

Ultrasound Guided Peripheral Intravenous Cannulation in Adult Patients

Issue Date	Review Date	Version
August 2019	August 2022	4

Purpose

To set out guiding principles on the use of Ultrasound guided cannulation and venepuncture by Acute Care Team (ACT) registered Nurses and Assistant Practitioners

Who should read this document?

These guidelines are applicable to all Acute Care Team Registered Nurses and Assistant Practitioners.

Medical Staff.

Trainers and Clinical Educators involved in cannulation training.

All staff involved in the care of patients with difficult venous access within or on behalf of Plymouth Hospitals NHS Trust.

Key Messages

Scope of this SOP:

This guideline is for Registered Nurses (RN's) and Assistant Practitioners (AP's) who are assessed as competent and confident in IV cannulation and venepuncture and are regularly undertaking this skill. The participant should have undertaken and completed the Elearning on OLM for image interpretation 87 vascular access Ultrasound training and been deemed competent to perform the task by an anaesthetist or senior member of the Acute Care Team who regularly performs this skill, using the Competency for ultrasound guided cannulation.

The ACT are regularly asked 'out of hours' to attempt to gain access on patients where previous attempts have failed. On occasions where the ACT have also been unsuccessful, it is then referred to the Duty Floor Anaesthetist to gain access using ultrasound guided cannulation. This SOP covers staff working within the ACT who have undertaken advanced skills in ultrasound.

Why Ultrasound?

Ultrasound guidance for the insertion of peripheral intravenous cannula (PIVC) has been used in the Emergency Department for many years (Miles et al, 2012), but is a new development in regards to the wider hospital. This technique offers the following advantages over the traditional method of gaining PIV access:

- 1) Allows cannulation of veins that are neither visible nor palpable
- 2) Reduces the need for a central line and its potential complications (Shokoohi et al, 2013,) (Ak et al, 2012)
- 3) Subjects the patient to reduced unsuccessful attempts (Costantino et al, 2005)

Costantino et al (2005) compared ultrasound-guided PIV access with the traditional blind technique and found that ultrasound-guided placement was more successful, required less time, reduced the number of needle punctures, and improved patient satisfaction.

Core accountabilities	
Owner	Edward Weaver. Acute Care Team Senior Charge Nurse Nick Millett. Vascular Access Lead Nurse/ Acute Care Team Charge Nurse
Review	Clinical Effectiveness Group (CEG)
Ratification	Assistant Medical Director - Mr Paul McArdle
Dissemination	Clinical Effectiveness Group
Compliance	All ACT placed ultrasound guided cannulations to be recorded on Acute Care Team database for audit purposes. Any lower limb cannulations using ultrasound to be recorded on the Acute Care Team database for follow up as per Lower limb policy. All cannulations documented according to PHNT protocols. Review any complications as reported via Datix/Infection Control

Links to other policies and procedures

- 1) Aseptic Non Touch Technique (ANTT) policy
- 2) Infection Control Manual
- 3) Cannulation and venepuncture policy
- 4) Blood Culture Policy
- 5) Blood Products Transfusion Policy
- 6) Acute Care Team Adult Lower Limb Cannulation and Venepuncture Standard Operating Procedure

Version History

3	May 2017	
4	August 2019	Reviewed and updated

The Trust is committed to creating a fully inclusive and accessible service. Making equality and diversity an integral part of the business will enable us to enhance the services we deliver and better meet the needs of patients and staff. We will treat people with dignity and respect, promote equality and diversity and eliminate all forms of discrimination, regardless of (but not limited to) age, disability, gender reassignment, race, religion or belief, sex, sexual orientation, marriage/civil partnership and pregnancy/maternity.

An electronic version of this document is available in the Document Library. Larger text, Braille and Audio versions can be made available upon request.

Standard Operating Procedures are designed to promote consistency in delivery, to the required quality standards, across the Trust. They should be regarded as a key element of the training provision for staff to help them to deliver their roles and responsibilities.

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Standard Operating Procedure (SOP) Ultrasound Guided Peripheral Intravenous Cannulation

1 Introduction

Peripheral intravenous cannulation (PIVC) is the insertion of a Vascular Access Device (VAD) into a peripheral vein (RCN, 2010). A cannula is a flexible tube containing an introducer which may be inserted into a blood vessel and are usually placed in the peripheral veins of the lower arms. There are occasions when they may be inserted into the veins of the foot, but they should not be used routinely due to the increased risk of thrombophlebitis. If veins of the feet are used, the cannula should be re-sited as soon as possible (Phillips et al, 2011). It is thought that approximately 80% of all patients will have a cannula inserted during their admission (Fernandez-Ruiz et al, 2014). Although there is a wide range of VAD's available to allow for the type of therapy being given, and for the patients' quality of life needs, the principles of care for the device remain the same:

- 1) to prevent infection
- 2) to maintain a 'closed' intravenous system with few connections to reduce the risk of contamination
- 3) to maintain a patent device
- 4) to prevent damage to the device & associated intravenous equipment (Dougherty & Lister, 2011) the cannulation procedure may be performed by a practitioner who can demonstrate relevant theoretical knowledge & who has been assessed as competent using a cannulation package as part of Plymouth Hospitals NHS Trust (PHNT).
- 5) If the practitioner attempts to put a cannula in using ultrasound guidance, they must have undertaken and completed Elearning Image Interpretation 87 Vascular Access course and be assessed as competent by the Acute Care Team (ACT) leads.

In addition, the practitioner must be satisfied that the cannula needs to be inserted and that the patient consents to the procedure

2 Definitions

Before performing the skill of ultrasound guided cannulation independently, the ACT practitioner must have completed all training provided by the ACT (including online resources) and have been assessed as competent in these skills.

3 Regulatory Background

1. Department of Health Code of Conduct for Health support Workers and Adult Social Workers in England (2013).
2. Nursing and Midwifery Council – (NMC) (2008). The Code; Standards of Conduct, Performance, and Ethics for Nurses and Midwives.
3. Plymouth Hospitals NHS Trust Hand Guidelines (2015) V1.
4. Plymouth Hospitals NHS Trust Guidelines for Aseptic Technique (2012).
5. Plymouth Hospitals NHS Trust Guidelines for the Management of Peripheral Intravenous Devices V4 (2013).
6. Plymouth Hospitals NHS Trust Medicines Management Policy and Standard Procedures v9.1 (05/2016)
7. Plymouth Hospitals NHS Trust Acute Care Team Lower Limb Cannulation and Venepuncture Standard Operating Procedure (2016) V3
8. Department of Health (2004) Building a safer NHS, London DH.
9. Department of Health (DH) (2007) Saving Lives: Reducing Infection, Delivering clean and safe care, London, DH.
10. Dougherty L et al (Eds) (2011) Royal Marsden Manual of Clinical Nursing Procedures (8th edition) London, Blackwell Publishing.
11. EPIC 3: National Evidence-Based Guidelines for Preventing Healthcare Associated Infections in NHS Hospitals in England H.P. Lovedaya*, J.A. Wilsona, R.J. Pratta, M. Golsorkhia, A. Tinglea, A. Baka, J. Brownea, J. Prietob, M. Wilcox. (2014) Journal of Hospital Infection 86S1 (2014) S1–S70
12. NMC (2015) Code: Professional standards of practice and behaviour for nurse and midwives, London, NMC.
13. NMC (2009) Record Keeping, London, NMC.
14. NMC (2010) Standards for Medicine Management, London, NMC.
15. Royal College of Nursing (RCN) (2010) Standards for Infusion Therapy, London, RCN

4 Key Duties

All Practitioners must perform the task as per the guidelines within this SOP after completion of training and having been assessed as competent in the skill. Staff must acknowledge any shortcomings in their ability and further training will be organised through their line manager. Staff requiring further training will not be able to

continue with this skill until assigned as competent by the ACT clinical leads in Ultrasound guided cannulation.

5 Procedure to Follow

Indications

Indications for performing ultrasound-guided peripheral intravenous (PIV) cannulation include, but are not limited to, the following:

- Failure to cannulate (x2) by using land marking or palpation techniques.
- Cannulation of a patient who is severely dehydrated.
- Cannulation in patients who are obese.
- Cannulation in the presence of peripheral oedema.
- Cannulation in patients who use intravenous drugs or who have had multiple intravenous catheters placed in the past.
- Patients that are known to be difficult to gain access.

Contraindications

There are no reported increased risks using ultrasound-guided peripheral intravenous catheter (PIVC) placement, compared with cannulation using land marking or palpation techniques.

Possible Complications

With any cannulation there are other structures within the limbs which the practitioner needs to be aware of. If accidental arterial puncture is noted then immediately remove the needle and apply pressure for 5 minutes then recheck and continue to apply pressure if needed until bleeding has stopped. If accidental nerve puncture is noted (the patient will normally feel a sharp shooting pain down the limb) immediately remove the needle and apply pressure. The pain should subside within a couple of hours, but explain to the patient to contact medical support if pain/numbness continues after this time.

Always document any complications in the medical notes.

Practitioner actions

- 1) Ensure there are no contraindications for the insertion of the cannula.
- 2) Inform the patient of the procedure and obtain consent.
- 3) Inform the patient of possible complications that can occur as a result of having a cannula in-situ.

- 4) Following the procedure, document the cannula in prescription chart and in the medical records where necessary.
- 5) Complete ACT data base for auditing purposes.

Anesthesia

- Application of topical Anaesthetic or 0.5 – 2 mls Lidocaine 1% sub-cutaneously should be considered at the site of insertion for deeper veins. Since ultrasound-guided PIV placement is usually of short duration and associated with limited discomfort, local infiltration is often not necessary.
- When local anesthetic infiltration is used, the swelling that results from the infiltration can make the target vein more difficult to see under ultrasound guidance.

Equipment

- 1) Ultrasound machine
- 2) Linear Probe
- 3) Transducer cover to protect the probe during cannulation attempts
- 4) Single use tourniquet (Not rubber gloves)
- 5) Cannula – If possible use a longer catheter.
- 6) Procedure tray Cannulation Pack
- 7) IV Dressing e.g. IV3000
- 8) Saline-filled syringes for flushes
- 9) Primed extension with needless connector
- 10) Skin preparatory materials (e.g. chlorhexidine or alcohol if allergies)
- 11) Sterile gel - Packaged water-based lubricant gel
- 12) Extra gauze if required
- 13) Sharps container
- 14) PPE - Standard precaution measures.

Procedure

- 1) Identify the patient and explain the procedure. Obtain informed consent. N.B if required apply local/topical prescribed anaesthetic in accordance with prescription and guidelines.
- 2) Collect appropriate equipment in clean tray
- 3) Wash and dry hands thoroughly
- 4) Put on apron and gloves
- 5) Prepare Ultrasound machine. Ensure correct probe choice (Linear).
- 6) Apply the tourniquet.
- 7) Apply gel to patient over probable cannulation site.
- 8) Identify vein and other structures on ultrasound machine.
- 9) Select the most appropriate vein.
- 10) Remove gel around proposed cannulation site

- 11) Clean the area of the selected vein with SEPP applicator, using a back and forth motion and allow to dry thoroughly in accordance with trust guidelines. Do not re-palpate the area once cleaned. Ensuring patient has no allergies to product prior to use. **N.B** For neonates please consult the neonatal intensive care unit guidelines.
- 12) Apply sterile ultrasound gel to probe and probe cover (condom is suitable) and secure.
- 13) Apply sterile ultrasound gel to proposed area and re-identify vein.
- 14) Remove the cannula from packaging and inspect for any faults.
- 15) Ensure the cannula is in the bevel up position and placing the device over the vein, insert the device according to the depth of the patient's vein.
- 16) Visualise cannula on ultrasound and follow path into vein.
- 17) Wait for the first flashback to appear in the primary flashback chamber of the cannula.
- 18) Level the device by decreasing the angle between the cannula and the skin and advance the cannula a few millimetres to ensure entry into the lumen of the vein.
- 19) Withdraw the needle slightly and a second flashback should appear along the shaft of the cannula. NEVER attempt to reinsert the needle.
- 20) Slowly advance the cannula off the needle into the vein.
- 21) Release the tourniquet and apply pressure to the vein above the cannula tip, remove the needle and place into the sharps bin (sterile gauze may be placed under the cannula to absorb any blood leakage). **DO NOT COVER END OF CANNULA WITH FINGERTIP AT ANY STAGE AS THIS WILL CONTAMINATE CANNULA.**
- 22) Attach a primed closed connector e.g. VADsite or sterile bung if closed connector unavailable.
- 23) Using sterile gauze clean away excess gel away from cannulation site, ensure no movement of cannula.
- 24) Apply sterile IV3000 dressing, tape should NEVER be used. Date and the time to be written on labels provided and this to be adhered to dressing.
- 25) Flush with 0.9% Sodium Chloride to ensure patency, observing site for signs of swelling or leakage and ask patient if they feel any discomfort.
- 26) Remove gloves and apron.
- 27) Remove probe cover and decontaminate probe and machine.
- 28) Dispose of waste according to appropriate policy and clean tray.
- 29) Wash hands with soap and water.
- 30) Document date and time of insertion, lot number, flush, size / colour of cannula, site, and number of attempts and any complications / actions on prescription chart and patient's notes. Any failed insertions should be documented in the patient's clinical record.
- 31) Complete ACT database.

6 Document Ratification Process

The design and process of review and revision of this procedural document will comply with The Development and Management of Formal Documents.

The review period for this document is set as default of two years from the date it was last ratified, or earlier if developments within or external to the Trust indicate the need for a significant revision to the procedures described.

This document will be reviewed by the Clinical Effectiveness Group (CEG) and ratified by Mr P McArdle.

Non-significant amendments to this document may be made, under delegated authority from Mr P McArdle, by the nominated author. These must be ratified by Mr P McArdle and should be reported, retrospectively, to the Clinical Effectiveness Group.

Significant reviews and revisions to this document will include a consultation with named groups, or grades across the Trust. For non-significant amendments, informal consultation will be restricted to named groups, or grades who are directly affected by the proposed changes.

7 Dissemination and Implementation

Following approval and ratification, this procedural document will be published in the Trust's formal documents library and all staff will be notified through the Trust's normal notification process, currently the 'Vital Signs' electronic newsletter.

Document control arrangements will be in accordance with The Development and Management of Formal Documents.

The document author(s) will be responsible for agreeing the training requirements associated with the newly ratified document with Mr P McArdle and for working with the Trust's training function, if required, to arrange for the required training to be delivered.

8 Monitoring and Assurance

Ultrasound guided cannulation must be requested by a doctor, and this to be documented in the clinical records by the ACT practitioner (if not documented by the Medical team).

All complications related to peripheral vascular access devices are currently reported via the Datix system and are regularly reviewed by the Infection Control Team.

On-going care is as Trust Policy Management of Peripheral Intravenous Devices V4. All ultrasound guided cannulation attempts must be recorded on the ACT database to allow tracking of any complications.

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2. Bauman, M., Braude, D. and Crandall, C. (2009) 'Ultrasound-guidance vs. Standard technique in difficult vascular access patients by ED technicians', *The American Journal of Emergency Medicine*, 27(2), pp. 135–140. doi: 10.1016/j.ajem.2008.02.005.
3. Carr, P.J., Rippey, J.C.R., Budgeon, C.A., Cooke, M.L., Higgins, N. and Rickard, C.M. (2015) 'Insertion of peripheral intravenous cannulae in the emergency department: Factors associated with first-time insertion success', *The Journal of Vascular Access*, 17(2), pp. 182–190. doi: 10.5301/jva.5000487.
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9. Nutbeam, T. and Daniels, R. (2009) *ABC of practical procedures (ABC series)*. United Kingdom: Wiley-Blackwell (an imprint of John Wiley & Sons Ltd).
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12. Shokoohi, H., Boniface, K., McCarthy, M., Khedir Al-tiae, T., Sattarian, M., Ding, R., Liu, Y.T., Pourmand, A., Schoenfeld, E., Scott, J., Shesser, R. and Yadav, K. (2013) 'Ultrasound-guided peripheral intravenous access program is associated with a marked reduction in central Venous catheter use in Noncritically ill emergency department patients', *Annals of Emergency Medicine*, 61(2), pp. 198–203. doi: 10.1016/j.annemergmed.2012.09.016
13. Troianos, C.A., Hartman, G.S., Glas, K.E., Skubas, N.J., Eberhardt, R.T., Walker, J.D. and Reeves, S.T. (2011) 'Guidelines for performing ultrasound guided vascular Cannulation: Recommendations of the American society of Echocardiography and the society of cardiovascular Anesthesiologists', *Journal of the American Society of Echocardiography*, 24(12), pp. 1291–1318. doi: 10.1016/j.echo.2011.09.021.
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