

THE NEWCASTLE UPON TYNE HOSPITALS NHS TRUST

Procedure for inserting a Peripherally Inserted Central Catheter (PICC line) in adult solid tumour oncology patients.

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INTRODUCTION

A Peripherally Inserted Central Catheter (PICC LINE) is defined as a catheter that is inserted into an antecubital fossa vein – which is advanced into the superior vena cava, (Halderman 2000, RCN 2005).

PICCs should not be considered as a last resort, but introduced early in treatment (Springhouse 2002). The PICC has many advantages over the other central venous access devices: firstly, it eliminates the risks associated with CVC placement, particularly pneumothorax (Weinstein 2000; Perucca 2001). Secondly, PICCs have been shown to be associated with a reduction in catheter sepsis when using these devices (Carlson 1999). Thirdly, it is easy to use for both staff and patients and helps to preserve peripheral veins (Goodman 2000; Gabriel 2000). It has also been shown to reduce patient discomfort and provide a reliable form of access (Crawford 2000; Gabriel 2000; Weinstein 2000; Springhouse 2002).

It has also been shown to be cost effective when compared with other long-term and short-term catheters and can be inserted at the bedside (Goodman 2000; Springhouse 2002).

Disadvantages include an increase in self-care; blood withdrawal is not always easy with the smaller gauges and they may occlude. Over time multiple insertions can cause venous scarring and decrease the ability to reuse the site (Goodman 2000). It has also been found that compared with skin-tunnelled catheters in patients with gastrointestinal cancers, the advantages of a PICC decrease significantly if treatment lasts more than 120 days (Snelling et al 2001).

The insertion of a PICC line will be performed by a 1st level Registered Nurse, Band 6 or above who has attended a PICC insertion workshop and whose competence has been assessed by a senior qualified nurse who has themselves been assessed, deemed competent and is experienced in inserting PICC lines. The Trust PICC line insertion training pack should be used to ensure competency-based training. The aim of this document is to standardise the PICC line insertion procedure for adults within the Cancer Centre.

Other documents to be used in conjunction with this nursing procedure include

- PICC line Patient Information Sheet
- NuTH NHS Trust PICC insertion training pack
- NuTH NHS Foundation Trust (2008) Adult and Paediatric guidelines for the care of Central Venous and Midline Catheters within the NuTH NHS Foundation Trust
- Infection control and waste management policies and procedures

EQUIPMENT

- PICC pack from CSSD. To include – 1 x green gown
4 x medium towels green
3 x towel clips
1 x pair of stain sterile stitch scissors
1 x sponge holder
1 x larger receiver
1 x large bowl
1 x small bowl
1 x hand towel

- 1 x PICC line - 4 French (single lumen) or 5 French (double lumen) valved or un-valved line depending on requirements of treatment and Directorate policy
- 1 x spare introducer, 14 gauge
- 2 pairs of sterile gloves – talc free
- 500 ml unopened bottle of sterile water for irrigation
- 3 x 10 ml luer lock syringes for a 4 French single lumen line, 5x10 ml syringes for a 5 French line
- 3 x10 ml sterile 0.9% Sodium Chloride
- 2% Chlorhexidine Gluconate, 70% Isopropyl Alcohol solution for cleaning skin
- Tourniquet
- 3 packets of sterile gauze swabs
- Tape measure
- 2 x Absorbent pads / drapes (not inco pads)
- Ametop 4%, local anaesthetic cream or EMLA local anaesthetic cream
- 4 x semi-permeable transparent dressings
- Heat pack
- Sharps bin
- Bandage
- 1 x sterile steri-strips (optional)
- 1 x Statlock dressing
- An assistant to assist with the insertion procedure
- Ultrasonography machine

Section 2 PATIENT ASSESSMENT AND EDUCATION

PROCEDURE	RATIONALE
Verify patient's identity.	To ensure correct patient is identified before consent.
Provide patient with educational material / information regarding the procedure using NUTH NHS Trust approved PICC info sheet, which includes - <ul style="list-style-type: none"> • Benefits of the procedure. • Necessity for the procedure. • Risks of the procedure. • Any alternatives. • Risks associated with refusing the procedure. 	Provides the patient with clear information about the procedure before obtaining informed consent.
Obtain patient's consent.	The Department of Health (2001) stipulates that informed consent should be obtained for any procedure or treatment carrying substantial risk or substantial side effect.
Assess patient – check for allergies.	To avoid anaphylaxis / allergic reaction.
Examine arms and select the best vein for cannulation and PICC Placement. <ul style="list-style-type: none"> • Avoid veins that are sclerotic on inspection and palpation. • Select patient's non-dominant arm, if possible. Avoid using extremities that have	To identify and avoid veins that may contraindicate the procedure. The median basilic vein is the vein of choice for PICC insertions owing to its larger size, straighter course for catheter advancement and improved haemodilution capability (Perucca 2001; Springhouse 2002)

PROCEDURE	RATIONALE
<p>compromised circulation. If the patient is over 6' tall, try to avoid using their left arm. Contraindications for using a PICC include:- inability to locate suitable antecubital veins; anatomical distortions from surgery, injury or trauma e.g. scarring from mastectomy, lymphoedema, burns etc which may prevent advancement of the catheter to the desired tip location; if a patient is unable to carry out catheter care or is confused; if the patient is unable to lie supine for the insertion period. (Macrae 1998).</p> <ul style="list-style-type: none"> • Veins of the ante cubital fossa are recommended with the basilic or median cubital basilic preferred. 	<p>The PICC line may not be long enough to advance in to the superior vena cava.</p> <p>In extreme circumstances or in an emergency a contraindicated arm may need to be used. This should be discussed with each individual Consultant and clearly documented in the notes.</p>
<p>Place patient in an upright position in a chair.</p>	<p>To aid identification of vein and provide comfort.</p>

Section 2.1 PRIOR TO BEGINNING THE PROCEDURE / ANATOMICAL MEASUREMENT

PROCEDURE	RATIONALE
<p>Assemble equipment necessary for identification of a suitable vein.</p> <ul style="list-style-type: none"> • Tape measure. • Local anaesthetic cream e.g. Ametop 4% or EMLA cream for pre cannulation assessment*. • Clear dressing e.g. IV 3000. • Tourniquet. <p>Ultrasonography machine if veins are hard to identify</p>	<p>To obtain the correct measurement of the length of catheter to be inserted, using a tape measure, measure diagonally from the selected point for venepuncture with the arm at 45°, to the middle of the clavicle, and then add the length of the clavicle – this gives the measurement for right-sided placement. For left-sided placement add the width of the manubrium (about 2–4 cm) (Lum 1999) Topical local anaesthetic cream is used to reduce the pain associated with the initial venepuncture with the introducer (ONS 1996). * The use of EMLA causes relaxation of the tunica media making cannulation more difficult.</p> <p>To aid identification of veins in patients with poor access. To be used by trained staff only. In patients with limited venous access, PICCs may be introduced using ultrasound technology. It has been shown that ultrasonography can increase the chance of successful cannulation of the vein on the first attempt (La Rue 2000) compared with using the traditional landmark method. This method is described as using surface anatomical landmarks and knowing the expected anatomical relationship of the vein to its palpable companion artery (NICE 2002).</p>

PROCEDURE	RATIONALE
Wash hands as per trust policy and use alcohol based hand gel.	To reduce cross infection.
Using a tape measure, measure from the selected point for venepuncture along the course of the vein pathway, then across the shoulder to the right side of the sternal notch, down to the third intercostal space (ONS 1996; Gabriel 1999). The external measurement can never exactly duplicate the internal venous anatomy.	To obtain the correct measurement of the length of catheter to be inserted.
Apply tourniquet above the anticipated insertion site.	To identify preferred vein.
Select a vein based on patient assessment and apply local anaesthetic for required length of time. The gel should be left on for 30 to 45 minutes and no longer than 60 minutes prior to procedure. Do not rub in gel.	After 1 hour the gel will be less effective. Rubbing gel makes the product ineffective.
Remove tourniquet.	
Apply semi-permeable transparent dressing to secure local anaesthetic cream.	A dressing must cover the gel for it to work effectively as per manufacturer's instructions.

Section 2.2 INSERTION SITE PREPARATION AND SKIN ANTISEPSIS

PROCEDURE	RATIONALE
Lie the patient on a treatment couch in a supine position and elevate the head of the bed 15 to 30 degrees. Position the patient in a comfortable position with the arm to be accessed extended at 90 degrees from the trunk of the body. Place the cannulation site below the level of the heart. Apply warm pack to the intended cannulation site.	To enhance vasodilation. Catheter insertion is facilitated when there is adequate vasodilation of the vessel intended for cannulation.
Place absorbent pad / drape under arm.	To absorb any spillage.
Both assistant and operator to wash hands with an antimicrobial agent as per local policy.	To reduce risk of cross infection.
Assistant to set up sterile field, open sterile packs onto the field.	
Don gown and sterile gloves.	To minimise the risk of occupational exposure and utilise maximum sterile barrier precautions.
Clean area 2% Chlorhexidine Gluconate, 70% Isopropyl Alcohol solution. Prep the area (diameter of the arm), cleaning from the intended cannulation site outward in a concentric circle. Do not track over an already cleansed area.	2% Chlorhexidine Gluconate, 70% Isopropyl Alcohol solution is recommended (Pratt et al 2007, NICE 2003) has been shown to be the most effective agent for skin cleansing around the VAD insertion site prior to insertion and between dressing changes, (Maki <i>et al.</i> 1991).
Remove gloves and replace with new sterile gloves.	To reduce risk of cross infection. Talc free gloves are used to avoid a phlebitis reaction / irritation from talc on insertion.

2.3 SET UP STERILE FIELD AND SUPPLIES

PROCEDURE	RATIONALE
Assistant to open all additional supplies and drop them onto sterile field.	To utilise maximum sterile barrier precautions.
Assistant to open vials of 0.9% Sodium Chloride.	
Assistant to fill the kidney bowl with sterile water for irrigation.	
Remove the PICC line from its sterile packaging and examine it along the entire length ensuring the internal stylet is straight.	Any bends or kinks make stylet removal difficult once the catheter is inserted into the vein.
Draw up 0.9% Sodium Chloride	
Place the catheter in the kidney bowl. Irrigate the catheter directly priming with 0.9% Sodium Chloride. If a valved line is used check valve for positive and negative pressure by flushing and withdrawing 0.9% Sodium Chloride.	To check line for any damage / leaks. During storage of the line the latex valve can become compromised. Flushing ascertains whether the line is patent.
Position the sterile drapes around the insertion site.	To minimise the risk of occupational exposure and utilise maximum sterile barrier precautions.

2.4 CANNULATION OF THE VEIN

(Bard access Systems, Groshong PICC (9710R) Instructions for Use p-6-10)

PROCEDURE	RATIONALE
Assistant to tighten tourniquet through sterile drape without compromising sterile field.	To dilate the veins.
Remove the needle guard and perform cannulation.	To gain venous access.
Slowly insert the introducer cannula / needle assembly into the vessel at a shallow angle (15 to 30 degrees), using standard technique.	
Observe for a blood flow return into the flashback chamber. Holding the needle stationary, advance the sheath into the vessel.	
Assistant to release the tourniquet through the sterile drape without compromising the sterile field.	Allows passage of line along the selected vein.
Maintain the stability of the introducer and advance it, if it passes easily. Apply slight pressure on the vessel above the insertion site to minimise blood flow. Observe the pattern of blood flow from the vessel.	To ascertain that a vein, not an artery, has been cannulated. The pulsating flow of blood is an indicator of arterial access. If arterial access is suspected remove introducer and apply pressure to site immediately.
Remove the needle from the introducer, leaving the introducer in place.	
Thread the PICC line into the vein through the introducer to the depth determined by previous measurements advancing the catheter slowly.	Rapid entry may cause venospasm.

2.5 THREADING THE PICC

(Bard access Systems, Groshong PICC (9710R) Instructions for Use p-6-10)

PROCEDURE	RATIONALE
Continue to advance the catheter. For central placement, when the tip has advanced to the shoulder the patient should turn head (chin to shoulder) toward the insertion site.	To prevent possible cannulation of the jugular vein.
Complete catheter advancement to the lower 1/3 of the superior vena cava.	To ensure insertion into distal superior vena cava.
Stabilise the catheter position by applying pressure to the vein distal to the introducer.	
Remove the pre placed guidewire from the catheter.	
Stabilise the catheter position by applying light pressure to the vein distal to the insertion site.	
Withdraw the introducer sheath from the vein and away from the site. Slide the intact cannula off the end of the PICC or split the sheath of the introducer as required.	

2.6 ATTACHING THE END CONNECTOR

(Bard access Systems, Groshong PICC (9710R) Instructions for Use p-6-10)

PROCEDURE	RATIONALE
Trim approximately 3mm from the end of the catheter with the sterile scissors.	To aid connector fit. During removal of the guidewire slight expansion at the end of the line may occur.
If inserting a single lumen line retrieve the oversleeve portion of the connector. Advance it over the end of the catheter.	
Slide the oversleeve portion of the connector and the winged portion of the connector together, aligning the grooves on the connector with the barbs on the winged portion of the connector.	
Advance completely until the connector barbs are fully attached. A locking sensation will confirm that the two pieces are properly engaged.	
Using a 10ml syringe aspirate for adequate blood return (each lumen).	To check patency.
All devices should be flushed with 10 to 20ml 0.9% Sodium Chloride after blood withdrawal (ONS 1996). Flushing solution and frequency are usually dependent on the type of catheter and so manufacturer's recommendations and Trust guidelines (NuTH NHS 2008) should be followed.	Only 10ml syringes or larger should be used. Smaller syringes create a greater pressure of mmHg or pounds per square inch (psi). This may then result in rupture of the catheter and/or clots being forced into the venous system, (Hadaway 1998; Macklin 1999). To avoid blockage of the PICC line through stasis of blood in the line. To maintain a closed system and to flush correctly the groshong valve.
It is important to use a pulsatile (push-pause) method, irrespective of the amount used and	Push-pause technique helps to maintain

PROCEDURE	RATIONALE
the frequency, to create turbulent flow (administer solution 1ml at a time) and complete the procedure using a positive pressure technique.	patency, (Baranowski 1993).
Apply injection cap.	
Apply primapore dressing aseptically and pressure bandage.	To protect site, stabilise catheter and to reduce bleeding at insertion site.

Section 2.7 X-RAY VERIFICATION FOR PICC

PROCEDURE	RATIONALE
Verify position prior to use by performing a chest x-ray. (A competent practitioner who inserts PICC lines can order a chest x-ray providing they have acquired the appropriate authorisation). A member of medical staff should confirm the correct positioning of the PICC line.	Ascertaining correct placement is the major reason for ordering CXR but also to rule out malposition and pneumothorax and confirm acceptable tip location for the type of medication being administered (Weinstein 2000; Perucca 2001; Springhouse 2002; RCN 2005). Tip must be located in the distal superior vena cava. This allows for repairs of up to 3cms. A higher placement of the line increases possibility of thrombus formation. The line should NOT be in the heart.
Document procedure in patient's notes and complete PICC insertion record.	For future audit purposes.

Section 2.8 PICC SECUREMENT AND DRESSING

(Bard access Systems, Groshong PICC (9710R) Instructions for Use p-6-10)

PROCEDURE	RATIONALE
Remove the primapore dressing taking care not to dislodge the line.	
Remove the suture wing from the delivery card. Squeeze the wing together so that it splits open. Place the suture wing around the catheter near the venepuncture site.	Correct dressing of the line reduces the risk of accidental dislodgement.
Form "S" curve in the catheter secure with two steri strips (optional).	
Clean around the entry site with 2% Chlorhexidine Gluconate, 70% Isopropyl Alcohol solution and allow to air dry thoroughly.	
Apply a fixation device e.g. STATLOCK dressing and secure to suture wing using green locking system.	PICCs can be adequately secured using Steristrips or securement devices (self-adhesive anchoring devices applied to the skin such as Statlocks; Gabriel 2000). An intravenous dressing is applied to minimise the contamination of the insertion site and provide stability of the device.
Place a folded piece of sterile gauze over the insertion site for the first 24 hours of insertion.	To absorb any post insertion bleeding.
Place occlusive semi-permeable transparent dressing over the catheter hub to include	The insertion site is then covered with a moisture-permeable transparent dressing and

PROCEDURE	RATIONALE
venepuncture site and catheter hub.	changed according to manufacturer's recommendations, e.g. once a week, to minimize the potential for infection and catheter migration (Gabriel 2000, RCN 2005). Transparent dressings have the advantage of allowing inspection of the insertion site while the dressing is in situ and therefore do not require removal, and most are waterproof (Keenleyside 1993). Moisture-permeable dressings allow moisture vapour transmission and appear to require only weekly dressing change (refer to manufacturers instructions) (Treston Aured <i>et al.</i> 1997).
Apply warm pack to upper arm.	Intermittent application of a warm pack for the first 48 hours post insertion to the upper arm helps to prevent mechanical phlebitis.

MONITORING AND REVIEW

Document update coordinated by M Vincent, Nurse Consultant Cancer Services in collaboration with Claire Lamb (Clinical Trials Nurse, CTU, NCCT), infection control, critical care and the original author Sister S Campbell, Clinical Educator NCCT. The oncology chemotherapy day unit sister and clinical educator are responsible for updating the document and for answering any comments / questions about the procedure.

REFERENCES

Bard Access Systems Groshong PICC Instructions (9710R) p-6-10, Intravenous Nurses Society, (2000), Policies and Procedures for Infusion Nursing, p74.

Baranowski, L (1993), Central venous access devices – current technologies, uses and management strategies. *Journal of Intravenous Nursing*, 16 (3), 167–94.

Carlson, K.R. (1999) Correct utilisation and management of PICCs and midline catheters in the alternate care setting. *J Intravenous Nursing*, 22(Suppl 6), S46-50.

Crawford, M. et al. (2000) Peripherally inserted central catheter program. *Nurs Clin North Am*, 35(2), 349-59.

Department of Health (2001) [Reference guide to consent for examination or treatment](#)

Goodman, M. (2000) Chemotherapy: principles of administration. In: *Cancer Nursing* (eds C.Henke Yarbro et al.). Jones & Bartlett, Boston.

Gabriel, J. (1999) Long term central venous access. In Dougherty L & Lamb J (1999) *Intravenous Therapy in Nursing Practice*. Churchill Livingstone, Edinburgh.

Hadaway, L. (1998) Catheter connection. *Journal Vascular Access Devices*, 3 (3), 40.

Keenleyside, D. (1993) Avoiding an unnecessary outcome. A comparative trial between IV 3000 and a conventional film dressing to assess rates of catheter related sepsis. *Professional Nurse*, February, 288–91.

La Rue, G.D. (2000) Efficacy of ultrasonography in peripheral venous cannulation, *Journal of Intravenous Nursing*, 23, (1), 29-34.

Lum, P. (1999) Techniques for optimising catheter tip position. Presentation at NAVAN 13th Annual Conference, Orlando, September.

Macklin, D. (1999) A review of the physical principles of fluid administration. *Journal of National Vascular Access Devices*, 4 (2), 7–11.

Macrae, K. (1998) Hand held Doppler's in central catheter insertion. *Professional Nurse*, 14 (2), 99–102.

Maki, D.G, Ringer, M. & Alvarado, C.J (1991) Prospective randomised trial of povidone iodine, alcohol and chlorhexidine for prevention of infection associated with CVC and arterial catheters. *Lancet*, 338, 339–43.

National Institute of Health and Clinical Excellence (NICE). [Infection Control; prevention of healthcare associated infection in primary and community care](#). June 2003

NICE (2002) [Ultrasound Imaging for Central Venous Catheter Placement](#). DoH, London.

NuTH NHS Foundation Trust (2008) [Adult and Paediatric guidelines for the care of Central Venous and Midline Catheters within the NuTH NHS Foundation Trust](#)

ONS. (1996). *Cancer Chemotherapy Guidelines and Recommendations for Nursing Education and Practice*. Oncology Nursing Society, Pittsburgh.

Perucca, R. (2001) Obtaining vascular access. In: *Infusion Therapy in Clinical Practice*, 2nd edn (eds J.Hankin et al.). W.B. Saunders, Philadelphia.

Pratt R.J. et al (2007) Epic 2. [Guidelines for preventing health care associated infections in NHS hospitals](#). DoH England

Royal College of Nursing (RCN) (2005) *Standards for Infusion Therapy*. Royal College of Nursing, London

Snelling, R. et al. (2001) CVC for infusion therapy in GI cancer. *Journal of Intravenous Nursing*, 24, (1), 38-47

Springhouse Corporation (2002) *Intravenous Therapy Made Incredibly Easy*. Springhouse, Lippincott, Williams & Wilkins, Philadelphia.

Treston Aured, J, Olmsted, R.N., Allen-Bridson, K. & Craig, C.P. (1997) Impact of dressing materials on central venous catheter infection rates. *Journal of Intravenous Nursing*, 20 (4), 201–206.

Weinstein, S. (2000) Plumer's Principles and Practices of Intravenous Therapy. Lippincott, Philadelphia.

FURTHER READING

Bard Access Systems, Groshong PICC (9710R) Instructions for Use p-6-10.

Department of Health (2003) Winning Ways. Working together to reduce Healthcare Associated Infections in England

NuTH NHS Trust (2004) [Guidelines for labelling invasive lines](#)

Royal Marsden Hospital (2004) [The Royal Marsden Manual of Clinical Nursing Procedures](#). London. 6th Edition. Published by Blackwell Science. Chapter 44.