Arterial Line Insertion in ICU

Author(s): Chris Williams & Karla Hobbs
Internal reviewer: Dr Craig Spencer
External reviewer: None
Version: 1.0 **Issue Date: 07/05/2019** **Review Date: May 2022**

Introduction and Objectives:

This SOP aims to promote best practice in arterial line insertion through:

- Standardisation of practice.
- Implementation of key safety checks and ongoing care to prevent circulatory loss to limbs.
- Consideration of securing features to prevent accidental loss or displacement.

Main text:

Indications for arterial line placement include:

- Requirement to obtain frequent arterial blood samples to guide therapies such as ventilation.
- Requirement to measure blood pressure continually, such as while infusing vasopressor or inotropic drugs.

Risks and Potential relative contraindications include:

Coagulopathy or thrombocytopenia
Ultrasound-guided arterial line insertion in patients with coagulopathy is safe if performed by an experienced operator.

Ideally, a platelet count should be above $50x10^9$/l to reduce potential for significant bleeding problems. However, there are no published prospective, randomised studies to support or negate this, an individual risk assessment should take place.

Arterial lines can occlude distal flow to the limb they are cited in, causing ischemia and in some cases loss of limb. Therefore sites with collateral flow such as the radial artery should be considered before end arteries such as the brachial or femoral. The brachial artery runs in close proximity to the brachial nerve and thus ultrasound guided insertion should be considered to prevent damage to the nerve. Arterial lines in Dorsalis Pedis may over-read and are challenging for nurses to care for. Femoral lines may be most appropriate if the patient is not yet fully resuscitated or reliable pulse-contour analysis cardiac output monitoring is required (PiCCO, LidCO).

Consent:

An individual risk-benefit assessment should be performed to both decide whether insertion should be performed, and to select the suitable site.

Many patients lack capacity on Intensive Care. Arterial line insertion is often mandated to successfully deliver intensive care therapies and is a fundamental part of that package of care. In these patients arterial line insertion should proceed in the best interests of the patient. Where patients have capacity, verbal or non verbal consent should be sought. Written consent (Consent form 1 or 4), is not normally required, though may be considered if risks are judged to be exceptionally high.

Competence:

Operators may proceed with arterial line insertion with local / indirect supervision if they have previously undergone a 'Direct Observation of Procedure (DOPS)' assessment to that standard. Once this has occurred, the operator may proceed without direct supervision. Paper / electronic evidencing of this should follow on in a timely manner.

Novice operators will need direct supervision. Supervisors should be competent to perform arterial line insertion with distant supervision.

If there are factors that make the arterial line insertion more difficult (unfamiliar approach such as femoral, or coagulopathy) these should be discussed with the Critical Care Consultant for that zone or the Consultant on call.

Staff:

A dedicated assistant is not mandatory for this procedure, but help should be available especially if the patient needs help in maintaining positioning or dignity, needs reassurance, or the procedure is expected to be difficult.

Pre-procedure checks:

- Check patient's ID.
- Check patient's allergies and recent coagulation.
- If patient aware, explain reason for procedure and gain consent.
- Consider procedure site based on palpable pulses, skin condition and risk of loss of collateral flow. Ultrasound and Allen's test may be used as part of this assessment, though Allen's test is certainly not 100% reliable.

Equipment:

- A clean procedure trolley should be used as a firm surface for equipment, not the bed.
- Ensure any hair in the expected area of the dressing is removed with clippers.
- Apron, clean hands, sterile gloves as minimum for most insertions.
- For PiCCO lines, full scrub as per CVC insertion is recommended (Hat, Mask, Gloves, Gown)
- Arterial line. 20G Flowswitch for radial, brachial or dorsalis pedis. Vygon or arrow Seldinger is suitable for all sites. PiCCO line is suitable for femoral.
- 2% w/v chlorhexidine gluconate in 70% v/v isopropyl alcohol for skin prep.
- 1% or 2% Lidocaine for local anaesthetic with 23g needle and small syringe.
- Dressing pack (this can be excluded if vygon seldinger pack is used).
- Mersilk 2.0 suture.
- Tegaderm 'winged' dressing

Procedure:

- Position patient to allow access to site while maintaining patient dignity
- Clean site with 2% w/v chlorhexidine gluconate in 70% v/v isopropyl alcohol **allow it to dry**
- If ultrasound is used this must be with a probe cover to reduce cross infection.
- Insert sub cutaneous lidocaine for local anaesthetic effect
- Insert arterial line
- Suture the line in place (2 sutures, using local anaesthetic)
- Place tegaderm dressing on line

Post Procedure:

- Record the procedure on the 'Arterial line in ICU procedure record' sticker in the patient's notes.
- The arterial line must be transduced at all times.
- Monitor the limb distal to the insertion site for perfusion.
- The dressing must be changed as required with a maximum length of 7 days.
- Monitor entry site daily for infection (VIP score).
- Arterial lines should be removed when it is no longer necessary.

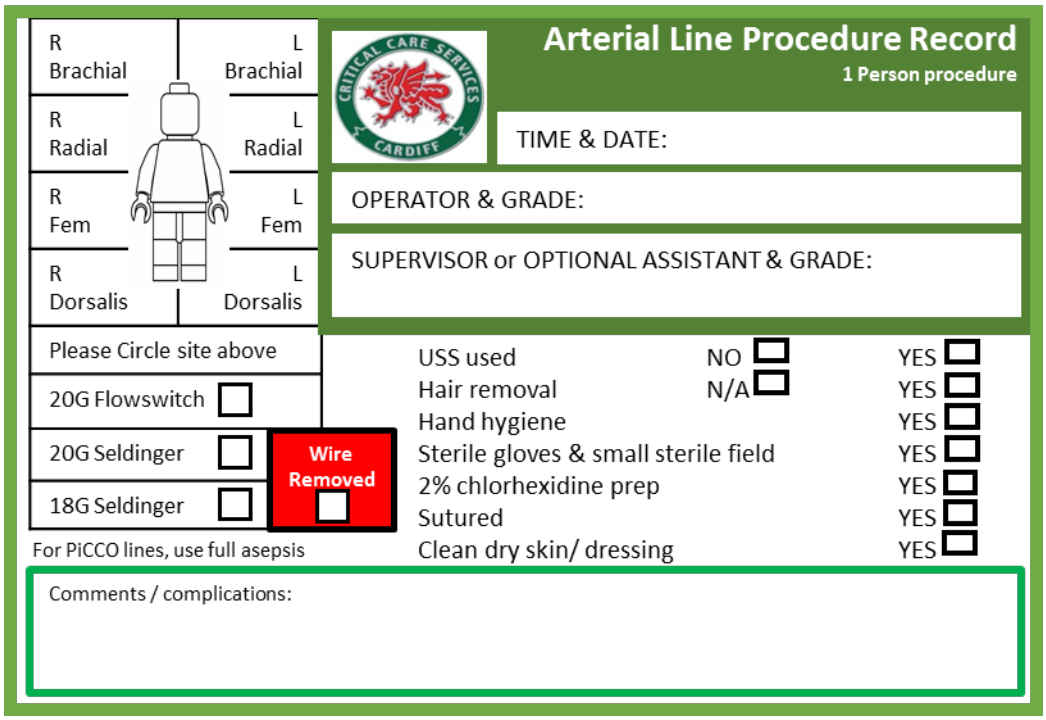
Audit Criteria:

- Arterial line insertion records will be reviewed on a periodic basis to ensure compliance with this guideline.

References

1.P. Loveday, J.A. Wilson, R.J. Pratt, M. Golsorkhi, A. Tingle, A. Bak, J. Browne, J. Prieto, M. Wilcox Epic3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England". (doi http://dx.doi.org/10.1016/S0195-6701(13)60012-2). Published as a supplement to *The Journal of Hospital Infection* Volume 86 Supplement1 2014 (S1-S70).

Appendix 1: Procedure record:


R Brachial
L Brachial
R Radial
L Radial
R Fem
L Fem
R Dorsalis
L Dorsalis
Please Circle site above
20G Flowswitch
20G Seldinger
18G Seldinger
Wire Removed
For PiCCO lines, use full asepsis
Arterial Line Procedure Record
1 Person procedure
TIME & DATE:
OPERATOR & GRADE:
SUPERVISOR or OPTIONAL ASSISTANT & GRADE:
USS used NO YES
Hair removal N/A YES
Hand hygiene YES
Sterile gloves & small sterile field YES
2% chlorhexidine prep YES
Sutured YES
Clean dry skin/ dressing YES
Comments / complications: