BPG 01 - Central Venous Access Catheter Care Guideline

Statement of Best Practice

*Patients with a central venous catheter (CVC) in situ will have care delivered safely, optimising their comfort and minimising adverse effects.*

Introduction

A CVC is a wide-bore tube that is inserted into a major vein such as the internal jugular, subclavian or femoral vein. The device can have one to five lumens.

CVC insertion is indicated in patients who:

- Are critically ill and require additional monitoring to guide fluid administration
- Have poor peripheral access
- Require administration of drugs such as inotropes and vasopressors which should be given into a central rather than peripheral vein.
- Require the administration of long-term antibiotics and parenteral nutrition.

This guideline is divided into four sections

- Insertion
- Management (Daily care)
- Removal
- Education and training

Insertion

Prior to line insertion a full risk assessment will be required by the patients consultant to assess the patients individualised need for central venous access and benefits achieved to patient care, alongside the risks of the procedure and catheter remaining in situ.

- Communicate effectively to the patient by giving a full explanation of the procedure and providing reassurance, maintaining privacy and dignity at all times.
- Prepare the equipment needed for the procedure and assist medical staff (e.g. lines box / trolley) Ensure Aseptic Non-Touch Technique (ANTT) and infection control standards are adhered to at all times.
- The pressure bag prescribed 0.9% Sodium Chloride flush should be inflated to 300mm/Hg at all times to ensure patency of the of the catheter. The flush bag should be changed every 72 hours if the bag needs to be changed sooner the central monitoring set should be changed at the same time.
- In selecting an appropriate intravascular insertion site, assess the risks for infection against the risks of mechanical complications and patient comfort. Use the upper extremity for non-tunneled catheter placement unless medically contraindicated. 2,3
- Position the patient appropriately according to site, patients bed should be in head down position to prevent air embolus
- Apply sterile, transparent, semi-permeable polyurethane dressing to cover the intravascular insertion site. (Consider the use of a chlorhexidine impregnated sponge dressing in adult patients with a central venous catheter as a strategy to reduce catheter related bloodstream infection.)³ Dressing to be dated.
- Identify a designated lumen of the catheter to administer lipid containing parenteral nutrition or other Lipid based solutions. ³
- Check chest X-ray or line placement to verify position and exclude possible complications of insertion, ideally before use.
- Complete relevant documentation in accordance with Trust policy.

Management

- Calibration / re-zeroing should be performed at the start of each shift, a minimum of 8 hourly, or as required (positional change) placing the transducer height at mid-axillary point.
- Appropriate alarm limits should be set and clearly audible.
- Daily reassessment of line use and site assessment using appropriate documentation
- Transparent, semi-permeable polyurethane dressings should be changed every 7 days, or sooner, if they are no longer intact or if moisture collects under the dressing, using an Aseptic Non-Touch Technique (ANTT). (Use a sterile gauze dressing if a patient has profuse perspiration or if the insertion site is bleeding or leaking, and change when inspection of the insertion site is necessary or when the dressing becomes damp, loosened or soiled. Replace with a transparent semi-permeable dressing as soon as possible) ³. Dressing to be dated.
- Use a single-use application of 2% chlorhexidine gluconate in 70% isopropyl alcohol (or povidone iodine in alcohol for patients with sensitivity to chlorhexidine) to clean the central catheter insertion site during dressing changes, and allow to air dry.³
- Administration sets in continuous use do not need to be replaced more frequently than every 96 h, unless device-specific recommendations from the manufacturer indicate otherwise, they become disconnected or the intravascular access device is replaced.³
- Administration sets used for lipid-containing parenteral nutrition should be changed every 24 h.³
- Following infusion of or medication administration the lines should be aspirated and the flushed with 0.9% Normal Saline
- All Inotropes, vasopressors and potassium infusions should have a designated lumen for administration
- Complete relevant documentation in accordance with Trust policy

Removal

- Removal should be considered if there is a suspicion or evidence of infection. Appropriate samples taken for C&S according to Trust Trust policy.
- If lumens become occluded. Occluded lumens should be clearly labelled as blocked.
- If the line has been in situ for more than 7 days, line should be removed and replaced.
- If the line is no longer clinically indicated.
Procedure

- Communicate effectively to the patient by giving a full explanation of the procedure and providing reassurance, maintaining privacy and dignity at all times.
- Ensure ANTT and infection control standards are adhered to at all times.
- Correctly position the patient, the patient’s bed should be placed head down.
- Patient if able to perform Valsalva manoeuvre if possible (The Valsalva manoeuvre is forced expiration of air against a closed glottis. This causes increased intra-thoracic pressure and decreases risk of air entering the subcutaneous exit tract. This can be achieved if the patient blows into a 20mL syringe with enough force to push the plunger back, or by the patient bearing down with catheter removal.)
- **If the patient is ventilated withdraw the catheter on the expiratory phase of the cycle.**
- Apply pressure on removal and cover with a sterile air occlusive dressing.
- Complete relevant documentation in accordance with Trust policy

References

1. Critical Care National Network Nurse Leads (CC3N) National Competency Framework for Adult Critical Care Nurses. [www.cc3n.org.uk](http://www.cc3n.org.uk)
2. [Central Venous Pathway](http://www.cc3n.org.uk), South Tees Hospitals

Group Membership

Julie Platten, NoECCN
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## CVC - Problem Solving

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Prevention</th>
<th>Suggested Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrhythmias</td>
<td>During CVC insertion the guide wire can enter the right atrium and cause arrhythmias</td>
<td>Use ECG monitoring during insertion so if arrhythmias occur the wire can be pulled back immediately</td>
<td>If arrhythmias are noted on the ECG on insertion of the guide wire immediately pull back the guide wire until the arrhythmia stops. Usually withdrawal of the guide wire will terminate the arrhythmia, but in some cases it may need to be treated by cardioversion or anti-arrhythmic medication.</td>
</tr>
<tr>
<td>Pneumothorax or Haemothorax</td>
<td>The needle used for locating the vein during CVC insertions can breach the pleura and cause a pneumothorax. If there is additional vascular injury this will cause a haemothorax</td>
<td>Ensure the use of ultrasound to guide the insertion of the CVC as this should minimise the risk of pneumothorax and haemothorax due to more accurate location of the vein to be cannulated.</td>
<td>A chest X-ray should be performed routinely following insertion.</td>
</tr>
<tr>
<td>Arterial Puncture</td>
<td>The artery is located adjacent to the vein in all sites used for the insertion of a CVC and so can be punctures accidentally instead of the vein.</td>
<td>Use of ultrasound to locate the vein to be used for CVC insertion</td>
<td>On identifying an arterial puncture, (blood will come back quicker, be pulsatile and bright red) the needle should be removed and pressure applied until the bleeding has stopped.</td>
</tr>
<tr>
<td>Nerve Injury</td>
<td>Nerves are found in close proximity to all the veins used in CVC insertion and so can be damaged during insertion of the needle to locate the vein.</td>
<td>Use of ultrasound to locate the vein to minimise the risk of damaging the nerve.</td>
<td>If awake patient may experience ‘pins and needles’ or numbness, in sedated patients may only become apparent at a later date. The area of altered sensation or weakness should be evaluated and documented and may require referral to a neurologist to evaluate further.</td>
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<tr>
<td>Air embolus</td>
<td>This is a risk during CVC insertion using the internal jugular vein and to a lesser extent the subclavian vein. If a patient is hypovolemic the venous pressure may be less than atmospheric pressure and so air can be sucked in via the needle or catheter.</td>
<td>The patient’s bed should be placed head down so that the pressure in the vein to be cannulated is increased, hopefully to a level above atmospheric pressure. When the catheter is inserted it should be ensured that none of the lumens are left open to air.</td>
<td>The sign of a significant air embolism are cardiovascular collapse and cardiac arrest. If air embolism occurs, the patient’s bed should be placed head down if not already done so and the patient tilted onto their right side. CPR should be commenced if cardiac output is lost.</td>
</tr>
<tr>
<td>Thrombosis of vein</td>
<td>The presence of a catheter in a vein for a prolonged period of time can lead to thrombosis of the vein.</td>
<td>Only have a CVC in situ for as long as clinically indicated</td>
<td>Remove CVC as soon as it is no longer required.</td>
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</table>

Adapted from Critical Care Manual of Procedures and Competence

Benchmarking Group: May 2015
Review Date: May 2017
# Central Venous Catheter Care Pathway

## Insertion

**Aim:** To ensure patient safety is maintained and to ensure best procedural practice is attained with the intention of minimising the occurrence of catheter related blood stream infections.

**When:** Throughout all central venous placements, repositioning and maintenance.

**By Whom:** All Healthcare professionals responsible for the insertion, ongoing management and removal of CVC

### Department

- Critical Care
- Theatre
- A & E
- Ward (state)
- Radiology

### Procedure

- Elective
- Emergency
- Re-position

### Catheter Type

- Multi-lumen
- Dialysis
- PICC
- Hickman
- Other (state)

### Insertion Site

- Tunnelled Line

## Before the procedure did the clinician:

<table>
<thead>
<tr>
<th>YES</th>
<th>NO (state reason below)</th>
</tr>
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</table>

- Wear a hat
- Use an Aseptic Non-Touch Technique (ANTT)
- Wear sterile gown and gloves
- Consider local anaesthetic

## During the procedure did the clinician:

- **Skin preparation Chlorhexidine 2% with 70% Isopropyl Alcohol**
  - Leave to dry for minimum of 30 seconds
- Fully drape the patient in a sterile manner
- Use Ultrasound guidance with sterile sheath and lubricant
- Use appropriate CVC pack
- Maintain sterile field and effective aseptic technique
- Secure line with sutures
- Guide wire removal

## After the procedure did the clinician:

- **Appropriate clear view dressing with Chlorhexidine 2% with 70% Isopropyl Alcohol dressing applied**
- Was sterility maintained during the application of the dressing?
- Was the dressing dated?
- Chest X-ray performed and correct position confirmed
- Check wave form of CVP trace on proximal lumen
- Aspirate and flush all lumen
- Identify lumen for parenteral feeding

Please state comments and complications
Shift Assessments

- Assess continued need for CVC – remove if needed, after consultation with medical staff
- No routine replacement unless clinically indicated.
- Dressing intact – If not replace – aseptically / disinfect site with Chlorhexidine 2% with 70% Isopropyl Alcohol or routinely replace every 7 days
- Check all sutures are secure
- Check line for migration
- Transduce waveform on proximal lumen in critical care

Line Management

- Replace administration sets following the giving of blood or blood products
- Replace TPN and other lipid administration sets every 24hrs
- Replace all administration sets every 96 hrs
- Replacement multi-lumen connectors every 6 days please try and coincide these changes with administration set changes.
- All administration sets/lines and multi-lumen connectors to be dated and labelled with the drugs administered
- Transducer lines and NaCl 500ml to be changed every 72 hours and to be dated
- Transducer pressure bag set at 300mgHg and line patent
- Transducer to be zeroed once a shift.

All Catheter Manipulations

- Hand hygiene prior
- Clean apron and clear pair of non-sterile gloves
- Aseptic Non-Touch Technique (ANTT)
- Disinfect all ports and hubs with Chlorhexidine 2% with 70% Isopropyl Alcohol impregnated wipes and allow to air dry for 30 seconds.

Dressing Changes

<table>
<thead>
<tr>
<th>Date</th>
<th>Reasons (Please state)</th>
<th>Signature</th>
<th>PIN/NMC</th>
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Benchmarking Group:    May 2015
Review Date:           May  2017
## Central Venous Catheter Care Pathway

### Visual Infusion Phlebitis Score VIPs

<table>
<thead>
<tr>
<th>Observations, signs and symptoms</th>
<th>Score</th>
<th>Action</th>
</tr>
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</table>
| IV site appears healthy. No pain                                    | 0     | No signs of phlebitis:  
OBSERVE CANNULA                                                        |
| One of the following is evident:                                    | 1     | Possible first signs of phlebitis:  
OBSERVE CANNULA                                                        |
| - Slight pain near IV site                                          |       |                                                                        |
| - Slight redness near IV site                                       |       |                                                                        |
| Two of the following are evident:                                  | 2     | Early stages of phlebitis  
LIASE WITH MEDICAL TEAM  
CONSIDER REPLACING/RESITING CANNULA                                   |
| - Pain at IV site                                                   |       |                                                                        |
| - Erythema                                                          |       |                                                                        |
| - Swelling                                                          |       |                                                                        |
| All of the following signs are evident:                             | 3     | Medium stages of phlebitis  
LIASE WITH MEDICAL TEAM  
RESITE CANNULA  
CONSIDER TREATMENT                                                   |
| - Pain along path of the cannula                                    |       |                                                                        |
| - Erythema                                                          |       |                                                                        |
| - Induration                                                        |       |                                                                        |
| All of the following signs are evident and extensive:               | 4     | Advanced stage of phlebitis or the start of  
thrombophlebitis:  
LIASE WITH MEDICAL TEAM  
RESITE CANNULA  
INITIATE TREATMENT  
COMPLETE INCIDENT FORM                                                 |
| - Pain along path of the cannula                                    |       |                                                                        |
| - Erythema                                                          |       |                                                                        |
| - Induration                                                        |       |                                                                        |
| - Palpable venous cord (if venous line)                             |       |                                                                        |
| - Pus                                                               |       |                                                                        |
| All of the following signs are evident and extensive:               | 5     | Advanced stage of thrombophlebitis:  
LIASE WITH MEDICAL TEAM  
RESITE CANNULA  
INITIATE TREATMENT  
COMPLETE INCIDENT FORM                                                 |
| - All of the above plus                                             |       |                                                                        |
| - Pyrexia                                                           |       |                                                                        |
| - Tissue damages                                                    |       |                                                                        |

Each shift record the VIPs and initial chart to verify compliance with the care pathway.

### VIP Score Chart

**DOES THE PATIENT STILL NEED A CENTRAL LINE?**

<table>
<thead>
<tr>
<th>Date</th>
<th>Insertion Day</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
<th>Day 7</th>
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<tbody>
<tr>
<td></td>
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<td>Day 8</td>
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<td>Day 13</td>
<td>Day 14</td>
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<td>Date</td>
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<td>Day 15</td>
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<td>Day 17</td>
<td>Day 18</td>
<td>Day 19</td>
<td>Day 20</td>
<td>Day 21</td>
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<tr>
<td>Date</td>
<td>Score</td>
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</table>
# Central Venous Catheter Care Pathway

## Removal

<table>
<thead>
<tr>
<th>Place of removal</th>
<th>Date</th>
<th>Requested Time removed</th>
<th>Actual time line removed</th>
<th>Number of days in situ:</th>
</tr>
</thead>
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<table>
<thead>
<tr>
<th>Was the line removed within 2-4 hours of decision?</th>
<th>Line infected at any time?</th>
<th>Reasons for removal:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes ☐ No ☐</td>
<td>Yes ☐ No ☐</td>
<td>Details:</td>
</tr>
</tbody>
</table>

### Care management on removal

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Yes</th>
<th>No</th>
<th>If answer ‘NO’ please give reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand Hygiene</td>
<td>☐</td>
<td>☐</td>
<td></td>
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<tr>
<td>Patient laid flat</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>Aseptic Non-Touch Technique</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>Chlorhexidine 2% with 70% Isopropyl Alcohol</td>
<td>☐</td>
<td>☐</td>
<td></td>
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<tr>
<td>Occlusive dressing</td>
<td>☐</td>
<td>☐</td>
<td></td>
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<tr>
<td>Removal on expiration</td>
<td>☐</td>
<td>☐</td>
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</table>

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<thead>
<tr>
<th>If line infection suspected:</th>
<th>Yes</th>
<th>No</th>
</tr>
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<tbody>
<tr>
<td>Site swab sent (if clinically indicated)</td>
<td>☐</td>
<td>☐</td>
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</table>

### Complications:

Removed by – print name

Signature

GMC/NMC number

New line sited

Yes ☐ No ☐

Same site

Yes ☐ No ☐

If catheter replaced - please commence a new

Central Venous Catheter and Insertion Pathway

### References:


Epic3 National Evidence Based Guidelines for preventing HAI’s in NHS Hospitals England, Journal of Hospital Infection 2014