

**GUIDELINE FOR CLINICAL STAFF ON:
HICKMAN / BROVIAC CATHETER IN OLCHC**

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This guideline has been taken from the supportive care guidelines for Haematology/Oncology and has been agreed for use in OLCHC for the care of children with Hickman/Broviac catheters. The NPC wish to acknowledge the Haematology/Oncology team.

Introduction

Central Venous Access Devices (CVAD), is a broad term used to include many catheter types which are inserted into a peripheral/central vein in the body to deliver medications or other therapies to children.

A catheter has one end positioned outside the body while a port is surgically placed under the skin and requires a special needle to access it.

The most common CVADs include:

- **Peripherally Inserted Central Catheter** inserted into one of the peripheral veins in the upper arm.
- **Central Venous Catheter**
- **Implanted Ports** inserted into the subclavian or vein or jugular and attached to a fluid reservoir placed in a surgically created subcutaneous pocket in the upper chest or into an arm vein.
- **Hickman / Broviac catheter**
- **Permcath-Vascath Catheter**
- **Umbilical Venous Catheter**

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Table 1. Skin Asepsis prior to peripheral and central line insertion by clinical staff in OLCHC.

S.A.R.I. Guideline 2009- for prevention of infection associated with CVC or peripheral line insertion recommends chlorhexidine gluconate 2% in 70% isopropyl alcohol (in a single patient use application) in adults & **children ≥ 2 months**.

Indication	Product	Composition
Skin cleansing prior to peripheral canula insertion	Sanicloth®	↑ 2% chlorhexidine gluconate in 70% isopropyl alcohol ↓
Skin cleansing prior to CVC insertion	OR	
Device cleaning (e.g. hubs)	Chlorhexidine 2% Alcohol (Ecolab) 200ml bottle	

For infants < **2 months old** the recommendation is 0.5% Chlorhexidine in aqueous solution

Indication	Product	Composition
Skin cleansing prior to peripheral and central line insertion in infants < 2 months old (Corrected age)	Sterexidine 200® 150ml bottle	Contains 0.5% Chlorhexidine Gluconate w/v in aqueous solution

NB: Use in premature babies:

In immature neonates (e.g.: below 30 weeks gestation), gently dab the product onto the skin for 10 seconds & allow the skin to dry in air. Avoid 'up & down, back & forth' movement as gentle friction can damage immature stratum corneum of neonates. After the procedure, the skin should be cleaned with sterile water and dried thoroughly.

NOTE:

Povidone Iodine 10% (*Videne®* or *Betadine®*) may be used in patients with a history of chlorhexidine sensitivity.

Povidone Iodine 10% (*Videne®* or *Betadine®*) should no longer be used prior to performing lumbar puncture. Use appropriate chlorhexidine product listed above instead.

The routine use of antimicrobial or antiseptic ointments around CVC insertion sites at the time of insertion or during dressing changes is not recommended

Table 2. Guide to CVAD choice and the duration of usage

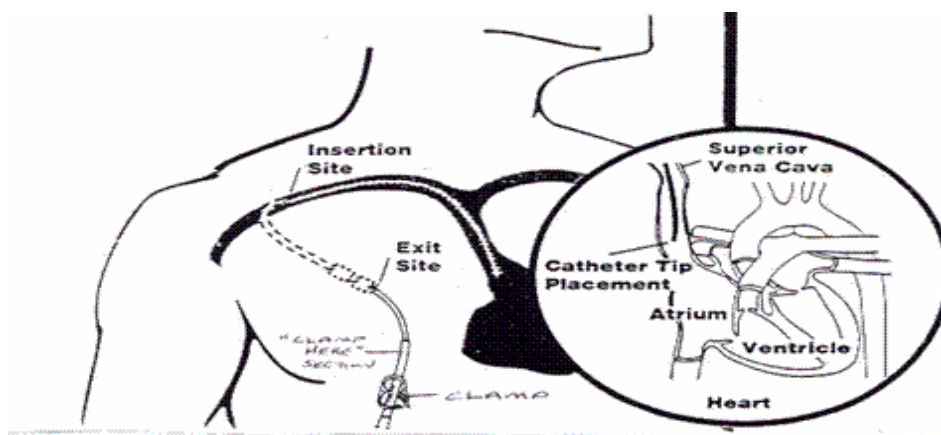
Type of Line	Type of access	Location	Length of usage
PERIPHERALLY INSERTED CENTRAL CATHETER PICC	<ul style="list-style-type: none"> Short-term venous access devices Inserted under local anaesthetic 	<ul style="list-style-type: none"> Brachial, cephalic, median-cubital or scalp vein placement Single or multiple lumens 	0 days to 6 weeks
MIDLINE	<ul style="list-style-type: none"> Short-term venous access devices Inserted under local anaesthetic 	<ul style="list-style-type: none"> Brachial, cephalic, median-cubital or scalp vein placement Single or multiple lumens 	0 days to 6 weeks
<p><i>Midlines can be used for antibiotic therapy, and fluids, blood transfusions, although not for concentrated TPN intended to use for centrally located catheters. So midline catheters should not be used for any solution containing greater than 10 percent dextrose or 5 percent protein, or any vesicant or caustic solution.</i></p>			
Central Venous Catheter	<ul style="list-style-type: none"> Short term central device inserted under general anaesthetic 	<ul style="list-style-type: none"> Single or multiple lumens Right or left internal jugular usually preferred Sutured in place 	7-10 days
TUNNELLED HICKMAN OR BROVIAC	<ul style="list-style-type: none"> Known to the children in OLCHC as “Freddy” 	<ul style="list-style-type: none"> Infraclavicular placement Single or multiple lumens Dissolvable sutures are used. Dacron cuff. Can be felt under the skin. Inform medical staff if the Dacron cuff is visible, as this is an indication that the catheter has moved. 	indefinite
IMPLANTED VENOUS ACCESS PORT (IMPLANTOFIX)	<ul style="list-style-type: none"> Totally implanted venous access device Inserted under general anaesthetic Accessed through the skin using a non-coring needle 	<ul style="list-style-type: none"> Intradermal Dome-shaped Incision scar often seen across, above, or below the dome Palpable 	indefinite
Umbilical Venous Catheter	<ul style="list-style-type: none"> Used in neonatal units 	<ul style="list-style-type: none"> Inserted via the umbilical vein in the umbilical cord, with the tip of the catheter positioned at the junction of the inferior vena cava (IVC) with the right atrium. It is above the diaphragm and beyond the liver at T9-T10 	3-7 days
Non tunnelled Permcath/Vascath	<ul style="list-style-type: none"> Used predominately for Haemafiltration or plasmapheresis 	<ul style="list-style-type: none"> Permcath are non-tunnelled long term lines used for haemodialysis or plasmapheresis. Vascaths are temporary non tunnelled lines used for maximum of three weeks for haemodialysis and haemofiltration or plasmapheresis 	<p style="text-align: center;">Indefinite</p> <p style="text-align: center;">Max 3 weeks</p>

Table 3. Flush volumes for CVADS

Line type	Age	Blood discard volume	Suggested Flush volume for pre and post line use	Heparin dose
PICC/Midlines It is not possible to withdraw blood from a 1-2fr PICC	< 1 year	1ml	0.5ml	10 units/ml
	1-3 years	2.5ml	0.6	10 units/ml
	> 3 years	3.5ml	0.8	10 units/ml
Central Venous Catheters	< 1 year	1 ml	0.5-1ml	10 units/ml
	1-3 years	2.5ml	1-2.5mls	10 units/ml
	> 3 years	3-5ml	3-5 mls	10 units/ml
Hickman/Broviac	< 1 year	1 ml	As per surgeons	10 units/ml
	1-3 years	2 ml	As per surgeons	10 units/ml
	> 3 years	3-5 ml	As per surgeons	10 units/ml
Implantofix In some cases it may be requested that blood is withdrawn from an Implantofix.	< 1 year	N/A	1ml -2.5 mls	10 units/ml
	1-3 years	N/A	1ml- 2.5mls	10 units/ml but Use 100units/ml when on discharge for patients with CF
	> 3 years	N/A	1ml-2.5mls	10 units/ml
Umbilical Venous Catheters	< 1 year	1ml	0.5-1ml	10 units/ml
	1-3 years	N/A	N/A	10 units/ml
	> 3 years	N/A	N/A	10 units/ml
Permcath-Vascath	< 1 year	1ml	0.5-1ml	See guideline
	1-3 years	N/A	N/A	See guideline
	> 3 years	N/A	N/A	See guideline

3.1 Introduction to Central Venous Access Devices: Hickman[®], Broviac[®] Catheters

The Hickman and Broviac catheters are a central venous access device commonly used in the paediatric age group especially for Haematology/Oncology patients. It is made of silicone and is approximately 90cm long. It is cut to the appropriate size for each individual child at the time of its insertion. Catheters are inserted under general anaesthesia via the subclavian, internal or external jugular vein with a subcutaneous tunnel to the anterior or lateral chest wall. The external end exits from the chest wall usually lateral to the right breast. The catheter has a short Dacron cuff on its outer surface, situated under the skin, above the point of exit from the chest. This is designed to act as a barrier to infection and to anchor the line in the subcutaneous tissue. These catheters may have single, double or triple lumens, which allows multiple, and concurrent venous access.



General principles for the care of Hickman Catheter

3.1.1 Use of Sterile technique/non-touch technique

Strict hand washing is essential prior to handling the catheter at all times.

A sterile technique must be used while accessing the catheter for taking blood cultures, changing the needle free access device and connecting or disconnecting Total Parental Nutrition (TPN) infusion lines. All other procedures are carried out using a non-touch technique.

When handling chemotherapy, blood products or taking blood samples, appropriate non-sterile gloves must be worn for the protection of staff (DOHC Guidelines for the Safe Handling of Cytotoxic Drugs (1996); Universal Precautions).

The use of gloves is unnecessary when administering bolus medication, attaching or detaching intravenous infusions.

Care and maintenance

3.1.2 Flushing and Maintaining Patency

It is essential to follow certain general principles prior to flushing and maintaining the patency of Hickman catheter. Please refer to the following:

Syringe size:

It is recommended that a 10 mL syringe (or larger) be used for withdrawing blood samples or injecting into any Hickman catheter. Infusion pressure should not exceed 25 psi. A 10 mL syringe generates pressure of less than 8 pounds per square inch (psi). Small syringes generate very high internal pressures with very little force. A catheter will rupture at pressures in excess of 25 psi. The back pressure from an occlusion (blockage) may not be felt when using a small syringe until damage to the catheter has occurred.

If a small syringe is required for accuracy of drug dose, always ensure that the catheter is flushed with a 10 mL syringe containing Sodium chloride 0.9% w/v to establish patency of the catheter prior to using the small syringe. **Exceptions are: injecting antibiotic locks and Urokinase instillation.**

Flush volumes:

OLCHC Policy: 3mL of sodium chloride 0.9% w/v is used, before and after drug administration, after taking blood samples, after disconnecting lines, and followed by instillation of 2.5mL of Heparin sodium (10unit/mL).

Push-pause method:

It is important to use a push-pause method for flushing the Hickman catheter. This creates turbulence within the lumen and helps prevent the formation of fibrin clots. Administer 1mL of solution, pause for 1 second, and repeat until the appropriate volume has been administered. The procedure is completed using a positive pressure technique.

Positive pressure technique:

A positive pressure technique is accomplished by clamping the Hickman catheter as the last 0.5 mL of Heparin Sodium (10unit/mL) is being instilled. Maintaining positive pressure in the Hickman line prevents backflow of blood into the catheter.

Blood return and patency:

Patency of Hickman catheter is confirmed by obtaining a blood return. It should always be checked prior to instillation of any drug or infusion. When not in use all lumens of the catheter should be clamped and heparinised weekly to maintain patency. If there is a suspicion that the line has dislodged i.e. cuff is visible, no blood return on aspiration, **do not use it**. If the line has dislodged a chest x ray may be indicated to confirm the position of the catheter. Contact OLCHC for advice.

Blood Discard Volume chart:

Prior to taking blood samples, the Hickman catheter should be aspirated with a 10mL syringe. The first sample will contain Heparinised saline mixed with blood and should be discarded unless being used for blood cultures. The discard volume will vary according to the age of the child (see table below). The discarded sample **must not** be returned to the patient.

Age	Volume
<1 year	1.5 mL
1 – 3 years	2.5 mL
>3 years	5mL

3.2 Blood Sampling

When obtaining a blood sample from a multi-lumen catheter use the free lumen where possible. Ensure that the other lines are clamped to avoid contamination of the blood sample (see **Section 6.10.4**).

If there is no free lumen for routine bloods, the sample can be taken from a lumen with IV fluids in progress. The IV pump should be 'paused', all lumens clamped and the IV line is disconnected carefully for blood sampling (See **Section 6.10.9**).

If all the lumens are being treated with antibiotic locks for line infection, it is still possible to obtain a blood sample when the antibiotic lock is due to be changed. Following removal of the previous antibiotic flush, obtain the usual discard volume of blood using a 10mL syringe, then using a 2nd 10mL syringe withdraw appropriate volume of blood needed for blood samples. This will avoid frequent blood sampling from a peripheral vein. Inject fresh antibiotic locks into the lumen following blood sampling.

3.3 Needle free access devices/Clamps

Needle free access system is in use on all IV devices in OLCHC. There are many other needle free access devices available that can be used.

The hub of the Hickman catheter should always be protected with a **luer lock** device. It should be changed weekly (See **Section 6.10.3**).

The clamp is kept closed, while disconnecting an IV line, changing a needle free access device and when the Hickman catheter is not in use. The clamp must only be closed over the reinforced catheter sleeve to prevent damage to the catheter.

3.4 IV Administration Sets/Drug Administration

IV administration sets:

IV administration sets connected to the Hickman line should be changed every 48 hours. However, patients who are neutropenic *or* on Total Parenteral Nutrition (TPN) should have administration sets changed every 24 hours. Attach a **label with the date and time of change**.

The use of three-way taps is not recommended.

When IV Buretrol infusion sets are used for intermittent medication administration, they must not be disconnected and reattached for subsequent medication infusions later. Where possible use a free lumen to administer bolus medications. If there is no free lumen, and IV fluids are in progress, it is possible to use the injection port on the IV administration set to administer bolus medications (ensure no incompatible additives are infusing at the same time). Flush with 3mL of Sodium chloride 0.9% w/v before and after the administration of the bolus medication.

Transfusion sets used for blood and blood products should be discarded on completion of the transfusion.

Chemotherapy administration sets:

IV administration sets used for intermittent chemotherapy administration should be discarded on completion of the infusion. When chemotherapy is given as a continuous infusion over several days, the line must be changed every 72 hours for those patients. Only IV administration sets **without** an injection port should be used when infusing chemotherapy. When administering or changing chemotherapy infusions, gloves, goggles and an apron should be worn as per the OLCHC policy and Department of Health Guidelines (1996).

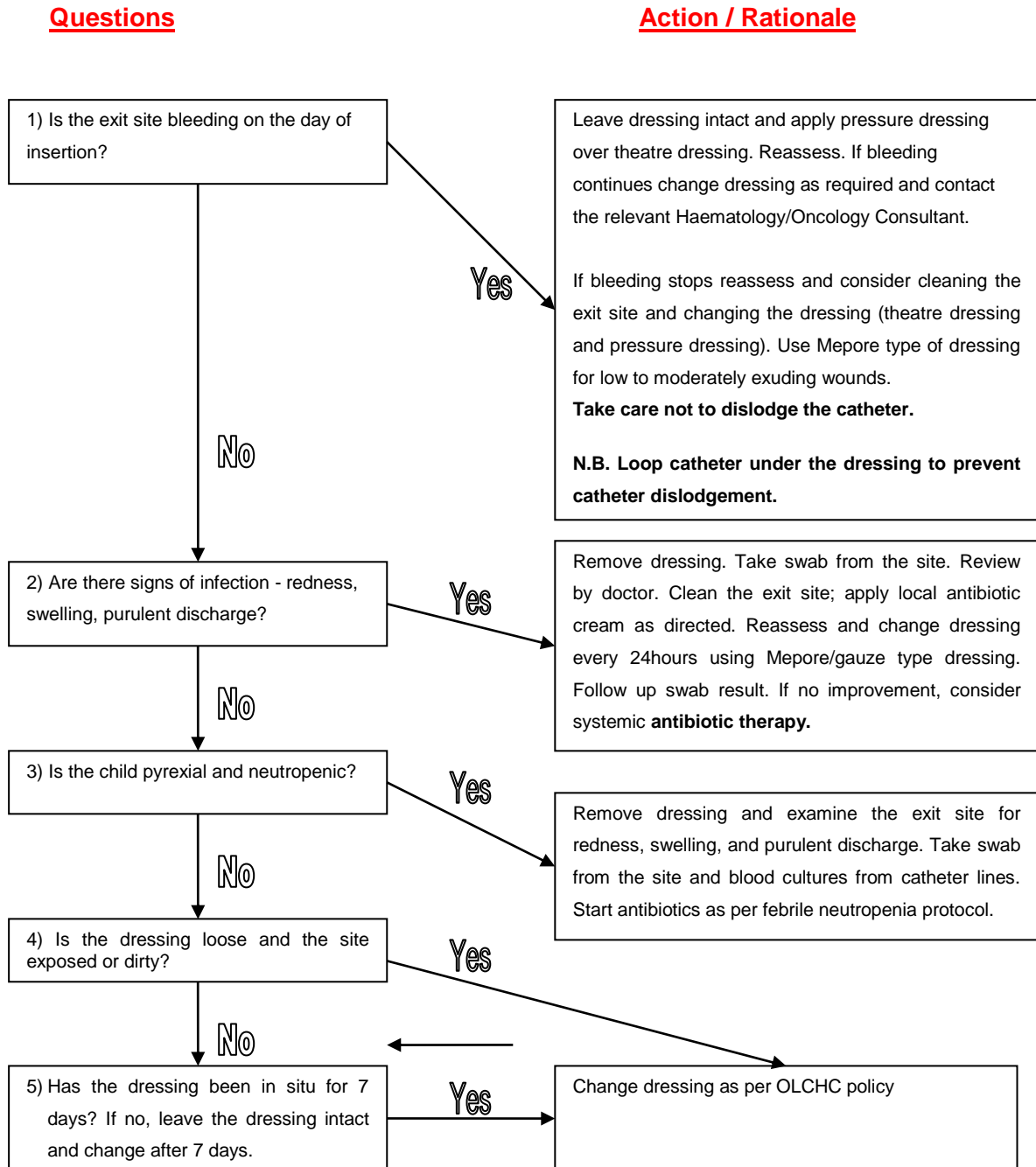
3.5 External Catheter dressings

Hickman exit site dressings should be changed weekly using an Opsite IV 3000 '1-hand' dressing. If patient become sensitive to the Opsite dressing, a Mepore type of dressing can be used. The frequency of dressing changes will be governed by the condition of the underlying wound (See **Section 6.7.1**).

3.5.2 Protocol for dressing changes in Hickman catheters:

During immediate post op period and for the first 7 days post insertion of Hickman catheter, the following algorithm should be used.

Note: It is important that the initial dressing applied over the exit site in the operating theatre should remain in situ for 7 days if possible to allow the catheter cuff to become secure. The dressing on the neck wound should be removed after 48 hours, leaving the steri-strips in situ until the wound has healed.



3.6 Hickman Catheter infections:

Action	Rationale
Obtain Blood cultures from all lumens if the child is febrile or experiences rigors during or after flushing the catheter (see Section 6.10. 5)	To determine cause of infection and enable treatment with appropriate antibiotics
If febrile and neutropenic follow febrile neutropenia protocol. Treat infected lumen/s with appropriate antibiotic lock (see Section 6.10.10)	To treat infection
Administer systemic antibiotics via non-infected lumen (see Section 6.10.6). If all lumens are infected give systemic antibiotics via a peripheral line	To ensure all lumens are appropriately treated and systemic antibiotics administered
<p>If initial culture result is positive, re-culture catheter and commence appropriate antibiotic locks</p> <p>If this re-culture is negative at 48hours, and the child is clinically well and afebrile, discontinue antibiotic locks</p> <p>If this re-culture is positive at 48 hours, continue antibiotic locks and repeat cultures on Day 6. Continue the antibiotic locks daily until the Day 6 (48 hour) result is available</p> <p>If Day 6 (48 hour) culture is negative, remove antibiotic lock and discontinue</p> <p>If Day 6 (48 hour) culture remains positive, re-culture and continue daily antibiotic locks for a further 48 hours (see Section 6.10.10). If these remain positive contact OLCHC.</p>	<p>To identify new organisms</p> <p>To determine what further action is necessary</p>

3.6.2 Management of Hickman Catheter Infection:

An infected Hickman catheter **should be suspected** when a child presents with a documented rise in temperature following flushing of the catheter. It may be associated with a chill or rigor and a period of being 'unwell' and may settle spontaneously.

Mandatory Investigations:

- **Obtain Blood Culture from each lumen:** aspirate first 1mL of blood. When using separate aerobic and anaerobic culture bottles, place 0.5mL into each bottle. When using a combination aerobic/anaerobic culture bottle, place 1mL in the bottle. Label each bottle according to the hospital and laboratory policies (see **Section 6.10.5**).
- **Full blood count**
- **Peripheral blood culture for both aerobic and anaerobic cultures.** Label each bottle as per the hospital and laboratory policies

Management of patients with Hickman Catheter line infections:

Patients with a **suspected Hickman catheter infection** are treated empirically by daily intra catheter Gentamicin locks until the culture results are obtained.

- If a gram positive organism is identified, switch antibiotic lock to Vancomycin and treat for 7 days (see **Section 6.10.10**).
- If a gram negative organism is identified continue Gentamicin locks as per policy (**Section 6.8**).
- If no organism is identified, remove Gentamicin lock.
- If the **culture shows fungal infection**, discuss with the relevant Haematology/Oncology team in OLCHC. Occasionally **Amphotericin B** intra catheter lock is used in patients with fungal infection of the line.

Patients who are febrile but no clinical suspicion of infected catheter, all lumens are cultured and await results prior to commencing locks. If this initial lumen culture is positive, a repeat culture is obtained from the lumens prior to starting the antibiotic locks. (See **Section 6.10.10**). If this repeat culture is negative and the child is clinically well and afebrile, discontinue the antibiotic locks.

The catheter is **re-cultured on day 6** (before the sixth dose), and locks continue until a 48 hr result of that culture is clear (i.e. patients receives a minimum of 7 doses of appropriate antibiotic locks). If the culture remains positive, antibiotic locks are continued and the lumen is re-cultured on alternate days until a 48 hr result is clear.

Re-culturing of Infected Hickman Catheter

To re-culture the Hickman line: **8 hours before** the next dose of antibiotic lock is due, remove the antibiotic locks from the line, instill 2.5 mL of Heparin Sodium 10unit/mL flush into the line. After 8hrs take Hickman catheter culture and then instill the appropriate antibiotic locks as prescribed (see **Section 6.10.10**).

In case of persistent systemic infection, please contact the Haematology/Oncology team in OLCHC for advice and re management. If the patients are neutropenic they must be treated with systemic broad spectrum antibiotics as per febrile neutropenia policy along with intra catheter antibiotic locks.

Peripheral cultures

If peripheral blood culture grows gram positive Cocci, add systemic Teicoplanin at a dose of 10mg/kg 12 hourly x 3 doses then 10mg/kg once daily.

Where all the lumens are infected, a peripheral line should be inserted for systemic antibiotics, intravenous fluids and for blood products. This should be re-sited every 72 hours if the patients are neutropenic (OLCHC policy) until the Hickman line infection has resolved.

Preparation of Antibiotic Locks: General Instructions:

All instructions are based on largest volume Hickman line ie 2mL. Please refer to the individual patient's information located in patient's medical notes and operating notes for priming volumes for individual lumens. This is particularly relevant for patients < 3kgs. If no priming volume information is available, please use the priming volume guide below:

Priming Volume Guide (when no information available)

< 3 kgs	Maximum volume 0.5 mL per lumen
> 3 kgs and < 3years	1 mL (Total volume)
> 3 years	1.5 mL (Total volume)

3.6.3 Hickman Catheter Exit Site infections

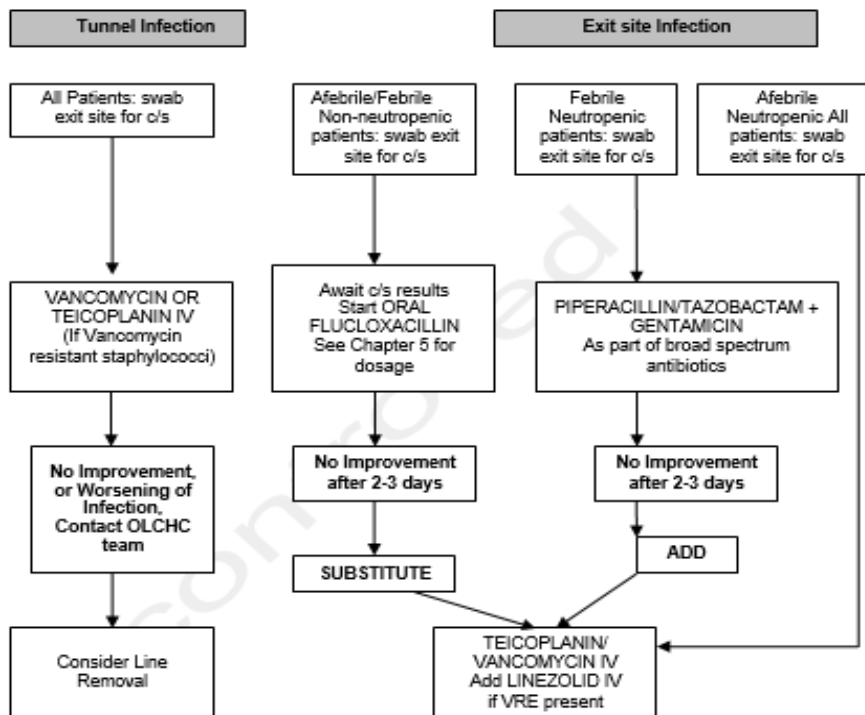
If the Hickman exit site appears red, inflamed or a discharge is evident, a swab for culture and sensitivity from the exit site should be taken. If the exit site has a discharge a Mepore type dressing should be used, to allow exudates to be absorbed. The dressing should be changed daily. Ensure that the catheter is firmly secured to prevent accidental dislodgement whilst the exit site is infected.

Depending on the sensitivity of the exit site infection appropriate topical and/or antibiotic treatment is applied. Consult with the team re treatment choice.

If the infection spreads to include the skin tunnel and tracks upwards, IV antibiotics will be required. The catheter may require removal if IV antibiotics are ineffective. If the patient is neutropenic and febrile follow appropriate antibiotic policy (see **Chapter 3**). If the patient is neutropenic and afebrile, please consult with the relevant team regarding treatment choice.

Refer to the Paediatric Haematology/Oncology Team in OLCHC supervising the child's treatment for specific guidelines.

3.6.4 Management of Tunnel and Exit Site Infections



Troubleshooting

3.7.2 Occlusion

Obstruction secondary to thrombus formation is one of the complications associated with CVAD. If the line is blocked it will not flush or yield blood on aspiration. Do not attempt to apply force to unblock the totally occluded catheter as it may cause rupture of the catheter or dislodge a catheter embolus. Always check the following - cuff position, the line is not kinked and the clamp is open. Consider asking the patient to change position and cough, as this may improve blood flow. Contact medical personnel as Syner-KINASE® may need to be prescribed to unblock the line occlusion (see **Section 6.10.11**).

A dye study may need to be performed in OLCHC to assess the cause of the obstruction if unable to unblock.

3.7.3 Catheter dislodgement

Hickman catheters may accidentally get pulled or dislodged. If so the Dacron cuff of the catheter may become visible. Secure the catheter with steri-strips and a chest X-ray should always be performed to identify the position of the catheter tip. **Do not use the line until it is confirmed and safe to use once again.**

If the catheter falls out, apply a sterile dressing over the exit site and apply direct pressure over the entrance site (neck site) and the exit site to stop any bleeding. A chest x-ray should be performed to ensure that there is no residual tubing in situ. Contact Haematology/Oncology Team in OLCHC for further advice.

3.7.4 Extravasation

CVAD's have decreased the incidence of extravasation. Whilst the incidence of extravasation is lower, the severity of the injuries is far greater as detection tends to occur later and is therefore more serious requiring immediate management. Extravasation can occur as a result of a leaking or damaged catheter, fibrin sheath formation or port needle dislodgement. (See **Chapter 7** for details). It may present clinically as leakage of fluid around the catheter exit site, dull aching pain in the shoulder area, tingling, burning or a warm sensation of the chest wall or fever of unknown origin.

3.7.5 Hickman Catheter Damage

Catheter damage may occur in the form of a weakness/splitting of the catheter wall resulting in leakage from the catheter.

Action	Rationale
Clamp the catheter between the patient and above the damaged area with a smooth-edged, atraumatic clamp	To prevent air entering the catheter via the damaged area and to prevent any blood loss.
Seal damaged area with a sterile occlusive dressing (IV Opsite 3000).	To prevent infection and air entry.
Determine the site of damage i.e. which lumen, size and type of catheter.	To identify appropriate repair kit and ensure a good repair.
Check if there is at least 2 inches of undamaged catheter beyond the skin exit site.	At least 2 inches (or 2.5 inches) of intact catheter beyond the skin exit site is needed to be able to repair the body of the catheter.
Repair catheter (performed in OLCHC).	To restore catheter function.
Follow the surgeon's instructions as to when the line can be used again.	To ensure full mechanical strength of the repaired joint

Take cultures from all lumens 24-48 hours after the catheter repair	To screen for infection following damage/manipulation.
Ensure the child/parents are familiar with the clamping/taping procedure if damage should occur at home.	Damage may occur to the catheter in the home setting.

Child will need urgent referral to OLCHC for catheter repair

3.8 Hickman Catheter Protocols:

3.8.2 Hickman Catheter – Parents Guidelines for General Care

Handwashing:

Thorough hand washing should be observed prior to handling the catheter. High standards of general hygiene should be maintained and always encouraged with children and parents. When changing nappies always ensure the catheter is away from the nappy area.

Baths/Showers:

Children with Hickman catheters may have a bath or shower according to their preference. Before having a bath or shower, the Hickman line must be secured out of the way e.g. by wrapping the catheter in cling film and taping it securely onto the shoulder. The cling film must be removed immediately afterwards. The dressing must be kept dry at all times, and must be changed if it becomes wet after the bath/shower.

Baths: The child may sit in a shallow bath of water.

Shower: The child may have shower avoiding direct water pressure over the Hickman site.

3.8.3 Securing a Hickman Catheter:

The Hickman catheter should be looped under the dressing for additional security, to reduce the effect of pulling on the catheter.

For infants, the catheter should be secured further with an adapted baby vest. The CNS team can provide details of a seamstress who can make this adaptation to the patient's own vests.

A 'Freddie Bag' or crop top may be used for older children to secure the catheter. Adolescents may prefer 'Cath-Secures'.

When the Hickman catheter is attached to IV fluids extra care is needed to prevent the lines being caught or pulled, particularly for babies and young children.

3.8.4 Hickman Catheter Dressing, Flushing, Changing Needle free access device:

WASH HANDS and collect the following:

Requirements for single lumen:

Tray (plastic)	Sterile Gloves x 1
10mL Syringe x 1	Dressing x 1
Filter needle/straw x 1	Needle free access device x 1
Heparin sodium (10unit per mL IV flush solution) 5mL x 1	Sharps bin
Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 8	

Note: For each additional lumen you will need: 10 mL syringe x1, filter needle/straw x 1, needle free access device x 1, Heparin Sodium (10 unit/mL) 5mL x1, Disposable Disinfection wipes x 4

Procedure:

- Follow the universal precautions of hand washing prior to starting the procedure
- Wash the tray and dry it with a paper towel
- Wipe the top surface of the tray with a Disinfection wipe and allow it to dry
- Open the glove packet onto the tray. The inside of this packet is now your “sterile area”
- Carefully open filter needle(s)/straw, syringes, needle free access device and dressing onto the glove packet without touching the contents
- Open the Disinfection wipes onto the packet in the same way
- Check the expiry date on the ampoule of Heparin sodium (10unit/mL), open and leave it beside the tray
- Remove the child's old dressing taking care not to dislodge the line. (a second person or the child can remove the old dressing, **having first washed their hands**, and taking care not to pull on the line).
- Wash hands again and put on the sterile gloves.
- Attach filter needle/straw onto the syringe and draw up 2.5mL of (10unit/mL) of Heparin sodium. Remove the filter needle/staw. Expel the air by slowly pushing up the plunger. Place the syringe on the tray.
- Unfold all of the Disinfection wipes except 3 for cleaning the exit site and leave on the tray.

- With one hand (becomes the dirty hand) pick up the Hickman line, pick up an unfolded Disinfection wipe in the other hand (clean hand) and remove the needle free access device by rotating it to the left, and discard both Disinfection wipe and the needle free access device. Pick up another unfolded Disinfection wipe (clean hand) and clean the open end of the Hickman line. Discard the Disinfection wipe and allow it to dry for a minimum of 30 seconds. Attach (clean hand) the new needle free access device to the Hickman catheter by rotating it to the right for a secure fit.
- Attach (clean hand) the 10mL syringe containing Heparin sodium solution by pushing it firmly into the centre of the needle free access device and rotating it to the right for a secure fit. Open (dirty hand) the clamp and slowly withdraw blood to check for the patency of the line, then slowly inject the Heparin Sodium (10unit/mL) into the line using push – pause method. Close (dirty hand) the clamp as the last 0.5mL is being injected. Remove (clean hand) the syringe and discard it.
- Clean (clean hand) the top of the needle free access device with an unfolded Disinfection wipe. Discard the Disinfection wipe and allow it to dry for a minimum of 30 seconds.
- Repeat the same procedure for change of needle free access devices in double and triple lumen catheters.
- Pick up (dirty hand) the Hickman line, taking care not to pull on it. Pick up (clean hand) a folded Disinfection wipe and carefully clean the skin around the exit site in a circular movement. Start at the catheter exit site. Discard the Disinfection wipe.
- Repeat the cleaning procedure with 2 other folded Disinfection wipes moving a little further out from the exit site each time.
- Now with the remaining unfolded Disinfection wipe (clean hand) gently clean the line from the exit site to the end of the line, taking care not to pull on the line, then discard
- For a double or triple lumen Hickman catheter, use a separate Disinfection wipe for each lumen, to clean from the triangle area down to the end of the catheter
- Loop the Hickman line on to the chest wall. The patient himself/herself or a second person (**having washed their hands**) may hold the loop in place. Place the dressing over the exit site securely and press out any air under the dressing. Place Hickman line into a “Freddie bag” or Cath Secure
- Dispose of needles, filter/straw and syringes into the sharps bin, and other equipment appropriately and wash hands

3.8.5 Protocol for Taking Blood Samples from the Hickman Catheter

WASH HANDS and collect the following:

Requirements:

Clean tray + Sterile preparation towel	Gloves (non-sterile)
10mL syringe x 4	Blood bottles + forms
Non-injectable bung x 4	Green needles (21g) x 1
Sodium chloride 0.9% w/v solution 10mL x 1	Filter needle/straw x 1
Heparin sodium (10units/mL IV solution) 5mL x 1	Sharps bin
Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 3	

Procedure:

- Follow the universal precaution of hand washing and non touch technique
- Wash the tray and dry it with a paper towel
- Open the preparation towel and cover the tray. Check expiry date of sodium chloride 0.9% w/v solution, using a green needle (21g) and 10mL syringe draw up 3mL. Remove the green needle, expel air bubbles and attach a non-injectable bung to the syringe tip. Place the syringe on the tray.
- Draw up Heparin sodium solution 2.5 mL into a separate 10mL syringe using the filter needle/straw. Remove the filter needle/straw, expel air bubbles and attach a non-injectable bung to the syringe tip. Place the syringe on the tray.
- Open the other two 10mL syringes and attach non-injectable bungs to maintain the sterility of the syringe tips and place them on the tray.
- Take the tray, Disinfection wipes and blood bottles to the patient's bedside and explain the procedure to the patient/parents.
- Open the Disinfection wipes and place them onto the clean area of the tray.
- Wash hands again before putting on the gloves.
- Carefully clean the centre of the needle free access device with a Disinfection wipes and allow it to dry for a minimum of 30 seconds. Place a Disinfection wipes under the needle free access device.
- Remove the non-injectable bung from a 10mL syringe, attach it by pushing firmly into the centre of the needle free access device rotating to the right for a secure fit. Open the clamp and slowly withdraw appropriate discard volume of blood (refer to blood discard volume chart below). Close clamp, remove the syringe by rotating it to the left and discard the blood and the syringe.
- If there is any difficulty in withdrawing blood from the catheter, changing the position of the patient and asking the patient to cough may improve the flow or instill 2-3 mL of 0.9% sodium chloride and try again.

- Remove the non-injectable bung and attach 2nd 10mL syringe (as before), open the clamp and withdraw the required amount of blood. Close clamp, remove syringe by rotating to the left, and place it on a clean tray.
- Attach the syringe with 0.9% sodium chloride solution (as before), open the clamp and slowly inject 3mL using push – pause method. Close the clamp, remove the syringe by rotating to the left and discard the syringe.
- Attach the syringe with 2.5mL of Heparin sodium solution (10units/mL), inject slowly using push-pause method. Close the clamp as last 0.5mL being injected and remove the syringe as above and discard. Discard the Disinfection wipes from underneath the needle free access device.
- Carefully clean the centre of the needle free access device with a Disinfection wipes and allow it to dry for a minimum of 30 seconds. Ensure the catheter is secured safely.
- Place blood in appropriate bottles and label correctly at the patient's bed side (fill U+E bottle before FBC bottle to prevent EDTA contamination of U+E sample).
- Dispose of needles and syringes immediately into a sharps bin and dispose of all other equipment appropriately. Ensure bloods are transported to the laboratory with the appropriate forms.
- Wash hands.

Blood Discard Volume Chart:

Age	Volume
<1 year	1.5 mL
1 – 3 years	2.5 mL
>3 years	5mL

3.8.6 Protocol for Taking Blood Cultures from the Hickman Catheter:

WASH HANDS and collect the following:

Requirements for a single lumen:

Clean Tray + sterile preparation towel [#]	sterile gloves x 1 pair
10mL syringes x 3	Sharps bin
Green needles (21g) x 3	Sodium chloride 0.9% w/v 10mL x 1
Filter needle/straw x 1	
Heparin sodium (10 unit per mL IV flush solution) 5mL x 1	
Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 6	

1 set of blood culture bottles (Aerobic + Anaerobic bottles), 1 set per lumen, labeled as per hospital and laboratory policy

[#]Sterile glove packet may be used as an alternative to sterile preparation towel, as a sterile field

For each additional lumen culture you will need: 1 set of blood culture bottles, 10mL syringe x 3, green needles x 3, filter needle/straw x 1, 0.9% Sodium Chloride 10mL x 1, Heparin sodium (10unit/mL) 5mL x 1 and Disposable Disinfection wipes x 5, 1 pair of sterile gloves for each lumen.

***Note:** If the catheter line needs to be cultured and IV fluids are in progress, stop the IV fluids when ready to start the procedure, follow protocol for "Disconnecting the Infusion Set for Blood Sampling" (see **Section 6.10.9**).

Special Note: When TPN and/or blood/blood products are infusing do not interrupt, culture on completion of infusion. However the patient's clinical condition may necessitate discontinuation of infusions and immediate culture of catheter. Seek medical advice.

Procedure:

- Follow the universal precautions of hand washing and aseptic non-touch technique.
- Explain the procedure to the patient and the parents.
- Wash the tray and dry it with a paper towel.
- Wipe the tray with a Disinfection wipe and allow it to dry.
- Prepare the sterile field by opening the sterile preparation towel onto the tray and open syringes, needles and Disinfection wipes onto the sterile field.
- Open glove packet onto work surface beside the tray.

- Check expiry dates on bottle of 0.9% sodium chloride, and Heparin sodium (10unit/mL), open and leave within reach of the tray.
- Check the expiry dates on Blood culture bottles. Prepare the blood culture bottles by removing the protective caps and leaving them beside the sterile field.
- Wash hands again. Put on sterile gloves. Place a Disinfection wipe on top of each blood culture bottle (2 in total). Using green needle(s) draw up 3mL of sodium chloride into a 10mL syringe, and using a filter needle/straw draw up 2.5mL of Heparin sodium (10unit/mL) into another 10mL syringe.
- Holding the catheter in one hand, pick up a Disinfection wipe and carefully clean the centre of the needle free access device. Allow it to dry for a minimum of 30 seconds. Place a Disinfection wipe under the needle free device.
- Attach one 10mL syringe to the needle free access device by pushing it firmly into the centre of the needle free access device and rotating it to the right for a secure fit.
- Open clamp and slowly withdraw 1mL of blood.
- Close the clamp, remove the syringe by rotating to the left, place blood sample on sterile area.
- Attach the syringe with 0.9% sodium chloride to the needle free access device as before and slowly inject 3 mL, followed by 2.5mL of Heparin sodium using a push-pause method. Close the clamp as the last 0.5mL is being injected. Remove the syringe as before. Discard the Disinfectionwipe from underneath the needle free access device.
- Clean the needle free access device with a Disinfection wipe, allow it to dry for a minimum of 30 seconds.
- Remove the Disinfection wipes from the tops of the culture bottles and using separate sterile green needle(s), inject 0.5mL of the blood sample into both aerobic and anaerobic culture bottles and label bottles.
- Ensure the catheter is secured safely.
- Send correctly labeled blood culture bottles with appropriate form to the laboratory immediately to avoid unnecessary delays.
- Dispose of all equipment appropriately.
- Wash hands following the procedure.

Note:

When multiple lumens are being cultured, culture each lumen separately and place the blood samples into the blood culture bottles immediately and label them to avoid confusion. Proceed to the next lumen and repeat as above. **Change gloves** - a new pair of sterile gloves are needed for each lumen culture.

3.8.7 Protocol for Administration of Bolus Medication via a Hickman Catheter:

WASH HANDS and collect the following:

Requirements:

Drug(s) to be administered	Drug labels
Clean tray + sterile preparation towel	Prescription chart
Heparin sodium (IV flush solution) (10units/mL) 5mL x 1	Filter needles/straws for glass vials
Green needles (21g) (1 per syringe)	Non-injectable bungs (1 per syringe)
0.9%w/v sodium chloride 10mL (3 mL per drug)	Sharps Bin
Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 2	

Procedure:

- Follow the universal precautions of hand washing and non-touch technique
- Wash the tray and dry it with a paper towel
- Open the preparation towel and cover the tray. Prepare drug in a clean environment using a non-touch technique. Replace the green/filter needle(s)/straw with non-injectable bung(s) to maintain sterility of the syringe tip. Label appropriately and place it on the clean tray.
- Draw up 3mL of 0.9% sodium chloride in separate 10mL syringes: one to check the patency of the line at the start of the procedure, one to flush the line after each drug administration. Draw up 2.5mL Heparinised sodium in a separate 10mL syringe. Replace the green/filter needles/straw with non-injectable bungs, label appropriately and place it on the clean tray.
- Each drug must be checked and witnessed by two nurses one of whom must be registered with An Bord Altranais and who will administer the drug.
- Take the tray to the child's bedside and explain the procedure to the child and the parent. Check the child's identity band with the drug chart.
- WASH HANDS.
- Pick up catheter in your left hand. Using a Disinfection wipe in your right hand, carefully clean the centre of the needle free access device and discard the Disinfection wipe. Allow the needle free access device to dry for a minimum of 30 seconds. Do not remove the needle free access device.
- Remove the non-injectable bung, and insert the syringe with the 0.9% sodium chloride firmly into the needle free access device. Rotate the syringe to the right for a secure fit.
- Open the clamp with the left hand and draw back gently to assess blood return, and then slowly inject 1-2mL of 0.9% sodium chloride into the line using push-pause method.
- Close clamp and remove the syringe by rotating it to the left and discard.

- Remove the non-injectable bung from the syringe containing the drug to be administered. Insert syringe as before, (push syringe tip firmly into the needle free access device and rotate it to the right for a secure fit)
- Open the clamp and slowly inject the drug using push – pause method.
- Close the clamp, rotate syringe to the left, and remove it.
- Insert the syringe containing sodium chloride, open clamp and instil 3mL of 0.9% sodium chloride solution to flush the drug as before. If giving more than one drug at a time, flush the line with 3mL of sodium chloride between each drug administration and at the end.
- Close the clamp, rotate the syringe to the left and remove it.
- Attach syringe with Heparin sodium, open the clamp and slowly inject using push–pause method closing the clamp as the last 0.5mL is being injected.
- Close the clamp, rotate the syringe to the left and remove it.
- Carefully clean the centre of the needle free access device with a Disinfection wipe and allow it to dry for a minimum of 30 seconds.
- Ensure the catheter is secured safely.
- Dispose of all needles immediately into the sharps bin and other equipment appropriately.
- WASH HANDS.
- Document administered medication in the prescription chart.

3.8.8 Protocol for Connecting an Infusion set to a Hickman Catheter:

WASH HANDS and collect the following:

Requirements:

Clean Tray + sterile preparation towel	Sodium chloride 0.9% 10mL x 1
10 mL syringe x 1	Infusion set
Green needle (21g) x 1	Non-injectable bung x 1
IV fluid prescription sheet	Sharps bin
IV fluid for infusion	
Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 1	

Procedure:

- Universal precautions of hand washing should be observed prior to starting any procedure

- The IV fluid intended for infusion (and any additive needed) must be checked and witnessed by two nurses
- Prepare the infusion set, maintaining the sterility of the end of the line which will be connected to the Hickman catheter
- Open preparation towel and cover the tray. Check expiry date of 0.9% sodium chloride and using green needle (21g) draw up 3mL into the syringe. Remove the green needle and expel the air bubbles. Attach a sterile non-injectable bung to the syringe and place it on the tray
- Bring the tray and the infusion set to the child's bedside and explain the procedure to the child and the parent
- Wash hands
- Carefully clean the centres of the needle free access device with Disinfection wipes and allow it to dry for a minimum of 30 seconds.
- Remove the non injectable bung from the syringe and attach the syringe to the centre of the needle free access device by pushing it in firmly and rotating it to the right for a secure fit. Open clamp. Confirm blood return by gently withdrawing blood into the syringe and slowly inject 1-2mL of sodium chloride 0.9% using a push–pause method. Close the clamp
- Remove the syringe by rotating it to the left.
- Remove cap from the IV giving set and connect it to the needle free access device by pushing it in firmly and rotating it to the right for a secure fit.
- Do not open the Hickman clamp until ready to commence infusion. Ensure the correct rate is set according to the prescription.
- Dispose of all needles and syringes immediately into the sharps bin and dispose of all other equipment appropriately and wash hands.

3.8.9 Protocol for Disconnecting an Infusion set from the Hickman Catheter:

WASH HANDS and collect the following:

Requirements:

Clean tray + sterile preparation towel	Gloves – see below
10mL syringe x 2	Filter needle/straw x 1
Non – injectable bung x 2	Green needles (21g) x 1
Sodium chloride 0.9% w/v 10mL x 1	Sharps bin
Heparin Sodium flushing solution (10 units/mL) 5mL x 1	
Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 3	

NB Precaution - when disconnecting blood products/chemotherapy lines use non sterile gloves for staff protection/safe handling of chemotherapy

Procedure:

- Follow the universal precaution of hand washing and non touch technique
- Open the preparation towel and cover the tray. Check expiry date of sodium chloride 0.9% and Heparinised sodium. Using green needle (21g) draw up 3mL of sodium chloride 0.9% and using filter needle/straw draw up 2.5mL of Heparin sodium into two separate syringes. Remove the green needle/filter needle/straw, expel air bubbles and attach a non-injectable bung to each syringe tip. Place the syringes on the tray
- Take the tray to the patient's bedside and explain the procedure to the patient/parents
- Wash hands
- Use non sterile gloves to disconnect an infusion line containing chemotherapy or blood products.
- Turn off the pump, close line clamp and clamp the Hickman catheter
- Holding the catheter in one hand, pick up a Disinfection wipes and clean the connection between the IV giving set and the Needle free access device, allow it to dry for a minimum of 30 seconds.
- Rotate the giving set connection to the left, and detach it from the needle free access device.
- Carefully clean the centre of the needle free access device with another Disinfection wipes and allow it to dry for a minimum of 30 seconds.
- Remove non injectable bung from the syringe and attach the syringe containing sodium chloride 0.9% by pushing firmly into the centre of the needle free access device and rotating to the right for a secure fit. Open the clamp and slowly inject 3mL using a push-pause method. Close clamp and remove syringe by rotating to the left and discard
- Remove non-injectable bung from the syringe containing 2.5mL of Heparinised sodium, attach the syringe to the needle free access device and inject the solution as above. Close the clamp as the last 0.5mL is being injected. Remove the syringe by rotating to the left and discard
- Carefully clean the centre of the needle free access device with Disinfection wipes and allow it to dry for a minimum of 30seconds. Ensure the catheter is secured safely
- Dispose of needles and syringes immediately into a sharps bin and dispose of all other equipment appropriately

3.8.10 Disconnecting the Infusion set from the Hickman Catheter for Blood Sampling:

WASH HANDS and collect the following:

Requirements:

Clean tray + sterile preparation towel

Gloves - see below

10mL syringe x 3	Blood bottles
Non – injectable bung x 4	Green needles (21g) x 1
Sodium chloride 0.9% w/v 10mL x 1	Sharps bin
Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 4	

NB Precaution - when disconnecting blood products/chemotherapy lines use non sterile gloves for staff protection/safe handling of chemotherapy

Procedure:

- Follow the universal precaution of hand washing and non touch technique
- Open the preparation towel and cover the tray. Check expiry date of 0.9% w/v sodium chloride solution, using a green needle (21g) draw up 3mL into the syringe. Remove the green needle, expel air bubbles and attach a non-injectable bung to the syringe tip. Place the syringe on the tray.
- Open the other two 10mL syringes and attach the non-injectable bungs to maintain the sterility of the syringe tips and place it on the tray.
- Take the tray and the unopened non-injectable bung and Disinfection wipes to the patient's bedside
- Explain the procedure to the patient/parents
- Open the Disinfection wipes and non injectable bung and place on the tray
- Wash hands again before putting on gloves
- Pause the infusion pump and clamp all lumens
- Holding the catheter in one hand, pick up a Disinfection wipes and clean the connection between the IV giving set and the Hickman catheter
- Rotate the giving set connection to the left, and detach it from the needle free access device. Place the non injectable bung on to the exposed end of the giving set and leave it aside
- Carefully clean the centre of the needle free access device with Disinfection wipes allow it to dry for a minimum of 30 seconds. Place a Disinfection wipes under the needle free device.
- Remove the non-injectable bung from a 10mL syringe, attach the syringe by pushing firmly into the centre of the needle free access device and rotating to the right for a secure fit. Open the clamp and slowly withdraw appropriate discard volume of blood (refer to blood discard volume chart below). Close clamp, remove the syringe by rotating it to the left and discard the syringe.
- If there is any difficulty in withdrawing blood from the catheter, instill 2-3 mL of 0.9% sodium chloride and try again. Additionally ask the patient to cough or change position as this may improve the blood flow.
- Remove the non-injectable bung and attach 2nd 10mL syringe (as before), open the clamp and withdraw the required amount of blood. Close clamp, remove syringe by rotating to the left, and place it on the tray.

- Attach the syringe with sodium chloride 0.9% (as before), open the clamp and slowly inject 3mL using the push-pause method. Close the clamp, remove the syringe by rotating to the left. Discard the Disinfection wipes from underneath the needle free access device.
- Carefully clean the centre of the needle free access device with a Disinfection wipes and allow it to dry for a minimum of 30seconds. Remove the non-injectable bung from the IV giving set and re-connect it to the catheter. If the IV giving set is due to be changed, attach a new IV giving set at this time.
- Place blood in appropriate bottles and label correctly at the patient's bed side (fill U+E bottle before FBC bottle to prevent EDTA contamination of U+E sample). Recommence the fluid regime as prescribed.
- Dispose of needle(s) and syringes immediately into a sharps bin and dispose of all other equipment appropriately. Wash hands. Ensure bloods are transported to the laboratory with the appropriate forms.

Blood Discard Volume Chart:

Age	Volume
<1 year	1.5mL
1 – 3 years	2.5mL
>3 years	5mL

3.8.11 Protocol for Instillation of Antibiotic Lock into the Infected Hickman Catheter:

Please refer to the individual patient's priming volume information located in patient's healthcare record. This is particularly important for patients <3kg and Gentamicin levels should be monitored on alternate days in this group.

If no priming volume information is available from the time of Hickman catheter insertion, please use the priming volume guide below. These instructions are based on the largest volume Hickman catheter which is 2mL.

Priming Volume Guide (when no information available)

<3kg	Maximum volume 0.5mL per lumen
>3kg <3years	1mL (total volume)
>3years	1.5mL (total volume)

NB Antibiotic locks are changed every 24 hours

WASH HANDS and collect the following:

Requirements:

Clean Tray + Sterile preparation towel	Gloves (non-sterile)
Non injectable bung x 2	Prescription sheet
Green needle (21g) x 1	Filter needle/straw x 1
2mL syringe x 1	Label for Hickman line
10mL syringe x 1 (to remove old flush)	Sharps Bin

Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 4

Heparin sodium Preservative Free (1,000unit/mL) **NB note strength**

If taking blood samples at this change - 10mL syringe x 2 (waste/blood sample), blood bottles

Antibiotic:

Gentamicin 20mg/2mL vial x 1

OR

Vancomycin 500 mg vial x 1

Water for injection x 1

5mL syringe x 1

Sodium chloride 0.9% 10mL x 1

10mL syringe x 1

1mL syringe x 1

OR

Amphotericin B 50mg vial x 1

Water for injection x 3

10mL syringe x 2

5mL syringe x 1

Procedure:

- Follow the universal precautions of hand washing and non touch technique
- Wash the tray and dry it with a paper towel
- Check prescription chart for antibiotic dose for catheter lock
- Prepare the antibiotic lock as follows:

• Gentamicin:

- Wipe the top of Gentamicin 20mg vial with a Disinfection wipe and allow it to dry for a minimum of 30 seconds.
- Using the 2mL syringe with a green needle, draw up 2mL (20 mg) of Gentamicin.
- Into the same syringe using a filter needle/straw draw up **0.2mL** of Preservative Free Heparin (1000 unit/mL) and mix it with the Gentamicin in the syringe (total volume of 2.2mL).

(Special Note: Monitor Gentamicin levels if the patient is also receiving systemic Gentamicin or patient is less than 3kg)

OR

• Vancomycin:

- Wipe the top of the Vancomycin 500mg vial with a Disinfection wipe and allow it to dry for a minimum of 30 seconds.
- Using a 10mL syringe draw up 9.7mL of water for injection and add to the vial and dissolve.
- Using 1mL syringe and a green needle draw up 0.2mL of Vancomycin (10mg).
- Using a 5mL syringe draw up 4.8mL Sodium chloride 0.9% solution and add the 0.2mL of Vancomycin (10mg) into the same syringe containing 4.8mL of Sodium chloride 0.9% and mix thoroughly.
- Using a 2mL syringe withdraw 2mL (4mg Vancomycin) and into the same syringe using a filter needle/straw draw up 0.2mL of Preservative Free Heparin and mix it with the Vancomycin (total volume 2.2mL).

(Special Note: Infants <3kg contact Haematology Oncology Team)

OR

• **Amphotericin B:**

- Wipe the top of the Amphotericin 50mg vial with a Disinfection wipe and allow it to dry for a minimum of 30 seconds.
 - Add 10mL of water for injection and shake well = 5mg/mL solution.
 - Using a 5mL syringe draw up 1mL of 5mg/mL solution, add 4mL of water for injection to the syringe and mix thoroughly = 1mg/mL solution.
 - Withdraw 2mL of 1mg/mL solution into 10mL syringe and add 8mL of water for injection = 200microgram/mL solution.
 - Using the 2mL syringe draw up 2mL of 200microgram/mL solution. Using the same syringe and a filter needle/straw, draw up 0.2mL of Preservative Free Heparin 1000units/mL (total volume 2.2mL).
- Ascertain the priming volume of the infected lumen. Carefully discard the excess volume of antibiotic flush from the syringe keeping **only** the priming volume amount. Remove green/filter needle /straw, and attach a non-injectable bung and place it on the tray.
 - Bring the tray to the child's bedside and explain the procedure to the child and the parent. Check the child's identity band against the drug prescription chart.
 - Wash hands again and put on the gloves.
 - Holding the infected lumen in one hand, pick up a Disinfection wipe and carefully clean the centre of the needle free access device and discard the Disinfection wipe. Allow it to dry for a minimum of 30 seconds. Place a Disinfection wipe under the needle free access device. Attach a 10mL syringe by pushing it firmly into the centre of the needle free access device, and rotate it to the right for a secure fit. Open clamp and slowly withdraw appropriate volume of blood (to remove last lock). Close the clamp and remove the syringe.

- Attach the syringe containing the prescribed antibiotic to the needle free access device. Open the clamp and slowly instill required lock volume. Close the clamp, remove the syringe and discard. Discard the Disinfection wipe from underneath the needle free access device.
- Carefully clean the centre of the needle free access device with a Disinfection wipe, and allow it to dry for a minimum of 30 seconds.
- Label the catheter '**Gentamicin or Vancomycin or Amphotericin B lock in situ**' and ensure that the catheter is secured safely.
- Dispose of needles and syringes immediately into sharps bin and dispose of all other equipment appropriately.

Important – Please note:

When intra-Hickman lock is in situ, the same lumen **should not be used** for systemic antibiotics, IV fluids or blood products. Always ensure the previous antibiotic flush is removed **before** instilling the next one.

On day 6 the infected catheter lumen must be recultured. Remove the lock in situ 8 hours before the next dose of antibiotic lock is due. Instill Heparin 10unit/mL flush (lock volume) into the lumen. After 8hours, aspirate 1mL of blood, place 0.5mL in each of the culture bottles (aerobic and anaerobic) (see Section 6.10.5). Reinsert antibiotic locks as prescribed and await culture reports.

If lumen cultures are negative, discontinue the lock. Ensure the **last dose** of antibiotic lock is removed from the catheter lumen. Flush with 0.9% sodium chloride and Heparin sodium (10unit/mL). The antibiotic label should also be removed from the line.

If the lumen culture remains positive, locks are continued and the lumen is re-cultured on alternate days until a 48 hour result is clear. If it remains positive seek advice from OLCHC Haematology/Oncology Consultant.

3.8.12 Protocol for Instillation of Urokinase into a Blocked Hickman Catheter:

Important – Please note:

These guidelines are for the use of nursing staff in OLCHC from Haematology/Oncology unit who have been trained in the management of blocked Hickman catheters. In local hospitals it may be appropriate for the medical staff to carry out this procedure.

***Please do not attempt to unblock totally occluded catheters unless trained to do so as it may cause rupture of the catheter or dislodge a catheter embolus.**

Wash hands, collect prescription and the following:

REQUIREMENTS

Clean tray + Sterile preparation towel	Vial of Urokinase (10,000 units) x 1
Green Needle (21g) x 1	2mL Syringe x 1

Non-injectable bung x 1

Sodium chloride 0.9% w/v x 1

Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 4

(In OLCHC Syner-KINASE® brand of Urokinase is currently being used, please note: dilution fluid for this brand is 0.9% w/v sodium chloride. If in doubt please read the summary of product characteristics and also check with OLCHC Pharmacy staff).

Procedure:

- Follow the universal precautions of hand washing and non-touch technique
- Check prescription chart for drug dose.
- Wash the tray and dry it with a paper towel.
- **Wash hands.**
- Open the cap of the Urokinase bottle; clean the top with a Disinfection wipe allow it to dry for a minimum of 30 seconds. Dissolve vial of Urokinase (10,000 Units) with 2mL of 0.9% w/v sodium chloride. **The concentration of Urokinase should always be 5,000 units per mL. It should not be further diluted.**
- When dissolved, if the priming volume of the blocked lumen is known, draw up the known amount of Urokinase into the syringe. Remove the green needle, attach the non injectable bung and place on the tray. However, if the priming volume is unknown draw up 1mL (5000 Units) in a 2mL syringe for children <3 years and for children >3 years use 2mL (10,000 Units).
- Bring the tray to the child's bed side. Explain the procedure to the child and the parent. Check the child's identity band against the drug chart. Wash hands again.
- Ensure the line is clamped. Clean the centre of the needle free access device with a Disinfection wipe, allow it to dry for a minimum of 30seconds. Remove the non injectables bung from the syringe containing the Urokinase and attach it to the centre of the needle free access device firmly, rotating to the right for a secure fit. Open the clamp and slowly inject. Do not force the fluid into the catheter. Close the clamp. Clean the needle free access device with a Disinfection wipe and allow it to dry for a minimum of 30 seconds.
- Label the lumen to identify that Urokinase is in situ with date and time of instillation. The child must remain in the ward, due to the potential risk of anaphylaxis. Ensure Chlorphenamine and Hydrocortisone injections are available, and medical staff is readily available.
- After one hour remove the Urokinase from the line by aspirating 4 to 5mL of blood to ensure removal of Urokinase plus clots.
- If the line is unblocked and there is a blood return, follow the usual flushing procedure; flush with 3mL of 0.9% sodium chloride, followed by 2.5mL of Heparinised saline, closing the clamp as the last 0.5mL is being injected.
- If the line remains blocked, please contact the OLCHC Haematology/Oncology Team for further advice. It may be necessary to repeat the procedure using the original volume of Urokinase and leave in situ for 4-6 hours. If it remains blocked after the above procedures, contact the **relevant Haematology/Oncology team in OLCHC.**

- For persistent occlusion, the same procedure can be repeated and left in situ overnight or a continuous infusion of Urokinase 200 Units/kg/hr for 24 hours can be attempted (performed in OLCHC). This approach does not require intensive monitoring of the patient or assessment of coagulation parameters.
- **Note:** For occlusions secondary to TPN and medication incompatibilities please consult with Haematology/Oncology Team or Pharmacist in OLCHC for further advice.

3.9 Protocol for Administration of Chemotherapy:

3.9.2 Protocol for Administration of Cytarabine via Hickman Catheter with Needle free access device:

WASH HANDS and collect the following:

Requirements:

Clean tray + protective sheet	1 pair of Gloves - see below
Plastic Apron	Goggles
10mL syringe x 3	Filter needle/straw for glass vial x 1
Non – injectable bungs x 3 (1 per syringe)	Green needles (21g) x 2
0.9% w/v sodium chloride 10mL x 1 (3 mL per drug)	Cytotoxic Sharps bin
Heparin sodium (10 unit/mL) 5 mL x 1	Prescription chart and Cytarabine 100mg/mL concentration (dose dispensed by Pharmacy Dept. OLCHC to parent/carer)
Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 2	

NB Precaution - when disconnecting blood products/chemotherapy lines use non sterile gloves for staff protection/safe handling of chemotherapy

Procedure:

- Follow the universal precautions of hand washing and non-touch technique
- Check prescription chart for drug dose.
- Prepare the tray in a clean environment. Wash the tray and dry it with a paper towel.
- Using strict non-touch technique, attach green needles and filter needle/straw to 10mL syringes.
- Draw up 3mL of 0.9% w/v sodium chloride into two separate syringes, one to check the patency of the line and another to flush following Cytarabine administration. Draw up 2.5mL of Heparin sodium with the remaining syringe with filter needle/straw. Replace the green needles and the filter needle/straw with non injectable bungs (red), label appropriately and place it on the clean tray.

- Each drug must be checked and witnessed by two nurses one of whom must be registered with An Bord Altranais and who will administer the drug.
- Wash hands and put on apron, goggles and gloves.
- Bring the tray to the child's bed side. Explain the procedure to the child and the parent. Check the child's identity band with the drug chart. Place the protective sheet on the child's lap.
- Ensure the line is clamped. Pick up the Hickman catheter in your left hand. Using a Disinfection wipe with your right hand, clean the centre of the needle free access device and discard the disinfection wipe, allow it to dry for a minimum of 30seconds (**Do not remove the needle free access device**).
- Remove the non-injectable bung from the 1st syringe containing 0.9% sodium chloride and attach firmly in to the centre of the needle free access device. Rotate the syringe to the right for a secure fit.
- Open the clamp with the left hand and draw back gently to assess blood return and then slowly inject 1-2mL of 0.9% sodium chloride into the line using push-pause method. Close the clamp. Remove the syringe by rotating to the left, and discard.
- Remove the non-injectable bung from the syringe containing **Cytarabine** and discard the bung into the cytotoxic sharps bin.
- Attach the Cytarabine syringe to the needle free access device firmly and rotate it to the right for a secure fit. Open the clamp and slowly inject the prescribed Cytarabine dose using push -pause method. Close the clamp. Remove the syringe by rotating to the left and discard it into the cytotoxic sharps bin.
- Attach 2nd syringe containing 0.9% sodium chloride to the needle free access device. Open the clamp and inject sodium chloride solution to flush the drug as before. Close the clamp. Remove syringe by rotating to the left and discard it into the cytotoxic sharps bin.
- Attach the syringe containing Heparin sodium to the needle free access device. Open the clamp and slowly inject 2.5mL using push-pause method closing the clamp as the last 0.5mL is being injected. Remove syringe by rotating to the left and discard it into the cytotoxic sharps bin.
- Carefully clean the centre of the needle free access device with the remaining Disinfection wipe and allow it to dry for a minimum of 30seconds. Ensure the catheter is secured safely.
- Dispose of all needles immediately into the cytotoxic sharps bin and other equipment appropriately. **Wash hands.**
- Document administered medication (date and signature) in the prescription chart.

Note:

Do not proceed with giving bolus Cytarabine if blood return cannot be obtained, please contact OLCHC Haematology / Oncology team for advice.

3.9.3 Protocol for Administration of Vincristine via a Hickman Catheter with Needle free access device:

WASH HANDS and collect the following:

Requirements:

Clean tray + protective sheet	1 pair of Gloves - see below
Plastic Apron	Goggles
10mL syringe x 3	Filter needle/straw for glass vial x 1
Non – injectable bungs x 3 (1 per syringe)	Green needles (21g) x 2
0.9% w/v sodium chloride 10mL x 1 (3 mL per drug)	Cytotoxic Sharps bin
Heparin sodium (10 unit/mL) 5 mL x 1	Prescription chart and Vincristine (dose dispensed by Pharmacy Dept. OLCHC to parent/carer)
Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 2	

NB Precaution - when disconnecting blood products/chemotherapy lines use non sterile gloves for staff protection/safe handling of chemotherapy

Procedure:

- Follow the universal precautions of hand washing and non-touch technique
- Check prescription chart for drug dose.
- Prepare the tray in a clean environment. Wash the tray and dry it with a paper towel.
- Using strict non-touch technique, attach green needles and filter needle to 10mL syringes.
- Draw up 3mL of 0.9% w/v sodium chloride into two separate syringes, one to check the patency of the line and another to flush following Vincristine administration. Draw up 2.5mL of Heparin sodium with the remaining syringe with filter needle/straw. Replace the green needles and the filter needle/straw with non injectable bungs (red), label appropriately and place it on the clean tray.
- Each drug must be checked and witnessed by two nurses one of whom must be registered with An Bord Altranais and who will administer the drug.
- Wash hands and put on apron, goggles and gloves.
- Bring the tray to the child's bed side. Explain the procedure to the child and the parent. Check the child's identity band with the drug chart. Place the protective sheet on the child's lap.
- Ensure the line is clamped. Pick up the Hickman catheter in your left hand. Using a Disinfection wipe with your right hand, clean the centre of the needle free access device and discard the disinfection wipe, allow it to dry for a minimum of 30seconds (**Do not remove the needle free access device**)
- Remove the non-injectable bung from the 1st syringe containing 0.9% sodium chloride and attach firmly in to the centre of the needle free access device. Rotate the syringe to the right for a secure fit.

- Open the clamp with the left hand and draw back gently to assess blood return and then slowly inject 1-2mL of 0.9% sodium chloride into the line using push-pause method. Close the clamp. Remove the syringe by rotating to the left, and discard.
- Remove the non-injectable bung from the syringe containing **Vincristine** and discard the bung into the cytotoxic sharps bin.
- Attach the Vincristine syringe to the needle free access device firmly and rotate it to the right for a secure fit. Open the clamp and slowly inject the prescribed Vincristine dose using push -pause method. Close the clamp. Remove the syringe by rotating to the left and discard it into the cytotoxic sharps bin.
- Attach 2nd syringe containing 0.9% sodium chloride to the needle free access device. Open the clamp and inject sodium chloride solution to flush the drug as before. Close the clamp. Remove syringe by rotating to the left and discard it into the cytotoxic sharps bin.
- Attach the syringe containing Heparin sodium to the needle free access device. Open the clamp and slowly inject 2.5mL using push-pause method closing the clamp as the last 0.5mL is being injected. Remove syringe by rotating to the left and discard it into the cytotoxic sharps bin.
- Carefully clean the centre of the needle free access device with the remaining Disinfection wipe and allow it to dry for a minimum of 30 seconds. Ensure the catheter is secured safely.
- Dispose of all needles immediately into the cytotoxic sharps bin and other equipment appropriately. **Wash hands.**
- Document administered medication (date and signature) in the prescription chart.

3.10 Protocol for Administration of Intramuscular PEG-Asparaginase:

WASH HANDS and collect the following:

Requirements:

Clean tray	1 pair of Gloves
Green needle (21g) x 1 per site	Cotton wool
Blue needle (23G) x 1 per site	Band-aid x 1 per site
Syringe 2mL x 1 per site	Peg-asparaginase vial(s)

Disposable Disinfection wipes (70% v/v Isopropyl alcohol and 2% w/v Chlorhexidine gluconate) x 2
(1 extra for each additional vial)

N.B. Please note that this is for intramuscular use only. A maximum of 2mL can be given in any one site. If the dose exceeds 2mL use a separate syringe and injection site for each 2mL or less.

Ensure topical anaesthetic is applied to injection site for appropriate time

Procedure:

- Explain the procedure to the child and the parent
- Follow the universal precautions of hand washing and non touch technique
- Remove local anaesthetic cream and dry patient's skin with tissue
- Check prescription for drug dose
- Wash the tray and dry it with a paper towel
- Clean the top of Asparaginase vial with a Disinfection wipe and allow to dry for 30seconds
- Attach the green needle(s) to the syringe(s) and draw up the dose of Asparaginase in separate syringes with a maximum of 2mL of the dose in each syringe
- Replace the green needle(s) with the blue needle(s) and loosen the cover(s) on the blue needle(s). Place them on the tray
- Bring the tray to the child's bed side. Check the child's identity band against the drug chart
- Put on gloves
- Wipe the patient's skin with a Disinfection wipe and allow to dry
- Using Z track technique*. Insert the needle quickly at a 90° angle and inject the fluid very slowly. Let go of the skin and remove the needle.
- Using dry cotton wool, apply pressure to the injection site. **Do not rub.**

- Apply Band-Aid.
- Repeat the above steps for second and third syringes if appropriate, allow distance of 25mm between sites
- Dispose of needles, syringes and vial appropriately. Remove gloves and wash hands.
- Document administration in the drug chart

Note: Patient must remain on ward for one hour post administration due to risk of anaphylaxis.

***Z track technique:**

- Pull/displace the skin with your dominant hand 1cm laterally to the site to be injected.
- This will displace the tissues prior to injection.
- Hold the position until the medication has been injected and the needle is removed.
- After removing the needle quickly, release the pull on the skin. This seals the medication within the muscle layer and prevents leakage.

Ref: Guidelines on the Administration of Intramuscular and Sub Cutaneous Injections. Nurse Practice Guidelines OLCHC 2017.

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