Central Venous Access Device (CVAD) guidance for RHC Glasgow

Objectives;
This guidance has been written to standardise the care of children with a central venous catheter to promote safe practice, reducing the risk of infection and promoting continuity of care

Scope;
The advice applies to patients in hospital and at home. Please refer to linked guidelines for advice specific to neonates within NICU

Audience;
This is primarily aimed at health professionals but should be followed by all those who access CVADs

Keywords;
CVL, Hickman, Broviac, Portacath, Port-a-cath, Port, Vascath, Gamcath, PICC, PIC, taurolock, flush, mid-line, biopatch.

Contacts for further advice about lines;
Haematology ANP Dect 84701, Office 84652, haemoncanp.sms2@nhs.scot
Line insertion team; for troubleshooting advice call Surgical Registrar Dect 85788, to book a patient email Dannie Seddon or Phil Bolton
Renal team ANP 84426
Cystic Fibrosis 86488
TPN 85758 / 84904
If you require assistance with other vascular access, 08.00 - 17.00 Duty anaesthetic consultant Dect 84842 or Anaesthetic junior reg on call 84342 (any time)

Terminology
Tunnelled catheters; Hickman™ or Vygon™ line (single or double lumen). Broviac line(single lumen)
Portacath; central line with an accessible reservoir implanted below the subcutaneous tissue, Usually single, occasionally double lumen. To access the Portacath™ a special non-coring needle (e.g. Gripper™) is inserted through the skin into the port. Before inserting the gripper™ needle a local anaesthetic cream such as Emla™ or Ametop™ can be used. Once the Gripper™ needle is in place it will be secured with a transparent dressing such as IV3000™. SOP for Inserting a Gripper Needle into a Portacath (scot.nhs.uk)
PICC (peripherally inserted central catheter), which are generally used as a temporary line before inserting a permanent device.
Mid-line; a type of PICC, but the catheter isnt always long enough for the tip to be in a truly central vein,
Ocasionally large bore lines such as GamCaths are placed, their care is covered here; Large bore veno-venous lines (e.g. "GamCaths") - SOP for first usage and troubleshooting (scot.nhs.uk)

The principles of ANTT must be followed to ensure pathogenic microorganisms cannot enter either the needle free access device (Smart site®) or the insertion site.

Link to sbar-aseptic-not-touch-technique-final.pdf (nhsggc.org.uk) stating that pages 13 and 16 have the most appropriate flow charts to follow. If for any reason it has been decided that using your patients line requires a new skin prep then follow the guidance Skin anti-sepsis: Chloraprep guideline (scot.nhs.uk)

Dialysis lines are accessed in the renal unit using full aseptic technique, NOT ANTT.

Needle free access/Purehub Cap

Smart sites® are used on all devices longer than simple iv cannulas and may be used on cannulas as well. Smart sites® maintain a closed system while allowing infusion of IV therapy or sampling of blood. They must be changed every 7 days. Adequate cleaning of the smart site® is key to ensuring asepsis, a 30 second scrub with 2% chlorhexidine plus 70% alcohol disinfectant wipe plus 30 seconds drying time is essential before applying new smartsite. BD PureHub Disinfection Cap (sometimes referred to with the older name 'curos cap') must be applied on the end of needle free bung. This is 70% isopropyl alcohol and provides physical barrier against contamination (up to 7 days). There is no requirement to scrub the hub.

Positive pressure

The use of a positive pressure turbulent flush helps to prevent negative pressure forming after completion of the flush therefore preventing blood being sucked (refluxing) back into the catheter. It also helps prevent biofilm and precipitate formation. This will help to prevent catheter occlusion and infection. This is achieved by closing the clamp **whilst flushing** the last 1ml of sodium chloride 0.9%, Taurolock or Hepsal (as appropriate).
Please note this flushing technique doesn't apply to neonatal small diameter PICC lines which should be continually infused to maintain patency, not intermittently flushed.

Procedure section beow has flush volumes, see Link to ggcmedicines.org.uk GGC Flush policy.url for NHSGGC procedure & framework document

Syringes.

It is not recommended that luer-lock syringes smaller than 10 ml be used on any procedure involving flushing central lines as high pressures can be generated with small syringes (Conn 1993).
1 mL syringe generates pressures greater than 100 psi.
10 mL syringe generates pressures less than 7 psi.
Catheters can rupture at 25-40 psi.
Smaller syringes may be used for aspiration / discards.

Dressings.

IV 3000 large dressings are the dressing of choice to cover all CVADs. These are transparent semi permeable membrane dressings which provide an effective barrier to bacterial contamination while allowing moisture to evaporate. Dressings should be changed after 7 days or when loose or soiled. Newly inserted central lines will have a Biopatch® on the site under the dressing for subsequent dressings Biopatch® should be used only when CVAD site is crusty, red, exudate and must be changed every 3 days. Percutaneous 'anaesthetic' central lines intended for shorter duration therapy will not routinely have a biopatch.

Dressing care for haemodialysis lines is covered in SOP for the Management of Haemodialysis Access Site (scot.nhs.uk)

If there are skin problems at the insertion site or dressings please seek advice from the ward Tissue Viability link nurse or contact the lead tissue viability nurse on Dect 85786.

Troubleshooting and line related problems

Occlusion

[Separate processes exist for large bore renal dialysis lines – seek advice from Renal ANPs]
There are a number of reasons a CVAD may have patency problems. A CVAD may not bleed back (withdrawal occlusion) or may be totally occluded – unable to flush or withdraw. This can be caused by catheter tip malposition, intraluminal clot, drug precipitate, fibrin sheath, catheter kink, pinch off between the clavicle and first rib or catheter rupture.
NOTE; its highly inadvisable to attempt to aspirate a line (or lumen) less than 4Fench Gauge or 19g cannula/catheter diameter as these lines block very easily, lines 4FG and above can be aspirated for sampling but this may decrease the longevity of the line.

It is essential when any CVAD has signs of occlusion (poor or no blood return, sluggish flow or complete occlusion) that a full assessment of the site and surrounding area is documented on the CVC care plan.

Nursing staff must not attempt to clear an occlusion using a syringe smaller than 10mL (risk of line rupture).

A chest x-ray may need to be carried out to check the tip position of the CVC/gripper particularly if clinical suspicion is that the line tip may have migrated or the line is kinked at some point.

Local installation of Urokinase
Urokinase dissolves clot, check there are no contraindications with supervising staff.
Urokinase 2500-5000 i.u with maximum volume of 2 mls (to cover CVAD priming volume + around line tip).

- Single lumen CVAD
  Dose 2500i.u instilled into lumen for 1-4 hours.

- Double lumen CVAD
  Dose 2500i.u instilled into each lumen 1-4 hours.

If unsuccessful in obtaining blood return, repeat once in 24 hours, or if possible, leave the Urokinase in situ for 24 hours.

Total occlusion

Using 10 ml syringe reconstitute the urokinase to achieve 5,000iu in 2mls per lumen.
Prime the 3-tap with urokinase solution at 3 o'clock access point on the tap. DO NOT DISCONNECT THE SYRINGE.
Using ANTT attach the empty syringe to the port at 6 o'clock position. Ensure the three way tap is open to the lumen and the 6 o'clock position. Pull gently back on the empty syringe plunger to create a vacuum in the catheter to approximately 6mls and hold the plunger at 6mls whilst turning the closed position onto the empty syringe. Turn 3 way tap so that it is open to the urokinase and the line.

A small amount of urokinase will then be drawn into the vacuum. REMOVE the empty syringe and expel air the empty syringe.

Repeat process of creating vacuum and administering urokinase until the 2ml volume is administered.

Leave for minimal 60 minutes (up to several hours / overnight) and then withdraw.
If the line remains blocked then seek advice from Haem/Onc or Renal ANPs as appropriate

Damaged lines

Please contact the surgical team for advice, the surgeons may refer to ANPs to repair. Repair kits are found in Theatre 6 or Schehallion ANP office. If the line is to be repaired there will need to be 5cm of undamaged line measured from the skin exit and 2.5cm undamaged line below the y connector (if present). Note the size of the line/lumen before referring.

Leaking lines

Advice on leaking PIC & mid-lines leaking at the insertion site
Mid-lines and other lines may generate leaks at the insertion site, these could be due to problems at the site itself e,g, difficult insertion with local venous trauma or problems with the line hub entering the vein. Manual pressure on the leaking site for 5 minutes may help, if ineffective please seek experienced help before removal. It may be possible to re-dress / glue / exchange the line.

Extravasation injury advice

Extravasation injuries: prevention and management (neonatal guideline) (scot.nhs.uk) this is directly applicable to neonates but the principles of advice do apply to a wider range of patients.

Prevention, treatment & follow-up of extravasation with SACT (scot.nhs.uk) is written specifically for chemotherapy related injuries, but again the principles are more widely applicable.

Line flushing

Prophylaxis against gram negative and fungal infections in immunocompromised babies, children & young people with a Central Venous Access Device (CVAD) (scot.nhs.uk) **this guidance contains detailed advice on flushing volumes, flushing solutions and discards for Hickman lines, PICs and Portacaths.**

Procedure;

Take a discard of 2.5ml from the CVAD to remove any previous lock solution, each time it is accessed. Standard practice in children <5kg or <6 months old is to replace the discard – this may be replaced through a central or peripheral line as available.

Flush with 10 ml Sodium Chloride 0.9%, using standard technique i.e. a positive pressure turbulent flush, prior to line locking.

For Hickman lines, PICs and ports which are being accessed intermittently (e.g. for blood samples, drug administration, fluids or chemotherapy). The line should then be locked using the appropriate lock solution as specified below which will remain in situ until the lumen is next accessed.

Haematology & Oncology CVAD flushing / locking

TauroLock (containing Taurolidine, Citrate 4%) for use in ***Hickman lines, PIC lines and Ports in regular use***

TauroLock Hep 100 (containing Taurolidine, Citrate 4%, Heparin 100iu/ml) for use in ***Ports only when removing the Gripper needle and locking the chamber(s)***

Any member of staff who has completed CVAD training, can administered Taurolock ensuring it has been prescribed. First exposure is carried out in theatre recovery due to the potential of Taurolock allergy (around 3%). Recording of this should be a clear documentation of the exact event in the 'patient notes' section of clinical portal and an email sent to haemoncanp.sms2@nhs.scot

The Hickman line or PIC should be locked for a maximum of 1 week using Taurlock or Hepsal.

Ports in situ should have these flushed and relocked every 4 weeks using **Taurolock Hep 100 or Hepsal 100iu/ml.**

Hepsal 10iu/ml for use in ***Hickman lines, PIC lines and ports in regular use where Taurolock allergy.***

Hepsal 100iu/ml for use in ***Ports only when removing the gripper needle and locking the chamber where Taurolock allergy.***

Cystic Fibrosis CVAD flushing / locking

Hepsal 10iu/ml for use in ***PIC lines and ports in regular use***

Hepsal 100iu/ml for use in ***Ports only when removing the gripper needle and locking the chamber***

TPN patients CVAD flushing / locking

2.5ml discard only required if line previously flushed with Taurolock

Hepsal 10iu/ml for use in ***PIC lines Hickman lines and ports in regular use***

Hepsal 100iu/ml for use in ***Ports when removing the gripper needle and locking the chamber and Hickman lines if the next therapy does not occur within 48 hours***

Renal Dialysis lines

Link to new guidance will be posted here, expected to be available Sept 2023 (leanne.millar@ggc.scot.nhs.uk). If you have no alternative intravenous access & require to use a dialysis line then please discuss with the renal unit & ensure you have TauroLock U25,000 available.

TAUROLOCK

PIC (any manufacturer, any size)	1.0ml
Single Lumen Hickman	1.0ml
Double Lumen Hickman	1.0ml in each lumen
Single Chamber Port	1.5ml
Double Chamber Port	1.5ml in each chamber

TAUROLOCK HEP 100

*****only when removing gripper needle*****

Line type Lock volume

Single Chamber Port	1.5ml
Double Chamber Port	1.5ml in each chamber

*Please note the above volume **does** account for the dead-space of the gripper needle*

TAUROLOCK

in patients <5kg or under 6months old

Line type Lock volume

PIC (any manufacturer, any size)	0.5ml
Single Lumen Hickman	0.5mls
Double Lumen Hickman	0.5ml in each lumen
Single Chamber Port	0.5ml
Double Chamber Port	0.5ml in each chamber

<u>ALLERGY TO TAUROLOCK</u>

HEPSAL 10iu/ml

Line lock volume

PIC	1.0mls
Single lumen Hickman Line	1.0ml
Double lumen Hickman Line	1.0mls into each lumen
Single chamber port	1.5mls
Double chamber port	1.5mls

HEPSAL 100iu/ml

*****Only when removing gripper needle from a Portacath*****

Single chamber port	1.5mls
Double chamber port	1.5mls in each chamber

HEPSAL 10iu/ml

in patients <5kg or under 6months old

Line type Lock volume

PIC (any manufacturer, any size)	0.5ml
Single Lumen Hickman	0.5mls
Double Lumen Hickman	0.5ml in each lumen

Single Chamber Port	0.5ml
Double Chamber Port	0.5ml in each chamber

Line infections; Comprehensive advice & flowchart contained in Guidelines for the management of paediatric line-related sepsis (scot.nhs.uk) and for haemodialysis lines SOP for Management of Haemodialysis Line Sepsis (scot.nhs.uk)

Line removal

large bore lines Large bore veno-venous lines (e.g. "GamCaths") - SOP for first usage and troubleshooting (scot.nhs.uk)contains advice on the removal of high risk venous lines. Consult this guideline for advice on misplaced lines, damaged lines, tamponade

Line Removal on the ward, planned removal & emergency dislodgement.

Microsoft Word - CVC Line Removal Guidance.docx (scot.nhs.uk). or Procedure: Removal of Central Venous Catheters (Jugular, Subclavian and Femoral) | LHSC have good advice on line removal.

If a line is being used for antibiotic therapy and must be removed, ivost-table-210120.pdf (ggcmedicines.org.uk) has advice on switching from IV to oral antibiotics. This is an adult guideline so dosage advice will not apply but it contains sensible advice on management decisions, the principles of which apply to paediatric practice.

If a central line is being removed on completion of therapy there is no need to send the tip for culture, if the line is being removed for any other reason, please sent the tip to microbiology.

There is no need to send mid-line tips for culture routinely if removal is just on account of line blockage.

Lines in out-patients

Education given to all parents on discharge from ward 2A Schehallion staff as part of discharge planning using a Discharge checklist. Line care advice is mandatory and each clinical area should identity a point of contact for their patients, for example Haem/Onc parents use the 24hr triage phone.

Linked guidelines

Peripherally inserted central catheters (PICC Lines) - Neonatology guideline (scot.nhs.uk)

All guidelines mentioned in the text need linked

Not mentioned but relevant to link
Point of care ultrasound for vascular access in PICU (scot.nhs.uk)

Policy & Guidelines for the Safe Prescribing, Dispensing & Administration of Systemic Anti-Cancer Therapy (SACT) (scot.nhs.uk) section 5.3 has advice on appropriate intravenous line use

Needlestick injury link;
https://eur01.safelinks.protection.outlook.com/?url=http%3A%2F%2Flibrary.nhsggc.org.uk%2FmediaAssets%2FPHPU%2FNHSGGC%2520MANAGEMENT%2520OF%2520OCCUPATIONAL%2520AND%2520NON-OCCUPATIONAL%2520EXPOSURES%2520TO%2520BBV.pdf&data=05%7C01%7CGraham.Bell%40ggc.scot.nhs.uk%7Cdb871d2d01a0480903f508db304ed6e1%7C10efe0bda0304bca809cb5e6745e499a%7C0%7C0%7C638156887381535612%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=ZAmqJULCyrovBbncll8X23DJsL6IdLnFhj7Cy871FnI%3D&reserved=0

CVAD access for phlebotomists is covered in Role of Phlebotomists (scot.nhs.uk)

Umbilical catheters (scot.nhs.uk)

References:

Conn C (1993) The importance of syringe size when using an implanted vascular access device Journal of Vascular Access Networks 3: 11-18

Cole M et al (2007) A study to determine the minimum volume of blood necessary to be discarded from a venous catheter before a valid sample is obtained in children with cancer Pediatric Blood Cancer 48(7): 687-95.

Procedure: Removal of Central Venous Catheters (Jugular, Subclavian and Femoral) | LHSC