Umbilical Artery and Vein Catheterisation in the Neonate

Guideline Responsibilities and Authorisation

Department Responsible for Guideline	NICU
Document Facilitator Name	Claire West
Document Facilitator Title	Neonatologist
Document Owner Name	Jutta van den Boom
Document Owner Title	Clinical Director NICU
Target Audience	Neonatal and Paediatric SMOs, Registrars and Fellows in NICU/SCBU, Neonatal Nurse Practitioners, Clinical Nurse Specialists and Registered Nurses working in NICU/SCBU
Disclaimer: This document has been developed by Waikato District Health Board specifically for its own use. Use of this document and any reliance on the information contained therein by any third party is at their own risk and Waikato District Health Board assumes no responsibility whatsoever.	

Guideline Review History

Version	Updated by	Date Updated	Summary of Changes
1	Claire West	Dec 2020	Initiated

Umbilical Artery and Vein Catheterisation in the Neonate

1 Overview

1.1 Purpose

Umbilical vessels are relatively accessible in newborn infants, and are often useful particularly in the very small and very large infants.

The National Women's / Starship guideline provides further information on the use of these catheters and the associated risks and benefits, and should be read in conjunction with this guideline. https://www.starship.org.nz/guidelines/umbilical-artery-and-vein-catheterisation-in-the-neonate

The document below outlines the preferences of the Waikato Hospital NICU regarding skin preparation, calculation of insertion distance and usage.

1.2 Scope

All health professionals working in the Waikato Hospital NICU.

1.3 Patient / client group

Neonates admitted to Waikato Hospital NICU, and to Midland Regional SCBU.

1.4 Exceptions / contraindications

Umbilical vessels are not cannulated in infants with omphalocoele, and rarely in infants with gastroschisis.

Care should be taken with cannulation in infants after the first 24 hours from delivery due to increased colonisation of the cord and potential for introduction of infection. Infants with omphalitis should not have the umbilical vessels cannulated.

1.5 Definitions

NICU	Neonatal Intensive Care Unit
SCBU	Special Care Baby Unit
UAC	Umbilical Arterial Catheter
UVC	Umbilical Venous Catheter
SMO	Senior Medical Officer

2 Clinical Management

2.1 Equipment

See Waikato DHB NICU nursing procedure Arterial Line: Catheterisation and set up umbilical and peripheral arterial catheter in Newborn Intensive Care Unit (1637)

2.2 Guideline

The basic background and technical information can be found in the guideline below. The Waikato NICU practice preferences are outlined after this with reference to the relevant sections of the guideline.

Try to maintain sterility until the correct position/s of the umbilical line/s are confirmed to allow further manipulation

https://www.starship.org.nz/guidelines/umbilical-artery-and-vein-catheterisation-in-the-neonate

Please read Starship disclaimer before proceeding further.

1. Skin preparation

- ELBW infants <1000g birthweight have skin cleaned with sterile water
- Infants with birth weight ≥ 1000g have skin cleaned with 2% chlorhexidine gluconate swabs
- Ensure there is no pooling of cleaning solution underneath the baby

2. Documentation

- It is the responsibility of the clinician inserting the catheter to ensure the Central Access Device Insertion Record and Checklist is completed, confirming process and documenting measurements, confirmation of position of line, and adjustment before use.
- In the clinical file the clinician should note the number of attempts to place catheter/s, their final measurements at the skin after adjustment, and confirmation of position
- It is the responsibility of the nurse to document each shift the insertion length of the catheter/s on the observation chart

3. Umbilical Venous Catheters

A. Insertion distance

- The preferred method for calculating the insertion distance for UVC is:

  UVC (cm) = (Umbilicus to nipple distance – 1 cm) + length of stump

- Alternatively the weight of the baby can be used as below – but may not be as accurate for an IUGR infant.

  UVC (cm) = (1.5 x birthweight in ***kg***) + 5.5

- **Do NOT** advance the catheter after initial insertion **unless** full sterility is maintained throughout the complete process.

B. Position (verification)

- Position of UVC should be verified with anteroposterior chest and abdominal radiograph
- If the UVC is not clearly above the diaphragm (and into the cardiac silhouette) a lateral chest and abdominal radiograph should be obtained to confirm positioning
- The ideal UVC position is in the inferior vena cava just outside the right atrium, at T8-9 (thoracic vertebrae)
- Any UVC adjusted after an X-ray should be re-X-Rayed to confirm the correct position
- An alternative method for confirmation of position is by cot-side ultrasound performed by an appropriately trained clinician.

4. Umbilical Artery Catheters

A. Insertion Distance

- The preferred method for estimating the insertion distance for the UAC is:

UAC (cm) = umbilicus to nipple distance – 1cm + (2 x distance from umbilicus to symphysis pubis) + length of the stump

- Alternatively the weight of the baby can be used as below:

UAC (cm) = (birthweight in ***kg*** x 4) + 7

- **Do NOT** advance the catheter after initial insertion **unless** full sterility is maintained throughout the complete process.

B. Position (verification)

- Position of UAC should be verified with anteroposterior chest and abdominal radiograph
- The ideal UAC position is at the high position at the level of T6-9 (thoracic vertebrae). The catheter tip is above the diaphragm and the coeliac axis. This is the usual initial placement
- Alternatively the UAC can be positioned at the low position, at the level of L4 (lumbar vertebra). The catheter tip is below major aortic branches such as the renal and mesenteric arteries, at the aortic bifurcation
- Any UAC adjusted after an X-ray should be re-X-Rayed to confirm the correct position.

5. Securing Umbilical Catheters

- Catheters are secured with a suture through the skin at the junction with the umbilical cord
- Infants born <1000g or <32 weeks do not have the catheters reinforced by a bridge. This can be reviewed at 5 days of age.

2.3 After care

Consider a CXR (including upper abdomen) if there is significant abdominal distension to confirm the position of the umbilical catheters.

It is the responsibility of the nurse to document each shift the insertion length of the catheter/s on the observation chart.

2.4 Complications

Vascular accidents (thrombosis, embolism), extravasation, hypoperfusion, pericardial effusion.

3 Audit

3.1 Indicators

- Correct position of umbilical catheters present on initial chest + abdomen X-ray
- Repeat X-ray is taken to confirm catheter position after manipulation

4 Evidence base

4.1 References

https://www.starship.org.nz/guidelines/umbilical-artery-and-vein-catheterisation-in-the-neonate

4.2 Associated Waikato DHB Documents

- NICU Nursing Procedure: Arterial Line: Catheterisation and set up umbilical and peripheral arterial catheter in Newborn Intensive Care Unit (1637)
- NICU Nursing Procedure: Arterial lines – sampling, nursing management and removal in NICU (1638)