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Document Title: Policy and Procedure of Drawing Arterial Blood Gas Samples

Approval Process

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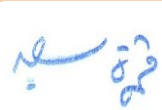
Validated by	Dr. Qamra Al Sariri	DG of QAC	Ministry of Health	Dec 2021	
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Acronyms:

ABG	Arterial Blood Gas
COHb	dyshemoglobins carboxyhemoglobin
ctO2	Oxygen Content/ Concentration of total Oxygen
FIO2	Fraction of Inspired Oxygen
Hbtotal	Total Hemoglobin
MetHb	Methemoglobin
MoH	Ministry of Health
O2Hb	Oxygen Hemoglobin
PaCO2	Partial Pressure of Carbon Dioxide
PaO2	Partial Pressure of Oxygen
pH	Hydrogen Ion
PRO	Professional

Policy and Procedure of Drawing of Arterial Blood Gas Samples

1. Introduction

The collection of arterial blood is not only technically difficult, but can be painful and hazardous for the patient. Therefore, it is essential that individuals performing arterial puncture are familiar with the proper techniques, with the hazards/complications of the procedure, and with the necessary precautions.

Blood gas analysis is used to assess the oxygenation, ventilation, and acid-base status of a patient. Other parameters that are derived from these three parameters are used in the assessment of oxygen content and oxygen delivery.

Blood is drawn anaerobically from a peripheral artery (radial, brachial, femoral, or dorsalis pedis) via a single percutaneous needle puncture, or from an indwelling arterial cannula or catheter for multiple samples. These syringes are pre-heparinized and handled to minimize air exposure that will alter the blood gas values.

2. Scope

2.1 Sampling may be performed by trained health care personnel clinical laboratory directors, respiratory therapists, physicians, physicians in training, certified nurses, exercise physiologists, perfusionists, and any other certified health care professionals who may collect, or be involved with the collection of, arterial blood specimens in a variety of settings including (but not limited to) hospitals, clinics, physician offices, extended care facilities, and the home.

2.2 This policy applies to samples from neonatal, pediatric, adult, and geriatric populations

2.3 This policy applies to all personnel functioning in a clinical capacity in the Section of Respiratory Care Services and in all health institutions in MoH.

3. Purpose

3.1. To assure that aseptic technique is practiced and used while obtaining a blood sample by arterial puncture.

3.2. To reduce the potential hazards to the patient and medical personnel.

3.3. To increase safe practices and the clinical usefulness of arterial blood specimen.

4. Definitions

4.1 Arterial-Blood Gas (ABG): measures the amounts of arterial gases, such as oxygen and carbon dioxide. An ABG test requires that a small volume of blood be drawn from the radial artery with a syringe and a thin needle, but sometimes the femoral artery in the groin or another site is used.

4.2 Oxygen content of blood: The sum of the substance concentrations of the oxygen bound to hemoglobin as O2Hb plus the amount dissolved in blood (intra- and extracellular).

4.3 Partial pressure: the pressure that would exist in a hypothetical ideal gas phase, in equilibrium with the solution.

4.4 pH: The symbol for the negative logarithm of the hydrogen ion activity.

5. Policy

5.1. A physician's order shall be obtained to perform arterial blood gas punctures.

5.2. Staff drawing arterial blood samples should positively identify the patient from whom blood is to be collected.

5.3. Appropriate supplies and protective equipment should be available to prevent dangerous practices.

5.4. Respiratory Therapists may routinely perform arterial blood gas punctures on the radial and brachial arteries. Femoral arterial punctures may be performed only during a medical emergency under the direct supervision of a treating physician and the last resort for puncture.

5.5. The principles of universal precautions shall be followed in all aspects of sample collection.

5.6. The patient sample shall be correctly obtained, labelled specimens clearly and complete all required paper work.

6. Procedure

6.1 **Positively identify the patient from whom blood is to be collected**.

6.1.1 Verify physician's order.

6.1.2 Check patient's record for precautions to be taken, such as in anticoagulant therapy.

6.2 **Assemble Equipment - Know which equipment is appropriate**

6.2.1 ABG Sampling Kit:

6.2.2 3cc syringe prefilled with Liquid Sodium Heparin

6.2.3 1 needle 22g x 1 1/4" with insert

6.2.4 1 Needle-Pro

6.2.5 1 Filter-Pro

6.2.6 1 3cc syringe w/25x5/8 needle

6.2.7 3% to 5% Lidocaine cream, spray or gel whichever is available (if needed for conscious patients)

6.2.8 bandage to cover the puncture site after collection

6.2.9 Blood Gas Lab Requisition Form

6.2.10 Gloves

6.2.11 A container with crushed ice for transportation of the sample to the laboratory

6.3 **Prepare the Patient**

6.3.1. Identify the patient by the wrist band adhering to wrist band identification policy. Verify the proper identity of the patient via two (2) patient identifiers whenever taking blood specimens – Check the patients name and DOB verbally and by the patients' wrist band.

6.3.2. Introduce yourself to patient and explain the procedure to the conscious patient of what you are about to do.

6.3.3. Check the patient's lab values – notify the Medical Director or their Designee if the patient's Prothombin Time is greater than 13 seconds.

6.3.4. Palpate right and left radial pulses. Select the vessel with the most prominent pulse for puncture.

6.3.4.1. Respiratory therapists should obtain samples from the radial artery only. Prior to drawing a sample, the Allen test must be performed. If the Allen test fails to demonstrate adequate collateral flow, do not use that radial artery.

6.3.4.2. Allen's Test (to check for collateral blood flow circulation in the radial artery).

6.3.4.3. Obliterate the radial and ulnar pulses simultaneously by pressing on both blood vessels at the wrist.

6.3.4.4. Ask patient to clench and unclench his fist until blanching of the skin occurs.

6.3.4.5. Release pressure on ulnar artery while compressing radial artery. Watch for return of skin color within 15 seconds.

6.4 **Anesthetize the Site**

6.4.1. Perform Hand hygiene by doing Hand washing first.

6.4.2. Assemble the spray. Cream or gel of lidocaine.

6.4.3. Put on gloves. Prepare the skin using the alcohol prep.

6.4.4. Anesthetize site with lidocaine by placing just on the surface of the skin.

6.4.5. After the Lidocaine has been placed gently rub the “wet” area for a few minutes.

6.4.6. Note whether the patient has “numbness” in the site area. If yes, proceed to obtain an arterial blood sample.

6.5. Obtain the Sample for Analysis

6.5.1. All drawing of blood will be done with protective gloves.

6.5.2. All material possibly in contact with blood will be regarded as contaminated.

6.5.3. Peel the blister pouch with the needle-pro needle protection device open half way.

6.5.3.1. Do not touch needle protector.

6.5.3.2. Remove cap from syringe and discard. Grasp sheath using the plastic peel pouch.

6.5.3.3. To prevent contamination, be careful not to touch needle-pro's luer connector.

6.5.3.4. With an easy twisting motion, attach syringe to the luer connection of the Needle-Pro.

6.5.4. Twist a needle into the male luer-lock fitting on the base of the Needle-Pro.

6.5.5. Expel any residual heparin out through the needle.

6.5.6. The needle must be coated with heparin to prevent the formation of micro-clots.).

6.5.7. Feel along the course of the radial artery and palpate for maximum pulsation with the middle and index finger.

6.5.8. Prepare the skin with alcohol prep.

6.5.9. Remove the sheath from the needle.

6.5.10. Hold the needle/syringe at a 45 - 60 degree angle (with bevel up) to the skin surface and advance in to the artery.

6.5.11. Once the artery is punctured, arterial pressure will push up the hub of the syringe and a pulsating flow of blood will fill the syringe.

6.5.12. Once a minimum of 1cc up to 3cc of blood is obtained, withdraw the needle firmly and apply pressure over the site with dry gauze.

6.5.13. Press the needle into the sheath by “gently” pressing the sheath against a hard surface such as a bedside table for 5 minutes.

6.5.13.1. As the sheath is pressed, the needle is firmly snapped into the sheath.

6.5.14. Twist off Needle-Pro and discard into a sharps container.

6.5.15. Place the Filter-Pro Air Bubble Removal Device on the syringe.

6.5.16. Push the plunger up to expel any air bubbles.

6.5.17. The syringe must then be labelled and placed in a labelled bag of ice for transport to the Blood Gas Lab.

6.5.18. Continue to maintain pressure of puncture site for up to 10 minutes. (If patient is on anticoagulant medication apply pressure for 15 minutes.)

6.6 **Label specimens clearly and complete all required paper work**

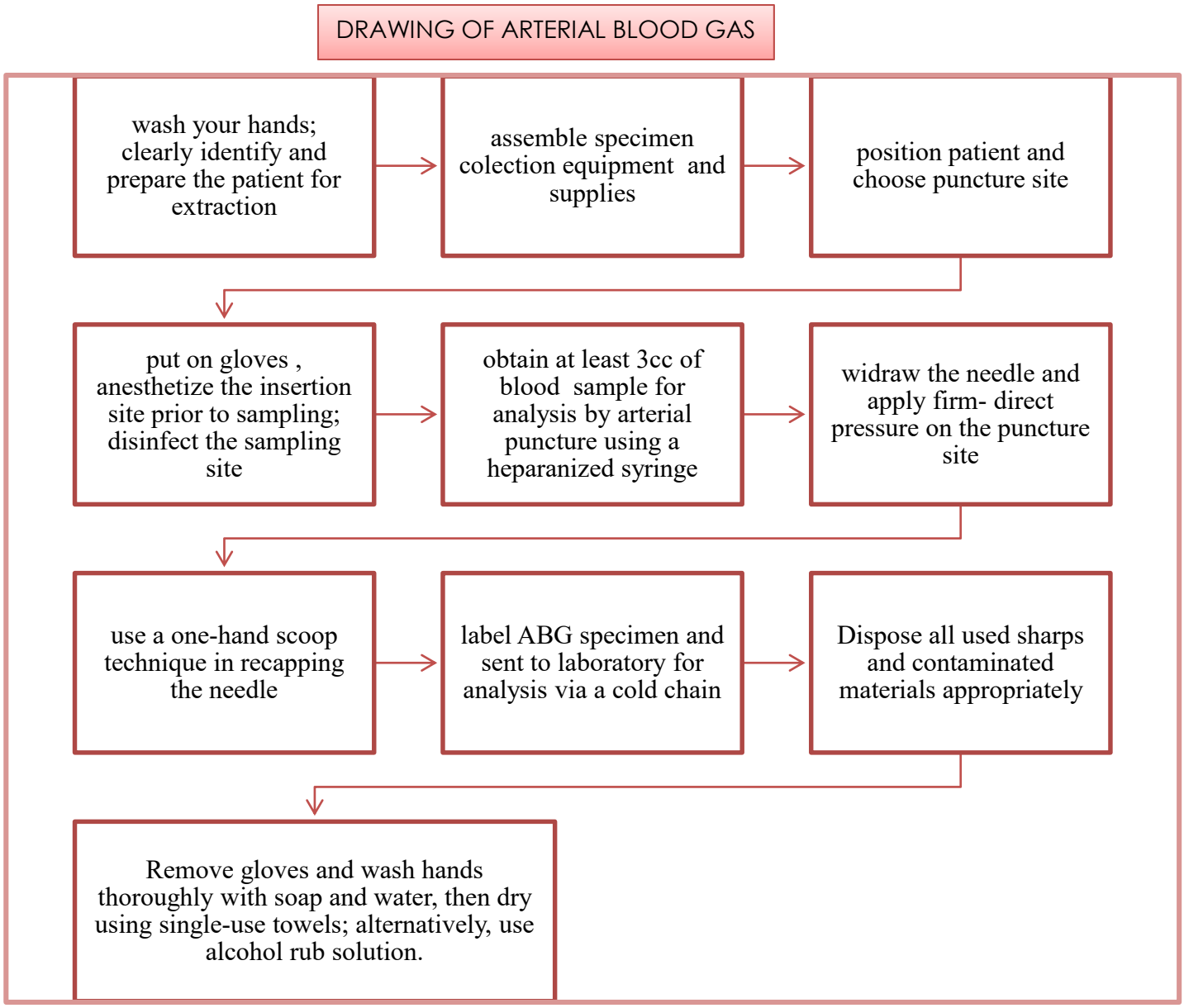
Give the proper paperwork and the sample to the unit secretary.

6.1.1. Samples will not be accepted by the lab unless the syringe is labelled, the bag of ice is labelled, and the requisition is complete.

6.1.2. To be considered complete, the requisition must contain the patient's name, hospital number, and date of birth or age, ordering physician, time drawn, FIO2 and patient temperature.

6.1.3. If there are labelling discrepancies you will be asked to come to the lab, identify the specimen, and complete an Identification of Specimen Form.

6.7 **Flowchart**



7. Responsibilities

7.1 Respiratory Therapists are responsible for:

7.1.1 Performing the arterial puncture, analyze the sample, input the patient information into the ABG database, and generate the report for the Medical Record.

7.1.2 Personally following through to the completion of the analysis and reporting of the results of that sample to the attending physician

7.1.3 pH-blood gas analysis, oxygen delivery devices, and related equipment, hazards and sources of specimen and handling proper disposal of contamination(s) associated with sampling and analysis

7.1.4 Familiarization and adhering with this document

7.2 Doctor or Physician is responsible for:

7.2.1. Performing arterial blood gas sampling/ extraction that will provide timely respiratory intervention if the procedure cannot be carried out by the Respiratory Therapist on the radial/ brachial artery.

7.2.2. The direct treatment of their patients, especially those that are critically ill to determine respiratory, metabolic and renal function after extraction and analysis.

7.3 Nursing Staff is responsible for:

7.3.1. Checking the patient's current coagulation screen, platelet count, medical history and prescription chart for anticoagulation therapy.

7.3.2. Identifying any areas of excoriation/infection, Distorted anatomy/ trauma/burns to the limb - arteriovenous fistula, poor perfusion at or proximal to the attempted arterial puncture site. If any of these are present the site nurses should inform staff extracting the blood **not to extract** on these sites.

8. Document History and Version Control

Document History and Version Control			
Version	**Description of Amendment**	**Author**	**Review Date**
01	Initial Release	Respiratory Care Services Team	May/2024
02			
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Written by	**Reviewed by**	**Approved by**
Respiratory Care Services Team	Khalsa Al Siyabi	Dr. Kadhim Sulaiman

9. Related Documents:

There is no related documents for this policy

10. References:

Title of book/ journal/ articles/ Website	Author	Year of publication	Page
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WHO Guidelines on Drawing Blood: Best Practices in Phlebotomy		Created: March 28, 2011; Last Update: April 18, 2016.	
AARC Clinical Practice Guideline Blood gas analysis and hemoximetry: Respir Care. 2013 Oct. 58 (10)	Davis MD, Walsh BK, Sittig SE, Restrepo RD	2013, Oct	1694-703
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Radial artery blood gas sampling: a randomized controlled trial of lidocaine local anesthesia.; J Evid Based Med.	Wade RG, Crawfurd J, Wade D, Holland R	2015 Nov. 8 (4):	185-91. [Medline].