وزارة الصحة

سياسات واجراءات

اسم السياسة: Arterial Blood Gas (ABGs)	رمز السياسة: MOH POL HOS RT 01
عدد الصفحات: 8 صفحات	الطبعة: الأولى

الوحدة التنظيمية: مديرية التطوير المؤسسي وضبط الجودة		
الجهة المعنية بتنفيذ السياسة: شعبة المعالجة التنفسية		
الاعداد: لجنة تطوير واستحداث وحدات المعالجة التنفسية في مستشفيات وزارة الصحة	التوقيع: التوقيع: التوقيع: التوقيع: التوقيع: التوقيع: التوقيع:	تاريخ الاعداد: ٢٠٢٤/٨/٤
المراجعة: قسم إدارة الجودة/ شعبة سلامة المرضى	التوقيع:	تاريخ المراجعة: ٢٠٢٤/٨/٢٠
التدقيق من ناحية ضبط الجودة: مدير مديرية التطوير المؤسسي وضبط الجودة	التوقيع:	تاريخ تدقيق ضبط الجودة: ٢٠٢٤/١١/٢٠
الاعتماد: عطوفة الأمين العام للشؤون الإدارية والفنية	التوقيع:	تاريخ الاعتماد: ٢٠٢٤/١١/٢٧

وزارة الصحة
مديرية التطوير المؤسسي و ضبط الجودة
السياسات و الإجراءات
Policies & Procedures
ختم الاعتماد
معتمدة
Approved

تتم مراجعة السياسة كل سنتين على الأقل من تاريخ اعتماد آخر طبعة:		
رقم الطبعة	تاريخ الاعتماد	مبررات مراجعة السياسة

ختم النسخة الاصلية

MASTER COPY

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1- Policy:

1.1 All respiratory therapy staff will perform Arterial Blood Gas Sampling under the following conditions:

1.1.1 Staff member has been in serviced on the procedures and has shown proficiency under supervision.

1.1.2 The staff member has a formal approval (ABGs Competency) in their personnel file in the Respiratory Therapy Unit department indicating that the authorization procedure was completed.

1.2 Arterial blood gases are done on a physician's order only.

2- Purpose:

To ensure that the Respiratory Therapy Unit Staff are knowledgeable and proficient in the utilization of equipment and technique of Arterial Blood Sampling in the patient care areas.

3- Scope:

The policy applies to all Respiratory Therapy staff employed by the Respiratory Therapy Unit and trained with an understanding of age specific requirements of the patient population.

4- Responsibilities:

Respiratory Therapy Unit.

5- Definitions:

Arterial blood gases (ABGs) are diagnostic tests performed on blood taken from an artery, which contains oxygen and carbon dioxide.

6- Procedure:

6.1 Indications for blood gas analysis:

6.1.1 The need to evaluate the adequacy of a patient's ventilatory ($PaCO_2$), acid-base (pH and $PaCO_2$), and/or oxygenation (PaO_2 and O_2Hb) status, carboxyhemoglobin (COHb) Methemoglobin (MetHb).

6.1.2 The need to quantitate the response to therapeutic intervention (e.g. supplemental oxygen administration, mechanical ventilation, insulin in patients with diabetic ketoacidosis).

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6.1.3 The need to monitor severity and progression of documented disease processes.

6.1.4 Correlation with arterial blood gases — although arterial blood gas analysis is more accurate than venous analysis for the assessment of oxygenation, measurement of PCO2, pH, and HCO3 are similar with some minor adjustments.

6.1.5 The central venous pH is usually 0.03 to 0.05 pH units lower than the arterial pH and the PCO2 is usually 4 to 5 mmHg higher, with little or no increase in HCO3. Mixed venous blood (i.e. SvO2 drawn from a pulmonary artery catheter) gives results similar to central venous blood (i.e. ScvO2 drawn from a central venous catheter)

6.1.6 The peripheral venous pH is approximately 0.03 to 0.04 pH units lower than the arterial pH, the venous serum HCO3 concentration is approximately 1 to 2 meq/L higher, and the venous PCO2 is approximately 3 to 8 mmHg higher

6.2 Relative contraindications to performing arterial blood gas puncture:

6.2.1 A coagulopathy or medium-to-high-dose anticoagulation therapy (e.g., heparin or Coumadin, streptokinase, and tissue plasminogen activator but not necessarily aspirin) and a platelet count <50 x 109/L may be a relative contraindication for arterial puncture.

6.3 Inappropriate site for arterial Blood Gas sampling (If there is an evidence of the following involving the selected limb, an alternate site should be selected).

6.3.1 Local infection, thrombus, or distorted anatomy at the puncture site (e.g. previous surgical interventions, congenital or acquired malformations, burns, aneurysm, stent, arteriovenous fistula, vascular graft). Arterial puncture should not be performed through a lesion or through or distal to a surgical shunt (e.g., as in a dialysis patient).

6.3.2 Severe peripheral vascular disease of the artery selected for sampling.

6.3.3 Active Raynaud's syndrome (particularly sampling at the radial site).

6.3.4 Abnormal modified Allen's test is indicative of inadequate collateral circulation to the hand and suggests the need to select another extremity as the site for puncture.

6.4 Inappropriate blood specimen include the following:

6.4.1 Specimen that has not been properly anticoagulated.

6.4.2 Specimen containing visible air bubbles.

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6.4.3 Specimen stored in a plastic syringe at room temperature for longer than **15 minutes**, stored at room temperature for longer than 5 minutes for a shunt study, or stored at room temperature in the presence of an elevated leukocyte or platelet count (PaO2 in samples drawn from subjects with very high leukocyte counts can decrease rapidly. Immediate chilling and analysis is necessary).

6.5 Possible hazards or complications include:

6.5.1 Infection of specimen handler from blood carrying the human immunodeficiency virus, or HIV, hepatitis B, other blood-borne pathogens.

6.5.2 Inappropriate patient medical treatment based on improperly analyzed blood specimen or from analysis of an unacceptable specimen or from incorrect reporting of results.

6.5.3 Arteriospasm, arterial occlusion.

6.5.4 Air or clotted-blood emboli.

6.5.5 Hemorrhage.

6.5.6 Trauma to the vessel.

6.5.7 Pain, Vasovagal response.

6.5.8 Local nerve injury

6.5.9 Needle stick injury to health care personnel.

6.5.10 Pseudoaneurysm formation.

6.6 Limitations of procedure and validation of results:

6.6.1 Sample clotting due to improper anticoagulation or improper mixing.

6.6.2 Sample contamination by (air, improper anticoagulant concentration, saline or other fluids venous blood.

6.6.3 Delay in sample analysis.

6.6.4 Incomplete clearance of analyzer calibration gases and previous waste or flushing solution.

6.6.5 Laboratory procedures and personnel are in compliance with quality control and recognized proficiency-testing programs.

6.6.6 The labeling of the blood sample container should be rechecked for patient's full name, medical record number (patient identifier), date and time of acquisition, and measured FIO2.

6.6.7 The arterial blood sample should be placed on ice during transport to the lab and then analyzed as quickly as possible

6.7 <u>Assessment:</u>

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6.7.1 If patient is receiving oxygen, check that therapy has been underway for at least 15 minutes before obtaining ABGs.

6.7.2 Assess if patient has received a nebulizer treatment recently. If so, wait 20 Minutes after completion of treatment before obtaining ABGs.

6.8 Procedure :

6.8.1 Obtain needed equipment.

6.8.1.1 Non-sterile gloves.

6.8.1.2 ABG syringe.

6.8.1.3 23 gauge X 1 needle with protector device.

6.8.1.4 Alcohol prep pads.

6.8.1.5 2 × 2 inch sterile gauze.

6.8.1.6 Patient label.

6.8.1.7 Plastic hazard bag with ice.

6.8.1.8 Adhesive bandage.

6.8.1.9 Sharp object container.

6.8.2 **Perform modified Allen's test**: The Allen's test or modified Allen's test are bedside tests that can be performed in patients undergoing radial artery puncture to demonstrate collateral flow from the ulnar artery through the superficial palmar arch.

Modified Allen's test – The patient's hand is initially held high with the fist clenched. Both the radial and ulnar arteries are compressed firmly by the two thumbs of the investigator. This allows the blood to drain from the hand. The hand is then lowered and the first is opened (the palm will appear white). Overextension of the hand or wide spreading of the fingers should be avoided because it may cause false-normal results. The pressure is released from the ulnar artery while occlusion is maintained on the radial artery. A pink color should return to the palm, usually within 6 seconds, indicating that the ulnar artery is patent and the superficial palmar arch is intact. Although the timing of return of circulation to the palm varies considerably, the test is generally considered abnormal if ten seconds or more elapses before color returns to the hand.

Release the occlusive pressure on the ulnar artery only to determine whether the modified Allen test is positive or negative.

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- **Positive modified Allen test** – If the hand flushes within 10 seconds it indicates that the ulnar artery has good blood flow; this normal flushing of the hand is considered to be a positive test.
- **Negative modified Allen test** – If the hand does not flush within 10 seconds, it indicates that ulnar circulation is inadequate or nonexistent; in this situation, the radial artery supplying arterial blood to that hand should not be punctured.
- **The Allen's test** (from which the modified Allen's test evolved) is performed identically, except these steps are executed twice: once with release of pressure from the ulnar artery while occlusion is maintained on the radial artery, and once with release of pressure from the radial artery while occlusion is maintained on the ulnar artery.

6.8.3 The skin over the puncture site is cleaned with 70% isopropyl alcohol or other

Suitable antiseptic solution.

6.8.4 Palpate the site trying to stabilize the artery. Slight hyperextension of the wrist or elbow can be achieved by placing a rolled up towel under the joint; this can aid palpation and stabilization of the artery.

6.8.5 One or two fingers should be used to gently palpate the artery while holding the Needle in the other hand. Both fingers should be proximal to the desired puncture site; placing the nondominant middle finger distally and the nondominant index finger proximally, with the needle insertion site in between, is not recommended, because of the increased risk of needle stick injury .

6.8.6Hold the syringe so the bevel of the needle faces upward, keeping the needle at a 30° to 45° angle to the artery. Insert the needle through the skin into artery taking care not to puncture the posterior wall of the artery (if any venous blood is obtained the procedure should be restarted with a new syringe). If the artery is not entered immediately, the needle may be slightly pulled back then redirected into the artery, for patients with poor distal perfusion (e.g.hypovolemia, shock, vasopressor therapy) who may exhibit a weak arterial pulse, the operator may need to pull back the syringe plunger.

6.8.7 Arterial pressure should cause the blood to flow into the syringe.

6.8.8 Withdraw the needle when an adequate sample has been obtained. Immediately place dry gauze or cotton over the puncture site and apply pressure.

6.8.9 Maintain pressure over puncture site for a minimum of 5 minutes (longer if the patient has taken aspirin or anticoagulants).

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6.8.10 Single-handedly cap needle then remove from syringe.
6.8.11 Expel any air bubbles from the sample and cap the syringe.
6.8.12 Mix sample by rolling and tilting syringe.
6.8.13 The puncture site should be compressed for a minimum of 5 minutes, longer if the patient is taking anticoagulant therapy, aspirin or has a prolonged prothrombin time.
6.8.14 Record initials, time and date of collection, percent of oxygen therapy, Respiratory rate and ventilator settings , as well as the patient temperature
6.8.15 Sample should be analyzed as soon as possible within 15 minutes with or without ice and not more than 5 minutes for shunt study and elevated leukocyte or platelet count.

6.9 Infection control:

6.9.1 Universal Precautions must be applied in all circumstances involving blood or blood contaminated collection devices in the immediate area.
6.9.2 Aseptic technique must be employed whenever blood is sampled from an indwelling arterial catheter.
6.9.3 Prior to a single puncture, the site should be cleaned.
6.9.4 Blood specimens, contaminated needles, and syringes must be disposed of in appropriate containers.
6.9.5 Needle sticks are the most frequent source of transmission of blood-borne diseases in health care workers.
6.9.6 Needles used for blood sampling should be resheathed only with a technique that utilizes a one-hand device or by careful insertion into a cork, rubber plug, or similar device that prevents the sharp point from being accessible.
6.9.7 The needle should remove from the syringe and the syringe capped.
6.9.8 Gloves provide little protection from needle punctures but should be worn to prevent splashing of blood on sores or other skin breaks.
6.9.9 Specimen sampling devices in which the needle retracts after use are recommended when the design does not interfere with obtaining the sample.

7- Forms and Document:

None

8- References:

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