infusion fluids. Trainees inserting catheters must have undergone competency based assessment for insertion of umbilical lines and for taking blood samples from arterial catheters (DOPS) or they must be supervised by a middle grade or senior colleague who is skilled in these procedures.

### **Anatomy** Figure One

Figure One is a diagrammatic representation of the fetal circulation showing the connections of the umbilical vessels to the systemic circulation.

The umbilical vein supplies oxygenated blood from the placenta to the foetus. It is approximately 2-3cm long and 4-5mm diameter. From the umbilicus it joins the left branch of the portal vein after giving off several intrahepatic branches and continues on to the inferior vena cava by way of a vessel called the ductus venosus.

The umbilical artery is usually paired and carries deoxygenated blood from the foetus to the placenta. The arteries are a direct continuation of the internal iliac arteries and they pass initially inferiorly and latterly as it passes the bladder before turning medially to enter the aorta.

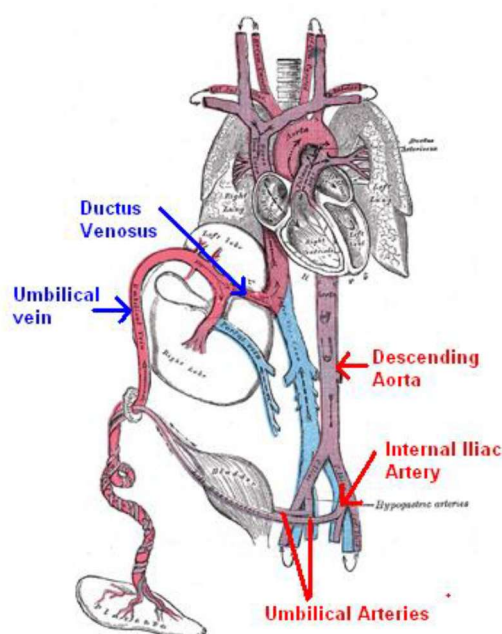


Figure One: Diagrammatic representation of the fetal circulation

### **Indications for line insertion**

- Umbilical venous catheter (UVC)
  - Secure, central venous access in neonates in the first 1-10 days of life
  - Delivery of drugs and parenteral nutrition
  - Emergency vascular access
  - Exchange transfusion
- Umbilical arterial catheter (UAC)
  - Monitoring arterial blood pressure
  - Where frequent blood gas analysis is required
  - Regular blood sampling

### **Relative Contraindications**


- Anterior abdominal wall defects
  - Exomphalos, Gastroschisis, Umbilical fistula
- Infection
  - NEC, Peritonitis, Omphalitis
- Evidence of local vascular compromise in lower limbs
- Abdominal surgery requiring an incision above the umbilicus

## Catheter Devices

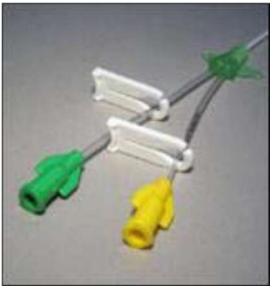
Double or single lumen catheters are available. Double lumen UVCs should be used as preference for those infants requiring multiple infusions as, although associated with increased risk of catheter malfunction, multi-lumen catheters decrease the need for peripheral access in the first month of life.

There is mandatory placement of a single lumen UVC for babies requiring balloon septostomy. For other purposes such as exchange transfusion or resuscitation a single lumen venous catheter may be advisable.

Arterial lines: Figure Two: Vygon PVC umbilical catheters and product characteristics

	Catheter size	Code	Length	Priming volume	Markings
	3.5 Fr	270.03	38cm	0.19 ml	5 - 25 cm
	4.0 Fr	270.04	38cm	0.26 ml	5 - 25 cm
	5.0 Fr	270.05	38cm	0.37ml	5 - 25 cm

Venous lines: Figure Three: Vygon dual lumen UVC and product characteristics

	Catheter size	Code	Length	Priming volume	Flow Rates	Markings
	4 Fr: Dual lumen -yellow: proximal -green: distal	1272.14	20cm	0.28ml	6ml/min	4 – 20cm (numbered)
Alternatively a single lumen 3.5 Fr, 4 Fr or 5 Fr Vygon umbilical catheter may be used.						

**NOTE:** The median diameter of the ductus venosus (DV), which is the narrowest point in the hepatic venous circulation, has a linear relationship with gestation<sup>2</sup>. For a UVC to be inserted without undue vascular trauma its external diameter should not exceed the DV diameter for gestation. Therefore at less than 25 weeks gestation a 3.5Fr catheter may be considered if there is difficulty advancing a 4Fr double-lumen catheter to the required insertion distance.

## Insertion Length

Prior to commencing the procedure it is essential to calculate insertion distance. Two of the most commonly used methods are described by Dunn and Shukla and Ferrara. Recent work has demonstrated that calculation methods are more accurate than measurement of the shoulder to umbilical length therefore this guidance only contains calculation method as detailed below.

**Calculation** (Shukla and Ferrara, Figure Four)

- UVC:  $1.5 \times \text{Birth Weight (kg)} + 5\text{cm}$
  - UAC:  $3 \times \text{Birth Weight (kg)} + 9\text{cm}$

**Remember to add the stump length to this calculation!**

## Position

All central catheter tips must be x-rayed to confirm appropriate position.

### Arterial Figure Five

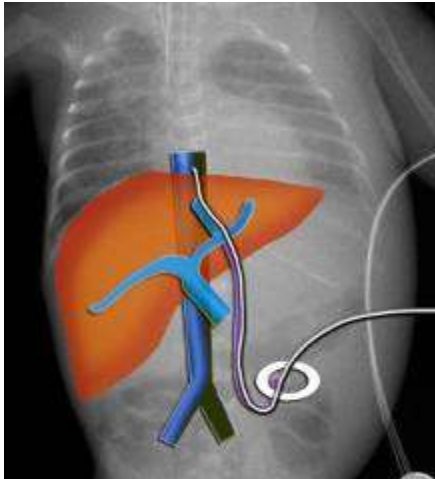
Arterial Catheter Position	
<b>HIGH:</b>	<b>T6-T10</b>
'above the diaphragm'	
Above the celiac and mesenteric roots and renal arteries	
<b>LOW:</b>	<b>L3-L5</b>
'above aortic bifurcation'	
Below most vessel roots though the inferior mesenteric artery arises from L3-L4	

The diagram illustrates the arterial system of a neonate. The aorta is shown descending from the heart. Key branches labeled include the ductus arteriosus, celiac trunk, superior mesenteric artery (sup mes artery), renal artery, and internal iliac artery. An umbilical artery line is depicted as a catheter inserted into the umbilical artery, with its tip positioned high in the thoracic region, above the diaphragm.

High UAC position is associated with significantly lesser risks of clinical vascular compromise as it avoids the origins of the major arteries. **This position should be used exclusively** unless a low position is the only position that can be obtained and a UAC is deemed necessary for optimum patient care. If the UAC is inadvertently placed too low it should be withdrawn to a position below the inferior mesenteric artery, that is below L4.

### Venous Figure Six

All central venous catheter tips should ideally be sited at T8/9, assuming this is **outside** the cardiac silhouette.

Venous Catheter Position	
<b>T8-T9</b>	
'just below diaphragm on xray'	
Pass through the ductus venosus and at the junction of the inferior vena cava with the right atrium	

If the catheter does not pass through the ductus venosus it usually comes to lie within the portal vein and cannot be further advanced. If so it should be withdrawn until it is possible to sample blood easily via the distal (green) lumen. This should be sufficient to allow free flow of infusate through the catheter when used. Alternatively consider inserting a smaller diameter catheter.

**A UVC tip sited below T10 carries a significantly higher risk of extravasation. These should only be used in the short term (24 to 48 hours) if absolutely necessary while alternative access is sought.**

All umbilical catheters **must** be x-rayed to confirm appropriate position. This image must contain the abdomen as well as the chest to include the entire route of the catheter [Figure Seven].

Remember only by demonstrating that the route of the catheter descends to meet the internal iliac artery before ascending the aorta can you be certain that the catheter has been placed in the artery rather than the umbilical vein.

UVCs that are inserted too far must be withdrawn to the correct position. A UVC in the portal vein has an increased risk of venous thrombosis and this may limit the length of time that the catheter should remain in situ.

There is no evidence to support the practice of 'railroading' a second UVC beside one which is thought to be malpositioned. This practice is to be avoided since it may increase the risk of vessel trauma and consequent extravasation.

A repeat x-ray should be performed following major positional change of a catheter to confirm correct tip position. Repeat imaging should be considered when small positional adjustments have been made. If a line is suspected to follow an atypical route into the liver or is not functioning as normal consider use of a lateral film: lateral imaging for line position is NOT considered routine and should only be used in exceptional circumstances.

See **Appendix A** for further x-rays of umbilical catheter position.

The use of point-of-care ultrasound is an evolving technique to confirm catheter position and can be used where the facilities and skill mix allow.

Evidence has shown that up to 50% of UVCs will migrate at some point<sup>2</sup> likely due to the Wharton's jelly around the cord shrinking and exerting a 'pull effect' on the catheter. Clinicians therefore should be aware to assess line position on any further imaging undertaken to ensure ongoing adequate positioning.

### Insertion considerations and training

In each situation where umbilical catheters need to be placed **an assessment should be made as to who is the most appropriate person to undertake the procedure**. Practitioners acknowledge that they must maintain their personal competence with the procedure and familiarity with local equipment.

Trainees new to the procedure must undergo appropriate training and supervision including completion of DOPS. Prior to undertaking this procedure, it is recommended that the practitioner review and complete the following learning resources:

- E-module available on RCPCH website: certificate of completion and 1 CPD point  
<https://learning.rcpch.ac.uk/external-resources/umbilical-venous-catheters-uvc/>

- RCPCH 15-minute consultation: 'Is this UVC safe to use?'  
[Fifteen-minute consultation: Is this umbilical venous catheter safe to use? | ADC Education & Practice Edition \(bmj.com\)](#) <sup>2</sup>

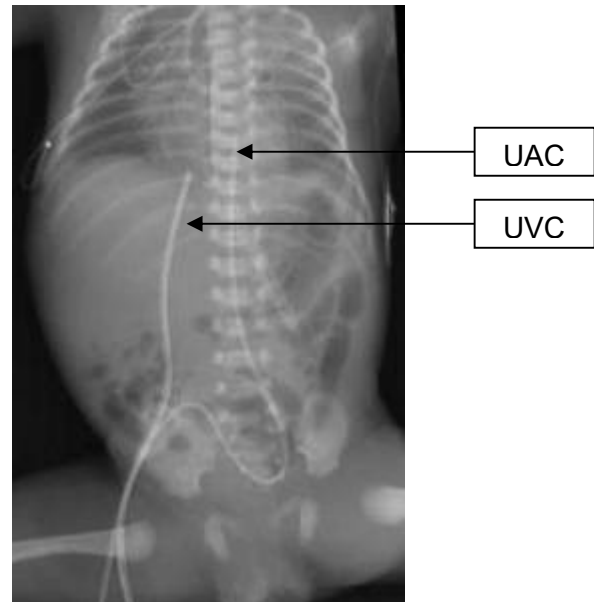


Figure Seven: X ray showing correct UAC and UVC positioning

## Equipment Figure Eight

Sterile gloves [2 pairs]

Sterile gown

Umbilical catheter(s) as needed

Antiseptic solution relating to gestation: see other available guidance

Umbilical catheter placement equipment:

Measuring tape

Gauze

Drapes

Umbilical tie

Syringes

Scalpel

Clamp

Forceps: straight and curved

Dilator

Scissors

Suture



Figure Eight: Equipment for umbilical catheterisation

Green needles x 2  
Suture (additional)

Needle-free adaptor x 2

NaCl 10ml or pre-made saline flush

## Preparation

Elective insertion of a CVC should be discussed with the parents in advance wherever possible although formal consent in emergency situations is not always practical. These discussions should be documented clearly. Provision of written information sheets can be helpful.

Prior to commencing the procedure:

- Position patient supine
- Ensure you have an assistant: MANDATORY for line insertion
- Ensure satisfactory cardiorespiratory monitoring and endotracheal tube secure if applicable
- Avoid placing items on the patient during the procedure
- 'Double-gloving' for the procedure is advised

## Analgesia

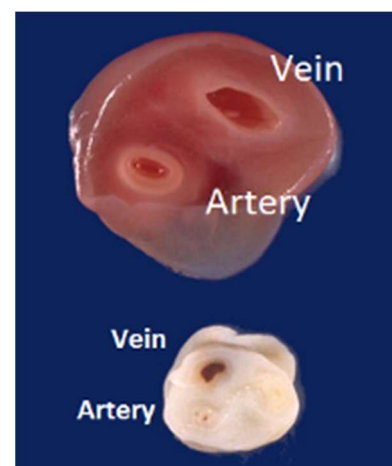
Consider the use of measures to relieve distress during the procedure such as containing the infant by swaddling or holding or expressed breast milk (EBM) or sucrose as analgesia. Refer to the following WoS guidelines for guidance about the use of oral sucrose for procedural pain (WoS Guideline – Oral Sucrose for Procedural Pain)



## Procedure

*NB - Remember to calculate your catheter length prior to commencing!*

<u>Flush</u>	Never leave catheters open to atmospheric pressure. The abdominal venous system is under negative pressure so on deep inspiration air can enter the catheter and cause an air embolism. Connect needle-free adaptors to the end of venous lines and flush all lumens with NaCl, line clamps should be closed when the catheter is not in use and 3-way taps should not be used. A syringe with NaCl should remain attached to the arterial line.
<u>Clean</u>	An assistant should hold the cord with a gloved hand by the cord clamp. Care should be taken that this does not touch the field following cleaning as this will result in contamination. Clean around the umbilical cord and surrounding skin. Particular care must be taken to avoid any pooling of antiseptic solution. The solution must be used sparingly and, if inadvertently spilled, it should be cleaned off and dried. The patient must not be allowed to lie in excess solution.
<u>Drape</u>	The entire baby and all surfaces from the baby's neck to the foot of the incubator should be draped to create a sterile field. Only the cord should be visible or exposed. Ensure ET can be seen if applicable.  Remove 'dirty' pair of gloves at this point.
<u>Tie</u>	Tie umbilical tape around the base of the cord – tightly enough to minimise blood loss but loosely enough that the catheter can pass.
<u>Clamp</u>	Clamp across the cord using straight forceps.
<u>Cut</u>	Using scalpel cut cord cleanly 1-1.5cm from skin. Place the edge of the scalpel patient side of the forceps and cut away in one direction. Try NOT to make a sawing action. Your assistant should remove the section of cord with clamp that is cut off and dispose of it. Take care that this does NOT touch the sterile field.
<u>Identify</u>	Identify vessels. Typically - vein: single, large, thin walled, oval. Artery: two, smaller, thick wall, round
<u>Dilate</u>	If needed GENTLY insert closed tips of curved iris forceps into the lumen until the cut end of the artery is at the bend in the forceps. Allow the spring of the forcep to gently open and the artery can be dilated. Dilator probes may also be used.
<u>Insert</u>	Grasp the catheter with forceps or thumb and fingers. Insert into the lumen. You may need to support the stump. Note: you may encounter resistance at the anterior abdominal wall. Gentle steady pressure with slight rotation may help overcome this. Repeat probing or excessive pressure must be avoided to prevent pushing the catheter outside the vessel lumen causing false tracking.
<u>Aspirate</u>	All central catheters should allow free aspiration of blood in their final position, and this aspiration should be documented.
<u>Observe</u>	Careful observation periumbilically and distally in the lower limbs and buttocks, if visible, for blanching, cyanosis or mottling throughout the procedure. If persistent the catheter should be removed.
<u>Image</u>	To avoid the risk of occlusion catheters should have fluid running whilst awaiting xray. Arterial catheters should be connected to a continuous infusion of heparinised saline (1 unit of heparin/ml) at a rate of 0.5ml/hour (1ml/hour may be used in babies >36 weeks gestation or >2.2kg birth weight) and venous lines should be used for infusions of 0.9% saline, glucose 10% or standard TPN. Other drugs or infusions should be avoided until



appropriate positioning is confirmed by X-ray unless required for acute resuscitation. If not used in this manner the lines should be flushed intermittently whilst the xray is awaited.

**Document** Contemporaneous documentation is essential. Insert central line sticker into patients case notes recording indication, line type, number of attempts, insertion length, position on X-ray and any adjustments subsequently made. The accepted position should be verified in writing within 24 hours of insertion by a Consultant Neonatologist. Ensure the care bundle is initiated. [Appendix B]

**Catheters should NOT be used if it is not possible to sample blood from them**

## Securing

One of the most frequent and potentially avoidable complications of umbilical catheters is inadvertent displacement which can result in significant blood loss and the loss of vascular access. Catheters must be sutured to the cord. Each catheter and securing suture should then be secured together with tape.

Each catheter requires separate fixation and the UVC and UAC should never be secured together.

In practice lines are secured with sutures prior to imaging allowing easy adjustment of position if required following. They are then taped securely in final position.

Label to distinguish arterial and venous catheters.

1. Suture through a large chunk of cord. A purse-string suture- using 3 bites of umbilicus around its circumference – may increase the security of this suture

2. Tie a knot around the umbilical catheter close to the insertion point. The knot should be tight to prevent slippage and ideally 2-4 hitches should be used to avoid the knot slacking. Each one should be tied in a reverse direction to the previous

3. Pass the suture around the catheter again, 1-2mm higher up, and tie another knot in identical fashion. This step can be repeated a maximum of two times for additional security if required

4. Using highly adhesive tape stick the catheter to the suture material ensuring the latter is taut. The tape should be close to the catheter base

5. Loop the catheter through 180 degrees and apply to tape

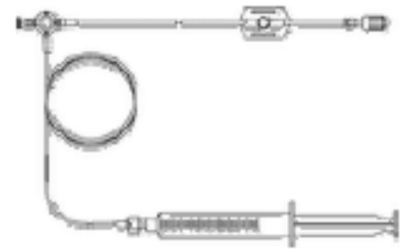
6. Stick both ends of the suture to the tape at an angle to each other as shown and then wrap the tape back on itself ensuring no adhesive surface is left exposed.

*Tip- if you fold over a small segment of the tape at each end it will be easier to unpeel the tape if required*



## Arterial Blood Sampling and Arterial Blood Pressure Measurement

All arterial catheters should be connected to a blood pressure transducer and the infants blood pressure should be monitored continuously. This provides an early warning of inadvertent disconnection as well as providing blood pressure measurements. An intermediate sampling point is also required and should be inserted between the arterial line and the pressure transducer – a closed circuit blood sampling set is routinely used to minimise the risk of infection Medex DPS Kids Kit (neonatal). The arterial line should be connected directly to this set and no additional connector.



Refer to the following WoS guidelines for guidance about the use of these sets (WoS Guideline - Arterial Lines: Priming and calibration) and procedures for taking arterial line samples (WoS Guideline - Arterial catheter blood sampling).

### Duration of use

The need for continued use of a central catheter should be reviewed daily. There is little evidence around the optimum dwell duration of central venous catheters in the neonatal population. Two single-centre studies suggested that the use of umbilical catheters for greater than 7 days is associated with an increased risk of central line associated bloodstream infection compared with use less than 7 days. If it is anticipated that a catheter is likely to be necessary for longer than 7 days then it should be replaced with a PICC. There is no trial data to compare early removal versus expectant management although observational data shows early removal will decrease incidence of infection.

### Post procedure care

All umbilical catheters should be monitored following insertion. The umbilicus should be examined at every care episode to ensure no bleeding, purulent discharge or peri-umbilical cellulitis. Ensure the catheter remains adequately fixated and is securely attached with no tension applied to the lines following change of position. Such observation is easier when the baby is in the supine position in an incubator, however prone positioning may be required on occasion. For either prone lying or kangaroo care it is important that an additional check of the umbilical catheter(s) is performed before moving the baby into the new position. It may be necessary for two people to assist such a move with one person caring for the line whilst the other adjusts the baby's position. The commonest scenario is that of an ELBW baby who has recently been extubated to CPAP in whom prone positioning improves respiratory mechanics. In other infants it may also be desirable to permit a period of kangaroo care whilst an umbilical line remains in place. Ensure regular review of position, minimise catheter access and maintain strict asepsis.

Consider running an infusate through or regular flushing of any unused lumen to prevent blockage or occlusion. Ensure this is not to the detriment of nutrition for your patient.

### Removal of Umbilical catheters – See Appendix D

- Care must be taken whilst cutting the sutures - holding the umbilical lines to avoid the potential risk of the line being cut. Stitch cutters should be used to cut the retaining sutures rather than a scalpel or scissors.
- Artery forceps should be available at the cot side during umbilical catheter removal so that the catheter or umbilical stump can be clamped immediately in the event of acute blood loss
- Complications arising from accidental severing of umbilical catheters include blood loss (more common with UAC) and intra-abdominal entrapment of the catheter (more common with UVC). The latter is an emergency and requires transfer of the infant to a unit with surgical / cardiac catheter expertise.



## Complications

Any clinical deterioration in an infant with a central venous catheter in situ should raise the question of potential catheter related complication, particularly infection, extravasation and tamponade.

**Abdominal compartment syndrome** is a complication secondary to extravasation of low-lying UVCs and presents with marked abdominal distention, respiratory distress, oliguria, haemodynamic instability and compromise to lower limb perfusion <sup>2</sup>.

Abdominal paracentesis may be required for an infant in extremis and might need to be considered prior to patient transfer. A guide to performing abdominal paracentesis is included in **Appendix B**.

**Bleeding** is a recognised complication of umbilical catheter insertion and can occur from either the umbilical arteries or umbilical vein. If only a UVC is in-situ there is a risk from bleeding from the arteries.

Infants with umbilical catheters in-situ should be under 1:1 nursing with regular observations and consideration can be given to a post-insertion observation checklist.

When bleeding is recognised to occur actions to consider include: tightening the umbilical ligature around the umbilical stump; direct pressure to the vessels; use of Haemostat where available and oversewing of the umbilical vessels which do not have a catheter in-situ. If bleeding persists following the immediate post insertion period recommend suturing the arteries.

<b>Infection</b>	<b>Vascular</b>	<b>Malposition</b>			<b>Equipment</b>	<b>Other</b>
Cellulitis	<i>Common to both:</i>	<i>General</i>	<i>Heart and Great Vessels</i>	<i>Portal system</i>	Broken catheters	<i>Venous:</i> Obstruction of pulmonary venous return
Line associated infection	- Thrombosis - Embolism	Migration	Perforation through heart muscle	Hepatic necrosis	Transection of catheter	
Necrotising enterocolitis (NEC)	- Haemorrhage  <i>Arterial:</i> - Vasospasm - Loss of extremity - Hypertension	Vessel perforation	Pericardial effusion	Portal hypertension	Fragmentation	<i>Arterial:</i> False aneurysm
		Peritoneal perforation	Cardiac tamponade			Herniation through umbilical ring
		Intestinal perforation	Cardiac arrhythmia			
		Effusion	Hydrothorax			
		Abdominal compartment syndrome	Haemorrhagic pulmonary infarction			

## References

1. BAPM Framework - [Use of Central Venous Catheters in Neonates - a Framework for Practice](#)
2. Manea C, Pryce R, Ramadan G. Fifteen-minute consultation: Is this umbilical venous catheter safe to use? Arch Dis Child Educ Pract Ed 2023; 108: 173-180. DOI: 10.1136/archdischild-2019-317388

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## Document Name

WoS\_UmbilicalLines\_Neonates

Replaces GGC\_UmbilicalLines\_Neonates

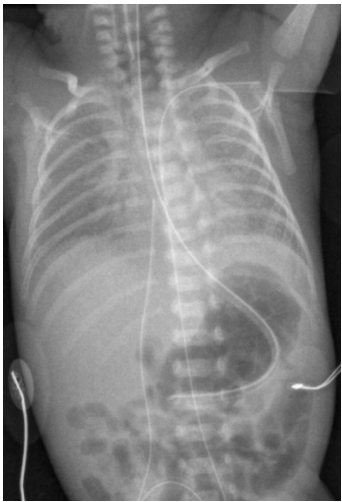
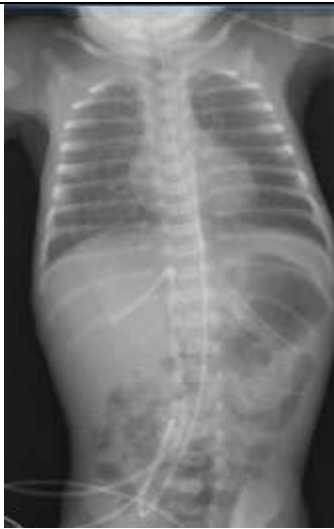
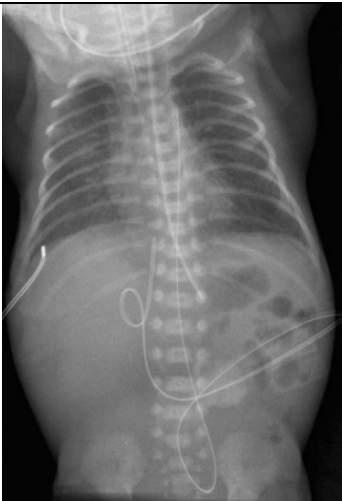
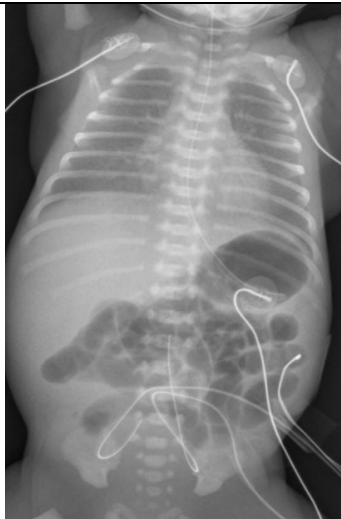
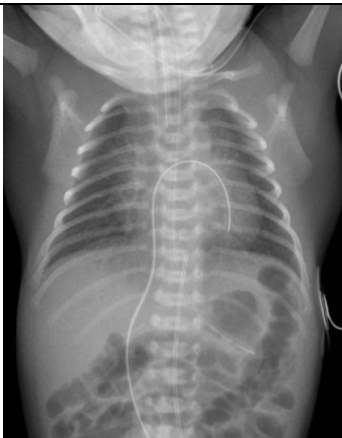
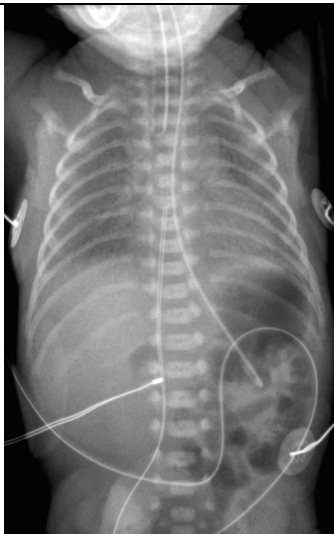
## Implementation and Review Dates




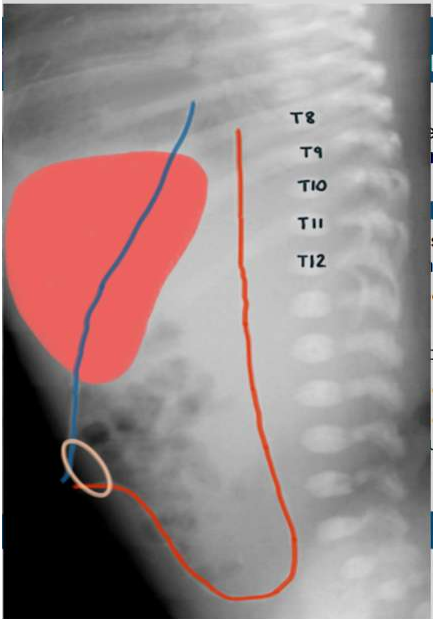
Implemented 12/09/16

Latest Review 12/12/2025

Next review 01/01/2029

## Appendix A: Catheter position and recommended actions

COMMENT	IMAGE	COMMENT	IMAGE
<p>UAC is too high sitting in the left subclavian artery</p> <p><u>Suggested Action:</u></p> <ul style="list-style-type: none"> <li>- Withdraw</li> <li>- Re-image as major position change</li> </ul> <p>UVC is too high</p> <p><u>Suggested Action:</u></p> <ul style="list-style-type: none"> <li>- Withdraw to sit outside the cardiac silhouette</li> </ul>		<p>Malposition of UVC in right portal vein</p> <p><u>Suggested Action:</u></p> <ul style="list-style-type: none"> <li>- Withdraw</li> <li>- Optimum to replace</li> </ul>	
<p>UAC is too high at T3</p> <p><u>Suggested Action:</u></p> <ul style="list-style-type: none"> <li>- Withdraw</li> <li>- Consider re-imaging</li> </ul> <p>UVC is coiled in the liver and exits via the ductus venosus. The coil is probably within the capacious space where the umbilical vein and left portal vein join.</p> <p><u>Suggested Action:</u></p> <ul style="list-style-type: none"> <li>- Optimum to replace</li> </ul>		<p>Two UACs are in place:</p> <ul style="list-style-type: none"> <li>- One in the right iliac artery</li> <li>- One in the lower aorta at the level of the upper border of L2.</li> </ul> <p>Neither position is satisfactory</p> <p><u>Suggested Action:</u></p> <ul style="list-style-type: none"> <li>- Optimum to replace</li> </ul>	
<p>The UAC is at T9: satisfactory</p> <p>The UVC is in too far, passing through the foramen ovale and into left atrium then left ventricle.</p> <p><u>Suggested Action:</u></p> <ul style="list-style-type: none"> <li>- Withdraw</li> <li>- Re-image as major position change</li> </ul>		<p>The UAC is looped upon itself and is probably tracking subcutaneously in the abdomen.</p> <p><u>Suggested Action:</u></p> <ul style="list-style-type: none"> <li>- Remove; replace if needed</li> </ul> <p>UVC is in the right atrium</p>	

		<u>Suggested Action:</u> - Withdraw	
<p>The UAC is in satisfactory position at the level of T6/7</p> <p>UVC is too far (into jugular vein)</p> <p><u>Suggested Action:</u></p> <ul style="list-style-type: none"> <li>- Withdraw</li> <li>- Re-image as major position change</li> </ul>		<p>UVC lies over the liver outline but position satisfactory</p> <p>Note the endotracheal tube is too low</p>	
<p>The UAC is high at T5</p> <p><u>Suggested Action:</u></p> <ul style="list-style-type: none"> <li>- Withdraw UAC</li> <li>- Remove UVC</li> </ul> <p>The UVC on the AP does not appear to be in far enough and is lying in the liver.</p> <p>In this instance a lateral film has been performed – remember these are not routine. On the lateral image the line can be seen to clearly loop anteriorly</p>		<p>This shows the expected positioning of an UVC and UAC on a lateral XR.</p> <p>Note the UVC should travel posteriorly through the ductus venosus of the liver to lie in the IVC.</p>	

## **Appendix B**

### **Emergency abdominal paracentesis for abdominal compartment syndrome due to massive ascites/ pneumoperitoneum**

This should be considered when abdominal distension is causing haemodynamic or respiratory compromise and an x-ray has excluded intestinal dilatation as a cause.

#### **Procedure**

1. Position infant at a 30 degree tilt (nappy/roll under right flank to position baby with left side down)
2. Consider analgesia if time/clinical state allows (morphine or fentanyl bolus, local anaesthesia, oral sucrose)
3. Prepare equipment:
  - Green or grey cannula
  - 3-way tap
  - 10 ml syringe
  - Catheter
4. Clean skin with appropriate cleansing solution for gestational age (see appropriate WOS guidance)
5. Attach 3-way tap to cannula and syringe and ensure tap is "open" to baby and syringe
6. Location:
  - Halfway between umbilicus and symphysis pubis, anterior superior iliac spine on left side of abdomen
7. Slowly advance cannula at 45° angle toward umbilicus while gently aspirating syringe
8. Stop when fluid/air obtained and push advance cannula catheter off over needle
9. Remove needle stylet, attach 3-way tap and syringe to catheter
10. Aspirate desired amount of fluid/air
11. Remember to send fluid for:
  - Biochemistry: LDH, Protein, Albumin, glucose, triglycerides, amylase, electrolytes, urea and creatinine
  - Microbiology: Gram stain, culture and sensitivity
  - Haematology: Lymphocyte count (if suspect chylous)
12. Secure with adhesive dressing
13. Leave 3 way tap in place but "switched off" to baby – can be re-aspirated if fluid/air accumulates in transfer

Note: Monitor haemodynamic parameters / urine output as fluid shift may occur



## **Appendix C: Audit Standards**

- Documentation – (Appendix D provides a sticker for the notes to act as a prompt and checklist for the operator and their assistant)
  - Indication for line insertion
  - Insertion length
  - Flushing and sampling
  - X-ray position
  - Any adjustment required
  - Final position if adjusted
  - Catheter type and serial no
  - CVC care bundle used
- Parental communication
- Removal information
  - Length of time in situ
  - Reason for removal
    - Changed for alternative access as still in situ 7-10 days
    - Catheter malfunction – not sampling, sepsis, inadvertent removal, suboptimal positioning, extravasation

## **Appendix D – Removal of Umbilical Catheters**

### **INDICATIONS**

- Central access no longer required
- Concerns regarding sepsis
- Removal after typical expected duration of UVC use which is normally 7 days. Longer term central access may be required beyond 7 days.
- Further complications (e.g. NEC, vascular compromise to the lower limbs)

### **EQUIPMENT**

- Dressing Pack
- Sterile stitch cutter
- Artery forceps should be available at cot side in event of acute blood loss
- Cleaning solution as per unit policy
- Gloves

### **PROCEDURE**

- Open dressing pack
- Place stitch cutter on open dressing pack with appropriate cleansing solution
- Wash hands as per unit policy and put on gloves
- Clean cord stump with cleaning solution
- If umbilical tissue adherent to catheter, loosen by soaking cord stump with gauze swab soaked in sodium chloride 0.9% to soften prior to line removal
- Turn infusion pump off and clamp infusion line
- Ensure umbilical tape secured loosely around base of umbilicus
- Cut sutures with the stitch cutter. Take utmost care when cutting the sutures to avoid cutting through the umbilical line
- Withdraw catheter slowly in a steady manner. Take particular care with the last 2-3 cm.
- If any bleeding noted, tighten umbilical tape (bleeding more likely in arterial line)
- Use sterile gauze to hold pressure on the umbilical stump after catheter is removed and ensure bleeding has stopped. Artery forceps can be applied if acute bleeding occurs.
- Confirm catheter is intact / visualise tip of umbilical line **(Figure 1)**
- If there is concern that any part of the umbilical line is missing immediately inform Consultant **(Figure 2)**

### **AFTERCARE**

- Observe for bleeding around the umbilical site
- Document the umbilical line removal procedure in the infant's electronic medical record and include catheter length and document if line intact/any problems during the procedure

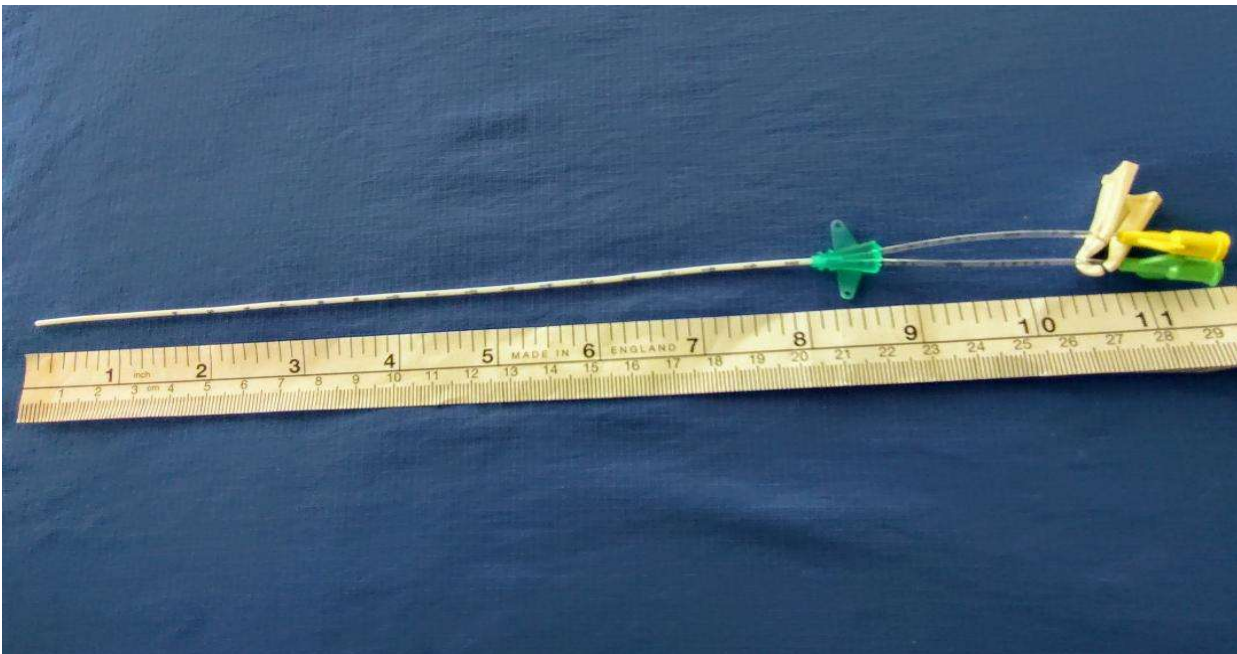
## COMPLICATIONS

- Accidental severing of umbilical catheters causing blood loss (more common with UAC) and intra-abdominal entrapment of the catheter (more common in UVC). The latter is an emergency and requires transfer of the infant to a unit with surgical/cardiac catheter expertise.
- Blood loss during elective removal or line dislodgment
- Loss of umbilical tip during removal of the line
- Infection

**Figure 1 – Tip of the umbilical line**



**Figure 2 – Length of a Standard UVC**



Prompt / Checklist be completed by Assistant

Date \_\_/\_\_/\_\_ Time \_\_:\_\_ Circle correct answers. Tick all boxes that apply

Operator: Assistant:

Line Type UAC / UVC / PICC / Femoral

Establish length of line by measurement / calculation (circle one)

- Clean trolley and set up all required equipment ☐
- Full sterile hand scrub (remove jewellery) ☐
- Hat, mask, gown and gloves ☐
- Ensure bionectors are connected to all lines ☐

Central

Please put a wee sticker on the record sheet      Name:      Name:      Please complete a DOPS for me!  
Date:      Date:      a DOPS for me!  
Line Type:      Line Type:

For documentation in