GUIDELINE

CVAD: Central Venous Access Device Bundle

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

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CAHS Child Safe Organisation Commitment Statement

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Aim

This guideline outlines the key points associated with the correct insertion, management and removal of Central Venous Access Devices (CVAD) for neonatal patients and aligns with the PCH Central Venous Access Devices and Midline Insertion and Management guideline. Providing consistency of care and incorporating the appropriate CVAD selection for a patient's clinical situation.

The benefits of having this guideline are to reduce the risk of procedural related complications, central line associated blood stream infections (CLABSI), and CVAD associated thromboses.

Specific procedural details for each central line are outlined in the following guidelines:

- CVAD CVC / Femoral Vein
- CVAD Percutaneously Inserted Central Catheter (PICC) / Long-line
- CVAD Umbilical Artery Catheter
- CVAD Umbilical Venous Catheter

Risk

Non-compliance may increase the likelihood of complications and reduce consistency in care. It can also affect compliance with safety and quality standards, create challenges for auditing and training, and impact overall confidence in care processes.

Abbreviations / Types of CVADs

PICC: Peripherally inserted central catheter

UVC: Umbilical venous catheter

UAC: Umbilical arterial catheter

CVC: Non-tunnelled central venous catheter: femoral or jugular vein insertion

tCVC/Broviac: Tunnelled central venous catheters

CLABSI: Central line associated bloodstream infection

Indications for Use

The indications for insertion of a CVAD can be multifactorial and may include:

- Long-term venous access requirement
- Safe route of administration for hyperosmolar fluids/drugs; long-term parenteral nutrition; or drugs/fluids that have a high risk if extravasation or are vasoactive such as inotropes
- Critically unwell neonates who require multiple infusions/ blood product administration
- Access for exchange transfusion/ haemodialysis/filtration

Complications

Complications from a CVAD can occur as part of the insertion process or later during the maintenance phase.

Procedural/Early Complications

- Bleeding - haematoma formation or haemorrhage from the insertion site

- Injury to adjacent structures – for example arterial puncture or injury to viscera
- Catheter fracture resulting in catheter or guidewire embolism
- Unsuccessful line insertion/catheter malposition requiring escalation

Potential Late Complications

- Mechanical failure: Catheter migration; occlusion; leakage; breakage
- Phlebitis – mechanical or infective
- Extravasation causing infiltration and damage to surrounding tissue
- Malpositioning leading to pericardial effusion, pleural effusion, ascites, hepatic injury or collection, arrhythmias
- Central Line Associated Bloodstream Infection (CLABSI)
- Thrombosis

CVAD Insertion Bundle

Central line insertion is a sterile surgical procedure. **Refer to associated neonatal guidelines for specific insertion procedures**

Documentation for insertion, removal and maintenance.

- Central Venous Access Device Insertion and Maintenance Chart MR422.01
- Umbilical Arterial and Venous Catheter (UAC/UVC) Insertion and Removal MR422.00.

The following aligns with the PCH Central Line Insertion Bundle Wheel and describes the 7 key points related to the insertion of a CVAD.

1. Appropriate planning

- Health care professionals performing CVAD insertion must be competent and have undergone training and education to perform this procedure or be supervised by an appropriately qualified clinician
- Document the reasons for insertion in medical records
- Determine the appropriate CVAD required – type/ gauge/ length and number of lumens – use the minimum number of lumens for the clinical scenario. This decision should be taken after consulting a senior doctor
- Consider any sedation/analgesia required for procedure
- Inform parents of the procedure and document in medical records
- Place **“Stop - Procedure Ongoing”** sign in front of the room or at edge of patient zone to minimise movement through the area for procedure duration
- Hand over pager or phone to second doctor or nursing staff

- Identify the site of insertion and measure the length of the catheter that will be inserted from the entry point
- Provide adequate thermoregulation
- Time out - Complete the pre-insertion checklist on MR 422.01
- Consider the use of a third person i.e. second doctor or nurse to assist with procedure if required

2. Routine decolonisation

Where feasible, decolonisation should be initiated **5 days prior** to central line insertion. If pre-insertion decolonisation is not achievable, the full 5-day regimen should be completed after insertion. Refer to CAHS decolonisation protocol.

Decolonisation prior to insertion of umbilical lines at birth is not required.

Infants <32 weeks CGA who require insertion of a PICC do not require additional decolonisation – the routine use of Chlorhexidine lotion during the routine Chlorhexidine Wash Procedure is sufficient.

3. Surgical Scrub

- The proceduralist and assistant must perform a surgical scrub as per KEMH and PCH Perioperative Guidelines with Chlorhexidine Gluconate 4% (40g/L) prior to insertion. The surgical scrub must be preceded by hand hygiene with soap and water up to the elbows. Refer to CAHS Surgical and hand antisepsis policy

4. Antisepsis

Application of antiseptic solution must be done on clean skin (free of adhesives, residual glue from previous dressings).

- **> 27 weeks** - use 1% Chlorhexidine solution. Allow to air dry for 30 seconds. Wash off excess solution **after** the procedure with sterile water or saline to prevent skin irritation or chemical burns.
- **≤ 27 weeks** - use Povidone-Iodine 10% solution/swab. Allow to air dry for 1 minute then wash off all solution with lukewarm sterile water or saline **before** the procedure. This is vital as iodine can be absorbed through neonate's immature, non-keratinised skin. Avoid areas with poor skin integrity.

5. Maximal Barrier Precautions

- A mask, cap, sterile gown, and sterile gloves are to be worn by all Health Care Professional (HCP) touching the sterile field during the catheter insertion procedure. The assistant and any personnel entering the procedure area (1m radius from edge of the patient's bed) must wear a cap, mask, and non-sterile gown **even if not participating in the procedure.**

- The sterile field must be large enough to cover the whole body (if not invasively ventilated allowing for the patient to breathe) and extend over the sides of the bed.

6. Insertion Checklist

- Complete insertion checklists
- Central Venous Access Device Insertion and Maintenance Chart MR422.01
- Umbilical Arterial and Venous Catheter (UAC/UVC) Insertion and Removal MR422.00.

7. Use of dedicated trolley and pre-packed equipment packs is recommended

- A clean, empty, specialised equipment trolley should be used for sterile procedures rather than the 'procedure trolley' which, when accessed during the procedure, may compromise the sterile field and contaminate the stock in the drawers.
- This trolley must be covered with a sterile field large enough to extend over the edges of the trolley.

Analgesia and sedation

Offer maximal non-pharmacological supports for all CVAD insertions as per the CAHS Neonatology Pain Assessment and Management guideline. Holding with sucrose or colostrum/EBM administration is often sufficient.

Pharmacological support may be considered for insertion of CVADs to improve success rate if non-pharmacological supports have been optimised, particularly for preterm and self-ventilating neonates:

Short acting sedatives or analgesics may be used but ensure that appropriate time is allowed to achieve maximal effect and ensure that full respiratory support is available in the event of instability.

Tissue adhesive

Tissue adhesive ("tissue glue") may be considered at the insertion site for PICCs and CVCs to reduce post-insertion bleeding and prolong the time to first dressing change. Evidence has demonstrated decreased catheter dislodgement and a tendency towards a reduction in CLABSI, with no reported adverse events in neonates—including preterm infants as early as 23 weeks' gestation.

The use of tissue adhesive is standard practice for PICC lines at PCH and may be considered for femoral lines and umbilical lines.

At KEMH, use of tissue adhesive is determined on a case-by-case basis by the senior doctor responsible for the patient.

Following insertion, and prior to dressing (once line position is confirmed), whilst still sterile apply 1 drop of tissue adhesive, let dry (30-60s) and apply a second drop on top if necessary.

Tissue adhesive is not to be used during routine maintenance of the device.

For removal, gently roll the adhesive away from the skin. Using gauze soaked in saline may assist with loosening and removal.

CVAD Maintenance Bundle

The aim of the maintenance bundle is to reduce late complications associated with CVADs such as infection or thrombosis, and to facilitate the early removal of CVADs.

The CVAD must be reviewed each shift and clearly documented on the MR422.01.

This bundle aligns with the PCH Central Line Maintenance Bundle Wheel

NOTE: Step 7 (discharge support) does not apply to the neonatal population.

1. Focus on **Hand Hygiene**

5 Moments of Hand Hygiene

2. CVAD competent nursing and medical staff

Staff handling and accessing CVADs must be deemed competent.

Staff to complete the online CVAD training through MyLearning. This is mandatory for PCH Neonatology staff.

3. Is the CVAD still required and working appropriately?

The need for the CVAD to remain in situ must be reviewed at every ward round and documented in the medical record.

4. Dressing and site check

- Dressing changes is a Surgical Asceptic Technique 2-person procedure and must be performed only by competent staff (medical, CN, NNT).
- Inspect the site each shift for redness, swelling, tenderness, discharge, or dressing lift; document in medical record and discuss with medical team
  - A swollen limb / body part near the insertion site may indicate:
    - Catheter displacement or extravasation
    - Constriction from tight dressing/tape
- Ensure transparent dressings are:
  - Fully sealed with ~1 cm margin
  - Dry and free of drainage
  - Non-restrictive (not circumferential)

If the dressing is intact and there are no concerns, do not change it — unnecessary manipulation increases infection and dislodgement risk.

- Change the dressing **only if**:
  - Dressing has lifted or catheter is exposed.
  - Excessive leakage is present.
  - Dressing is damp, loosened, or soiled.
  - Circulation or movement is restricted.
  - Site inspection is required due to suspected complications.
  - For old, contained blood under Tegaderm with no active bleeding, weigh the benefit of redressing against the risk of dislodgement.

Refer to individual CVAD guideline for equipment required for dressing changes and catheter assessment

5. Accessing central lines/ drug and infusion administration

i. Scrub the Hub

Needle free ports must be swabbed with 2% chlorhexidine gluconate in 70% alcohol swab with friction for 20 seconds and allowed to dry completely for 30 seconds prior to use

ii. Central line care

- Minimise changing or “breaking” the line for infusions and medications. If multiple breaks are required, consider rationalisation of medication or the insertion of a Peripheral Intravenous Cannula.
- If an infusion line is disconnected from the patients CVAD, a new infusion and line must be prepared using aseptic technique.
- Blood sampling from central lines should be considered based on the risk benefit to the patient. UVCs / CVCs and 3F PICC lines should only be bled at the instruction of senior doctor, and where possible should be limited to once per day. **24G (2F) and 28G (1F) PICC lines must never be used for blood sampling.**
- To maintain lumen patency, central lines **MUST** have heparinised fluids infusing through every lumen, **AT ALL TIMES.**
- Pressure limits must be set at 50-100mmHg above base line AND pressure monitoring should be numerically displayed, at all times.
  - In the event of pressure limits being exceeded, **prompt** medical review is required. If this is left too late, the line may become completely occluded and require removal.

- Frequency of line changes:
  - Giving sets and lines must be labelled according to CAHS Labelling of Injectable Medications and Fluids
  - Giving sets must be changed every 96 hours. If the concentration of fluids ordered has changed, the giving set must also be changed.
  - If the line is being used to administer blood products, lipids or lipid-containing drugs such as propofol, the catheter set should be changed after product administration
  - Infusions prepared on the ward must be changed after 24hours

If occlusion is suspected, report immediately to medical staff for assessment. Refer to occlusion management on MR422.01

CVAD related Thrombosis

Symptoms of neonatal CVC thrombosis include:

- Swelling
- Erythema
- Skin discoloration
- Increased warmth
- Pain and/or tenderness of the affected leg
- Venous distension
- Presence of subcutaneous collateral veins
- Superior vena cava syndrome
- Loss of central venous catheter patency
- Prolonged catheter related septicaemia
- Unexplained thrombocytopenia
- Arrhythmia and hemodynamic instability

Symptomatic CVAD-associated thrombosis should be confirmed by Doppler ultrasonography. High-risk venous CVC thrombosis is defined as thrombosis that compromises the function or viability of an organ or limb. Consult Haematology to develop an appropriate management plan. Before initiating treatment, the risks and benefits of each management option, as well as the risks associated with ongoing thrombosis, should be carefully considered for each neonate.

Contraindications and relative contraindications to anticoagulation and thrombolytic therapy include:

- Invasive surgical procedure(s) within the preceding 10 days
- Intracranial haemorrhage within the preceding 10 days
- Invasive surgical procedure(s) planned within the next 3 days
- Active bleeding
- Severe asphyxia
- Extreme prematurity (<28 weeks' gestation) with a high risk of intraventricular haemorrhage
- Severe thrombocytopenia

Removal of CVADs

Review the need for the CVADs on clinical rounds every day to consider if the CVAD is still required thus can it be removed and documented in the medical record.

Refer to specific CVAD guidelines for removal procedure. Tunnelled catheters must be removed by the CVAD team and hence they should be contacted when this is required.

Post-removal care of CVAD site

- If sepsis is suspected, the tip should be sent for culture
- Review insertion checklist and confirm that the length of the CVAD is correct after removal
- Complete removal documentation on MR422.01 and in the patient medical record including the reason for removal and any line complications.

Related CAHS internal policies, procedures and guidelines

CAHS Labelling of Injectable Medications and Fluids
Central Line Associated Bloodstream Infection (CLABSI)
CVAD Femoral Vein
CVAD Percutaneously Inserted Central Catheter (PICC) / Long-line
CVAD Umbilical Artery Catheter
CVAD Umbilical Venous Catheter
Hand Hygiene
PCH Central Venous Access Devices and Midline Insertion and Management

References and related external legislation, policies, and guidelines

1. Australian Guidelines for the Prevention and Control of Infection in Healthcare
2. C. Heleen van Ommen, et al. NEOnatal Central-venous Line Observational study on Thrombosis (NEOCLOT): evaluation of a national guideline on management of neonatal catheter-related venous thrombosis, Journal of Thrombosis and Haemostasis, Volume 21, Issue 4, 2023, Pages 963-974, ISSN 1538-7836, https://doi.org/10.1016/j.jtha.2022.11.044.
3. Piersigilli F, Iacona G, Yazami S, Carkeek K, Hocq C, Auriti C, Danhaive O. Cyanoacrylate glue as part of a new bundle to decrease neonatal PICC-related complications. European journal of pediatrics. 2023 Dec;182(12):5607-13.

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