ARTERIAL LINE MANAGEMENT IN PICU - CHW

PRACTICE GUIDELINE ©

DOCUMENT SUMMARY/KEY POINTS

- Intra-arterial monitoring should be considered for continuous blood pressure monitoring in haemodynamically unstable patients, patients requiring vasoactive agents or for serial blood sampling.
- Manual aspiration of the discard volume is only indicated when the arterial cannula is positional and unable to withdraw blood using the SafeSet™ reservoir or when an incorrect result has been obtained.
- **Arterial line sites need to remain uncovered and visualised at all times**.
- All intra-arterial cannulae must be connected to a primed transducer and a monitor with an audible alarm.
- Preferred sites are radial, posterior tibial, dorsalis pedis, femoral and axillary artery.
- Sampling from arterial lines should only be performed by accredited staff.
- Arterial lines must be zeroed once a shift and the transducer level adjusted whenever the patient's position is changed.
- The arterial line insertion site must be monitored for bleeding, perfusion, blanching, infection, haematoma, and possible digital embolism at least hourly and when accessing the line.
- Arterial monitoring alarms should never be switched off.
- Check the arterial line site when flushing for blanching and observe to ensure the return of normal perfusion.
- The transducer and tubing must be inspected for air hourly as well as prior to connecting to the patient and when accessing the line to ensure that no air is present.
- Pre-made flush solution should be changed when empty or with line changes.
- Transducer sets should be changed at least every 96 hours. Routinely done on Mondays and Thursdays in PICU.
- Continuous flushing solution should be infused at 0.6mL - 1mL/hr (maximum), flush line with 0.5-1mL or until line is clear post sample collection.
- No medication to be administered via an arterial line.

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CHANGE SUMMARY

- Suturing Arterial in older Children.
- Reflection of ANTT practices when inserting an arterial line.
- Non-invasive blood pressure once per shift to check correlation to invasive blood pressure.

READ ACKNOWLEDGEMENT

- All PICU clinical staff whom will insert/use/access/care for arterial lines are to read and acknowledge they understand the contents of this document.
- Arterial Line Clinical Skills Assessment Required for all PICU Nursing staff whom will use/access/care for arterial lines.

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1 General Principles

Intra-arterial lines provide the most accurate beat to beat continuous blood pressure monitoring for critically ill patients, as well as providing a non-painful source for arterial blood sampling. Arterial lines should be connected to a pressure transducer which is connected to a monitor with an audible alarm. Arterial cannula sites should always remain visible.

Indications for arterial line use may include:

- Haemodynamic instability
- Titration of vasoactive medications
- Major surgery
- Frequent blood sampling
- Plasmapheresis
- CRRT
- ECMO
- Exchange transfusions
- Intracranial pressure monitoring

2 Inserting an Arterial Line

2.1 Equipment

- Cannula: 24 G for neonates, otherwise 22 G; consider using Arrow or Vygon "Arterial Catheterisation Set" (22 G 4cm/5cm/6cm/8cm/12cm).
- Primed Minibore Extension set with Red needle free valve (Figure 1)
- 0.9% Sodium Chloride ampoule for flushNon-luer lock 3mL syringe
- 1% Lignocaine
- An Arrow "Positive Placement spring-wire guide" (RW-04018) or 0.018" guide wire will be required if using a Seldinger technique
- Ultrasound machine
- 2% Chlorhexidine in 70% Alcohol solution or swabs
- Suture kit (for older children)
- IV cannulation pack.

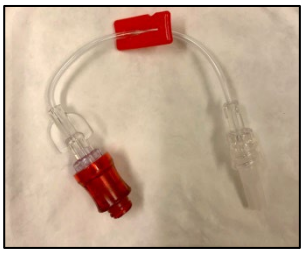


Figure 1: Minibore Extension Set

NB: A clear semi-permeable dressing (IV Advanced dressing or IV3000) should be used to ensure the insertion site can be visualised.

2.2 Site Selection

Preferred sites

- Radial artery
- Posterior tibial artery
- Dorsalis pedis artery
- Femoral artery
- Axillary artery

Second-line Sites

Consult on-call Intensivist

- Ulnar. Ulna artery is discouraged as occlusion at this site may not be noticed until the ipsilateral radial artery is cannulated on a later occasion.
- Brachial
- Umbilicus
    - For management and removal of umbilical arterial lines please see Arterial Catheter management in Neonates

The central arteries (femoral, axillary and brachial) are larger and less likely to thrombose, however, the consequences of thrombosis are major. They are also easier to feel in hypotensive/poorly perfused patients.

2.3 Preparation and Insertion of Arterial Cannula

1. Explain procedure to child/parent/guardian. Obtain verbal consent.
2. Perform hand hygiene.
3. Collect equipment.
4. Confirm the pressure monitoring set has been primed.
5. Select an appropriate size cannula or "Arterial Catheterisation Set" (See 2.1)
6. Set up using **Surgical** Aseptic Non Touch Technique (ANTT)[4] using a critical aseptic field.
7. Position patient in the bed and ensure that limbs are supported. Ensure that infant/child will be supported throughout the procedure as developmentally appropriate e.g. containment.
8. Select vessel for cannulation.

NB: If hair removal is required, hair clippers should be used rather than razors.

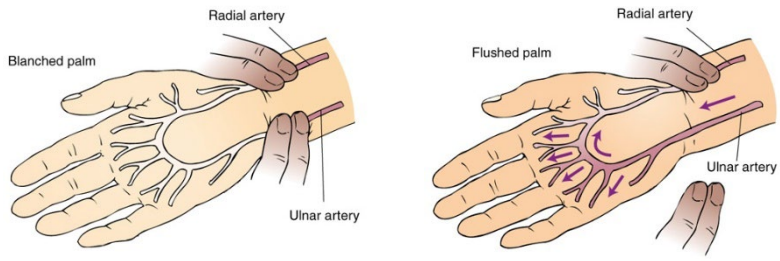


Figure 2 Modified Allen Test

Note: modified Allen test should be performed if the radial artery is chosen to check for collateral circulation through the ulnar artery.

9. Perform hand hygiene.
10. Don mask, eye protection and hair covering. Wash hands using antiseptic handwash and running water for 2 minutes. Don sterile gown and gloves.
11. Establish sterile field around cannulation site with sterile drape.
12. Clean the skin thoroughly with 2% Chlorhexidine in Alcohol 70% solution
13. Locate the artery using either digital palpation or ultrasound. (Insert the arterial catheter under direct ultrasound guidance if possible). If using ultrasound guidance, a sterile probe cover/shield **must** be used over probe.
14. In conscious patients, infiltrate the area with local anaesthetic (1% lignocaine) either at the point of insertion or in a fan-like distribution proximal to the insertion site. Topical anaesthesia cream can also be applied 45 to 60 minutes prior to insertion. For neonates sucrose/EHM can be administered prior to and during the procedure for additional pain relief.

    Utilise general sedation such as morphine and midazolam or ketamine boluses when appropriate.

NB: Topical anaesthetic containing Prilocaine should not be used in children under six months old.

15. Insert the cannula through the skin overlying the point of maximum pulsation, along the line of the artery at an angle of 20-30º to the skin. Some operators like to perforate the skin in advance with a 19 or 21 G needle to make subsequent cannula insertion easier.
16. Cannulate the artery directly like a vein, inserting the cannula until a flashback of blood is seen. The angle between the artery (skin) and the cannula is then reduced to about 10º. Advance the cannula and remove the needle once you are sure that sure the cannula is within the lumen of the artery. If resistance is felt, then the cannula is likely not to be within the artery. Remove the cannula and try again.

NB: This technique may be difficult in neonates as their arteries are often very superficial.

17. Another technique is to 'skewer' the artery with the cannula and then withdraw the needle and pull the cannula back very slowly until blood flows freely from it. Using the Seldinger technique, pass a (0.018") guide wire into the lumen and then gently push the cannula up the artery. Remove the guidewire after pushing the cannula up the artery.
18. Withdraw some blood to ensure free flow and then flush the cannula with 1-2 mL of 0.9% saline, ensuring no air bubbles are injected. The normal response is an area of slight pallor that quickly dissipates rather than a small, localised area of intense blanching or induration.
19. Confirmation of successful arterial cannulation. Arterial trace, confirmation of placement with ultrasounds and PaO2 and SpO2 can be used to confirm placement.

In cyanotic/shocked children the PaO2 & saturation on the blood gas as well as arterial pressures & pulsation curve when transducing will confirm arterial vs venous cannulation.

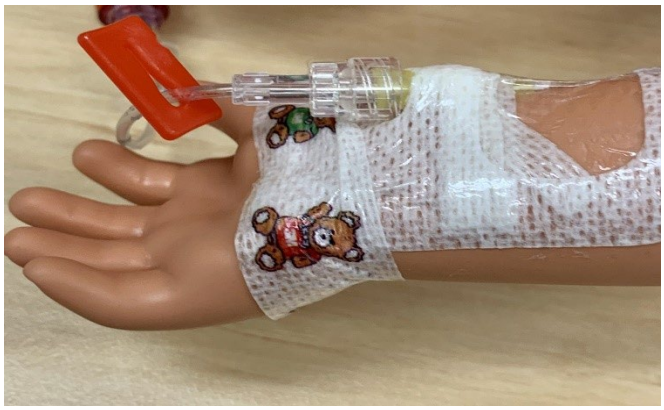
20. Secure the cannula using method suggested in section 2.4. Attach the pre-primed Minibore Extension set with Red needle free valve to the cannula hub. Connect primed, zeroed transducer set and monitoring cable see. Observe trace on the monitor for appropriate arterial waveform.
21. Document in electronic medical record the date and time of insertion, insertion site, catheter size and any assessment findings.

2.4 Securing the Arterial Cannula

1. The arterial cannula must be securely strapped and secured using a suture. The suggested method is to place two 1cm tapes underneath the cannula and cross them over the top. A further piece of tape is placed lengthways across the cannula.

2. The skin area at cannula tip should be visible.

3. A clear transparent, semi-permeable dressing such a small IV Advanced Dressing or IV3000 must be applied over the cannula site.



4. To further secure the arterial cannula, an additional tape or adhesive gauze border should be placed **over** the arterial dressing and **under** the catheter hub and extension. Securing the arterial line in this manner reduces risk of accidental dislodgement, additionally reducing risk of infiltration and occlusion occurring from micro motion of the arterial cannula. [18]

5. Where possible, the limb must be supported by an arm board that is placed on the back of the arm and taped securely in place allowing slight extension of the wrist.

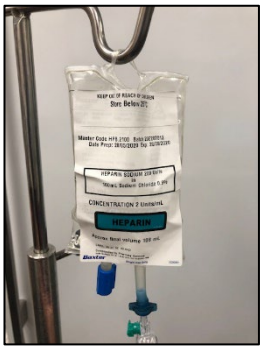
Ensure circulation to fingers and thumb are not compromised.

6. Place sticker with date on dressing.

7. Place a red colour coded route label on the arterial line (red) near the 3-way tap closet to the patient. Add time and date the line was commenced.

3 Priming the Safeset™ Transducer Set

Heparinised Saline Solutions are the standard fluid of choice as the flush solution for Transducers including Central venous pressure monitoring. In some instances, however, saline flush solutions are preferred. E.g. ECMO patients, post of Liver patients and those needing a heparin free line for sampling.

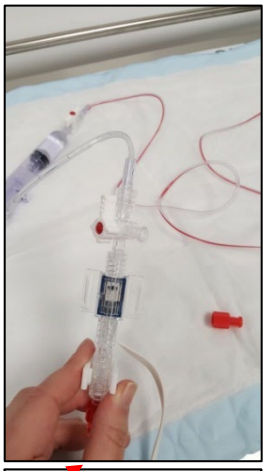


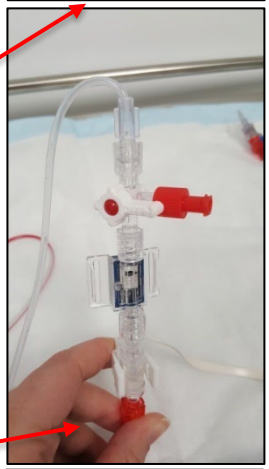
3.1 Equipment

- Premade Heparin 200 Units in 100mls 0.9% Sodium Chloride
- Braun IV Transfusion giving set
- SafeSetTM Transducer set
- Extension Set with needless valve
- 2 x Large 2 % Chlorhexidine gluconate in 70% Alcohol swabs

3.2 Procedure

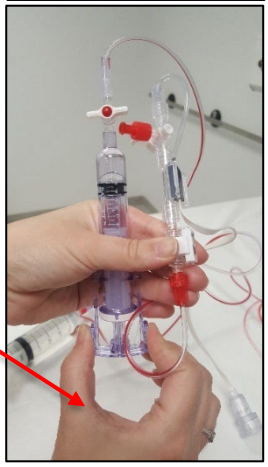
8. Clean work surface
9. Clean hands
10. Using ANTT, prime IV giving set with flush solution
11. Open SafeSet™ Transducer Set; remove and discard drip chamber extension.
12. Connect extensions and ensure all connections are secure.
13. Connect IV giving set to transducer and prime as per manufacturers recommendations





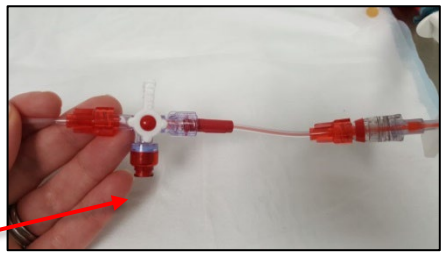
14. <u>To Prime Transducers</u>:

- Turn 3-way tap off to “patient”.
- Squeeze the wings on the transducer till
- Heparinised saline exits the side port.
- Turn 3-way tap off to “air” and place a red cap on the end.



15. <u>Prime the Safeset™ Reservoir</u>:

- Unlock the wings, pull back on the plunger to 6mL.
- Pointing the reservoir upright, squeeze wings of the transducer allow the reservoir to fill.
- Firmly tap reservoir to ensure all bubbles rise to the top



16. Ensure all 3-way taps are in the 'ON' position as pictured.

17. Using the reservoir, continue priming to the end of the line ensuring all 3-way taps are primed. Check the transducer set for air bubbles.

18. Place IV giving set into the BBraun Volumetric pump

19. Program to run at 0.6-1mls/hr. Ensure the pressure limit alarm is set to no more than 4 on the pump. Please note: Increase the rate only if backflow is observed in the line

20. <u>Connect to cable:</u>

- Align the arrow of pressure monitoring cable with the line of transducer connector and click into place
- To disconnect: **DO NOT PULL**

Push down on the clear connector and wriggle out of connection

Figure 3: Connect

Figure 4: Disconnect

21. <u>To connecting the primed line to the patient the transducer to the patient</u>

- Using ANTT
- Apply clean gloves, clean the minibore extension set for 20 seconds with a Large 2% Chlorhexidine Gluconate and 70% Alcohol swab and allow to dry
- Connect primed line. Ensuring no air is in the line.
- Zero the transducer, observe for correct trace.

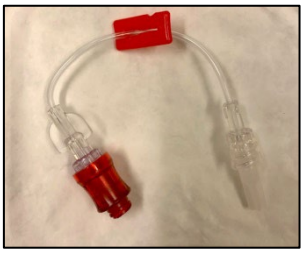
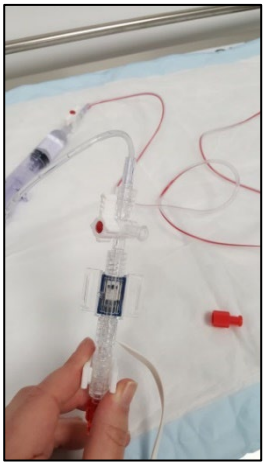


Figure 5: Minibore Extension Set

NB: Always prime under gravity to prevent micro air bubbles.

4 Zeroing the transducer

The purpose of zeroing the transducer is to use atmospheric pressure as a reference point to ensure the values obtained are accurate.



4.1 Process

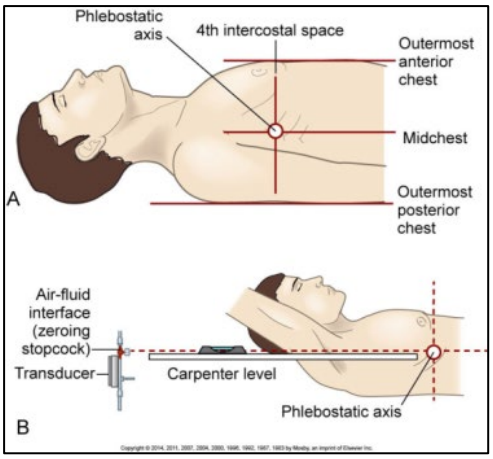
1. Turn the 3-way tap at the top of the transducer off to "patient".
2. Remove the cap.
3. Press "Zero" on the Philips monitor (accessed on the bottom menu bar).
4. The line will be flat and the number in brackets will reach zero. You should hear an audible "beep".
5. Place a new sterile red cap on the 3-way tap and close the tap off to the cap.

NB: Arterial lines must be zeroed at least once every 12 hours to ensure accuracy of measurement.

Zeroing should also be done:

- Following line changes or when connecting to a new arterial cannula
- At commencement of the shift
- When erroneous measurements are suspected

5 Leveling the transducer



The Zeroing stop cock located above the transducer is levelled using a spirit level to the phlebostatic axis. The phlebostatic axis is an anatomical reference point on the chest located at the intersection of the 4th intercostal space and the mid-axillary line. This point is used as baseline for consistent transducer site placement and represents the position of the atria reflecting central venous blood pressure. If the transducer is placed higher than the phlebostatic axis, the blood pressure reading will be inaccurately low, likewise if the transducer is positioned too low, the reading will be inaccurately too high.

The arterial line should be leveled:

- At commencement of shift
- After patient has been repositioned
- When erroneous measurements are suspected

NB: The transducer level should be checked at the start of each shift and re-adjusted whenever the patient's position is changed.

6 Ongoing Care of the Arterial Line

- Arterial lines can be a source for blood stream infections, thus ANTT is to be followed during insertion, dressing changes and when accessing line.
- Arterial cannula sites need to be always visible to facilitate early detection of disconnection.
- Hourly site checks should be performed checking integrity of the dressing, distal perfusion, haematoma formation, kinking of catheter, signs of infection or bleeding.
- Site checks need to be documented in the electronic medical record.
- Flush solution rate should be documented in electronic medical record.
- Flush solution is premade bags of Heparinised Saline 200 units/100mL = 2units/mL.
- Transducer flow rate set between 0.6-2mL/h.
- The integrity of the tubing should be inspected regularly to ensure all connections remain tight and secure, and that no air bubbles are present in the line.
- Check the arterial line site when flushing. Blanching of the skin may be due to arterial spasm (or clear fluid in capillaries). This should be transient, and normal perfusion should return quickly. If return to normal perfusion is slow inform medical staff as the line may need to be re-sited.
- Premade solutions should be changed when empty or with routine line changes.
- Line changes are attended every 96 hours. This is routinely done on Mondays and Thursday in PICU.
- All arterial lines should be labelled with red intra-ARTERIAL route label with time and date line was commenced.
- Arterial line dressings should be changed every 7 days or sooner if the dressing is no longer intact, or evidence of inflammation or moisture.
- Non-invasive blood pressure should be performed at minimum once per shift.
- Patients post liver transplantation often have two arterial lines. The second line is non-heparinised with the flush solution of 0.9% sodium chloride. Blood samples are taken from this additional line for TEG studies, Refer to the Liver Transplant policy for further information.
- For specific requirements for patients on ECMO with arterial lines, refer to the ECMO policy for guidance on flush solutions and arterial line access.

7 Potential Complications with Arterial Lines

- Haematoma formation
- Arterial thrombosis
- Distal embolisation
- Cerebral embolisation
- Pseudo-aneurysm formation
- Inadvertent injection of medications
- Accidental disconnection and potentially major blood loss
- Infection
- Compromised distal circulation (either from vasospasm or thrombosis)
- Iatrogenic anaemia from frequent blood sampling 12,13
- Ischaemia and necrosis
- Nerve damage
- Atriovenous fistula formation
- Abdominal visceral injury

Neurovascular injuries

Neurovascular injuries can occur from arterial lines.

Signs of neurovascular injury may include:

- Changes in peripheral perfusion
- CRT <3 seconds
- Cool or pale limbs
- Reports of paraesthesia or tingling in limb
- No palpable pulse or no audible pulse on doppler

Patients who develop clinically significant ischaemia should have their arterial line urgently removed to minimize ischaemic complications. Acute arterial occlusion is a vascular emergency. If acute limb ischaemia occurs, the patient should be urgently reviewed by a senior doctor, and a discussion with the intensivist should occur about the need for referral to a vascular surgeon.

Further management advice on neurovascular injuries can be found at: https://aci.health.nsw.gov.au/networks/eci/clinical/clinical-tools/vascular-emergencies/acute-limb-ischaemia

8 Blood Sampling via SafeSet™

Special Considerations

- Prior to sampling, determine the minimum volume of blood required. Refer to the pathology Lab Collection manual guide on sampling volumes: http://chw.schn.health.nsw.gov.au/ou/biochemistry/resources/collection_manual.pdf
- Sampling from Arterial Lines should only be performed by an accredited staff member
- All blood sampling from arterial lines in PICU should be performed using the SafeSet™ closed in-line blood sampling system to reduce blood waste from discarding volume.[20] This is especially important to consider in patients at risk of developing iatrogenic anaemia requiring blood transfusions for example neonates and Jehovah's Witnesses. Manual aspiration of the discard volume is only indicated when the arterial cannula is positional and unable to withdraw blood using the SafeSet™ reservoir or when an incorrect result has been obtained.

Obtaining a Blood Sample using the Safeset™

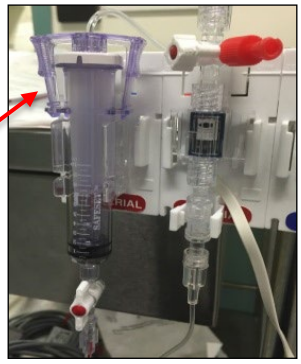
8.1 Equipment

- 2 x Large 2% Chlorhexidine Gluconate in 70% Alcohol swabs
- Blood gas syringe
- Gloves
- Protective Eye Wear
- Green tray
- Optional:
  - 3ml Syringe and red cap
  - Appropriate blood tubes

Figure 6: Blood sampling set up as per ANTT

8.2 Procedure

1. Clean work surface and green tray
2. Gather equipment
3. Clean hands
4. Set up as per ANTT
5. Don gloves and protective eye wear
6. Clean the Luer Activated Stopcock (LAS) with an alcohol swab for 20 sec and allow to dry
7. Turn the 3-way tap so it's opposite the LAS.
8. Using the Safeset™ reservoir, unlock the wings and slowly (no more than 1 mL/sec) aspirate 2mL of blood. Blood should not enter the syringe.



Note: Slow aspiration is essential, as even small amounts of haemolysis can raise potassium significantly.

9. Turn the 3-way tap on LAS "off" to the diluted blood (transducer)
10. Insert the blood gas syringe into the LAS and ¼ turn to the right to lock it in place, withdraw 0.3mL of blood. Turn the 3 way tap "off" to the blood gas syringe prior to removing the syringe from the LAS.

Note: When taking blood for blood tubes use the same technique as described above, however take the blood sample prior to the blood gas sample as a small amount of heparin in the blood gas syringe may contaminate blood results.

11. Replace the cap on the blood gas syringe; expel all the air into the cap. Mix the sample immediately to disperse the heparin throughout the sample by moving the syringe in a figure 8 motion eight times. Take care to avoid warming the sample.
12. Turn the 3-way tap opposite to the LAS; slowly return the diluted blood using the reservoir.
13. Bolus 0.5mL on the BBraun Volumetrics pump while simultaneously squeezing the white wings on the transducer to clear the line on any residual blood. Repeat if needed.
14. Leave the 3-way tap in the opposite position to LAS and clean the LAS with an alcohol swab. This allows continual flushing through the LAS.
15. Observe for the arterial trace to return and analyse the blood gas sample as per unit protocol.

NB: Always observe the site for blanching when returning the blood or flushing the line. Ensure no air is flushed into the artery.

8.3 Special considerations for Umbilical Arterial Catheters

- When sampling from Umbilical Arterial Catheters please refer to the Arterial Catheter Management in Neonates – GCNC
  http://webapps.schn.health.nsw.gov.au/epolicy/policy/5122
- Blood sampling from the umbilical artery catheter should be carried out slowly to decrease risk of cerebral hypo-perfusion as there is a direct relationship between the rate of the flush of the catheter and changes in cerebral blood flow velocity. [14]
- The recommended rate of withdrawal and flush is 1mL per 30 seconds to reduce the effect on the cerebral blood flow. [2,14]

9 Mobilising patients with Arterial lines

Early mobility of PICU patients is an important part of recovery. Patients with arterial lines can be mobilised with some precautions to minimise potential adverse outcomes.

- Before mobilising a patient out of bed:
  - Check patient is medically cleared for activity and nil contraindications present.
  - Check arterial line is well secured and that the dressing is intact.
  - Consider length of lines and transducer cable and ensure that there will be appropriate slack – particularly important for patients with femoral arterial lines.
  - Plan move beforehand to minimise tangling of lines, communicate with patient/families/other staff as relevant.
  - If mobilising outside of room, check arterial line transducer cable is connected to portable monitor brick, so monitoring continues.
  - Relevel arterial line after position changes e.g. transferring from bed to sitting in chair.

10 Removal of Arterial Line

To reduce the risk of infections and other complications, arterial lines should only remain in situ as long as medically necessary. Daily consideration of the continuing indication for arterial blood pressure monitoring and/or arterial blood sampling. Arterial lines should be removed when no longer required for patient care.

NB: Use of scissors for removal of arterial lines is contraindicated due to the risk of the cannula being cut and becoming lodged in the vessel.

10.1 Co-located peripheral cannula

- When removing an arterial cannula that is close to a peripheral cannula: scissors should NOT be used to cut tapes which may be joining the dressings.
- If able, attempt to separate the tape and dressings using adhesive removal wipes.
- If unable to remove arterial cannula without cutting the dressings, the co-located cannula should be removed at the same time as the arterial cannula.

10.2 Suspected infection

NB: If arterial line is being removed due to suspected or proven catheter related infection, confirm with medical team before removal if arterial catheter tip should be sent for culture and sensitivity.

Procedure for removal of arterial line

16. Check patient coagulation status and documentation if ok to be removed.
17. Clean hands, stop infusion and turn off alarm.
18. Prepare equipment – gauze and occlusive dressing.
19. Clean hands, Don gloves and protective eye wear
20. Remove dressings and tapes.
21. Apply pressure to the insertion site with gauze and withdraw the catheter.
22. Apply firm pressure until bleeding stops, 5-15 minutes, longer time may be needed for anticoagulated patients.
23. Remove distal pressure slowly, as a sudden release of pressure can cause undue pressure on the arterial wall and cause re-bleeding.
24. Apply occlusive dressing.
25. Monitor site for bleeding. If required a pressure dressing can be applied over the sterile dressing to achieve haemostasis.
    i. Must not encircle the wrist or limb.
    ii. Must not impede venous blood flow.

iii. Peripheral circulation distal to the site should be recorded.

26. Document line removal in electronic medical record.

11 Arterial pressure monitoring

11.1 Normal arterial waveform

The arterial pressure wave corresponds with the cardiac cycle. The systolic phase is characterised by a rapid increase in pressure to a peak, followed by a rapid downward turn. This phase begins with the opening of the aortic valve and corresponds to the left ventricular ejection. A notch - called the dicrotic notch is visible on downward stroke which represents closure of the aortic valve signifying the beginning of diastole. The remainder of the downward stroke represents diastolic run off of blood flow into the peripheral circulation. The QRS complex of the ECG trace comes first, followed by a slight delay in between actual ventricular depolarisation and the waveform reaching the transducer to show the arterial waveform.

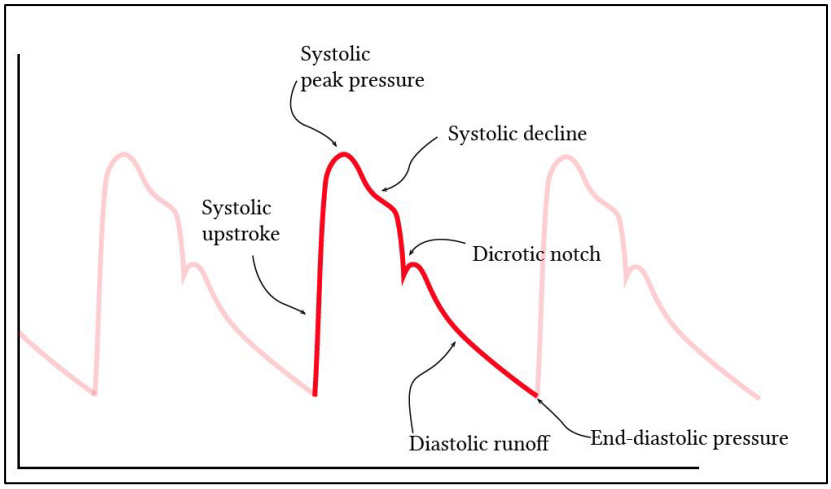


Figure 7: Normal Arterial Waveform [10]

Figure 8: Arterial Trace correlating with Cardiac Cycle

11.2 Damping

It is important to have appropriate amount of damping in the system. Inadequate damping will result in excessive resonance in the system and an overestimate of systolic pressure and an underestimate of diastolic pressure. The opposite occurs with overdamping. In both cases the mean arterial pressure is the most accurate and reliable marker of tissue perfusion.

Assess for optimal dampness by performing a square wave test:

Damping is loss of energy like a bouncing ball losing momentum. We reduce this by using stiff tubing for the arterial line connected to the transducer. The longer the tubing the more damp it can be.

Square wave test: Perform a manual flush at the closest access point (LAS) while open to transducer to the patient and wait a sec and release – you will see a sharp upward deflection and the waveform drops quickly back down forming a square then you will see the pressure wave trying to get back to baseline with 1-2 oscillations: this is optimally damped

This important because the blood pressure will be more accurate and the treatment provided to that patient will be optimised.

It is important to do a non-invasive blood pressure at least once a shift to compare to your arterial BP.

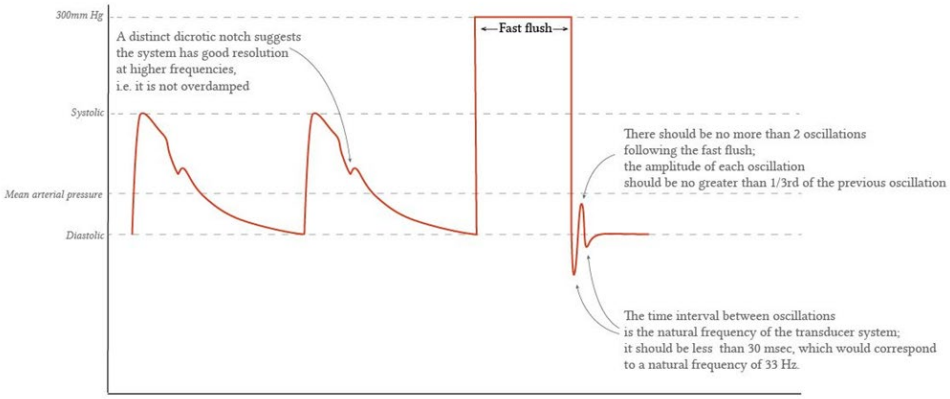


Figure 9: Optimally damped IAL trace

Over damped trace could be due to clots, obstruction, narrow tubing, or air bubbles in the system. Often an arterial spasm can cause the waveform to be damped.

Trouble shooting over damped trace

- Double check non-invasive blood pressure.
- Double check that the selected monitor scaling is appropriate.[12]
- Reposition limb.
- Assess site.
- Inspect all lines for air or clots.
- Inspect line and check all connections are tight.
- Flush arterial line. If unable to flush, attempt to withdraw blood.

NB: If unsuccessful, inform the medical staff and review the viability of the intra-arterial line. Sometimes the cannula becomes kinked as it enters the skin, and these lines can often be salvaged by a 're-wiring' technique.

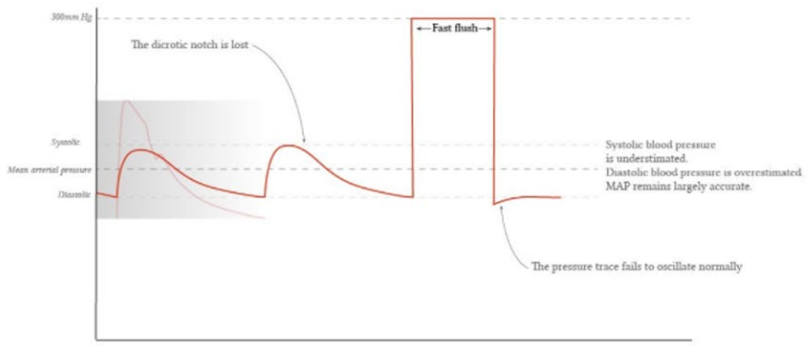


Figure 10: Overly damped IAL trace

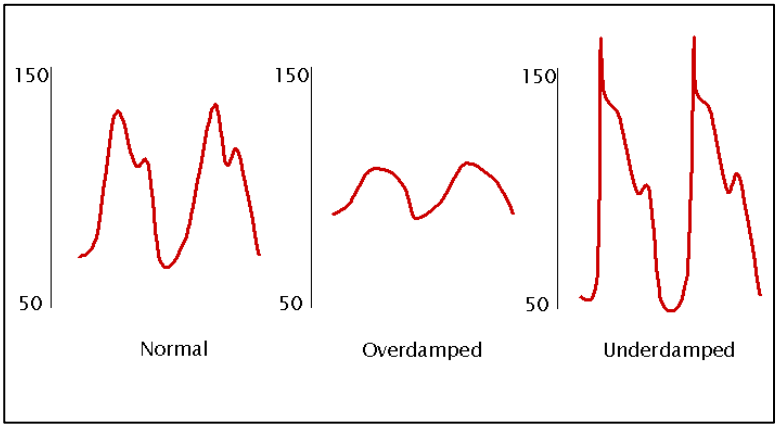


Figure 11: Over and Under Damped Trace [10]

An underdamped trace is often characterized by a high initial spike in the waveform. This may be due to rigid tubing or a faulty transducer, hypothermia, tachycardia or arrhythmias.

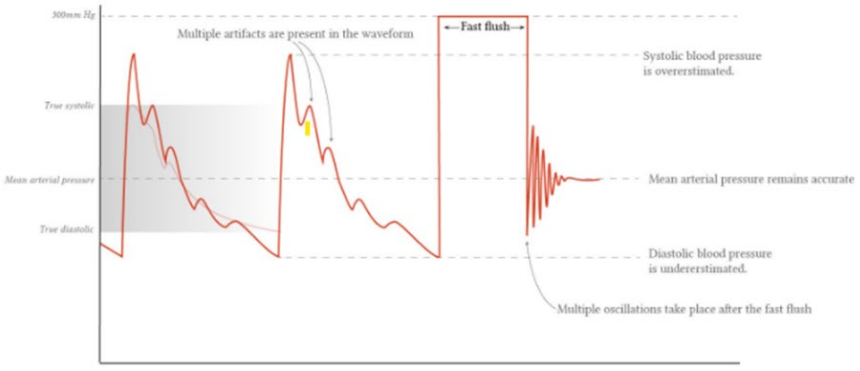


Figure 12: Underdamped IAL trace

12 Setting parameters and alarm limits

- Appropriate alarms must be set and audible for all patients with arterial lines.
  - Exceptional circumstances e.g. during palliation it may be appropriate to turn arterial alarms off, this is to be discussed with medical team.
- Alarms provide prompt notification of both changes in blood pressure and accidental disconnection/opening of the circuit.
- Alarm settings should be selected based on the degree of fluctuation in blood pressure.
- Upper and lower limits are selected to represent clinically significant changes for an individual patient.
- Alarms are typically based on set MAP targets for patients, however for certain patients it may be appropriate to set alarm limits for systolic or diastolic readings.
- Alarm limits should be checked and set a minimum of once per shift.

12.1 Scale

Check the monitor display has an appropriate scale. To set the scale of the graph, click the arterial waveform and the 'set up ABP/ART' menu will be displayed, select the scale button and adjust the parameters for individual patient requirements using alarm limits as a guide. The scale should be set approximately 10-20mmHg greater than the average systolic pressure reading. If there is a change in a patient's haemodynamic status, the scale should be changed in reflection.

As an example, if a patient has had a systolic blood pressure sitting 70-90mmHg it would be appropriate to set the scale to 100mmHg. If their blood pressure range fluctuates and the systolic range increases to 100-120mmHg the scale will need to be adjusted and an appropriate scale would be 150mmHg.

NB: Do not use "optimal scale" function, as this setting can distort the waveform.

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