- Long Lines - Full Clinical Guideline - UHDB Joint

Reference no.: NIC PP07

1. Introduction

Central venous lines (long line) are an important and common part of neonatal intensive care. Parents shouldbe informed in advance in the impending procedure and written consent obtained.

Indications and Usage of Long line:

1. Extremely growth retarded infants at high risk of NEC.
2. **Major gastrointestinal problems and enteral feed intolerance**
3. Infants requiring intravenous parenteral nutrition or high doses of inotropic agents.
4. Infants anticipated to need long term venous access (eg drug or fluids).

Long lines should not routinely be used:

- For intravenous antibiotics (unless peripheral venous access is impossible)
- If a Long line infection is suspected.
- Blood product (or blood) should not be infused through a central line.
- **For bolus drugs and those given by intermittent infusion (should be given via a peripheral cannula whenever possible) as repeated manipulation of the lines are the main source by which bacteria are introduced and also increases the risk of line rupture.**

Types of longline:

- Vygon Premicath 28G
- Vygon Nutriline PIC line

Premicaths should be avoided where expected flow rates exceed 10-12 ml/hour.

2. Patient preparation:

The baby must have respiratory (pulse oximetry) and cardiovascular monitoring (ECG) on when inserting central venous catheters.
Both pharmacologic and nonpharmacologic methods of pain control should be employed when placing a neonatal PICC. Swaddling and the oral administration of sucrose reduce pain but do not eliminate it. These methods should be used in combination with analgesic agents for the most effective pain control.[2]

3. Placement of central venous lines

- The parents should be informed about the procedure prior to placing a PICC line ,unless urgent access is required when the parents are unavailable. Written consent should be obtained. **The information giving process should include a discussion of the problems of infection, thrombus formation, line breakage and migration, pleural effusion and cardiac tamponade.**

2.0 Technique of insertion

1. Carefully inspect infant for most suitable site and measure approximate length of catheter required using a tape measure (from insertion point to xiphisternum for lines inserted in lower limb and to the sternal angle for upper limbs)
2. Gown and glove up and using full aseptic technique prepare the equipment. Flush the catheter with normal saline and keep the syringe attached to the end.
3. **NICU Longline Insertion Checklist should be followed, completed and filed in the patient's notes. (See Appendix 1)**
4. Clean skin carefully with a sterile sachet of 0.5% aqueous Chlorhexidine solution and wait for it to dry before using sterile drapes/towels. Identify insertion point and clean again.
   If the baby is <28 weeks gestation and <1 week old further clean the skin with sterile water or 0.9% saline to avoid skin damage/burns caused by the chlorhexidine and avoid excess chlorhexidine pooling around the baby[3]. It is essential that the whole area of the insertion site is sterile, this usually involves cleaning the whole arm/leg for example.
5. Occlude vein proximal to insertion point and advance needle briskly into vein. If the peelable cannula is used, cannulate the vein and then remove the needle.
6. Once a good backflow of blood is seen use non-toothed forceps to introduce catheter while keeping position and angulation of needle steady.
7. Advance the catheter about 1cm at a time using the forceps until the resistance point at entry into the vein is overcome.
8. Continue to feed the catheter through the needle /cannula aiming for the tip to be sited in a major vein just outside the heart. Check the length inserted using the markings on the catheter. Check that blood can be aspirated and line can be flushed.
9. Withdraw the introducer needle or peelable cannula until it is outside of the skin, taking care not to alter the line position. Peel the cannula or unscrew and remove the butterfly as necessary. Apply gentle pressure during this procedure to the insertion site using a clean gauze.
10. Flush line again and continue to apply gentle direct pressure on the insertion

point until bleeding ceases. This may take up to 30 minutes on some occasions and patience is definitely required!

11. Coil the spare catheter length on the skin and secure in place with Steri-Strip prior to covering with a neonatal size Tegaderm. The infusions can be connected providing an X-ray is requested immediately to check the location of the catheter tip.
12. Aim to located the catheter tip the SVC or upper IVC just outside of the heart.

3.0 Principles for checking and altering the position of a Long Line

The optimal position for the distal tip of a PICC line is in the SVC or IVC but **clearly outside the cardiac silhouette.**
The position of the catheter tip must be confirmed using the imaging guidelines below. A contrast study is undertaken initially for all percutaneous long lines. The verification of the catheter tip must be confirmed by a neonatal SpR or Consultant or radiologist before the line is used.

If a percutaneous long line does not pass satisfactorily into a major vessel such as the IVC or SVC then itshould only be used temporarily until a better placed line can be achieved. Such "short lines" are rarely useful for more than 24 hours and inevitably lead to local inflammation and swelling.

Imaging percutaneous Long Lines

Aim to define the position of tip using contrast-a satisfactory exposure is one where the tip is opacified andsome contrast is seen the vessel.

1. Position baby so that tip is in position of maximum insertion before exposure i.e. upper limb- abduct arm at 90 to torso, lower limb –hip fully extended.
2. Have ready 1ml of water soluble contrast. Contrast to use OMNIPAQUE 300(1ml diluted with 1mlof sterile water and then inject 1ml of that solution)-this is isotonic with blood. DO NOT USE any other contrast-if Omnipaque is not available you MUST contact one of the consultant radiologistsfor advice.
3. Have ready 1ml of sterile water as flush.
4. Connect contrast to longline with flush ready.
5. Expose film immediately injection of 1ml contrast is completed.
6. After the X-ray flush the longline immediately.
7. Examine film taken to identify tip position-if in doubt ask a consultant to review.
8. If tip is visible but incorrectly sited, reposition the line and repeat a plan film. Do not use the line until you are certain that the catheter tip is correctly located.

<u>Fixation and care of the central venous catheter</u>
Central venous catheters should be taped to the patient to avoid any strain being placed on the catheter and to prevent the tube becoming kinked or damaged.
During each daily review the medical notes must state:
1) The number of days the line has been in (only necessary for long lines)
2) If the dressing is clean and intact

3) There is no evidence of infection/inflammation or phlebitis at the line site.

4.0 Complication and Indications for Removal

Central catheters should be removed as soon as they are no longer needed.[4]

1. Local inflammation and swelling, especially for “short lines”.
2. Sepsis. The decision to remove a long line for sepsis may be difficult and vary with individual circumstances. If clinical need for central venous access is low then reinsertion should be deferred for at least 48 hours where possible.
3. The “importance” will depend on availability of other veins for peripheral cannulation, the need for TPN or inotropes and the ability of the infant to withstand handling. In most cases of confirmed sepsis however, the infant will not improve, even with appropriate antibiotic therapy, until the line is removed. Scalp veins may be a useful adjunct to peripheral venous access.
4. Catheter related endocarditis or Candidal or Gram Negative septicaemia is an absolute indication for line removal. This should be undertaken promptly once peripheral venous access isobtained.

   If re-insertion is deemed to be critical a period of 48-72 hours should ideally occur with optimalantibiotic therapy before this is performed.
5. Migration into other sites. The catheter should be withdrawn or removed if local complicationshave occurred.
6. Perforation and leakage. The line should be removed and replaced if necessary.
7. Blocked or Non-functioning line. The line should be observed for local inflammation and swelling and then flushed with normal saline using aseptic technique and a 5ml syringe. Care should not be taken not to use excessive force or too small a syringe.
8. Air embolism
9. Pleural effusion. Clinical suspicion should prompt cessation of fluids through the line until radiographic confirmation has occurred. Since these cases present less acutely than cardiac tamponade, blind thoracocentesis is usually not required.
10. Arrhythmias and SVT. An urgent plain X-ray should be taken if an infant has a percutaneous long line in situ, as this can occasionally be caused by catheter migration into the right atrium.
11. Cardiac tamponade. This complication is unlikely unless a line has been placed or migrated into right atrium. If this complication is suspected, no further fluids should be infused through the line and if time permits X-ray or echocardiographic confirmation should be sought. Emergency pericardiocentesis is only indicated for severe cardiovascular compromise. However resuscitation should not be completed for a baby with a central line failing to respond to CPR until the pericardiocentesis is performed.

5.0 Technique for Removal

Remove percutaneous long line as soon as possible after infusion has been stopped to reduce the risk ofthrombosis.

A percutaneous central line may be removed by first gently peeling the occlusive dressing from the skin. The surrounding skin should be cleaned to prevent microbiological contamination. Gentle steady withdrawal of the catheter is usually possible until the tip is estimated to be a short distance from the entry site. At this stage the entry site may be occluded by a sterile gauze with light pressure while the lineis completely removed.

The catheter tip should be cut off into a sterile container using sterile scissors and sent for culture (if required).

In cases where the catheter will not easily withdraw, gentle steady traction can be applied (if necessary twisting the line around a thin object and every few minutes slightly increasing the traction by rotating the object. One can also gently rub the vein above the entry point which enables a stuck line to be removed.

If these measures do not succeed or if the catheter snaps during withdrawal then the line should be clamped and senior advice should be sought immediately.

2. Documentation Controls

Reference Number NIC PP 07	**Version:** 2		**Status** Final	
Version / Amendment History	Version	Date	Author	Reason
	V2	Jan 2025	Dr Bala Subramaniam	Review and renew
Intended Recipients: Neonatal consultants, neonatal education team, neonatal senior nurses				
Training and Dissemination: Cascade the information via BU newsletter and address training				
Development of Guideline: Dr Bala Subramaniam **Job Title:** Consultant Paediatrician and Neonatologist				
In Consultation with: Dr Bala Subramaniam				
Linked Documents:				
Keywords: Neonatal Intensive Care Unit; Baby; Central Line; Parenteral Nutrition (PN); Vygon Premicath; Vygon Nutriline PIC line; NICU; Babies; Infant; Infants; Neonate; Neonates; Neonatal; Newborn; Central Venous Line				
Business Unit Sign Off			**Group:** Paediatric Guidelines Group **Date: 12/02/2025**	
Divisional Sign Off			**Group:** Women's and Children's Clinical Governance Group **Date: 03/03/2025**	
Date of Upload			4th March 2025	
Review Date			Feb 2028	
Contact for Review			Dr Bala Subramaniam	

3. Appendices

University Hospitals of Derby and Burton
NHS Foundation Trust
WPH2727/UHDB

HNLOCSSIPS

NICU Longline Insertion checklist

Patient Identity – Please affix label.

Sign in – before preparing trolley			Tick
Date:	**Time:**		
Operator Name			
Operator Signature			
Operator Designation			
Assistant Name			
Assistant Signature			
Assistant Designation			
Operator confirms with team:			
Indication documented in the notes			
Informed verbal consent obtained			
Consent documented in the notes			
Nurse or midwife caring for patient informed			
3 patient identification markers			
Is monitoring indicated			
YES		NO	
Contraindications:			
Bleeding disorder			
Recent longline sepsis			
I am competent to insert this longline or have appropriate supervision			
I have considered indication for use			
I have considered anatomical features that may influence the planned insertion site			
Make of Line and Lot No			

Time Out – Before preparing patient	Tick
STOP MOMENT	
All team members have introduced themselves and are aware of their role	
Operator and assistant confirm:	
3 patient identification markers	
Planned procedure	
Site - Limb Specify	
How confirmed:	
Line type, gauge and calculated insertion length	
Sterile precautions:	
Gown, gloves, drape	
Cleaned and decontaminated incubator	
skin Prep - 0.5% Chlorhexidine gluconate	
Analgesia considered and ready to administer	
If repeat required due to unsuccessful attempt Re tick relevant boxes above	

Sign out – After procedure				Tick
Operator and assistant confirm:				
Flushed ok				
YES		NO		
Longline secured with:				
Seristrip				
Tegaderm				
Length line inserted to:				
Xray performed				
Line Position:				
Position satisfactory	YES		NO	
Adjusted	YES		NO	
Repeat Xray	YES		NO	
Comments:				
Guidewire removed by:				
Confirmed by:				
ALL SHARPS ARE DISPOSED OF SAFELY				
Procedure documented in medical notes				
Outcome discussed with:				
Nurse		Parents/ Carer		
DEBRIEF-complications or concerns:				

University Hospitals of Derby and Burton
NHS Foundation Trust

NICU Longline Equipment Checklist

Patient Identity – Please affix label.

Date:	Time:

Item	
Cut down pack	
Gown and gloves	
Premicath (28G) for neonates 1Kg Nutriline Twin Flo (24G 2Fg) for all neonates requiring multiple infusions of incompatible solutions.	
Peel-away introducer (micro-flash introducer) or 24g Cannula for insertion (optional for extreme preterm babies but not recommended by manufacturer) or Vygon's 2Fr Microsite can be used to gain access to difficult neonatal veins.	
Chlorhexidine Gluconate 0.5%.	
Steri-strips	
Sterile IV 3000 or Tegaderm (high moisture vapour permeable transparent dressing)	
Needle free device	
10ml syringe	
Blunt filter needle	
0.9% Sodium Chloride	

Operator _____

Designation _____

Check x-ray requested	
Please document procedure progress in the medical notes	