**Name of Procedure/Guidelines/Protocol:** PROCEDURE FOR INSERTION OF PERCUTANEOUS CENTRAL VENOUS CATHETER AND STATIC LINOGRAM

**Purpose of Procedure/Guidelines/Protocol:** To provide guidance on insertion and maintenance of PCVC and Static Linogram

**Replaces:** New

**Applicable to which staff:** Neonatal and SCBU Nursing and Medical Staff

**Name & title of author:** Una Toland Lead Nurse Neonatal Services and ANNP team SH&SCT

**Equality Screened by:** N/A

**Proposals for dissemination**

**Proposals for implementation:** With immediate effect

**Training Implications:** To be included in induction training of all new nursing staff

**Date Procedure/Guideline/Protocol submitted to Procedures Committee:** 31-03-13

**Outcome:** Approved

**Comment:** Approved/Minor amendments

**Date of CYP SMT approval**

**Comments:**

**Date of approval by Trust SMT (if required):**

**Date approved by HSCB (Social Work only):**

**Date for further review (3 year default):** 31:03:16

**Date added to repository:**

**Date added to Intranet:**

**State where to be placed on Intranet:**
Procedure for insertion of a Percutaneous Central Venous Catheter (PCVC) and Static Linogram

1. Background

Indications
A central venous catheter (‘long line’) should be considered in the following instances:
- To permit the administration of parental nutrition to those babies where full enteral feeding is delayed. (e.g. extreme prematurity, NEC)
- To administer medications or fluids such as inotropes or 15% glucose.
- For those babies with difficult peripheral venous access

The insertion of a central venous catheter is an elective procedure which should take place only after consultation with a Consultant/Registrar. The procedure should only be undertaken by, or under the supervision of, a skilled practitioner. Long line insertion should, where possible, take place within normal working hours.

Contraindications
- Infection
  - Systemic (a possible exception is where a long line is an urgent requirement and/or 48hrs of treatment has been given - this requires discussion with a Consultant)
  - Cutaneous - at the site of insertion
- Abnormal clotting profile - consider correcting before proceeding with insertion of the long line

2. Preparation

Suitable insertion sites
Veins in the ante-cubital fossa and the long saphenous vein are the preferred sites. Scalp veins should only be used if absolutely necessary

Guide to insertion distance
Firstly check the length of the CVC and note the number of interval marks.
For CVCs inserted via the arm: measure from insertion site along the arm to the top of the anterior axillary fold, then to the sternal notch, level with the second intercostal space. This is the approximate location of the superior vena cava.
In a 1kg baby insertion distance is usually 8-9cms depending on length of arm

For CVCs inserted via the leg: measure from insertion site to the groin and then to the xiphisternum. The aim is for the catheter to be above L4/5.

For scalp veins: measure from the site of insertion to the clavicular head and then to the sternum, level with the second intercostal space

Ensure that long line selected is of adequate length to reach the desired position e.g. 15cm lines may be too short for leg lines

Vigon Premicath 1Fr (28G) single lumen polyurethane catheter
This catheter is 20cm long, and can be introduced via a splittable needle (included in the pack). There are catheter markings every 1cm and the priming volume 0.16mls.

Nutriline 2Fr (24G) single lumen polyurethane catheter
This catheter comes in 2 lengths; 15cm and 30cm. The priming volume is 0.08mls for the 15cm catheter and 0.16mls for the 30cm catheter

Equipment
- Appropriately sized long line
- Long line pack: 1 tray; 2 drapes (one adhesive and one with aperture); 4 gauze balls; 2 plastic forceps; 1 paper tape measure; 1 bionector, 1 tegaderm 6X7cm, 5 swab gauze, 1 neonatal tourniquet, 1 pair scissors, 1 iris straight forceps, 1 iris curved forceps, 10 ml syringe, 1 gallipot, 1 outer wrap
- Gown and sterile gloves
- Cleaning solution – Chlorprep 1.5ml
- Steristrips
- 10mls 0.9% saline
- Blue 23G needle
- 2% Clinell wipe
- Care bundle documentation

3. Procedure


2. Prepare equipment
   - Make sure equipment correct and functioning
   - Flush long line with 0.9% saline and check the integrity of the line
   - Cut steristrips and tegaderm in half
3. Establish sterile field by cleaning site of insertion and surrounding area with cleaning solution and wipe with saline. Cover with sterile drape, ensuring full access to required site by making a hole in the drape beforehand.

4. Tourniquets maybe useful but must be used with care. For small babies, a piece of gauze is the most appropriate choice. **The green tourniquet provided in the long line pack should not be used.**

5. Use slight tension on the skin to stabilize the vein and then insert the introducer into the vein. Once a flashback is seen, stop and advance the plastic cannula over the needle for 1-2mm whilst removing the needle completely from its plastic cannula. Stabilise the cannula with one finger to maintain its position. Release the tourniquet.

- **It may be necessary to alter the angle of the cannula in line with the vein**

6. Using non-toothed forceps, carefully advance the long line to the measured distance. If resistance is met at 4-5cm, this is probably the end of the cannula. Take the line out to check the cannula is still in the vein. If resistance is met at 5-10cm, try repositioning the limb as the line may be stuck at the junction of vessels. Flushing may also be helpful.

7. Once the long line has been inserted to the desired distance, remove the cannula.

8. If there is bleeding at the insertion site, apply pressure with gauze until the bleeding stops. This may take some time - 15 minutes or more in some cases.

9. Flush the long line with 0.9% saline

10. Prior to securing the line, clean the site, as blood is a source of infection. Secure the long line by taping it flat against the skin with steristrips. Place the catheter hub on a small square piece of sterile gauze.

11. Coil the remainder of the long line near the insertion site ensuring there are no kinks. Secure further with steristrips.

12. Cover the insertion site, hub, and coiled line with tegaderm. Take care not to completely wrap the tegaderm or steristrips around the limb.

4. Confirming long line position
The location of the tip should be assessed prior to its use radiologically. Consider removal of Ng tube if it could interfere with defining long line site. The limb with the line should be positioned appropriately to image the maximum line incursion (so that when the limb position is adjusted, the line should not be able to enter the heart)

- For lines inserted into the basilic vein, the arm should be flexed at the elbow and fully ADDUCTED at the shoulder (ie. the arm is held at the baby’s side)
- For lines inserted into the cephalic vein, the arm should be flexed at the elbow, but ABDUCTED at the shoulder (ie. with the arm alongside baby’s head)
- For lines inserted into the axillary vein, the arm should be ADDUCTED at the shoulder. Elbow flexion/extension does not make a difference (ie. with the arm at baby’s side)
- For lower limb lines, the leg should be flexed at the hip and the knee

The line tip must be placed in a large vein outside the heart, aiming for the IVC if inserted via a leg vein or close to the SVC if inserted from an arm. **There should be no loops or buckling of the line on x-ray, as this is suggestive of misplacement.** If there is any uncertainty, the position should be confirmed by a static linogram. Catheter malposition may occur at insertion or migrate over time. Sites of malposition or catheter migration include:

- cardiac chambers
- internal jugular vein
- subclavian vein
- ascending lumbar vein

Ultrasound/ECHO is also a reliable method of confirming tip position if there is adequate expertise available.

All long line tips must lie outside the right atrium. If the line tip is beyond the desired position, it must be withdrawn as an aseptic procedure. Under no circumstances should the line be advanced further. Following readjustment, the position of the tip must be confirmed radiologically.

Complete the insertion form and file in patient’s notes including any subsequent adjustments to the line and final position of the tip. When removing the line, the date and reason for removal must be documented.

5. **Static Linogram Procedure**

1. **Preparation**

Inform the consultant that this procedure is being undertaken. The radiology consultant will need to be contacted to give permission for the linogram, as the radiology consultant may be able to see the line tip and the linogram therefore is not warranted.

The doctor/ANNP injecting the line must wear a lead apron.
The procedure should not be performed by anyone who could be pregnant. Strict aseptic technique must be maintained.

2. **Contrast Medium**
A water soluble, non-ionic contrast media is advised. Omnipaque may be used but Visipaque is preferable as it is isotonic. The contrast medium contains 270-300mg/ml of iodine. It is primarily excreted via the renal system; caution is advised in neonates with renal impairment. Check anaphylaxis kit is available and in date, as with any drug there is a risk of allergic reactions.

3. **Volume**
A maximum volume of 2ml/kg of contrast may be used. This should be sufficient to allow for the CVC “dead space”, which is 0.1-0.16mls depending on the catheter type eg. premicath = 0.16mls.

4. **Technique**
Allow radiographer to complete positioning of cassette and baby. ANNP/Dr draws up 1mL of Visipaque in a 10mL syringe. ANNP/doctor starts the injection of contrast just before the image is taken and using a pulsatile action (“push-pause’ x 6) injects the contrast slowly as the x-ray is taken. After the x-ray the line should be flushed (pulsatile, ‘push-pause’ action x 6) with normal saline in a 10mL syringe.

**Note: Do not use** syringes less than 10ml volume for flushing the catheter. The smaller the syringe, the greater the pressure – this can lead to rupture of the catheter.

**References:**
4. NI Neonatal CR-BSI Surveillance Central venous line and Umbilical Catheter Care Bundles NICORE 2009
5. Neonatal Percutaneous long line insertion – Ashford and St Peters NHS Trust

**Authors**
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Una Toland Lead Nurse
Dr M. Hogan Lead neonatal consultant
Record of Insertion of Central Venous Access Device (CVAD)

Name ..............................................................................
Hosp No: SHSCT .........................................................
Or affix patient label

Date of insertion: Time .........................
Date of removal: Time .........................

1. Indication for line insertion:


2. Catheter type used:  
   - Nutriline Pic-Catheter 24G
   - Premicath 28G
   - Umbilical Venous
   - Umbilical Arterial
   Size
   Size

3. Site used (name vein and right or left):

4. Length of catheter inserted: ___________ cm

5. If attempt to site line was unsuccessful, which sties were tried and how often?


6. Doctor/ANNP inserting the line: ____________________________
   Please print name
   Grade
   Supervised by (if appropriate): ____________________________
   Please print name
   Grade

7. Type of X-ray ordered (include relevant limb):

8. Anatomical position of line tip on X-ray:

9. Decision about line:
   Position satisfactory, can be used
   Line needs repositioned
   Remove line
   Why? ____________________________

10. If line was repositioned, describe how, including new length of catheter:


11. Re-X-rayed? Yes [ ] No [ ]
    If yes, final position of tip of line on X-ray:


Doctor making final decision about line position: ____________________________
   Please print name
   Grade
   Confirmed by (if appropriate): ____________________________
   Please print name
   Grade

Dated: October 2012
**Central / umbilical line Insertion Bundle**

Maintenance Bundle for CVCs and Umbilical Catheters instructions

<table>
<thead>
<tr>
<th>Care Elements</th>
<th>Hand / Hygiene</th>
<th>Maximum barrier precautions (gown &amp; gloves &amp; large sterile drape)</th>
<th>Sterile field maintained during insertion</th>
<th>Skin Asepsis</th>
<th>Sterile transparent dressing</th>
<th>Please state if cvc or umbilical line</th>
<th>All elements performed</th>
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<tbody>
<tr>
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1. This form provides 10 observations of care elements and should be completed on a daily basis when there is an infant with a CVC or umbilical line in your unit.
2. The form should preferably be completed after Intravenous fluids have been changed for the day.
3. One observation should be completed daily for each infant with a CVC or umbilical line in situ.
4. Insert a ‘✓’ or an ‘X’ for each care element in the box, relevant to whether the care element was successfully completed or not. Further details of care elements are given below. Any box left blank will subsequently be recorded as an ‘X’ therefore please make sure to complete all boxes.

### Care Elements

**Care element 1: Hand Hygiene, Sterile gloves for manipulation**
Was hand hygiene properly performed (7 step technique), sterile gloves worn and aseptic non-touch technique ‘ANTT’ used for all CVC/UVC manipulations in previous 24 hours to your knowledge? (Hand hygiene and ANNT) will suffice for UAC due to lack of evidence for use of sterile gloves.

**Care element 2: Dressing intact, (not damp, loosened or soiled)**
Is the sterile transparent dressing covering CVC intact? If sterile transparent dressing is used to cover UVC/UAC, is this intact? Record ‘N/A’ UVC/UAC if appropriate

**Care element 3. Hub decontaminated with alcohol swab**
Has the catheter hub been decontaminated with Clinell wipe before and after accessing the system?

**Care element 4: lipids discontinued if > 50% oral feeds**
Has lipofundin been discontinued if infant has achieved > 50% oral feeds?

**Care element 5: Need for line assessed today**
Has the need for CVC, UVC or UAC been assessed today on ward round? Record ‘X’ if this has not been discussed or documented.