



GUIDELINES AND AUDIT  
IMPLEMENTATION NETWORK

# GUIDELINES FOR INSERTION AND MAINTENANCE OF CENTRAL VENOUS ACCESS DEVICES IN CHILDREN AND YOUNG PEOPLE

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## CONTENTS

PREFACE	03
INTRODUCTION	04
AIMS OF GUIDELINE	05
CARE BUNDLE APPROACH	06
PATHOGENESIS	07
PROCEDURE FOR INSERTION OF CENTRAL VENOUS CATHETER	08
BEST PRACTICE PRINCIPLES WHEN ACCESSING THE CVAD	10
PROCEDURE FOR THE ADMINISTRATION OF DRUGS VIA A CVAD	11
PROCEDURE FOR ACCESSING PORT-A-CATH®	13
GENERAL PRINCIPLES FOR MANAGEMENT OF CVAD	14
<b>Dressing</b>	<b>14</b>
<b>Inspection of site</b>	<b>15</b>
<b>Change of Catheter</b>	<b>15</b>
<b>Change of Administration set</b>	<b>15</b>
<b>Use of antibiotic</b>	<b>15</b>
<b>Diagnosis of infection</b>	<b>15</b>
COMMUNICATION AND DOCUMENTATION PROCESSES	17
EDUCATION & TRAINING RECOMMENDATIONS	18
CLINICAL AUDIT	19



<b>Table 1:</b> Flushing and Heparinisation of Central Venous Access Devices (CVADs)	20
<b>Table 2:</b> General observations of patients with totally implantable venous access devices (e.g. Port-a-Cath®)	21
APPENDICES	
<b>Appendix 1 – Review of the evidence</b>	<b>23</b>
<b>Appendix 2 – Central Venous Catheter Insertion Checklist</b>	<b>25</b>
<b>Appendix 3 – Summary of general principle and rationale</b>	<b>26</b>
<b>Appendix 4 – Central Venous Catheter insertion &amp; removal details</b>	<b>27</b>
<b>Appendix 5 – Central Venous Access Device Patient Record</b>	<b>28</b>
<b>Appendix 6 – Summary of types of central venous catheter used in the children</b>	<b>29</b>
<b>Appendix 7 – Audit Tool</b>	<b>30</b>
<b>REFERENCES AND FURTHER READING</b>	<b>32</b>
<b>MEMBERSHIP OF GAIN WORKING GROUP</b>	<b>34</b>



## PREFACE

Insertions of central venous catheters are essential for the care of critically and chronically ill patients. Amongst others, infections related to central venous lines are a major source of complication. It has been estimated that, with proper insertion and aftercare, up to 70% of central line-associated bloodstream infections are preventable, with substantial reduction in both morbidity and mortality.

With the current changes in health care delivery, and advances in medical and nursing practices, the numbers of children and young people requiring Central Venous Access Devices (CVADs) are increasing both in acute and community care settings. Although there are guidelines available for the management of CVADs in adults, there are no specific guidelines available which address the issues in the management of CVADs in Children and Young People. GAIN has identified the need to develop such guidelines with the aim to ensure that a consistent approach and care is provided for the management of these devices across all Health and Social Care Trusts in the province. During preparation of this guideline, we have conducted literature searches (see Appendix 1), reviewed the most up-to-date guidelines published by the various professional bodies and consulted external experts in the field for peer reviews.

I hope that this guideline will improve patient care and would strongly recommend that the practices should be audited and learning should be shared across all the Trusts in the province on a regular basis.

In the end, I am grateful to all the members of the working group, external experts who have taken time out from their busy schedules to review the guidelines, and the GAIN team at the Department of Health & Social Services & Public Safety for their help in producing these guidelines which I hope will further improve the quality of patient care in the province.

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Chairman of the Guideline Working Group



## INTRODUCTION

A Central Venous Access Device (CVADs) is one in which the tip of the catheter is placed into a central, jugular, subclavian, femoral or a peripheral vein. Appendix 6 summarises the main types of CVADs used in the care of children. CVADs are essential for the care of critically and chronically ill patients. They are used for the repeated administration of chemotherapy, antibiotics, parenteral feeding and blood products, and other reasons, e.g., frequent blood sampling, poor venous access, frequent administration of Factor VIII.

The numbers of children and young people requiring CVADs are increasing both in acute and community care due to advances in medical and nursing practices. These children and young people may require long-term treatment for chronic conditions or treatment for a specified period, for example following a diagnosis of cancer. Amongst other, Central Line-Associated Bloodstream Infection (CLA-BSI) is one of the most common complications.

## AIMS OF GUIDELINES

The aim of this clinical guideline is to:

- Ensure a child/young person's centred approach to care is achieved for those who require a CVAD from 4 weeks to the day prior to their 16th birthday
- Provide best practice guidelines based on all available evidence for the insertion, and maintenance of CVADs to avoid both infective and non-infective complications
- Provide a standardised approach to documentation in relation to the insertion and maintenance of CVADs
- Ensure that training for all staff/carers/children/young people involved in the care of a CVAD is based on this approach

Note: This guideline *excludes neonates* as they require specific management therefore local guidelines within the neonatal unit should be followed. Throughout the guideline, we have recommended the use of alcoholic chlorhexidine as an agent of choice for antiseptic. If the patient is allergic to chlorhexidine gluconate, it is essential that alternative antiseptic should be used.



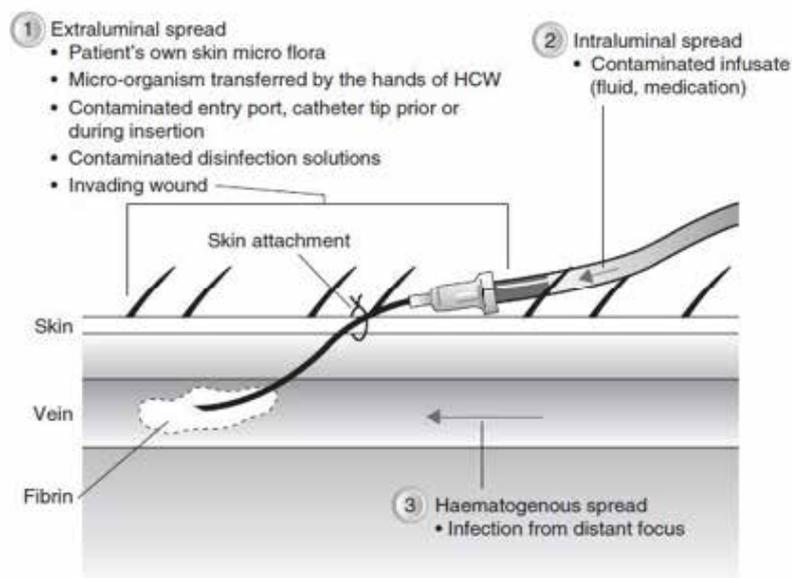
## CARE BUNDLE APPROACH

In recent years, the 'Care Bundle Approach' has been introduced in the hospital setting in order to reduce the infective complication(s) associated with a CVAD. The 'Care Bundle' is a package of evidence-based interventions, which when integrated as part of the on-going care for patients with a CVAD in place, has resulted in substantial and sustained reductions in the incidence CLA-BSI. The 'CVC Care Bundle' developed by the USA Institute of Health Improvement and Care Bundle developed for the management of CVC catheters by the UK Dept. of Health are available from the respective web sites: <http://www.ihl.org/> and <http://www.clean-safe-care.nhs.uk/web sites>.



## PATHOGENESIS

The source of infection may be extrinsic (introduced during therapy) and can occur due to contamination of the IV catheter at the time of insertion, poor aseptic precautions during drug administration of the intravenous (IV) fluid, or contamination of part of the administration system or the catheter by the hands of the operator (Fig 1). However, the most important reservoirs of microorganisms causing catheter-related infection are the insertion site and the device hub. The microorganisms causing infections are usually Gram-positive bacteria residing on the patient's skin, most often coagulase-negative staphylococci and *Staphylococcus aureus*. In addition, metastatic colonization of the device from a distant site of infection (Gastrointestinal and urinary tract, wound etc.) may occur.



**Figure 1.** Sources of microbial contamination in patients with an IV catheter. Extraluminal sources are the most common source of introducing infections. Reproduce from Damani N. *Manual of Infection Prevention and Control*. 3rd edn. Oxford: Oxford University Press, 2012.



## PROCEDURE FOR INSERTION OF CENTRAL VENOUS CATHETER

The insertion of a Central Venous Catheter is an aseptic procedure. The hands must be disinfected with an antiseptic/detergent hand wash preparation for 1 minute. Sterile gloves, gown, and mask should be worn. Use large sterile drapes to cover the area.

- Collect all necessary equipment; a dedicated trolley should be used for this purpose
- Hand antisepsis must be carried out using an antiseptic/detergent preparation for 1 minute using proper hand hygiene technique
- Disinfect the skin insertion site with *sterile* 2 % alcoholic chlorhexidine solution with friction for at least 2 minutes prior to venepuncture. If single-use sterile solution of 2 % alcoholic chlorhexidine is used, follow the manufacturer's instruction. For patients with chlorhexidine solution sensitivity, 10 % alcoholic povidone-iodine solution should be used
- Allow the insertion site to dry before inserting the catheter
- Surround the site with large sterile drapes
- Insert the CVC as swiftly as possible, maintaining an aseptic non-touch technique throughout the procedure
- Blood should be aspirated freely to ensure that the catheter is in a vascular space before injecting fluid. Check the position of CVC lines by x ray– other methods should be considered for femoral lines according to local policy. Two-dimensional (2-D) real-time ultrasound guidance is recommended to improve successful insertion and to reduce the incidence of complications associated with the insertion of large-bore CVC inserted into the internal jugular in both paediatric and adult patients in elective situations

- Leave the site clean and dry after insertion
- Secure the catheter with sutures or clips and then apply an appropriate sterile, transparent, semipermeable dressing
- Label the site with insertion date. Record insertion date in the patient's medical notes
- Connect up the IV administration set
- Ensure that all sharps are safely discarded into a designated sharps bin
- Wash and dry hands

(Refer to Appendix 2 for CVC insertion checklist)



## BEST PRACTICE PRINCIPLES WHEN ACCESSING THE CVAD

The following are general principles. It is recommended that local Trust policies and procedures as well as manufacturer's instructions are followed. The rationale behind implementing these principles are summarised in Appendix 3.

- In order to reduce the incidence of infection, an aseptic non-touch technique is essential for accessing the device and site maintenance of every CVAD
- Hand antisepsis must be carried out using the correct hand hygiene technique. This can be performed before accessing the device with alcohol hand rub for 20- 30 seconds or soap and water used for 40-60 seconds. If hands are visibly soiled, they *must* be washed with soap and water
- Individual single use sachets of antiseptic solution or individual packages of single use antiseptic-impregnated swabs/wipes should be used to disinfect the insertion site. An alcoholic chlorhexidine gluconate solution (preferably use 2% chlorhexidine gluconate in 70% isopropyl alcohol) should be used to clean the catheter insertion site during dressing changes and allowed to air dry
- When accessing a CVAD, the hub must be disinfected thoroughly with an alcoholic chlorhexidine gluconate solution wipe and left to dry for 15 seconds. An aqueous sterile solution of chlorhexidine gluconate should be used if the manufacturer's recommendations prohibit the use of alcohol with their product.



## PROCEDURE FOR THE ADMINISTRATION OF DRUGS VIA A CVAD

- Carry out hand antisepsis with soap and water or use alcohol hand rub (see above)
- Clean and disinfect tray using large size alcohol wipe
- Gather equipment and place around tray in advance of the procedure
- Repeat hand antisepsis using alcohol rub or with soap and water
- If the IV port is covered by a dressing this should be removed for access
- Use sterile gloves if you must touch key parts – key parts are those that come into contact with the liquid infusion i.e. needles, syringe tips, IV line connections, exposed vascular catheter lumens
- Prepare drugs and protect key-parts using male/female luer lock and a non-touch aseptic technique. Proceed directly to patient
- Preferably use unit-dose, pharmacy prepared, or use pre-filled syringes
- If your hands are still clean and the patient's IV port is already exposed then continue with the procedure
- Scrub the hub for at least 15 seconds using a 2% chlorhexidine and 70% isopropyl alcohol impregnated wipe
- Allow to dry for 15 seconds
- Administer drugs using an aseptic non-touch technique
- Do not resheath needles in order to avoid a needlestick injury



- Dispose of sharps into the designated sharps container
- Appropriate disposal of syringes according to their content, e.g. pharmaceutical residue/other content should be disposed as per local guideline
- Clean tray, dispose of gloves and decontaminate hands immediately with soap and water or use alcohol hand rub ( see above)
- Refer to Table 1 for Flushing and Heparinisation of Central Venous Access Devices(CVADs)



## PROCEDURE FOR ACCESSING PORT-A-CATH®

- A non-coring safety needle must be used to access the system. A standard hypodermic needle will damage the septum
- Single use local anaesthetic cream may be applied before accessing the device. This must be applied under aseptic conditions and the site disinfected after with 2% chlorhexidine and 70% isopropylalcohol
- The needle is inserted through the skin and septum and into the reservoir and must hit the back plate; this requires a degree of pressure
- The smallest gauge needle should be used when the port is being accessed. However a large gauge needle may be required when higher flow rates are needed
- The length of the needle required must be appropriate to avoid any damage to the skin or to the septum. Length is assessed depending on the amount of subcutaneous tissue over the area and the depth of the reservoir. It must sit flush against the skin surface. The length of the needle required may vary as the child gains or loses weight. The length of the needle used should be recorded on the patient's documentation
- Do not rock or tilt the needle as it may damage the septum
- General observations of patients with these devices are outlined in Table 2



## GENERAL PRINCIPLES FOR MANAGEMENT OF CVAD

**Dressing:** A dressing will assist in anchoring the device during day to day social activities and play. It will help protect the site against contamination with food debris and body fluids. The dressing selected maybe dependent on the patient/carer preference. A dressing is no longer required in implantable device once the surgical site has healed.

It is preferable that sterile *transparent* semi-permeable polyurethane dressing is used to cover the catheter insertion site. This should be changed every 7 days or sooner if it is no longer intact or moisture collects under the dressing.

Transparent dressings are the dressings of choice as they:

- Reliably secure the device
- Enable continuous visual inspection of the catheter insertion site
- Permit children to bathe and shower without disturbing the dressing, and
- Require less frequent changes than the standard sterile moisture absorbent (sterile gauze) and tape dressings

If the patient has profuse perspiration or if the insertion site is bleeding or oozing, *sterile gauze dressing* is preferable to a transparent semi-permeable dressing. The sterile gauze dressing should be assessed daily and when inspecting the insertion site. It should be replaced when the dressing becomes damp, loosened or soiled. A gauze dressing should be replaced with a transparent semi-permeable dressing as soon as possible.

Each time the dressing is changed/removed the site should be disinfected with 2% chlorhexidine & 70% isopropyl alcohol unless contraindicated or there is a history of allergy to chlorhexidine, 10 % alcoholic povidone-iodine solution should be used.

The use of a sustained-release *chlorhexidine gluconate-impregnated sponge* (which releases a steady amount of chlorhexidine over several days and is covered by a transparent dressing) has been shown to substantially reduce CVAD infections and it should be used in addition to all other routine measures.

**Inspection of the site:** Inspection of the catheter insertion site is non-diagnostic for bloodstream infection but can be used for detection of local site infection. For children in hospital, the catheter site should be evaluated at least daily for signs of infection (see Appendix 5). Monitor for erythema, tenderness, warmth, thrombosis, pus and pyrexia. For children in the community, care givers are advised to inspect the catheter site on a daily basis for signs of redness, ooze or discomfort.

If there are any concerns, carers should contact the appropriate health care professional as per local arrangement. If the device is used for the administration of medication, fluids, TPN, blood or blood products then the site should be inspected each time the device is accessed and during dressing changes.

**Change of administration set:** An administration set used for blood or blood components should be changed when the transfusion has finished. Sets may be used for consecutive units to a maximum of 12 hours. An administration set used for TPN should be changed at the end of the infusion or within 24 hours of commencing the infusion. In patients *not* receiving blood, blood products or fat emulsions, replace administration sets that are continuously used, including secondary sets and add-on devices, no more frequently than at 96 hour intervals, but at least every 7 days.

**Changing of catheter:** *Do not* routinely replace catheters as a method to prevent catheter related infection.

**Use of antibiotics:** *Do not* give routine prophylactic IV antibiotic therapy before insertion of a catheter and *do not* apply antimicrobial ointment/spray to catheter insertion sites as part of routine catheter site care.

**Diagnosis of infection:** Where line infection is suspected two sets of blood cultures should be taken using aseptic non-touch technique from all patients with suspected



CVC - related infection – one from the CVAD and another from a peripheral vein. The bottles should be appropriately marked to reflect the site the cultures were drawn from. If the blood cultures cannot be drawn from a peripheral vein, then blood cultures can be drawn from the CVAD but because a positive blood culture from CVADs may represent colonization of the CVC catheter, the findings must be interpreted in presence of clinical signs and symptoms. It is essential that blood cultures should be taken *prior* to the initiation of antimicrobial therapy. If pus is present at the catheter exit site, the site must be swabbed for culture and removal of the catheter should be considered. Routine culturing of intravascular catheter tips is not recommended. However, if the catheter is removed and a catheter-related infection is suspected, send the CVAD tip (4 centimetre which must be cut using sterile non-touch technique) for culture in a sterile container.



## COMMUNICATION AND DOCUMENTATION PROCESSES

When a child with a CVAD is transferred to another hospital or discharged to a community setting, the proforma (Appendix 4) for recording details about the insertion of the CVAD should accompany the referral request. This information will be retained in the patient's records, along with the proforma for the on-going monitoring of the CVAD (Appendix 5). This practice will ensure consistency and continuity of the patient's care. Omission of this information may delay the transfer/discharge of the child/young person.



## EDUCATION AND TRAINING RECOMMENDATIONS

All parents/carers, registered nursing and medical staff who are involved in processes associated with the use, care and maintenance of CVADs must have undertaken the appropriate training and have practical supervision before undertaking the procedures. This should include standard precautions (including hand hygiene), insertion and maintenance of CVAD. All staff should ensure that their practice is up to date and should avail of any additional training and updates as necessary.



## CLINICAL AUDIT

This guideline may alter practice and it may be useful to audit the process of insertion (see appendix 7) and outcome to monitor local sepsis, bloodstream infections and occlusion rate rates.



Table 1 Flushing and Heparinisation of Central Venous Access Devices (CVADs)

CVAD TYPE	INTERMITTENT DRUG ADMINISTRATION WITHIN 24 HOUR PERIOD	INTERMITTENT BLOOD SAMPLING	NOT IN USE
Short term CVAD in acute care setting (single, double, triple lumens) Peripherally inserted CVAD (PICC)	Flush with at least 1 ml Sodium chloride 0.9% injection before drug and up to 3 ml sodium chloride 0.9% injection after drug	Flush with 1ml sodium chloride 0.9 % injection after blood sample, followed by 2 ml heparin sodium flushing solution 10 units/ml	Flush daily with 1ml sodium chloride 0.9% injection followed by 2 ml heparin sodium flushing solution 10 units/ml
Tunnelled Type CVAD (Broviac® 4-6 Fr) (Hickman® 10 Fr)	Flush with sodium chloride 0.9% injection before and after drug administration Draw up 3.5 ml sodium chloride 0.9% injection and inject 3 ml	Flush with 2ml sodium chloride 0.9 % injection after blood sample, then flush with heparin sodium flushing solution 10 units/ml Draw up 2.5 ml heparin sodium flushing solution 10 units/ml and inject 2 ml	Centrally placed CVADs should be flushed once or twice weekly Peripherally inserted CVADs should be flushed on alternate days Draw up 2.5 ml heparin sodium flushing solution 10 units/ml and inject 2 ml in all tunnelled CVADs
Port-a-Cath®	Non-coring needle already in situ. Ensure flashback of blood. Flush with up to 3ml of Sodium Chloride 0.9% injection before and after each drug and lock with 2ml Heparin Sodium Flushing Solution 10 units/ml. Change gripper needle every 72 hours	Administration of drugs or therapeutic treatments daily or less frequently. Access device using a non-coring needle. Prior to flushing, ensure 4ml of blood is discarded to remove heparinised saline. Flush with 10ml Sodium Chloride 0.9% injection and clamp the line. Lock with 4ml Heparin Sodium Flushing Solution 100 units/ml and withdraw prior to next use	Flush monthly as indicated in relation to 'Administration of drugs/therapeutic treatments'
<p><b>NOTES</b> Heparin administration: Draw up 2.5 ml heparin sodium flushing solution 10 units/ml and inject 2 ml. Ensure flushing completed on down stroke of syringe plunger, so no "bounce back" and blood drawing up into catheter tip If pro-coagulant condition exists: Flush with sodium chloride 0.9% injection and then flush with heparin sodium flushing solution 10units/ml If additional extensions attached and increase flushing volume to account for extra volume of equipment. Total volume + 0.5 ml. Each lumen of catheter is treated separately</p> <ul style="list-style-type: none"> <li>Heparin sodium flushing solution 10 units/ml is a drug. It must be prescribed and administration recorded using the IV prescription chart. Ensure the correct strength of heparin sodium flushing solution 10 units/ml is prescribed and administered. The volume of heparin sodium flushing solution 10 units/ml should be 0.5 ml greater than the volume of the catheter and any other attachments (e.g. one-way tap, short extension). There is evidence that heparin flushes provide a serious risk to health without providing any commensurate benefits</li> <li>Heparin sodium flushing solution 100 units/ml should only be used for monthly flushing of implantable ports</li> <li>Continuous infusions via CVADs do not require flushes</li> <li>May need to consider patient's fluid/sodium allowance when prescribing flushing solutions</li> <li>Syringe size of 10ml is recommended to avoid catheter rupture due to pressure</li> </ul>			

**Table 2 General observations of patients with totally implantable venous access devices (e.g. Port-a-Cath®)**

ACTION	RATIONALE
<p>Assistance/advice should be sought from an experienced nurse or doctor if any of the following occur:</p> <ul style="list-style-type: none"> <li>• Resistance is felt</li> <li>• The child reports pain</li> <li>• Unable to obtain discard blood sample or instil 0.9% sodium chloride</li> <li>• Swelling is observed around the port site</li> </ul>	<p>These signs could indicate:</p> <ul style="list-style-type: none"> <li>• Catheter rupture</li> <li>• Blockage/fibrin sheath</li> <li>• Presence of fibrin in the port reservoir</li> <li>• Port/needle malposition</li> <li>• Incorrectly placed port</li> <li>• Thrombosis</li> <li>• Extravasation</li> </ul>
<p>The tissue around the port site should be monitored for the following:</p> <ul style="list-style-type: none"> <li>• Redness</li> <li>• Swelling</li> <li>• Pus formation</li> </ul> <p>If there is pus formation, the doctor should be informed; a swab of the pus taken. The site should be cleaned with sterile saline</p> <p><i>Note:</i> Pus formation will not occur in a neutropenic child</p>	<p>To identify signs of a port infection</p> <p>To remove debris or build-up of organic matter to facilitate a swab of bacteria from the wound bed</p>
<p>If the infection is suspected, blood cultures should be taken from the port and from peripheral vein (if possible) and IV antibiotics commenced, after discussion with the Clinical Microbiologist/ID physician/Paediatrician and according to local antimicrobial prescribing guidelines, leaving the needle <i>in situ</i>. Antibiotics may be used to treat infection. After 48 hrs, the port can be accessed and antibiotics given via this route. Antibiotics should be reviewed at 48-72 hours with culture and other relevant results</p>	<p>To identify and treat possible infection</p> <p>To facilitate treatment without accessing the port</p>
<p>The skin over the port area should be monitored to ensure it remains intact</p>	<p>To identify loss of integrity could indicate port erosion and result in the device being removed</p>
<p>The skin over the catheter (the skin tunnel) should be monitored for signs of infection i.e.</p> <ul style="list-style-type: none"> <li>• Redness</li> <li>• Swelling</li> <li>• Red tracking following the path of the catheter</li> </ul>	<p>To monitor for signs of a skin tunnel catheter infection</p>



**Table 2 General observations of patients with totally implantable venous access devices (e.g. Port-a-Cath®) continued**

ACTION	RATIONALE
<p>Any discomfort experienced by the child in the tissue surrounding the port and the subcutaneous tunnel should be reported. Any complaints of unusual sensations in the neck or ear should be also be reported</p>	<p>To identify potential concerns e.g.</p> <ul style="list-style-type: none"> <li>• Port pocket infection</li> <li>• Port erosion</li> <li>• Skin tunnel infection</li> <li>• Extravasation/needle dislodgement</li> <li>• Separation of catheter from reservoir</li> <li>• Migration of catheter</li> </ul>
<p>The child's general condition should be monitored regularly</p>	<p>To detect signs of port related infection</p>
<p>Any pyrexia (above or equal to 38.5 °C) should be acted upon according to local policy</p>	<p>To ensure effective treatment is instigated</p>
<p>Any rigor following use of the port should be reported</p>	<p>To identify potential signs of port related infections</p>
<p>Observe child for the following:</p> <ul style="list-style-type: none"> <li>• Oedema of the face, neck, arms or shoulders</li> <li>• Venous distension/collateral circulation</li> <li>• Pain, aching or tenderness of the chest, shoulder or arm</li> <li>• Numbness or tingling of the fingers, hands or arms</li> </ul> <p>Skin discolouration, particularly of the arms and hands</p>	<p>To identify potential of thrombosis</p>
<p>Ascertain from child/parent if child has interfered with port</p>	<p>To identify if unintentional manipulation of the port (Twiddler's Syndrome) has occurred. This can rotate the device 180 degrees which will make it impossible for the non-coring needle to enter the port</p>
<p>If the patient has an infusion in progress, pump pressures must be recorded hourly and any increase or sudden drop in pressures must be reported to medical staff</p>	<p>A steady increase in pressure could indicate the line is about to occlude or has displaced. A sudden drop in pressure could indicate the catheter tip has eroded the vessel</p>
<p>If suspect systemic infection take culture from CVAD site and peripheral site using aseptic technique</p>	

## APPENDIX 1

### REVIEW OF THE EVIDENCE

The following sources were searched for relevant evidence: Cochrane; MEDLINE; CINAHL; and EMBASE. The databases were searched for two concepts: 'central venous access devices' and for 'children and young people'. Each concept was searched for using a combination of MESH terms and key words. The results for both concepts were then combined in order to identify articles specifically relating to central venous access devices in children and young people. A subsequent search was undertaken on the MEDLINE and CINAHL databases for articles relating to 'aseptic non-touch technique' commonly referred to as ANTT. The abstracts of the identified articles from the various bibliographic databases were pooled before being individually reviewed to remove duplicates and to exclude articles that focused on adults or neonates.

Appendix 1 details the search terms used for searching the MEDLINE database and how these terms were combined. Every effort was made to maintain consistency in search terms across the databases. The following limits were placed on the results: English language; human subjects; and abstract available. The searches were conducted in November 2009 and were limited to articles published since the beginning of the year 2000. Further relevant articles and guidelines were also identified by members of the working group developing the guideline.

The remaining abstracts were then grouped into topic areas to be reviewed by subgroups of the overall working group. Subgroups, which included individuals with domain expertise, identified which articles needed to be reviewed in detail. Full text copies of the selected articles were then reviewed by the working groups in light of the concept of hierarchy of evidence.



## MEDLINE Search Terms and Individual Searches

Concept 1: CVADs	Concept 2: Paediatrics
<b>MESH Terms</b> Catheterization, Central Venous	<b>MESH Terms</b> Child Child, Preschool Paediatrics Infant Adolescent
<b>KEY WORDS</b> Central venous access device CVAD Central venous catheter Peripherally inserted central catheters PICC Broviac Hickman Port-a-Cath	<b>KEY WORDS</b> Child Children Paediatrics Young People
# Searches	
1 Catheterization, Central Venous/ or central venous access device.mp. 2 cvad.mp. 3 Central venous catheter.mp. 4 Peripherally inserted central catheters.mp. 5 picc.mp. 6 Broviac.mp. 7 Hickman.mp. 8 Port-a-Cath.mp. 9 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 10 child.mp. or Child/ 11 children.mp. 12 Pediatrics/or Infant/or paediatrics.mp. or Child, Preschool/ or Adolescent/ 13 pediatrics.mp. 14 Young people.mp. 15 10 or 11 or 12 or 13 or 14 16 9 and 15 17 limit 16 to (English language and humans) 18 limit 17 to abstracts	



# APPENDIX 2

## CENTRAL VENOUS CATHETER INSERTION CHECKLIST

Patent's Name..... DOB..... HSC No .....

Date: ..... Time : (24hr clock) .....

Hospital..... Location: state: .....

Planned Procedure: Yes  No

Emergency Procedure Yes  No

Guidewire exchange (*not recommended*) Yes  No

I confirm that I have completed an approved CVC education package and that I have been signed off as being competent Yes  No

I have not completed the above package but consider myself to be competent in CVC insertion. (*Perform under supervision if operator has inserted <3 CVCs*) Yes  No

The operator(s) performed a Surgical Scrub Yes  No

The operator(s) cap, mask, sterile gown and sterile gloves Yes  No

2% Chlorhexidine in alcohol was applied to the insertion site and allowed to dry before the procedure was progressed Yes  No

Sterile drapes were placed to create a sterile operating field Yes  No

Number of skin punctures 1  2  3   $\geq 4$

Number of needle passes 1  2  3   $\geq 4$    
*(Seek the help of a supervisor if more than 3 unsuccessful insertions)*

Type of Catheter	Insertion site	Side inserted
CVC <input type="checkbox"/>	Subclavian <input type="checkbox"/>	Right <input type="checkbox"/>
	Internal Jugular Vein <input type="checkbox"/>	Left <input type="checkbox"/>
	Femoral <input type="checkbox"/> <i>(If possible avoid using the femoral site)</i>	

PortaCath

A sterile field was maintained throughout the procedure Yes  No

Ultrasound was performed Yes  No

Clean blood from the site using 2 % chlorhexidine in alcohol and dry site Yes  No

The CVC was secured with:..... Yes  No

A sterile CVC dressing was placed over the insertion site. (*The dressing must be specifically designed for vascular catheter insertion site protection*) Yes  No

Name of Operator: .....

Name of supervisor (if applicable) .....

Name of Observer .....



## APPENDIX 3

### SUMMARY OF GENERAL PRINCIPLES AND RATIONALE

GENERAL PRINCIPLES	RATIONALE
Use an aseptic, non-touch technique whenever accessing the devices	To prevent infection
Hand antisepsis should be performed and sterile gloves should be considered for all procedures using CVAD devices	To provide protection from blood and to prevent the introduction of microorganisms
Recommendations for flushing and heparinisation of CVADs are outlined in Table 1, page 20	To prevent occlusion of the lumen. Always use a brisk pulsating (push-pause) flush for all catheters. This helps create a positive pressure within the catheter to prevent reflux of blood
Do not allow air to enter the catheter. All syringes and IV administration sets must be carefully primed	To prevent air embolism. The negative pressure within the chest may suck air into the catheter during inspiration especially if the patient is sitting up
In order to prevent IV access related needle stick injuries, various needleless devices are available. However, their introduction can lead to outbreaks of blood stream infections due to sub-optimal infection control practices. If such devices are used, each hospital must diligently review the literature relating to a particular device and follow manufacturer's specific recommendations. Seek advice from the Infection Prevention and Control Team before choosing such a device	To prevent IV access related needle stick injuries
If the catheter possesses an integral clamp, always clamp in the specially enforced area and monitor for weakness at clamp site. The clamp must be kept closed whenever the cap is removed and at all other times except when administering or withdrawing fluids	The clamp will prevent air entry and bleeding should the luer lock cap become unattached. Repeated clamping away from the specially reinforced area may result in damage to the catheter
A 10 ml syringe should only be used for the flushing and locking of tunnelled CVADs (Broviac and Hickman) as high intra-luminal pressures can be generated	To avoid catheter rupture due to pressure
Where a patient has a multi-lumen catheter, each lumen should be treated separately when flushing and locking. If parenteral nutrition is required, one lumen must be exclusively dedicated for this and labelled appropriately	To ensure patency of each lumen and to prevent interactions or false laboratory findings



## APPENDIX 4

### CENTRAL VENOUS CATHETER INSERTION AND REMOVAL DETAILS

Name ..... Date of Insertion ...../...../.....

Date of Birth ...../...../..... HSC Number.....

Diagnosis.....

Reason for line insertion .....

#### INSERTION RECORD

Hospital where device inserted.....

Location within where device inserted.....

Contact person/telephone number for patient/carer .....

Contact details within Trust.....

\*Emergency/Planned (\*Please delete as appropriate): Type of CVAD.....

Tunnelled  Non tunnelled (Cuffed)  Non cuffed

**Site:** Subclavian  Jugular  Basilic  Femoral

Other please specify..... Right side  Left side  Number of lumens .....

Ultrasound performed: \*Yes/No (\*Please delete as appropriate)

Distance of insertion..... Length of line.....

Fixation method: \*Clips/Sutures/Other (\*Please delete as appropriate) If other specify: .....

Chest X-ray: \*Yes/No (\*Please delete as appropriate)

Line position satisfactory: \*Yes/No (\*Please delete as appropriate)

Signature of person completing form .....

Block caps..... Date ...../...../.....

Additional Information .....

#### REMOVAL RECORD

Date of Removal ...../...../..... Number of days line in situ.....

Reason for removal.....

Removed by..... Signature.....



# APPENDIX 5

## CENTRAL VENOUS ACCESS DEVICE PATIENT RECORD

Patient Name ..... DOB: ...../...../.....

Monitoring Record:.....

Date of Insertion: ...../...../.....

Device Implanted:.....

### MANAGEMENT PLAN

ACTION	RATIONALE
Flushing – frequency, solution	
Dressings	
Needle size – for port-a-caths	

COMMENTS .....

ASSESSMENT OF SITE	Date											
	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
Site assessed												
Signs of local infection												
Erythema												
Tenderness												
Warmth												
Oedema												
Palpable thrombosed vein												
Pus												
Temp > 38°C												
WBC if appropriate												
Other obvious focus of infection												
DRESSING DETAILS												
Dressing intact, dry and clean												
Site Cleaned, solution used												
Dressing changed												
Transparent dressing												
Moisture Absorbent dressing (sterile gauze)												
FLUSHING												
Was line flushed today?												
Record the length of the line as appropriate												
Signature												
Designation												



## APPENDIX 6

### SUMMARY OF TYPES OF CENTRAL VENOUS CATHETER USED IN THE CHILDREN

TYPE OF CATHETERS	USE	ADVANTAGES	DISADVANTAGES
Peripherally Inserted Central Catheter (PICC)	Inserted via the antecubital veins in the arm and advanced into central veins until the tip is in the superior vena cava	<ul style="list-style-type: none"> <li>Ease of insertion and removal</li> <li>Fewer insertion complications</li> <li>Bedside access</li> <li>Low incidence of related infection/thrombus</li> </ul>	<ul style="list-style-type: none"> <li>Smaller lumen/flow problems</li> <li>Inflammation at insertion site</li> <li>Higher rate of phlebitis than other CVADs</li> <li>Problems with kinking</li> </ul>
Non Tunnelled Central Venous Catheter	Inserted directly into the vein, these devices are mainly used in theatres and intensive care units for therapies of less than 3 weeks duration. It has a lifespan of 5-7 days but can remain <i>in-situ</i> for up to 14 days (follow manufacturer's instructions)	<ul style="list-style-type: none"> <li>Can be inserted at the bedside</li> <li>Insertion procedure quicker, suitable for emergency situations</li> <li>Several lumens</li> <li>Can be used for continuous access and high flow</li> </ul>	<ul style="list-style-type: none"> <li>Highest infection rates of all CVADs</li> <li>Requires external sutures</li> <li>Uncomfortable for patients</li> <li>Difficulty maintaining dressing at exit site</li> <li>Requires to be changed every 5-7 days</li> </ul>
Tunnelled central venous catheter e.g. Hickman	Not placed directly into vein but are tunnelled through the skin	<ul style="list-style-type: none"> <li>Low infection rate</li> <li>Ease of dressing application</li> <li>Patient comfort, no external sutures</li> <li>Durability</li> <li>Ideal for repetitive use</li> <li>Doesn't require skin puncture for access</li> </ul>	<ul style="list-style-type: none"> <li>Experienced operator required to insert</li> <li>Inserted in theatre or radiology</li> <li>Requires surgical removal</li> <li>External portion of catheter visible</li> </ul>
Subcutaneous Port e.g. Port-a-cath	These are totally implanted vascular access devices and manufacturer's instructions should be followed. The port is accessed via a non-coring (Huber point) needle	<ul style="list-style-type: none"> <li>Patient acceptance, intact body image</li> <li>No exit site dressing, allows patient to bathe and swim</li> <li>Require less maintenance- less flushing &amp; no dressing changes</li> </ul>	<ul style="list-style-type: none"> <li>Use of needle to access port</li> <li>Local skin ulceration</li> <li>Shorter life span than tunnelled CVADs if accessed regularly</li> <li>Requires operative placement</li> </ul>



## APPENDIX 7

### AUDIT TOOL

- These guidelines have been developed in part to ensure a standardised approach to documentation in relation to the insertion and maintenance of CVADs (Appendix 2, 4 & 5).
- Omission of appendix 4 & 5 from the case notes may delay the transfer of the child/young person which will ultimately affect their standard of care.

This tool is to be used when auditing the use of Appendix 4 & 5 in the child/ young person's case notes. In addition, the clinical team should also perform audits based on Appendix 2 (CVAD insertion check list) to ensure that they are complying with the recommended best practice at the time of insertion of CVAD and this should be used as a part of feedback to the clinical team and used as an educational tool to improve compliance.

- 1) Has **Appendix 4 – Central Venous Access Device Patient Record Insertion & Removal Details** – been included in the case notes? Yes / No
  
- 2) Are the following details included on Appendix 3:
  - i) Name Yes / No
  - ii) DOB Yes / No
  - iii) Date of insertion Yes / No
  - iv) Hospital record number Yes / No
  - v) Diagnosis Yes / No
  - vi) Reason for line insertion Yes / No
  
- 3) Are the following details of the Insertion record included?
  - i) Hospital Yes / No
  - ii) Location within Trust Yes / No
  - iii) Whether it was an emergency or planned Yes / No
  - iv) Type of CVAD Yes / No
  - v) Site Yes / No
  - vi) If an ultrasound was performed Yes / No
  - vii) Distance of insertion Yes / No
  - viii) Length of line Yes / No
  - ix) Fixation method Yes / No

- x) If a chest x-ray was performed Yes / No
- xi) If line position is satisfactory Yes / No
- xii) Has the form been signed Yes / No
- xiii) Has the form been dated Yes / No
  
- 4) Are the following details included about the removal record
  - i) Date of removal Yes / No
  - ii) Number of days line in situ Yes / No
  - iii) Reason for removal Yes / No
  - iv) Removed by Yes / No
  - v) Signature of person who removed it Yes / No
  
- 5) Has **Appendix 5 – Central Venous Access Device Patient Record** – been included in the case notes? Yes / No
  
- 6) Are the following patient details recorded on the above form?
  - i) Patient name Yes / No
  - ii) DOB Yes / No
  - iii) Monitoring record Yes / No
  - iv) Date of insertion Yes / No
  - v) Device Implanted Yes / No
  
- 7) Has the Management Plan been completed? Yes / No
  
- 8) Has the Assessment of site been completed? Yes / No
  - i) On what dates were these completed ...../...../..... ...../...../.....
  - ...../...../..... ...../...../.....
  - ...../...../..... ...../...../.....
  - ...../...../..... ...../...../.....
  
- 9) Have the dressing details been completed? Yes / No
  - i) On what dates were these completed ...../...../..... ...../...../.....
  - ...../...../..... ...../...../.....
  - ...../...../..... ...../...../.....
  - ...../...../..... ...../...../.....
  
- 10) Have the flushing details been completed? Yes / No
  - i) On what dates were these completed ...../...../..... ...../...../.....
  - ...../...../..... ...../...../.....
  - ...../...../..... ...../...../.....
  - ...../...../..... ...../...../.....



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## GUIDELINE WORKING GROUP FOR CENTRAL VENOUS CATHETERS IN CHILDREN AND YOUNG PEOPLE

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