

018 – GUIDELINES FOR THE MANAGEMENT OF CENTRAL VENOUS CATHETERS (CVC) IN ONCOLOGY AND HAEMATOLOGY ADULTS

Broad Recommendations / Summary

These guidelines are to ensure the safe care and management of Oncology and Haematology adult patients who require a central venous catheter (CVC).

The guidelines have been adapted from the former North East Yorkshire and Humber Clinical Alliance (Cancer) NEYHCA CEG – Guidelines for the Management of Central Venous Catheters (CVCs) in Adults, version 2.2 March (2011) - formally HYCCN. NEYHCA has since ceased to exist as has administration or version control facilitation. Therefore, the adapted, updated guidelines are to rebrand and publish directly onto the local HEY Trust Intranet Site and linked to the Queens Centre for Oncology and Haematology; Cancer Services and Chemotherapy CNS Team Website to ensure up to date best practice

In 2003 NICE undertook a detailed literature review focusing on how to minimise infection in CVC, its search noted the robust guidelines developed by Pratt et al (2001) known as the epic guidelines, NICE (2003) based their recommendations upon the epic guidance.

The epic 2 guidelines focused upon prevention of infection (Pratt et al 2007). It is recognised that there are other issues that needed addressing in relation to the management of CVC's such as management of blocked lines and educational requirements of both patients and staff.

The Royal College of Nursing issued 'Standards for Infusional Therapy' November (2005i). This document provided further evidence to inform these guidelines.

NB: For full local procedural resource folder please see the Chemotherapy Nurse Specialist Team intranet web-site.

1 PURPOSE / LEGAL REQUIREMENTS / BACKGROUND

The Manual of Cancer Standards (DoH 2011) states that common guidance for the 'care of aids to venous access such as Hickman lines' should be available. This guidance is a continued requirement in the Manual of quality measures for peer review.

The foundation of the guidance based upon the NICE guidelines (2003), which drew primarily upon epic guidelines (Pratt et al 2001) and epic guidelines 2 (Pratt et al 2007) The Standards for Infusional Therapy, Royal College of Nursing (2005). Expert nurses from across the Yorkshire Cancer Network (YCN) sought further evidence to support the additional needs of cancer nurses caring for central lines. It is with permission from the YCN that these amended guidelines have been produced to reflect the Clinical Support Health Group, Queen's Centre for Oncology and Haematology, HEY Hospitals NHS Trust.

These guidelines have been developed to assist practitioners who are involved in the insertion and/or management of central venous catheters (CVC). In general they will provide guidelines relating to CVC lines as opposed to detailing actual procedures. Refer to local policies for actual insertion and removal of CVC procedures.

The guidelines are predominately aimed at nurses caring for Oncology and Haematology patients within the Clinical Support Health Group, but it is recognised they may be of benefit to other health professionals. The guidelines will address care of medium to long term CVC's i.e. peripherally inserted central catheters (PICC's), skin tunnelled catheters (STC's) and implanted port systems.

These guidelines do not address insertion of CVC's or specific management of split cath.

(A split cath is a type of tunnelled central venous catheter with two free floating lumens designed for long term access during apheresis. It is manufactured from soft radiopaque polyurethane material and placed either into the internal jugular vein or the subclavian vein. For care and management please see standard operational policy – Appendix 9. Also available via EQMS)

The guidance provides recommendations for practice as opposed to step-by-step procedures. Procedures can be agreed at local level with involvement of all relevant personnel.

2 POLICY / PROCEDURE / GUIDELINE DETAILS

EDUCATION OF PATIENTS, THEIR CARER'S AND OTHER HEALTH CARE PERSONNEL

- Before discharge from hospital, patients and/or carer's should be taught how to safely manage their CVC and be provided with written guidance to support this.
- All health care professionals involved in caring for a patient with a CVC should be trained and assessed yearly, as competent in using and consistently adhering to these guidelines.
- Ongoing support should be available to patients with a CVC and their carer's.
- Verbal and written information is to be provided for all patients and/or carer's on how to access support both during and outside normal working hours.

To improve patient outcomes in relation to reduction of infection risk, education of those involved in caring for the line is essential. Health care personnel, patients and their carer's need to be confident and proficient in both infection prevention practices and be aware of the signs and symptoms of infection if they arise (Pratt et al 2001 and Pratt et al 2007). An awareness of potential line complications and how to seek advice, if suspected, should also be established (see troubleshooting Appendix 8).

GENERAL ASEPSIS

- An aseptic technique must always be used for accessing a CVC.
- Before accessing or dressing a CVC, hands must be cleaned by washing with an anti-microbial liquid soap and water, followed by using an alcohol (70%) hand rub (Epic 2, 2007)
- An aseptic non-touch technique (ANTT) must be used for catheter site care and for accessing the system (Epic 2, 2007)
- Following hand antisepsis, sterile gloves should be used when changing the insertion site dressing, line manipulation or IV drug administration (Epic 2, 2007).

Because the potential consequences of catheter related infections are so serious, enhanced efforts are needed to reduce the risk of infection to the absolute minimum (Epic 2, 2007).

Multi lumen catheters are associated with a higher risk of infection than single lumen catheters.

Multi lumen catheter insertion sites may be particularly prone to infection because of increased trauma at the insertion site or because multiple ports increase the frequency of CVC manipulation.

CATHETER MANAGEMENT AND CATHETER SITE CARE

Dressings

Following initial insertion

- Sterile, transparent, semi permeable polyurethane dressing or all-inclusive gauze dressing should be used to cover the catheter site.
- Gauze dressings should be changed when they become damp, loosened or soiled. Gauze dressings should be replaced with a transparent dressing as soon as possible if this is acceptable with the patient and their carer.
- If blood is oozing from the catheter site gauze dressing is acceptable until bleeding stops.

Long-term Management

- PICC lines should always have a dressing to secure and prevent infection of the line.
- Dressings for STC lines can be removed when the exit sutures have been removed and the site is healed (21 days), a dressing is no longer required unless it is the patient's/carers preference. The line should be looped above waist level to prevent pulling in both adults and children.

- Transparent semi permeable dressings should be changed every 7 days or when soiled or they are no longer intact, or required.

The type of dressing selected should be based upon minimising the risk of infection and optimising patient comfort. For PICC lines the dressing of choice is polyurethane as it secures the line to the skin minimising movement. PICC lines can fracture and cause mechanical irritation if movement is not minimised.

It should be noted there might be two dressings in place after insertion of a STC, entry site and exit site. The entry site dressing is generally removed within 48 hours and suture left exposed. The exit site generally stays in place until the wound has healed.

There is currently no evidence that demonstrates one dressing is preferable to another in reducing infection rates (Gillies et al 2003). However polyurethane dressings have the advantage that the line can be seen through the dressing, ensuring the line is fully secured and allows the patient to shower or bath without the need to change the dressing. There is concern that the polyurethane dressing leads to increased skin surface humidity thus increased infection risk; however there is no evidence to support this (Gillies et al 2003). Patient/carer preference and clinical judgment should inform selection.

Cleaning Solutions

An alcoholic chlorhexidine gluconate solution (2% chlorhexidine gluconate in 70% isopropyl) should be used to clean the catheter site during dressing changes, and allowed to air dry.

Check manufactures recommendations on the use of alcohol based substances. An aqueous solution of chlorhexidine gluconate should be used if use of alcohol prohibited (Pratt et al 2007). Chlorhexidine may not be suitable for all patients; sterile normal saline may be an alternative to use for such patients as it is non-irritating to the skin.

Accessing and Maintaining the System

General Principles

- The catheter hub should be cleaned, and allowed to air dry, with 70% alcohol or an alcoholic solution of Chlorhexidine Gluconate before and after the system is accessed. Do not allow organic solvent- based solutions to come into contact with the catheter tubing.

It is essential that appropriate cleaning agent be used to clean the catheter hub before accessing the system.

Needleless Devices

Needleless systems have been widely introduced into clinical practice to reduce the incidence of sharps injuries. The Centre for Disease Control and Prevention (CDC 2011) found that devices when used according to manufacturer recommendations do not substantially affect the incidence of infection related to CVC's.

- Recommendations for changing the needleless components should be followed: 7 days/100 accesses if BBraun Safeflow needle free valve, always check manufacturers' instructions (Medical Devices Alert 2005).
- Health care personnel should ensure that all components of the system are compatible and secured, to minimise the risks of leaks and breaks in the system.
- Clinical areas should be using needleless devices for line access.
- Syringes used to access any CVC should be no smaller than 10mls with luer lock connecting ends.

Syringe size is dependent upon pressure created. This is measured in pounds per square inch (PSI). For all CVC's recommended maximum pressure should be no greater than 40 PSI.

Intravenous Administration Sets

- Administration sets must be maintained as a closed system. When used for continuous crystalloid infusion they need not be replaced more frequently than at 72 hour intervals unless they become disconnected or if a catheter – related infection is suspected (CDC 2011).

- Administration sets for blood and blood components should be changed every 12 hours (CDC 2002, RCN 2005ii) or prior to subsequent infusions other than blood.
- Administration sets used for Total Parenteral Nutrition (TPN) infusions should generally be changed every 24 hours.
- If the solution contains only glucose and amino acids, administration sets in continuous use do not need to be replaced more frequently than 72 hours (CDC 2011).

Maintaining Catheter Patency and Preventing Catheter Thrombosis

- The patency of the catheter will be checked prior to the administration of medications and/or solutions.
- Affirming patency by aspirating for the blood in the line is indicated when the patient is to receive chemotherapy via the line.
- There is no requirement to routinely withdraw blood and discard it prior to flushing (RCN 2005i).
- When sampling a line for routine blood a discard of 3-5 mls should take place depending on catheter internal volume.
- If obtaining blood for cultures a discard should not take place.
- The flush will be done using a pulsated push-pause and positive pressure method (RCN 2005i).
- Routine flushing / Systemic Anticoagulation. NICE (2003):
 - PICC routine flush of 10mls sterile sodium chloride 0.9% weekly.
 - STC routine flush of 5mls Heparin (50u/5mls) weekly. (Or as instructed by the manufacturer if a Groshong STC.)
 - Port routine flush of 5mls Hepflush (500u/5mls) monthly.

NB: The procedure for flushing apheresis catheters is different from standard skin tunnelled catheters; please refer to standard operational procedure – Insertion, Removal and Care of Central Venous Access Devices in the Transplant Setting. (Appendix 9 of these guidelines)

The catheter should be flushed at established intervals to promote and maintain patency, reduce incidence of intraluminal infection and to prevent the mixing of incompatible medications and/or solutions (RCN 2005i, Epic guidelines 2 2007).

On discharge from secondary care the patient should be provided with guidance on how and what solution their line should be flushed with. This information will advise the person who will be responsible for flushing the line.

The correct technique should be used when flushing CVC's. Centre for Disease Control (2011) and the Department of Health (2013) recommend the pulsated flush; this creates turbulence within the catheter lumen, removing debris from the internal catheter wall. This technique should be used in conjunction with positive pressure. Through created positive pressure within the lumen of the catheter reflux of blood is prevented (INS 2011).

Management of Blocked CVC's

- The patient must always be assessed for any history of pain or swelling prior to flushing the line.
- The nurse shall understand the predisposing factors for catheter occlusion and preventative strategies (Gabriel 2013).
- The cause of the occlusion should be established where possible based upon patient history e.g. is it precipitation or blood clot induced or a combination (INS 2011).
- Excessive pressure may result in catheter separation and/or rupture resulting in loss of catheter integrity. It is recommended that a 10ml syringe or larger is used.
- Any agents used to unblock lines should adhere to local guidelines.
- The appropriate health care professional should be informed if catheter patency is not restored using thrombolytic or precipitate clearance agents (RCN 2005i).
- The procedure should be documented in the patient's records (NMC 2012).

Prior to flushing a CVC an assessment of the patient will take place as outlined in flow chart 1. The patient must be fully assessed as outlined in flow charts 1 and 2 prior to attempting to unblock a line.

Thrombotic Occlusions

- Thrombolytic agents specifically indicated for dissolving clots shall be administered and must be prescribed (RCN 2005ii).

- Three thrombolytic agents are cited commonly in the literature Urokinase (5,000 units per ml), Streptokinase and tissue plasminogen activator (t-PA).
- The volume used should not exceed the internal volume of the catheter; most catheters accommodate 1-2mls.
- Excessive pressure to instill a greater volume may result in catheter rupture (DoH 2013)

Management of Damaged Catheters

- When the external portion of a CVC is damaged, the device shall be repaired according to the manufacturer's guidelines, using aseptic technique and observing universal precautions (Gorski et al 2010).
- All damaged catheters should be referred back to the referring Cancer centre/ unit where expert advice can be sought.
- For guidance on immediate management of damaged line refer to appendix 1.

Vascular catheters that can be repaired include a mid-line catheter; PICC's and tunnelled central catheters (Gorski et al 2010).

Management of CVC Infections

The management of catheter infections remains controversial.

- Attempts should be made to make a microbiological diagnosis by culturing blood from all catheter lumens and peripheral samples before commencing antibiotics.
- However, in clinical practice, it is usual for broad-spectrum antibiotics to be initiated while awaiting culture results.
- See Appendix 7, which summarizes current recommendations based upon consensus and the literature.
- The decision to salvage or remove a catheter should be made following discussion with the microbiologist and after consideration of the patient's clinical status and position within treatment pathway.
- The immune status should be assessed, as it will determine the aggressiveness of treatment.
- Patients with normal immune status: catheter salvage should be considered as the main aim of therapy.
- In patients with severe compromised immune status protecting the patient from progressive infection must be the primary goal.
- Local infections should be treated with antibiotics given orally or IV.
- Systemic infection should be treated with IV antibiotics or oral and IV antibiotics.
- In the case of septic thrombo-phlebitis the treatment is removal of the CVC and administration of IV antibiotics.

Infection is one of the greatest complications associated with a CVC. Infections can occur at the insertion site or systemically. Signs of infection at the insertion site include erythema and/or oedema, tracking along the length of the catheter, tenderness at the site, and exudate. Septicemia is a systemic infection, which is usually characterised by pyrexia, flushing, sweating and rigors, particularly when the catheter is flushed.

Infections can be categorised into early (within 2 – 3 weeks) after insertion and delayed (more than 2 – 3 weeks after insertion). Early infections usually occur due to bacterial contamination during the initial insertion, are most commonly caused by skin flora and are likely to be attributed to inadequate skin preparation or cleansing before insertion. Delayed infections are often due to poor wound care, migration of micro-organisms along the catheter tract or seeding from a secondary source.

Management of Catheter Related Thrombosis

Refer to intervention report form for the management of catheter related thrombosis (appendix 10)

PATIENT INFORMATION

Patients/carer's who have agreed to care for their line and would be flushing and/or dressing the line themselves should have additional guidance provided to support this:

- Provision of a 24-hour contact number if they have any worries about their line.

- Information regarding activities and possible restrictions that are applicable with day to day activities of having CVC.
- Information on when they should contact the hospital e.g. signs of possible infection, pain at exit site.

EDUCATION AND TRAINING

Nurses' accessing/managing CVC's must be able to demonstrate their competency and be able to:

- Discuss the issues of accountability and responsibility in relation to central line administration.
- Critically analyse catheter selection and route of administration.
- Discuss specific safety issues associated with different routes of administration.
- Recognise and manage common complications associated with the CVC.
- Demonstrate an understanding of the information and educational requirements of patients prior to, during and post CVC insertion.
- Understand the physical and psychological impact a CVC has upon the patient and carer.

3 PROCESS FOR MONITORING COMPLIANCE

Qualified staff new to the service will be expected to attend the 3 day Chemotherapy Competency Induction Workshop to be entered into the work based learning Chemotherapy Competency Programme (NEYHCA 2013). The monitoring of compliance with and clinical competency of staff regarding the management of central venous catheters (CVCs) will be undertaken by the ward/department managers with support from the Chemotherapy Nurse Specialist Team. All nursing staff will complete required competency and will be reviewed yearly, with specific regard to Central Venous Access Devices (Topic 7) Chemotherapy Competency Programme.

Guidelines will be monitored and reviewed as per the cancer standards and Peer Review process with advice and support from the Trust Chemotherapy Committee Meeting (CCM) members.

All incidents must be documented accordingly as per guidelines and reported via HEY Trust DATIX system and reviewed by the CCM.

4 REFERENCES

- British Committee for Standards in Haematology: Guidelines on the Insertion and Management of Central Venous Access Devices in Adults (2007)
- Guidelines for the Prevention of Intravascular Catheter Related Infections. Centers for Disease Control and Prevention (CDC) (2011)
- Chaiyakunapruk, N., Veenstra, D.L., Lipsky, B.A. , Saint, S. (2002) Chlorhexidine compared with Povidone- iodine solution for vascular catheter – site care: A meta- analysis. *Annals of Internal Medicine*. Vol. 136, No11.
- DoH (2011) Manual of Cancer Service Standards. NHS. London
- DoH (2013) Guideline – Peripherally Inserted Central Catheter (PICC) Version 2.
- Dougherty L (2006) Central Venous Access Devices: Care & Management. Blackwell Publishing, Oxford.
- Gabriel J (2013) Venous access devices part 2: preventing and managing complications of CVADs. *Nursing Times*; 109: 40, 20-23.
- Gillies D, O’Riordan E, Carr D, O’Brien I, Frost J, Gunning (2003) Central venous catheter dressings: a systematic review. *Journal of Advanced Nursing* 44(6) 623-632
- Gorski L, Perucca R & Hunter M (2010) Central Venous Access Devices: Care, Maintenance and potential complications in: *Infusion Nursing: An Evidence-Based Approach*. 3rd Ed, section V Ch 25. Saunders Elsevier
- INS (2011) Infusion Nursing Standards of Practice, *Journal of Intravenous Nursing* 23 (6S) Supplement
- Medicines and Healthcare Products Regulatory Agency (2005) All brands of needle free intra-vascular connectors Medical Devices Alert MHRA 17 May Ref MDA/2005/030 <http://www.mhra.gov.uk>
- National Institute for Clinical Effectiveness (2003) Section 5 – Central Venous Catheterisation in Prevention of health care – associated infections in primary and community care London.

- Nursing and Midwifery Council (2012) Guidelines for records and record keeping. London
- Pratt RJ, Pellowe C, Loveday HP, Robinson N, Smith GW & the epic Guidelines Development Team (2001) Guidelines for preventing infections associated with the insertion and maintenance of central venous catheters. Journal of Hospital Infection 47 suppl. 547-67
- Pratt RJ, Pellowe CM, Wilson JA, Loveday HP, et al (2007) epic2: National Evidence-Based Guidelines for preventing HealthCare-Associated Infections in NHS Hospital in England. Journal of Hospital Infection. 65:S1-S64 Available at <http://www.epic.tvu.ac.uk/PDF%20Files/epic2-final.pdf>
- Royal College of Nursing (2005i) Standards for infusion therapy. RCN IV therapy Forum, London.
- Royal College of Nursing (2005ii) Right Blood, Right Patient, Right Time. RCN London (111) Todd, J (1998) Peripherally inserted catheters. Professional Nurse 13 (5) 297-302
- Stephen-Haynes J (2013) Managing Overgranulation.
- Wound Care Today.
- Widgerow AD & Leak K (2010) Hypergranulation Tissue: Evolution, Control and Potential Elimination.
- Wound Healing 3(2):00-00.

5 APPENDICES

- Appendix 1 - Immediate Management of a Damaged CVC
- Appendix 2 - Product Selection - Central Venous Catheter (Adult)
- Appendix 3 – Flow Chart 1 - Management of Patient with a Blocked Central Vascular Access Device
- Appendix 4 – Flow Chart 2 - Management of a Blocked Line in the Cancer Centre/Cancer Unit
- Appendix 5 - Maintaining Catheter Patency/Flushing Guidance
- Appendix 6 - Care of Central Venous Catheters
- Appendix 7 - Recommendations for the Management of CVC Related Infections
- Appendix 8 – Troubleshooting
- Appendix 9 - Split Cath Standard Operating Procedure
- Appendix 10 – Intervention Report for the Management of Catheter Related Thrombosis

Document Control			
Reference No:	18	First published:	September 2004
Version:	3	Current Version Published:	November 2016
Lead Director:	Russell Patmore	Review Date:	November 2019
Document Managed by Name:	Chemotherapy Nurse Specialist Team	Ratification Committee:	Clinical Support HG Quality Governance & Assurance Committee
Document Managed by Title:	Chemotherapy Nurse Specialist Team	Date EIA Completed:	
Consultation Process			
Chemotherapy Nurse Specialist Team Chemotherapy Committee Meeting members Russell Patmore <i>Lead Director</i> Dr R. Roy <i>Clinical Lead</i> Dr Dhadda Head of Clinical Chemotherapy Services Mandi Elliott Lead CNS of Clinical Chemotherapy Services Clinical Effectiveness Group Policies & Practice Development Group			
Key words (to aid intranet searching)			
Management of Central Venous Catheters in Oncology/Haematology Adults			
Target Audience			
All staff		Clinical Staff Only	Non-Clinical Staff Only
Managers		Nursing Staff Only	Medical Staff Only

Version Control			
Date	Version	Author	Revision Description
May 2016	3	Chemotherapy Nurse Specialist Team	Adapted from NEYHCA. Full review with change of title and minor rewording throughout, split cath information added and update of references.
March 2011	2.1	Chemotherapy Nurse Specialist Team	Review, no changes made
March 2011	2	Chemotherapy Nurse Specialist Team	Infected Lines Amendment
August 2007	1.3	Chemotherapy Nurse Specialist Team	Includes details of management of infected lines
August 2006	1.2	Chemotherapy Nurse Specialist Team	Amended format & detail in response to clinical governance & policy group comments
April 2006	1.1	Chemotherapy Nurse Specialist Team	Update references & minor details
September 2004	1	Chemotherapy Nurse Specialist Team	New guideline

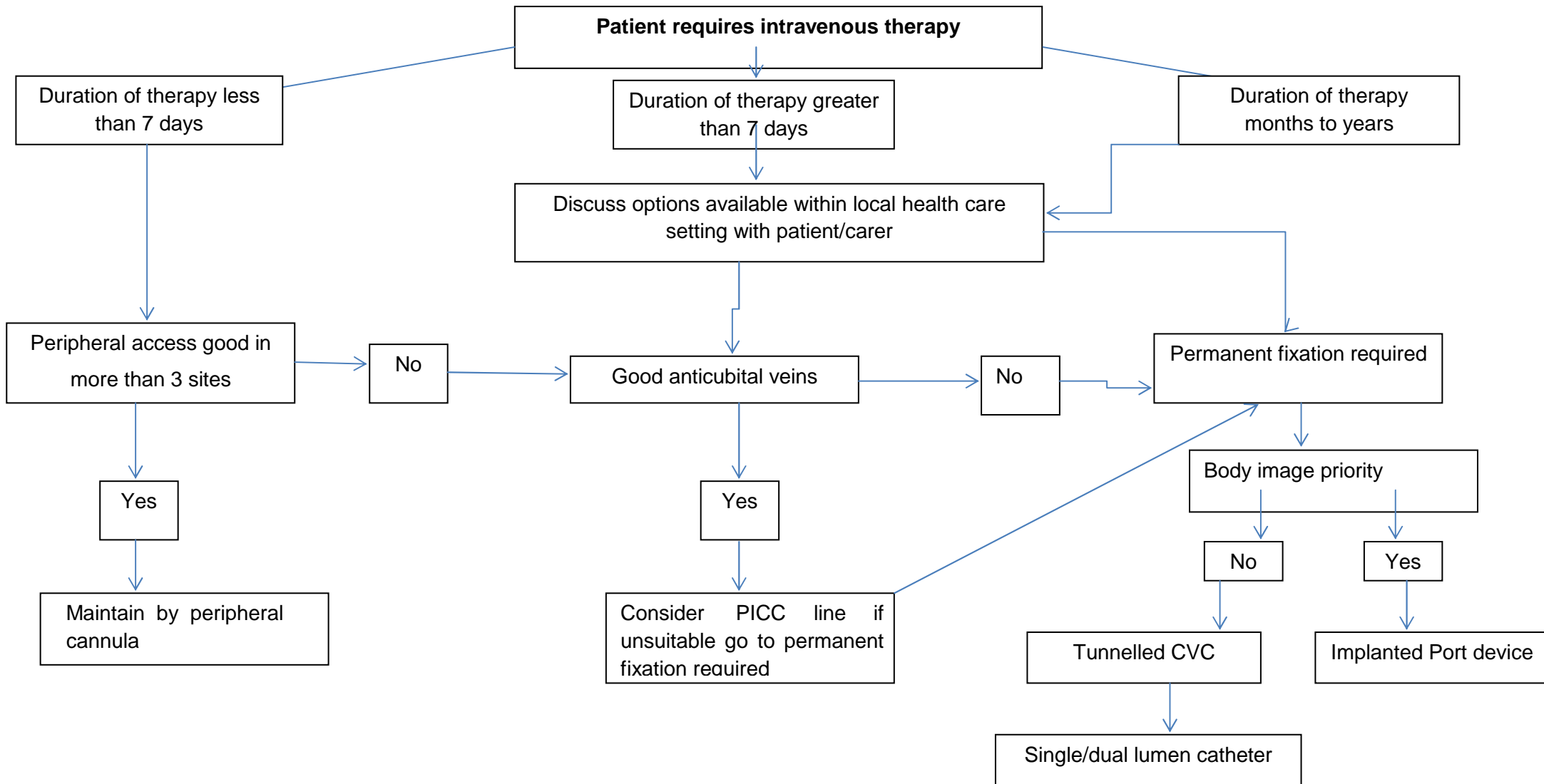
IMMEDIATE MANAGEMENT OF A DAMAGED CVC

Aim: To establish patient safety

- Establish what fluid is leaking. If cytotoxic follow local guidance to manage spillage. Take all necessary measures to protect the patient, carer and yourself.
- If the line has a clamp, clamp the line above the point of leakage
- Switch off any infusion device
- All patients with tunnelled lines should be discharged home with a clamp if one is not in situ on the line already.
- If it's a PICC line, fold the line back on itself and secure
- Contact referring hospital; arrange for the patient to return for assessment and possible line repair or removal.
- Document incident in patients notes

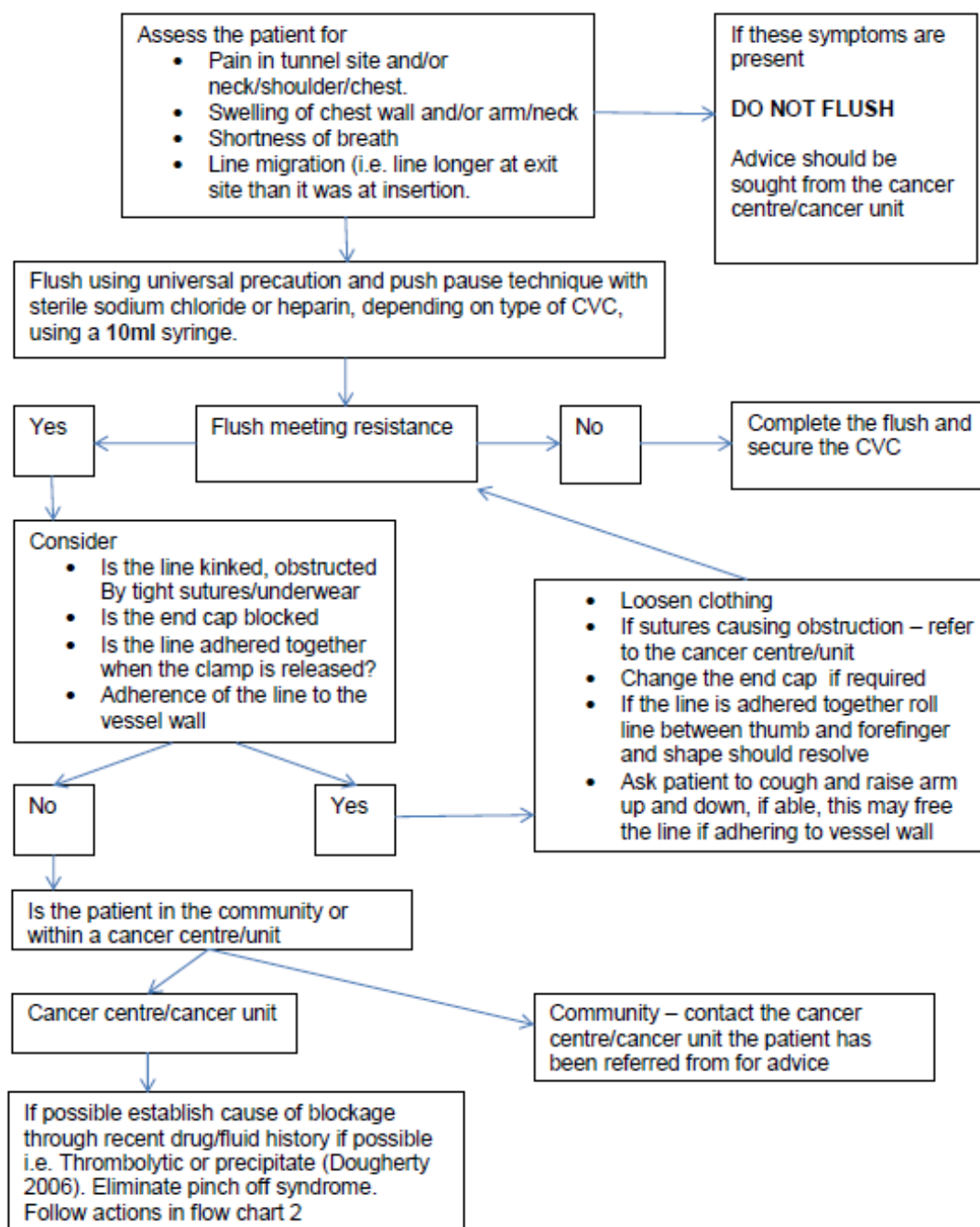
PRODUCT SELECTION - CENTRAL VENOUS CATHETER (ADULT)

Appendix 2



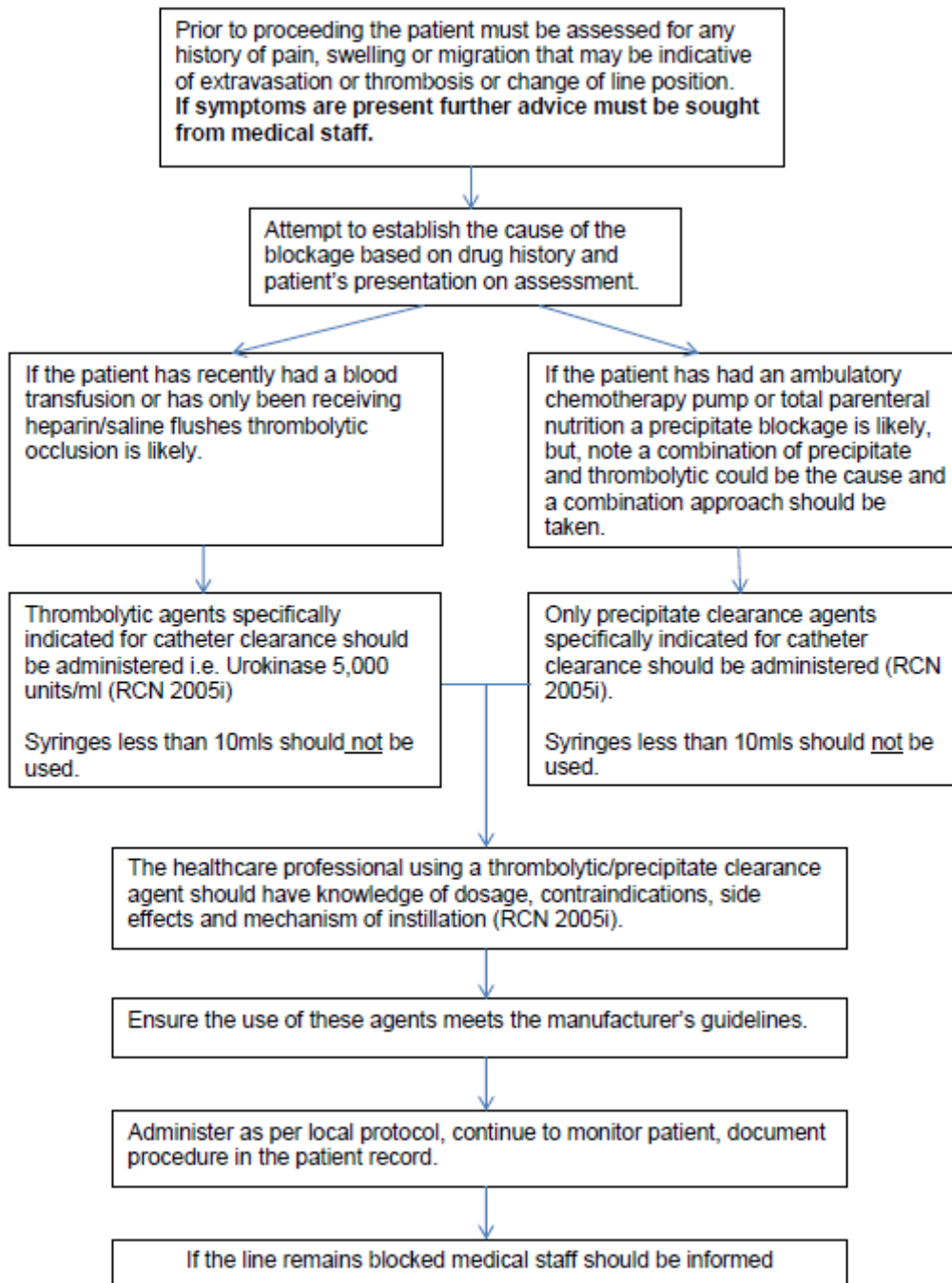
FLOW CHART 1 - MANAGEMENT OF PATIENT WITH A BLOCKED CENTRAL VASCULAR ACCESS DEVICE

GUIDELINES FOR FLUSHING LINE WITH SODIUM CHLORIDE OR HEPARIN



11

FLOW CHART 2 – MANAGEMENT OF A BLOCKED LINE IN THE CANCER CENTRE/CANCER UNIT



Adapted from NEYHCA cancer – Guidelines for the Management of Central Venous Catheters (CVC) Version 2.2 May 2013

MAINTAINING CATHETER PATENCY/FLUSHING GUIDANCE
Appendix 5

Nursing responsibilities	Peripheral Inserted Central Catheter (PICC)	Skin-tunnelled catheter (STC, Hickman line)	Implanted ports (Port-a-cath, PAS-port)
After blood sampling	20ml Sodium Chloride 0.9% for injection.	10ml Sodium Chloride 0.9% for injection. 50 units/5ml Heparin/Hepsal if not in use (Heparin Sodium 10 units/ml)	10ml Sodium Chloride 0.9% for injection. 200 units/2ml Hep-Flush 500 units/5ml Hep-Flush if not in use (Heparin Sodium 100 units/ml)
After blood transfusion	20ml Sodium Chloride 0.9% for injection.	20ml Sodium Chloride 0.9% for injection.	200 units/2ml Hep-Flush 20ml Sodium Chloride 0.9% for injection.
Before and after administration of intravenous medication	10ml Sodium Chloride 0.9% for injection.	10ml Sodium Chloride 0.9% for injection.	10ml Sodium Chloride 0.9% for injection.
When converting from continuous to intermittent use	10ml Sodium Chloride 0.9% for injection.	10ml Sodium Chloride 0.9% for injection.	10ml Sodium Chloride 0.9% for injection.
After intermittent therapy	10ml Sodium Chloride 0.9% for injection	10ml Sodium Chloride 0.9% for injection.	10ml Sodium Chloride 0.9%
When catheter is not in use	10ml Sodium Chloride 0.9% for injection.	5ml Heparin/Hepsal-50 units/5ml (Heparin Sodium 10 units/ml)	500 units/5ml Hep-Flush (Heparin Sodium 100 units/ml)
Frequency of flush when not in use	Weekly	Weekly	Monthly
➤ Aseptic technique must always be used for accessing central venous catheters			
➤ Syringe size limited to 25psi/10ml syringe or larger.			
➤ Use pulsating flush technique and finish on positive pressure			
➤ Before administering chemotherapy via any central venous catheter blood return must be ascertained.			
In the event of withdrawal occlusion refer to local policy for management			

CARE OF CENTRAL VENOUS CATHETERS

Appendix 6

Nursing responsibilities	Peripheral inserted central catheter (PICC)	Skin-tunnelled catheter (STC, Hickman)	Implanted ports (Port-a-cath, PAS-port)
Cleaning solution	70% Aqueous Chlorhexidine solution	70% Aqueous Chlorhexidine solution	N/A internal device
Dressings	Sterile dressing with a sterile transparent semi permeable dressing for 24 hours post insertion Sterile transparent semi permeable dressing, changed every 7 days or as necessary	Entry site-sterile dressing until sutures removed, 7days Sterile transparent semi permeable dressing, changed every 7 days or as necessary. When Dacron cuff has fibrinogised, (approx 21 days) the dressing can be removed	Sterile dressing until sutures removed and site healed, (10 days)
Luer lock connection ends	Luer lock caps should be changed every 7 days.	Luer lock caps should be changed every 7 days.	Gripper needles left in situ must be changed every 7 days. Luer lock caps if used should be changed every 7 days

Do not apply organic solvents (acetone or ether) or use topical antibiotic ointment or creams at the catheter insertion site because of the possible incompatibility with catheter tubing and their potential to promote fungal infection and ant microbial resistance.

RECOMMENDATIONS FOR THE MANAGEMENT OF CVC RELATED INFECTIONS

Category of Infection	Non-Neutropenic patient	Neutropenic patient
Exit site infection	<p>Remove catheter if no longer needed</p> <p>Treat empirically with Flucloxacillin</p>	<p>Remove catheter if no longer needed</p> <p>Initial empirical therapy</p> <p>Treat for 10-14 days or longer until infection resolved</p> <p>Modify according to isolates. Remove catheter if evidence of progression or if blood cultures are positive for Staph. Aureus, Pseudomonas spp, Mycobacterium spp, or fungi</p>
Tunnel infection	<p>Remove catheter if no longer needed</p> <p>Treat empirically with Flucloxacillin</p>	<p>Remove catheter if no longer needed</p> <p>Treat for 10-14 days or longer until resolution of soft tissue infection.</p> <p>Modify according to isolates.</p> <p>If tracking continues to spread remove catheter.</p>
Presumed CVC related bloodstream infection	<p>Remove catheter if no longer needed</p> <p>Treat empirically with antibiotics targeted against isolates</p>	<p>Remove catheter if no longer needed</p> <p>Initial empirical antibiotic therapy</p> <p>Modify according to isolates Treat for at least 14 days</p> <p>Remove catheter if cultures remain positive after 48 hours of therapy or if proven CVC related infection with Staph. Aureus, Pseudomonas spp, Mycobacterium spp, or fungi</p>

TROUBLESHOOTING

A quick reference guide for managing problems with CVC's

Presenting symptom/s	Potential problem	Possible cause	Recommended actions
Chest pain Dyspnoea Tachycardia/irregular pulse Hypotension	Air embolism or Atrial fibrillation	Air entering the venous system during insertion or catheter use	Seek urgent medical advice/emergency admission
Pain on inspiration and expiration, dyspnoea	Pneumothorax	Air entering the space between the plural lining and the lung	Seek urgent medical advice/ emergency admission
Tingling Loss of movement down part or all of the affected limb Shooting pain	Nerve injury	Damage to the nerves in the local area can occur	Contact the cancer centre/unit for medical advice
Coughing Ear/neck pain on the side of insertion/palpitations or arrhythmia's Inability or difficulty aspirating blood (See flow chart 1) Swelling of neck, chest arm or leg. Shoulder tip pain	Catheter malposition	Catheter in the wrong place	Contact the cancer centre/unit x-ray may be required
Swelling of neck, chest, arm or leg Skin discoloration Skin temperature changes Infusion difficulties Inability to aspirate blood	Thrombosis in vein	Thought to be caused by damage to vein wall causing the release of thromboplastic substances that cause platelets to collect at injury site. These may grow into a larger thrombus or small bits break away and cause occlusion of a vessel elsewhere	Seek urgent medical advice/ emergency admission Complete intervention report - Appendix 9
Pain redness along the vein, tracking and swelling. For PICC lines – if post 10days insertion consider whether chemical phlebitis or infection. Mechanical phlebitis less likely after 10 days insertion	Mechanical phlebitis/ infection	Irritation of the vein due to movement of the catheter in the vein (not associated with tunnelled CVC's but can occur with PICC's)	Ensure the line is appropriately secured. If less than 10 days ensure the patient is applying heat packs as advised. Refer to Cancer centre/unit for advice, may require anti-inflammatory or antibiotic medication
Continuous back flow of blood into the catheter	Blood present in the lumen of the catheter	Fault in catheter, or line flushed incorrectly	Flush the line using correct technique. If back flow continue seek advice from the Cancer Centre/unit

Symptoms	Potential Problem	Possible cause	Recommended Actions
Inability to flush the line	Catheter occlusion	Line adhered together near clamp Line kinked or twisted Clot or fibrin sheath in catheter. Infusion stopped Drug precipitate blocking catheter. Lipids from TPN feed blocking catheter	Follow flow chart 1 and 2
	Pinch off syndrome	When the catheter is compressed between the clavicle and the first rib	Refer to the Cancer centre/unit who will assess
Difficulty in aspirating blood	Catheter occlusion	Line adhered together near clamp Clot or fibrin sheath in catheter Line kinked or twisted Drug precipitate blocking catheter. Lipids from TPN feed blocking catheter	Refer to the Cancer centre/unit
	Pinch off syndrome	When the catheter is compressed between the clavicle and the first rib	Refer to the Cancer centre/unit who will assess
	Fibrin sheath formation	Sheath has formed around the catheter tip	Cancer centre/unit to consider venogram to confirm patency dependent on the chemotherapy regimen. Medical consultation required.
Redness and tracking at site. Purulent discharge at site	Infection at insertion site	Infection at insertion site.	Refer to the Cancer Centre/unit,
Pyrexia of unknown origin, rigors. These may occur up to one hour after line has been flushed and should be investigated	Infection associated with the catheter	Infection	Refer to the cancer centre/unit.
Leakage from the catheter when used. Damage visible	Damage to catheter	Use of a sharp object near the catheter or movement twisting of the catheter (PICC's are vulnerable to fracture). High pressure on the syringe as injecting into the catheter.	Refer to the cancer centre/unit for advice (NB Many CVC's can be repaired by cancer centre/ unit)

Symptoms	Potential problems	Possible cause	Recommended action
Line appears longer at the exit site or the cuff is visible. On measurement the length is on longer than upon insertion.	Line migration (Common problem for PICC's)	Can occur with general activity, caution should be taken when removing dressings specifically PICC's not to pull the line.	Refer to the Cancer Centre/unit for advice. X-ray to confirm the catheter tip may be required
Skin changes at insertion site - thickening of skin at point of insertion. - pink/red in colour.	Skin over granulation	Unknown - possibly due to inflammatory response of injured tissue, as prolonged and excessive inflammation can lead to over granulation (Stephen-Hayes 2013). The presence of a foreign body interfering with healing may also contribute (Widgerow et al 2010)	Discuss with the cancer unit/centre A change of dressing may be indicated. Polyurethane foam dressings e.g. Lyofoam are suggested for over granulation.

UNCONTROLLED WHEN PRINTED

HULL & EAST YORKSHIRE HOSPITAL NHS TRUST	YORKSHIRE BLOOD & BONE MARROW TRANSPLANT PROGRAMME
STANDARD OPERATING PROCEDURE	INSERTION, REMOVAL AND CARE OF CENTRAL VENOUS ACCESS DEVICES IN THE TRANSPLANT SETTING

Skin-tunnelled Catheter (STC) for High Dose Chemotherapy

Patients who have not required a long term vascular access device prior to high dose chemotherapy require a referral for a double lumen skin tunnelled catheter. The referral needs to be made a minimum of two weeks prior to admission for high dose chemotherapy and stem cell support. This referral will be made by the Medical Transplant Co-ordinator by contacting the Interventional Radiology Department at Hull Royal Infirmary on Ext 88-4128. The insertion of the line should ideally take place on the morning of the day of planned admission for high dose treatment to Ward 33. The patient will be informed of the date and time by the Transplant Nurse Specialist.

The Transplant Nurse Specialist will be responsible for ensuring MRSA screening has been completed a minimum of 1 week prior to line insertion date.

Care of Central Venous Access Devices (CVAD)

Staff accessing or taking bloods from a CVAD's will have successfully undertaken in-house competency training. Staff administering IV drugs and chemotherapy will have completed the *IV Drug and Fluid Administration* and *Chemotherapy Competency* training and updates.

For guidelines on the *Care of Central Venous Catheters in Adults* please see the Hull and East Yorkshire NHS Trust guidelines and policies website. <http://intranet/chemo/docs/guidelinesManagementCVC.pdf>

NB The procedure for flushing apheresis catheters is different from standard skin tunnelled catheters.

- Withdraw 5ml of blood from each lumen and discard. The rationale for withdrawal is that apheresis lines in other areas are potentially locked with larger doses of Heparin, withdrawal of blood prior to flushing is recommended as a means of reducing risk of over heparinisation.
- In the event of withdrawal occlusion refer to the *Care of Central Venous Catheters in Adults* guideline. (see above)
- Take any necessary blood samples.
- Flush each lumen with 10ml of normal saline (posiflush).
- Lock both lumens with 2 ml of Heparin solution 100 iu/ml.
 - **A PATIENT GROUP DIRECTIVE TO COVER THE FLUSHING OF SPLIT CATHETERS IS NOT APPROPRIATE THEREFORE IN ALL CASES 100 iu/ml OF HEPARIN MUST BE PRESCRIBED FOR EACH PATIENT ON A DRUG CARD.**
 - If patients are attending the Queens Centre Outpatients Department, prescriptions for individual patients can be located within Room 2 of the Outpatients area within the Queens Centre, Castle Hill Hospital.
- Weekly flushing/locking and dressing change is required.
- Top suture to be removed after 7-10 days.
- A split catheter is a cuffed line and as such the anchoring suture can be removed after 21 days, but a dressing must remain in situ.
- If the line is fractured and the line proximal to the fracture is accessible it should be clamped.

UNCONTROLLED WHEN PRINTED

HULL & EAST YORKSHIRE HOSPITAL NHS TRUST	YORKSHIRE BLOOD & BONE MARROW TRANSPLANT PROGRAMME
STANDARD OPERATING PROCEDURE	INSERTION, REMOVAL AND CARE OF CENTRAL VENOUS ACCESS DEVICES IN THE TRANSPLANT SETTING

REMOVAL OF CENTRAL VENOUS ACCESS DEVICES IN THE TRANSPLANT SETTING

Removal of the Vascath®

- Confirmation of a successful harvest will be given via the telephone from the National Blood Centre in Leeds. THE LINE MUST NOT BE REMOVED UNTIL THIS CONFIRMATION HAS BEEN RECEIVED.
- The line must be removed by a competent member of the nursing team.
- Place the patient in the supine position.
- All dressings and sutures must be removed and the femoral line gently pulled out using aseptic techniques. All equipment to perform this procedure is available from the store cupboard at the nurse's station.
- Constant firm pressure should be applied to the exit site for 5- 10 minutes.
- If bleeding has not stopped following this period then a member of the medical team should be contacted. If a doctor is not present on the ward then contact via the hospital switchboard.
- Once bleeding has stopped then an occlusive dressing should be applied.
- Patient can be discharged if no further treatment is necessary and their observations are stable.

Removal of Skin Tunnelled Catheters including Split Catheters in the Transplant Setting

This SOP supports the removal skin tunnelled catheters/split catheter in the transplant setting by appropriately trained medical staff. Personnel will be clinically competent and experienced in such a procedure (Bishop et al, 2007).

In the unlikely event that a line requires urgent removal and no such personnel is available; the transplant director or on-call consultant haematologist will be contacted to discuss the appropriate action to be taken. Under no circumstances must a junior or inexperienced member of staff attempt to remove a skin tunnelled catheter/split catheter.

A Registered Nurse will be present to support the patient during and after the procedure. The nurse will have prior experience of line removal and an understanding of potential complications, presentation, and initial management (Table 1).

Patient preparation

Discuss the procedure with the patient outlining the risks and potential complications and document this along with the reason for removal of the STC in the medical notes.

Platelets will be above $50 \times 10^9/L$ (Bishop et al, 2007). Transfuse platelets prior to removal of line if required.

Prepare the equipment.

Prepare the patient on their bed in the supine position. It is not necessary to adopt the Trendelburg position for line removal (Rosenthal, 2004).

Assess patient's ability to perform the Valsalva manoeuvre. The Valsalva manoeuvre is recommended as a means of reducing the risk of air embolism following the removal of a skin tunnelled catheter. (Clark and Plaizier, 2011, Fell 2012, Peter and Saxman 2003). It involves the patient forcefully exhaling whilst bearing down at the point the line is removed. This promotes positive pressure in thoracic cavity (Andrew, 2002)

UNCONTROLLED WHEN PRINTED

HULL & EAST YORKSHIRE HOSPITAL NHS TRUST	YORKSHIRE BLOOD & BONE MARROW TRANSPLANT PROGRAMME
STANDARD OPERATING PROCEDURE	INSERTION, REMOVAL AND CARE OF CENTRAL VENOUS ACCESS DEVICES IN THE TRANSPLANT SETTING

If the patient is deemed as unable to perform the Valsalva manoeuvre then it is sufficient to ask the patient to simply exhale as the line is removed.

The British Committee for Standards in Haematology (BCSH) makes the following recommendations;

- Traction can be applied as a means of line removal if the cuff is not embedded in the surrounding tissue (<3 weeks in-situ)
- Where the cuff is embedded a cut down technique needs to be adopted
- Patients should be supine to reduce the risk of air embolism
- Catheter should be removed by a competent and experienced member of staff
- Platelet count should be above 50x10⁹/L
- Local anaesthetic should be used
- A small incision should be made alongside the cuff and blunt dissection to free the catheter to avoid damage to the line prior to removal
- If the catheter shears leaving the intravascular portion in-situ this will require urgent intervention by a vascular radiologist for removal
- The intravascular portion of the catheter should be removed before the line is cut
- The catheter should be removed in the direction of the tunnel
- The site of the cut down can be sutured
- Following removal of the line, pressure should be applied at the exit site, venotomy site and over the tunnel for a minimum of 5 minutes or until bleeding has stopped.
- Use an occlusive dressing to prevent air embolism.

The *British Committee for Standards in Haematology Guidelines on the insertion and management of central venous access devices in adults* (Bishop et al, 2007).

DO NOT USE GAUZE AND TAPE AS THIS IS NOT SUFFICIENT TO PREVENT AIR EMBOLISM. THE OCCLUSIVE DRESSING SHOULD REMAIN IN PLACE FOR 72 HOURS.

Post line removal patient should remain supine for a further 30 minutes. Procedure should be documented in the medical notes. Sutures can be removed after 7-10 days.

Any concerns with regards to the patency or integrity of an apheresis catheter see urgent advice from a Consultant Haematologist.

UNCONTROLLED WHEN PRINTED

HULL & EAST YORKSHIRE HOSPITAL NHS TRUST	YORKSHIRE BLOOD & BONE MARROW TRANSPLANT PROGRAMME
STANDARD OPERATING PROCEDURE	INSERTION, REMOVAL AND CARE OF CENTRAL VENOUS ACCESS DEVICES IN THE TRANSPLANT SETTING

All staff involved in the removal of central lines should be aware of potential complications, their presentation and initial management. See below:-

Complication	Presentation	Initial management
Air embolism	Dyspnoea, tachycardia, jugular venous distension, hypotension, cardiac arrest	Place the patient in the left lateral head down position tilted at 10-30 degrees Commence 100% oxygen therapy Contact the emergency medical team
Catheter fracture – risk of air embolus and catheter migration into venous system	Catheter accidentally shears or is cut during the removal	Apply pressure at the site to prevent further displacement Contact the radiology department for the urgent removal of the remaining portion of the line Monitor patient's vital signs and treat air embolism if one occurs.
Dislodged thrombus or fibrin sheath	Shortness of breath, dyspnoea, chest pain, hypoxia	O2 therapy and immediate senior medical assessment required. Monitor vital signs.
Haemorrhage/haematoma	Excessive bruising or swelling at the site	Apply direct pressure. If continues to bleed after 10 minutes or if blood loss is profuse contact senior member of the haematology medical team.

Appendix 10

Intervention Report Form for the Management of Catheter Related Thrombosis

(To maintain documentary evidence of the interventions carried out in the event of Catheter Related Thrombosis)

Date		Ward / OPD	
Patients name: (Patient sticker)			
Unit	DOB	Consultant	
Regimen:		Cycle:	
Type of CVAD: PICC STC PAS-Port Port-a-Cath			
Length of time in situ approx.:		months	days
How long since last flush		days	Previously bled back Yes / No
Clinical Signs:			
<ul style="list-style-type: none"> • Pain in: Chest Shoulder Neck Interscapula area • Swelling of: Arm Neck Face • Flushes easily: Yes / No 			
Arm circumference (PICC only) above & below entrance site (re-measure at review)			
Doppler Ultra-sound requested Yes/No			
Outcome of above:			
Management			
<u>Patients' circulation not compromised</u> Leave CVAD in place Commence anticoagulation Review after 3 days Review date and time.....		<u>Patients' circulation compromised</u> Commence anticoagulation for 3-4 days prior to removal of CVAD	
Management discussed with consultant, details :			
CVAD removed Yes / No			
Alternative access discussed - Outcome:			
Print Name & Designation			
Signature			

File in patients nursing notes