



GUIDELINE

**Central Venous Access Device:
Umbilical Venous Catheter (UVC) Insertion and
Management**

Scope (Staff):	Nursing and Medical Staff
Scope (Area):	NICU KEMH, NICU PCH, NETS WA

Child Safe Organisation Statement of Commitment

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.

This document should be read in conjunction with this [disclaimer](#)

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Aim

Outlines the indications, insertion and management of umbilical arterial lines **in neonates**. Use this guideline in conjunction with the [Central Venous Access Device Bundle](#).

Risk

Invasive devices always carry potential risk which increases when processes and management are not followed. Some of the identified complications associated with umbilical lines include:

- Infection
- Thromboembolism
- Mal-positioned catheter in heart or great vessels: pericardial effusion, cardiac arrhythmias, thrombotic endocarditis, haemorrhagic pulmonary infarction, hydrothorax
- Catheter mal-positioned in portal system: NEC, peritoneal effusion, colon perforation, hepatic necrosis

Indications for Insertion

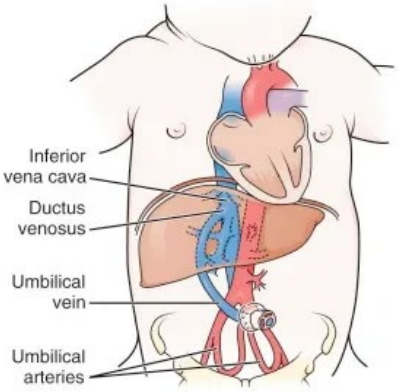
The umbilical vein is a relatively safe and pain free option for intravascular access in the newborn. Insertion of an umbilical venous catheter (UVC) is seen as a simple procedure that is often used in emergency situations at birth. **The decision to insert a UVC should be made on a case-by-case basis and discussed with the consultant or senior registrar. Indications for insertion may include:**

- Preterm neonates < 800 grams or < 26 weeks
 - Consider for higher gestation / birth weight infants if they are out born, inadequate antenatal steroid cover and being retrieved from rural and regional WA.
- Resuscitation and/or critically unwell infant e.g. at birth, prematurity, surgical infants or HIE
- Administration of multiple medications including inotropes and/or hypertonic solution. e.g.
 - glucose solutions >12.5%, hypertonic saline, sodium bicarbonate, calcium gluconate.
- Cardiac infants requiring a prostaglandin infusion
- Exchange transfusion

Prior to Procedure

- The clinician performing the procedure must have appropriate training or supervision during the procedure.
- Documented clinical indication in the patient's progress notes.
- Adequate cardiac and SaO₂ monitoring of the infant throughout the procedure.
- Refer to Neonatal Intravascular Device Insertion Record (MR422) for procedural checklist.
- UVC is often inserted in conjunction with [Umbilical Arterial Catheters](#).
- Refer to the [Reusable Medical Devices: Reprocessing, Tracking and Traceability](#) guideline for tracking and tracing process and documentation at point of care for reusable medical devices (RMD's)

Anatomy and Position

<p>The umbilical vein is 2-3cm long and 4-5mm in diameter. From the umbilicus, it passes cephalad and a little to the right. It joins the left branch of the portal vein after giving off several large intrahepatic branches. The ductus venosus arises from the point where the UV joins the left portal vein and bypasses the liver, joining the inferior vena cava just distal to its entry into the atrium.</p>	 <p>The diagram illustrates the anatomy of the newborn's torso, focusing on the abdominal and thoracic regions. It shows the inferior vena cava (IVC) entering the right atrium of the heart. The ductus venosus is shown as a shunt that bypasses the liver, connecting the umbilical vein to the IVC. The umbilical vein is shown originating from the umbilicus and passing cephalad. The umbilical arteries are also shown originating from the umbilicus. Labels include: Inferior vena cava, Ductus venosus, Umbilical vein, and Umbilical arteries.</p> <p>Adapted from: <i>From Robert and Hedge's Clinical Procedures in Emergency Medicine</i></p>
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- The ideal position for a UVC is in the inferior vena cava, just outside of right atrium, at T9, which correlates to 0.5cm above the diaphragm on the lateral image.
- In an emergency, a UVC that remains in the portal circulation may be withdrawn until it lies in the umbilical vein. Hypertonic solutions can be infused through this for a short period of time until more suitable access is obtained.
- In a resuscitation situation, it is safe to advance a UVC whilst aspirating frequently until blood return is seen. Inserting the catheter 1-2 cm beyond this point is an appropriate position for emergency use without radiographic confirmation of position.

Catheter Size and Insertion Distance

<1500g 3.5F – single lumen catheter

>1500g 5F – single lumen catheter

- The preferred method for estimating the insertion distance for the UVC is by measuring the umbilicus to shoulder distance. Measure from the skin at the base of the stump where it connects to the anterior abdominal wall then add the length of the umbilical stump to the distance inserted.
- The catheter can then be inserted to the appropriate distance according to the table below:

UVC Insertion distance	
Shoulder - Umbilicus Distance (cm)	UVC insertion length
9	5.5
10	6.5
11	7.0
12	8.0
13	8.5
14	9.5

Equipment

Common equipment Appendix 1	UVC specific
<ul style="list-style-type: none"> • Surgical gown x 1 • Sterile pair of gloves x 2 • Mask x1 • Face Shield (as required) x1 • Sterile non-woven (soft) gauze* • Antiseptic solution: <ul style="list-style-type: none"> ○ >27 weeks gestation: 1% chlorhexidine solution ○ ≤27 weeks gestation: Povidone-iodine 10% solution/swab • PICC placement kit (PCH only) • Sterile 0.9% Sodium chloride ampoules x2 • Blunt drawing up needle x 1 • Sterile absorbent towel x 1 • 3-way taps x 3 • Smartsite™ valves x2 (for each 3-way tap) 	<ul style="list-style-type: none"> • Appropriate size UVC for gestation • Fluid administration set • Suture- 3.0 Prolene / 3.0 Silk • Sterile Instrument pack • Cord tie • Sterile plastic drape <div style="border: 1px solid black; padding: 5px; margin-top: 20px; text-align: center;"> <p><i>*to reduce the risk of abrasive skin injury</i></p> </div>

Fluids:

- 27 weeks - Starter Pack 5% Glucose **or** Glucose 5% + 0.5 u/mL Heparin
- 27 to 29⁺⁶ weeks - Starter Pack 8% Glucose
- 30 to 33⁺⁶ weeks - Glucose 7.5% + Sodium Chloride 0.22% + 0.5 u/mL Heparin
- ≥34 weeks - Glucose 10% + 0.5 u/mL Heparin

Procedure Steps

1. Arrange all the equipment on the procedure trolley in a systematic manner. [Appendix 1. Assistant to complete tracking and traceability requirements of Reusable Medical Devices: Reprocessing, Tracking and Traceability.](#)

2. Draw up 10 mL of 0.9% sodium chloride into syringe and attach a three-way tap to the catheter. Flush through both the three-way tap and the catheter with the saline (both lumens of the catheter) ensuring that there is no air in the catheters.



Note: Sodium Chloride for priming of catheters is to be drawn up directly from ampule with a drawing up needle.

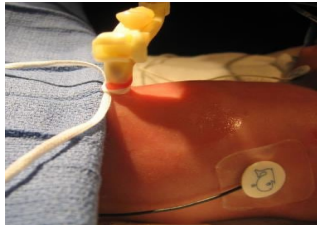
3. Ensure three-way taps are connected at end of all lumens of catheter. Turn the three-way tap off or clamp the line to prevent any entry of air into the catheter. To reduce the risk of air embolism whilst the catheter is being inserted.

4. Position the infant comfortably and drape the bed with a sterile "blue cloth" on the side where the operator is standing.
5. Hold the cord clamp with the sterile forceps and hand that over to the assistant.
6. Clean cord and peri-umbilical area with disinfectant appropriate for the age and gestation. Avoid excess application and any spillage around down to the back of the baby as this may cause burns to very preterm skin.
7. **Allow to dry for 30/60 seconds depending on solution** and wash off with sterile water and pat dry to prevent potential chemical burns and skin irritation.

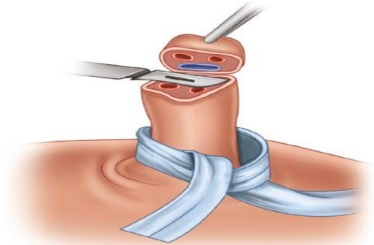


Procedure Steps

8. Tie umbilical tape around the base of the cord tightly enough to minimise blood loss but loosely enough to allow the catheter to be passed through.



9. Make a clean horizontal cut in cord under the clamp with a scalpel blade (or scissors) preferably leaving 1cm of cord above the skin junction

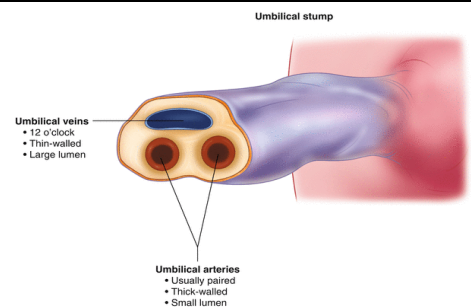


10. Cover the baby with the large clear plastic drape, with the pre-cut hole in the centre of the drape over the site of insertion.

11. Identify the umbilical vessels

Vein: single, large, thin-walled

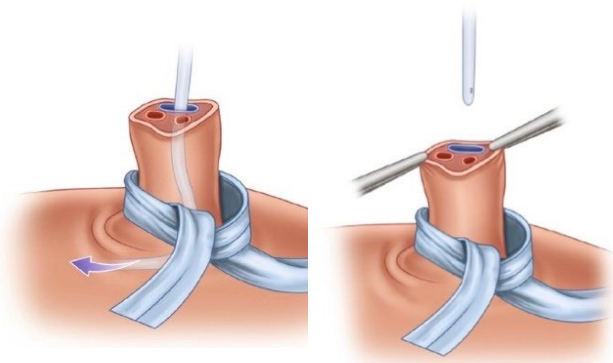
Artery: two, smaller, thick wall, generally constricted so that the lumen may appear pinpoint.



12. The cord stump should be stabilised which can be done with artery forceps.

13. Place the tip of the catheter into the lumen of the vessel and gently advance to 5 cm into the vein.

14. Turn the three-way tap so that the catheter is open to the syringe and assess smooth back flow of blood. If there is good backflow, continue inserting to the predetermined length and aspirate to verify blood return. Remember that the vein goes up towards the heart unlike the arteries which descend first, therefore, the catheter should be passed upwards. Directing the catheter to the left shoulder often helps to navigate through the ductus venosus.



15. If no blood is aspirated at this point either advance the catheter 1 cm at a time or withdraw catheter 1 cm at a time until blood can be aspirated. **Note:** UVCs placed during neonatal resuscitation also require demonstration of adequate back sampling of blood before use.

16. It can be difficult to pass the catheter through the ductus venosus. There are some manoeuvres that can assist in placement. These include:

Procedure Steps
<p>a. Pulling the catheter back to about 4-5cm, then advancing the catheter whilst rotating the catheter clockwise.</p> <p>b. Pulling the umbilical cord stump in a downward direction with the forceps while inserting the UVC.</p> <p>17. If there is any resistance and you cannot advance the catheter to the desired depth or there is a bobbing motion of the catheter, it may have entered the portal vein or be wedged in the intra-hepatic branch of the umbilical vein. The catheter will either be retracted or removed and replaced.</p> <p>Note : <i>Some authors have described a technique involving insertion of another smaller bore catheter alongside which may then pass into the ductus venosus before removal of the original catheter. However, there is insufficient evidence to support the technique of double cannulation at the present time. This practice may increase the risk of umbilical vein trauma and should be considered only under adequate supervision</i></p>
<p>18. Secure the catheter with an anchoring suture that is close to the catheter and goes through Wharton's jelly and taking a small bite through the skin.</p> <p>19. Anchor the knot close to the catheter. For alternative methods of securing the UVC- refer to the appendix 2</p> <p>20. Tie suture around the UVC tight enough to prevent slippage but still allowing easy drawback and flushing of the line.</p>
<p>21. Infusion giving set to be opened onto sterile field, assistant to spike bag or attach to syringe for priming of line. Primed giving set to be attached to umbilical catheters using sterile aseptic technique and commence infusions at 1.0 mL/hr prior to x-ray confirmation of placement to avoid blocking of the line.</p>
<p>22. Apply a 2.5cm piece of brown tape around catheter and suture material as close as possible to umbilical stump/catheter. UAC & UVC should be secured separately.</p>
<p>23. Remove excess skin prep with sterile water or saline. Residual cleaning solutions on the infant's skin can be a potential for chemical skin burns. Check that the infant is left clean and dry, check linen under the infant and assess temperature.</p>
<p>24. Clear away all equipment and ensure that any needles or scalpel are safely disposed of into a sharps bin.</p>
<p>25. Complete the Neonatal Intravascular Device Insertion Record (MR422)</p>
<p>26. Infant to be nursed supine for a minimum of 1 hour post insertion to observe for ooze/blood loss around umbilical stump.</p>

Post Procedure Management:

1. Confirm the catheter tip placement with an X-ray: refer to [Central Line Imaging in Neonates: Radiographic Views, and Acceptable Line Positions](#)

2. A repeat x-ray is to be performed following catheter adjustment to confirm tip position. Adjustments to be documented in the progress notes MR420 and on the MR422 (UAC/UVC Insertion record).
3. Clinician performed ultrasound may be used in conjunction with X-ray to ensure safe placement and adjustment of UVC.

Nursing Management

- Inspect the umbilical site at least hourly for signs of infection, ooze and catheter position (distance of brown tape from umbilical stump).
- Inspect the lower extremities at least hourly for colour, temperature and perfusion. Any changes should be reported immediately to medical staff.
- Infants with umbilical lines in situ should not be wrapped or have nappies or booties on. The pelvic area and feet to be visible to check for adequate circulation.
- Document inspections on MR489.

UVC Removal Guidance

As per the Guidelines for the Prevention of [Intravascular Catheter-Related Infection \(BSI\) Prevention Guidelines](#) (2011), Centre for Disease Control (CDC) and Prevention, **a UVC should be kept in no longer than 7-10 days due to the high risk for vascular and infection related complications.**

If it is anticipated that central venous access is likely to be necessary for longer than 5-7 days, the UVC should be replaced with a suitable central venous access device.

- Review the need for the UVC on clinical rounds every day. Once the decision to remove the catheter has been documented, it should be performed within an hour of the medical order. If delays occur, document and inform medical staff.
- Removal of an umbilical catheter is a 2-person aseptic technique by staff who have received training and are deemed competent. Refer [to Appendix 3 for Removal of UVC procedure.](#)
- A nurse may remove the UVC if it has been stitched in separately from the UAC. If the catheters have been stitched in together then it is the responsibility of medical staff to remove the catheter.
- Medical staff must be informed of impending UVC removal and be available during removal procedure to attend to the patient in the event of a complication occurring e.g. abnormal coagulation profile, resistance, tight sutures.
- Bedside nurse and assistant to complete pre procedure safety checklist including “time out” prior to removal/adjustment of UVC as per MR422.00.
- Where Reusable Medical Devices are used i.e. universal tray, IA kits, suture tray, refer to the [Reusable Medical Devices: Reprocessing, Tracking and](#)

Traceability guideline for tracking and tracing process and documentation at point of care.

- If intravenous access is still required, ensure that there is another patent intravenous access prior to the removal of any umbilical catheters.

Related CAHS internal policies, procedures and guidelines

Neonatology Clinical Guidelines

- [Central Line Imaging in Neonates: Radiographic Views, and Acceptable Line Positions](#)
- [Central Venous Access Device Bundle](#)
- [Sepsis Neonatal](#)
- [Umbilical Arterial Catheter](#)

CAHS Infection Control Policies

- [Hand hygiene](#)

References and related external legislation, policies, and guidelines (if required)

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Related CAHS internal policies, procedures and guidelines

Neonatology Clinical Guidelines

- [Central Line Imaging in Neonates: Radiographic Views, and Acceptable Line Positions](#)
- [Central Venous Access Device Bundle](#)
- [Reusable Medical Devices: Reprocessing, Tracking and Traceability](#)
- [Sepsis Neonatal](#)
- [Aseptic Technique in the Neonatal Unit](#)

CAHS Infection Control Policies



- [Hand hygiene](#)

PCH Clinical Practice Manual

[PCH Central Venous Access Devices \(CVAD\) and Midline Insertion and Management](#)

Central Venous Access Device:
Umbilical Venous Catheter Insertion and Management

This document can be made available in alternative formats on request.

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Standards Applicable:	NSQHS Standards:   Child Safe Standards: 1,10		

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Healthy kids, healthy communities

Compassion
Excellence
Collaboration
Accountability
Equity
Respect

Neonatology | Community Health | Mental Health | Perth Children's Hospital

Appendix 1: PICC Placement Kit

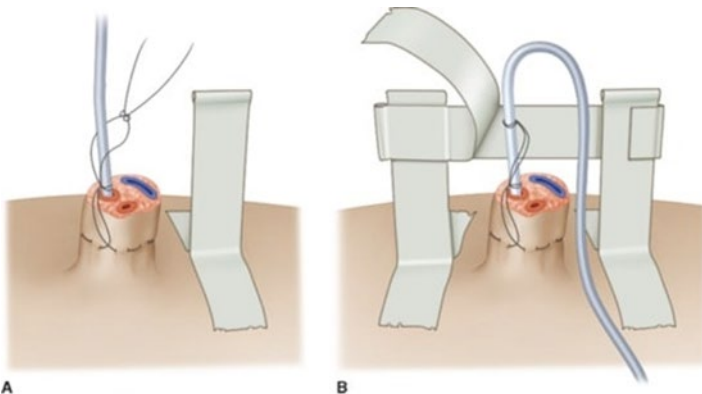


- 1 x outer wrap
- 2 x drape towels (absorbent/impermeable)
- 2 x blue prep forceps
- 2 x measuring tapes (60cm)
- 2 x Tegaderm dressings (4cm x 4cm)
- 1 x 10ml luer lock syringe
- 1 x silicone neonatal tourniquet
- 4 x ball swabs
- 2 x hand towels
- 1 x peelable transparent drape with 'easy peel' 50cm x 50cm (opening 4cm)
- 1 x straight Reynolds scissors 9cm
- 1 x straight Iris forceps 10cm
- 1 x curved Iris forceps 10cm
- 5 x swabs, 4 ply (7.5cm x 7.5cm)
- 2 x gallipots 60ml
- 1 x tray 20cm x 15cm x 4cm
- 1 x pack of small steri-strips (6 x 38mm, x 6)

Note: PICC placement kit is preferred, in-line with the PCH CVAD guideline. However, suitable sterile reusable instrument kits may be used when PICC kits are not available.

Appendix 2: Alternative Methods for securing umbilical catheters

- **Cut 2 pieces of Comfeel®** and adhere to skin at either side of the umbilical stump which protects the skin and provides a barrier against epidermal stripping.
- Fix tapes as illustrated
- Ensure tape is secure and catheter is looped so that accidental tension to line will not displace catheter
- UAC & UVC should be secured separately
- This method is not routinely used in the preterm population (<32weeks) due to the fragility of their skin.



Source: Lisa B. Zaoutis, Vincent W. Chiang:
Comprehensive Pediatric Hospital Medicine, Second Edition
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Appendix 3: Removal of UVC (2 Person Procedure)

Equipment required:

- Umbilical catheter removal kit
- Dressing pack
- Sterile non-woven (soft) gauze
- Gloves (sterile gloves not required)
- >27weeks gestation 1% Chlorhexidine solution
- ≤27weeks gestation or Povidone Iodine 10% swab
- 0.9 % Sodium Chloride

Procedure Steps

Pre-procedure - Perform the **Removal Procedure Safety Checklist including Time Out** as per the Umbilical Arterial and Venous Catheter (UAC/UVC) Insertion and Removal MR 422.00

1. Perform hand hygiene and prepare equipment using aseptic technique.
2. Assistance to gently hold the legs of the infant. Consider sucrose as pain relief
3. Perform hand hygiene and don gloves
4. Remove the tape around the catheter to be removed if suture not visible. If coagulated blood around suture material and umbilical stump, moisten gauze with sodium chloride and wrap around umbilical stump for 1-2minutes. Clean area prior to commencing procedure.
5. Cleanse umbilical area with appropriate skin prep as per gestation as above.

TIME OUT: Before applying the forceps to the umbilical catheter to be removed, the assistant must visualise the forceps and agree that it is a forceps and not a scissor.



6. Apply artery forceps **below the sutures** prior to cutting the suture (to prevent migration of the catheter internally in the advent of the catheter being accidentally cut).

Then cut the suture.



7. Place gauze pad directly over the umbilicus, apply gentle pressure in downward direction for a UAC.
8. Remove catheter in a slow continuous motion to promote vasoconstriction. Check that catheter is intact. Continuous pressure should be applied for a minimum of 5 minutes. Ensure the peripheries stay pink and well perfused.
9. Clean skin prep from skin with sodium chloride and leave infant in the supine position with the stump uncovered for one hour to observe for any blood loss. Perform hand hygiene post procedure.
10. Document the removal procedure on Neonatal Intravascular Insertion Record MR422, and in the patient's progress notes. Include estimated blood loss (if any)