

PARKLAND HEALTH & HOSPITAL SYSTEM
Nursing Services

Section: Specimen Collection
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Procedure #: NSG 26-01
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Distribution: Nursing Procedure Manual

ARTERIAL BLOOD SPECIMENS

PRACTICE

STATEMENT: Upon the order of a provider, the qualified registered nurse may obtain arterial blood from the radial or dorsalis pedal artery. Qualified Patient Care Assistants (in the ICU's) and qualified registered nurses may obtain specimens from arterial line using the closed reservoir's system.

Coagulation status should be reviewed prior to performing arterial punctures

PURPOSE: To obtain an adequate sample of arterial blood for analysis.

EQUIPMENT: Arterial Blood Sampling Kit or
Pre-heparinized syringe
Appropriate lab specimen tubes
Sterile needles, 22 or 23 gauge (for arterial sticks)
Syringe cap
Betadine/Antiseptic Solution
Ice slush in container for arterial blood gas
Laboratory requisition from EPIC
Biohazard Specimen Transport Bag
EPIC Demographic Labels
4x4's
Gloves
Needleless syringe for reservoir system
Thermometer

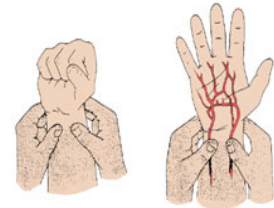
PROCEDURE:

A. Radial Artery Puncture:

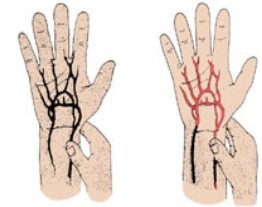
1. Wash hands.
2. Assemble necessary equipment and don gloves.
3. Obtain the ice slush.
4. Identify patient using two identifiers.
5. Prior to obtaining specimen, obtain patient's temperature and document on lab requisition.

6. Before drawing blood from a radial artery, perform the modified Allen's test to determine if the patient will receive adequate blood through the ulnar artery to supply the hand if occlusion of radial artery occurs.

- a. Check for collateral circulation by first checking for an ulnar pulse. Elevate the patient's hand above the level of the heart and apply firm pressure to the radial and ulnar pulse sites. Have the patient open and close his/her hand rapidly until palm is blanched.

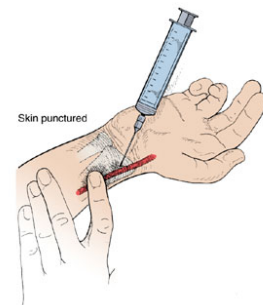


- b. Lower patient's hand release pressure. Instruct patient to leave his/her hand open. Release the ulnar pressure only and observe for rapid return of color in the area of the hand, which indicates collateral circulation. If collateral circulation is not demonstrated by this method, do not puncture the artery. Notify provider of need for alternate arterial access.



7. Position the patient's arm on the mattress and support the wrist with a small rolled bath cloth.
8. Locate the point of maximum impulse of the artery where the puncture is to be made. Clean this area and your fingers that you will use to palpate with betadine and allow to dry..

9. Palpate the artery. Insert the needle at a 45° angle with the bevel up, facing the flow of blood. In most cases, the blood will flow into the syringe with minimal aspiration. If blood does not flow, insert needle further or change direction of the needle by withdrawing the needle almost out of the skin, change direction and then advance again. Hold the syringe and needle steady to prevent tearing of the artery.



10. Obtain at least 1ml blood sample.
11. After collecting the sample, withdraw the needle and activate safety device and apply pressure to the puncture site for a minimum of 5 minutes. Pressure should be held for no less than ten minutes in the following situations:
 - a. The patient is on any anticoagulants such as Heparin, Coumadin, or Warfarin.
 - b. The patient is receiving Persantin, Dextrin, or Aspirin in large doses.
 - c. The patient's clotting studies are abnormal.
12. Check blood gas samples for the presence of air in the syringe and expel any air present
 - a. Place cap on syringe and attach label. Document Date, time and initials.

- b. Rotate syringe to mix heparin and blood immediately and place specimen in ice slush. .
 - c. Place specimen ice slush and syringe in a Biohazard bag.
 - d. Place ice slush and syringe in a Biohazard bag.
 13. Remove gloves and wash hands.
 14. Send sample to the laboratory within 15 minutes.
 15. Check the site to ensure presence of collateral circulation and for a pulse distal from the puncture area to make sure no hematoma has formed.
 16. Document the following on the appropriate form: (flowsheet, Nurses Notes, if applicable)
 - a. time
 - b. % O₂/ vent settings
 - c. site appearance
 - d. patients tolerance
 - e. presence of collateral circulation
 - f. lab results
- B. Pedal Artery Puncture (*only in ICU areas*)
1. Follow steps 1-4 as outlined in A.
 2. Position the patient's foot on the mattress, making sure there is adequate support.
 3. Select the pedal artery from either foot by 2-finger palpation. Check for adequate circulation by palpating posterior tibulus pulse and check collateral circulation by occluding dorsalis artery and blanch the big toe by compressing the toenail for several seconds. When pressure is released, a rapid return of color indicates adequate collateral flow.
 4. Follow steps 8-16 as outlined in A.
- C. Factors affecting Arterial Blood Gas (ABG) sample values:
1. Heparin — used to prevent clotting of the blood sample; excessive amounts alter the pH of the specimen. Use pre-packaged arterial blood sampling syringe.
 2. Air contact — no air must come in contact with the blood sample. Air contact can increase the PO₂ and decrease the PCO₂ since there is usually more oxygen and less carbon dioxide in the air than in the blood as measured by partial pressures.

3. Temperature — red cell metabolism must be minimal. The sample must be placed immediately in ice slush to slow metabolism. Red cells that are warm will continue to metabolize, giving off CO₂ and consuming O₂, thus affecting the blood gas values.
4. Steady rate — the blood should be drawn when the patient is in an equilibrated state, that is, when at least 20 minutes have elapsed since any change has occurred or been made that might affect the blood gases. Significant changes are respiratory rate, tidal volume, minute volume, FIO₂, and suctioning before sampling time.

D. Complications:

1. Hematoma — blood may extravasate from a punctured artery and into the tissues or layers beneath the skin. This can cause discoloration if:
 - a. More than one puncture is made into the artery.
 - b. Too much time is spent in drawing.
 - c. Inadequate pressure is applied after the puncture.
2. Peripheral nerve damage. There is a nerve adjacent to the puncture site at the brachial and femoral arteries. Damage may occur if the nerve is pierced with the needle or if a hematoma develops and causes extended pressure on the nerve. One of the advantages of choosing the radial artery is that the radial nerve does not lie immediately adjacent to the radial artery in the area of the wrist where the puncture will be made.
3. Thrombus - the possibility of an intra-arterial thrombus occurring must always be kept in mind. If a good pulse cannot be palpated down from the puncture site after the puncture is performed, notify the provider immediately. If collateral circulation between the ulnar artery and the radial artery is present, there could be minimal loss of circulation caused by thrombus formation in the radial artery. CAUTION must always be taken to prevent injection of any air into the artery when performing the arterial puncture.

E. Arterial line in place:

PROCEDURE: CLOSED RESERVOIR SYSTEM

1. Wash hands.
2. Assemble necessary equipment and don gloves.
3. Obtain the ice slush.
4. Identify patient using two identifiers.
5. Prior to obtaining specimen, obtain patient's temperature and document on lab requisition.

6. Gently aspirate blood into reservoir and close (no faster than 1cc/second).
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 7. Swab sample site port with antiseptic solution.
 8. Place needleless syringe onto needleless port.
 9. Obtain specimens. Usually the blood will fill the syringe without aspiration. Avoid rapid manual aspiration.
 10. Remove Syringe/Vacutainer.
 11. Open reservoir and reinfuse blood (no faster than 1cc/second).
 12. Flush line via intra-flow device to clear.
 13. Follow steps 12- 16 as outlined in Section A
- F. Arterial line in place with T-piece (*Pedi only*)
1. Repeat steps 1 and 5.
 2. Clamp line with slide clamp on T-piece.
 3. Clean injection port with antiseptic wipe.
 4. Insert 22, 23 or 25 gauge needle into injection port and allow 3-5 drops of blood out.
 5. Attach heparinized syringe to needle and withdraw blood for ABG.
 6. Remove needle and syringe.
 7. Follow steps 12-16 as outlined in Section A.
 8. Open clamp on T-piece, flush the line and observe for cleaning of T-piece and return of wave form.
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NOTE: For Pediatric Patients:

Open clamp on the T-piece (the volume of pressurized fluid that accumulated when the piece was clamped is usually enough to flush the catheter adequately). Observe for cleaning of T-piece and return of waveform. If the catheter fails to clear with the back-pressure, gently flush the system with 1-2 mls heparinized solution. DO NOT use the continuous intra-flow device to flush the catheter.

G. PATIENT EDUCATION

- Do not rub the puncture site
- Report any bleeding, pain, numbness, or tingling following the arterial puncture

Link to Mosby's Nursing Skills:

[Specimen Collection: Arterial Blood Gases](#)

[Arterial Catheters: Blood Sampling](#)