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REVIEW

Easy blood gas analysis: Implications for nursing



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KEYWORDS

Arterial blood gases;
Arterial puncture;
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Acid base imbalance;
Oxyhaemoglobin Dissociation Curve

Abstract Arterial blood gas analysis is a common investigation in emergency departments and intensive care units for monitoring patients with acute respiratory failure. It also has some applications in general practice, such as assessing the need for domiciliary oxygen therapy in patients with chronic obstructive pulmonary disease. An arterial blood gas result can help in the assessment of a patient's gas exchange, ventilatory control and acid–base balance. Nurses are usually involved in taking and analyzing the ABGs and normally they report these results to the doctors or anesthesiologists. Out of these results the anesthesiologists will then prescribe further treatment for the critically ill patient. Hence, it is important that nurses are familiar with the information obtained to be able to detect the disturbances in ventilation, oxygen delivery and acid–base balance.

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Abbreviations ABGs, arterial blood gases; ODC, Oxyhaemoglobin Dissociation Curve

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Introduction

Arterial blood gas analysis is a common investigation in emergency departments and intensive care units for monitoring patients with acute respiratory failure. It also has some applications in general practice, such as assessing the need for domiciliary oxygen therapy in patients with chronic obstructive pulmonary disease. An arterial blood gas result can help in the assessment of a patient's gas exchange, ventilatory control and acid–base balance [1]. However, the investigation does not give a diagnosis and should not be used as a screening test. It is imperative that the results are considered in the context of the patient's symptoms. While non-invasive monitoring of pulmonary function, such as pulse oximetry, is simple, effective and increasingly widely used, pulse oximetry is no substitute for arterial blood gas analysis [2,3]. Pulse oximetry is solely a measure of oxygen saturation and gives no indication about blood pH, carbon dioxide or bicarbonate concentrations [4].

The arterial blood gas (ABG) is frequently used for monitoring the patient's respiratory status and ABGs can be sampled as an arterial stab or by drawing blood from an arterial line. Knowledge about interpretation of ABGs is consequently essential for nurses who are working in ICU, to be able to analyze each component of the ABGs to avoid overlooking a change that could result in an inaccurate interpretation and lead to inappropriate treatment. All over the world nurses in ICU use considerable time in drawing, documenting, reporting and interpreting blood gases. Blood gases can be obtained from the arteries, veins or capillaries [1,3].

Arterial blood gases are analyzed with a great frequency. Nurses are usually involved in taking and analyzing the ABGs and normally they report these results to the doctors or anesthesiologists. Out of these results the anesthesiologists will then prescribe further treatment for the critically ill patient. Hence, it is important that nurses are familiar with the information obtained to be able to detect the disturbances in ventilation, oxygen delivery and acid–base balance [5].

Arterial puncture

Blood is usually withdrawn from the radial artery as it is easy to palpate and has a good collateral supply. The patient's arm is placed palm-up on a flat surface, with the wrist dorsiflexed at 45°. A towel may be placed under the wrist for support. The puncture site should be cleaned with alcohol or iodine, and a local anesthetic (such as 2% lignocaine) should be infiltrated. Local anesthetic makes arterial puncture less painful for the patient and does not increase the difficulty of the procedure. The radial artery should be palpated for a pulse, and a pre-heparinized syringe with a 23 or 25 gauge needle should be inserted at an angle just distal to the palpated pulse (Fig. 1) [6]. A small quantity of blood is sufficient. After the puncture, sterile gauze should be placed firmly over the site and direct pressure applied for several minutes to obtain hemostasis. If repeated arterial blood gas analysis is required, it is advisable to use a different site (such as the other radial artery) or insert an arterial line. To ensure accuracy, it is important to deliver the sample for analysis promptly [7]. If there is any delay in processing the sample, the blood can be stored on ice for



Figure 1 Performing an arterial puncture.

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