

BLOOD GAS COLLECTION (ARTERIAL AND VENOUS)

1. Purpose

This document covers arterial and venous blood gas collection, performed by Alfred Pathology Service phlebotomists.

2. Scope & Responsibilities

Alfred Pathology Service (APS) phlebotomists are only permitted to perform arterial blood gas (ABG) collections in the Alfred Hospital outpatient collection rooms.

Staff performing an ABG must:

1. have received specific training for ABG collections.
2. be signed off as competent by the collection supervisor.

An ABG is a blood test that requires a blood sample taken from an artery to measure the levels of oxygen and carbon dioxide in the blood. The test also checks the balance of acids and bases, or pH balance in the blood.

The test is relatively simple and complication free, provided the collector follows the documented procedure carefully to minimize risk to the patient.

If a patient presents to the outpatient rooms for an ABG and there are no trained staff on duty, the supervisor or collection coordinator must be contacted.

A venous blood gas (VBG) can be collected by all trained APS phlebotomists in both the outpatient rooms and on the inpatient wards.

Collectors must adhere to Aseptic Technique guidelines and all other relevant APS and Alfred Health policies when performing blood gas collections.

3. Description

ABG – Arterial Blood Gas

VBG – Venus Blood Gas

CSR – Central Specimen Reception

APS – Alfred Pathology Service

4. Pre-ABG Collection

4.1 Correct Site Selection

The artery is located deep within the patient's wrist and should not be confused with a superficial vein.

Do not perform an ABG if a patient has had any arterial surgery, or has had arteries removed from their wrist.

An ABG cannot be performed on an arm with fistulae.

BLOOD GAS COLLECTION (ARTERIAL AND VENOUS)

4.2 Avoiding Erroneous Results

Erroneous results can be caused by the following conditions:

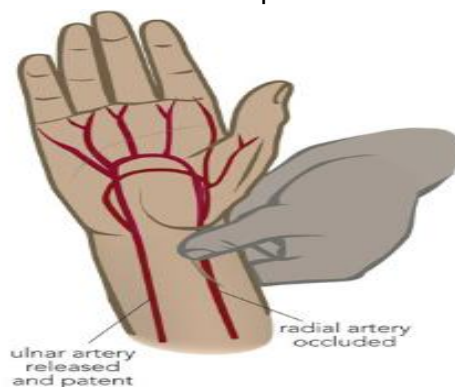
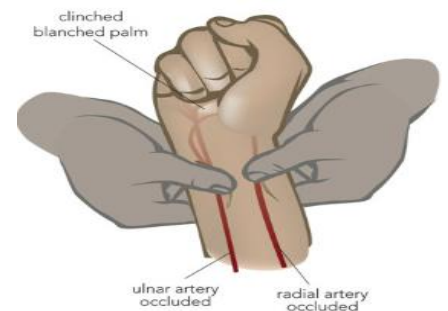
- **Temperature** - ensure the sample is kept between 1- 4°C, post collection, as it will affect the pCO₂, pO₂ and acid-base status.
- **Incorrect vessel** - Arterial blood is bright red in colour, while venous blood is darker. Consider that patients who are acutely unwell or cyanotic (blue tinge to skin) might have poorly oxygenated arterial blood, which will also appear dark.
- **Air- pockets of air** - Bubbles trapped in the syringe can distort the results of the test. Remove any bubbles in the sample by tapping them to bring them to the top of the syringe, where they can be plunged out.
- **Incorrect equipment/ syringe additive** - Heparin is the accepted anti-coagulant for ABG collection.

4.3 Perform Allen's Test

Assess the blood flow to the patient's hand by performing an **Allen's Test**. Allen's test has to be formed before the collection of ABG sample.

To perform an Allen's Test:

1. Place a rolled towel under the patient's wrist to get a better feel of their arteries.
2. Locate the radial and ulnar arteries.
3. Pressure is applied directly at the wrist - compressing and obstructing both the radial and ulnar arteries for 20 - 30 seconds.
4. The patient clenches their fist. The hand is observed for colour change from pink to pale (or "blanching" of palm).
5. The patient releases their hand.
6. The collector releases pressure from the ulnar artery only as shown in the below pic.



7. Observe the palm, fingers and thumb- they should become flushed (pink) within 15 seconds. **This constitutes a positive Allen's Test.**
8. **The RADIAL ARTERY at the wrist meets the above criteria as being the safest and most accessible site for arterial puncture.**

BLOOD GAS COLLECTION (ARTERIAL AND VENOUS)

9. If the ulnar artery does not adequately supply the entire hand (i.e. a negative Allen's Test), that radial artery should not be used. Check the other hand - if neither hand is suitable, contact the referring doctor to indicate that you cannot proceed with the collection.
10. Once the appropriate hand has been selected, the collection can proceed.

5. Preparation and Collection

If the patient is on oxygen, document the dose on the request slip.

ABGs requested as 'ABG on room air' will require the patient's oxygen to be turned off for 10 minutes prior to the collection.

The collector is to document if the patient is on any anticoagulants - if they are, the puncture site will take longer than usual to clot. Outpatient collections require the patient remain in the rooms until the site has completely stopped bleeding.

Tourniquets are NOT required for an ABG collection.

5.1 ABG Preparation

1. Perform positive patient identification. Refer to Patient Identity Verification (Prompt Doc No: [AHG0079226](#)).
2. Gather equipment - 23 (blue) gauge needle, blood gas syringe and a cup of ice. Prime the syringe plunger to 1.5ml.
3. Explain the procedure to the patient and ask them to be seated in a comfortable position. The patient's wrist should be resting on a stable surface, where their position can be maintained without effort.
4. Position yourself so that your dominant hand can rest firmly and comfortably on the patient's hand.

5.2 ABG Collection

1. Find the patient's radial artery – palpate artery and check to see if it is likely to roll or move.
2. Insert needle to palpated artery at a **45-90° angle**. When the needle reaches the artery, arterial blood will fill the syringe. Do not pull the plunger.
3. Wait for the blood to fill 1.5ml, or as much as possible.
4. Once the syringe is filled to the desired amount, take the needle out and apply firm pressure on artery for a minimum of 5 minutes, and up to 15 minutes.
5. Apply a bandage to the wrist, post collection, and instruct the patient remove it after one hour. ([CSC DDP010](#) Post Blood Collection Instructions)



BLOOD GAS COLLECTION (ARTERIAL AND VENOUS)

5.2 Complications associated with ABG Collection

During or after this procedure a patient might encounter the following:

1. Bleeding / haematoma formation.
2. Vessel obstruction caused by a clot, resulting in loss of circulation to digits.
3. Infection.
4. Arterial spasm.

6. VBG Collection

VBGs are collected at the end of the draw (placed last in the order of draw). Perform the collection with a butterfly needle only.

6.1 Preparation

1. Gather equipment – butterfly needle and blood gas syringe. Prime the butterfly needle prior to collection by loosening the barrel end. Have a cup of ice ready.
2. Vein selection – optimal blood flow is required for VBG, as the blood gas syringe has no vacuum.

6.2 Collection

1. Collect all other specimens as normal, following the correct order of draw. If no other tubes are required, draw a plain 'purge' tube, to fill the butterfly line.
2. Once all specimens have been collected, obstruct the flow of blood through the butterfly line by using your fingers or a clamp to pinch the line.
3. Remove barrel and the barrel end of the needle. Ensure the tourniquet is loosened.
4. Attach the blood gas syringe. Slowly draw back on the plunger, matching the speed of blood filling the syringe- the tourniquet may need to be retightened to assist the blood flow. Allow blood to fill to 1.5ml.
5. Once the syringe is filled to about 1.5ml, loosen the tourniquet and remove the needle from the patient's arm. Dress the puncture site appropriately.

7. Specimen Handling (ABG / VBG)

1. Remove the needle and discard into sharps disposal.
2. Hold the syringe with plunger facing down. Gently tap on the syringe and push the air bubbles out as much as possible without splashing blood.
3. Carefully place the cap on the syringe- hold the cap while gently pressing the plunger so the heparinised cap is filled with blood. Be careful not to push too hard.
4. Push the cap firmly once the top chamber is filled with blood.
5. Roll syringe or wave in figure 8 motion for approximately 1 minute to thoroughly mix with heparin bead in syringe.
6. Label and sign (or e-sign) the specimen.

BLOOD GAS COLLECTION (ARTERIAL AND VENOUS)

7. Place the sample in an ice slurry & hand deliver with their request form marked URGENT to CSR immediately- ensure the specimen is handed directly to reception staff for immediate processing.
8. VBGs collected on Caulfield and Sandringham wards are transported on ice - it must be couriered down to CSR.
9. At Alfred Hospital wards, collectors can send blood gas specimens to us via the chute without ice. Send this sample down in an individual canister promptly post collection.

8. Related Documents

CD_SP_0327_Patient ID Verification Specimen Collection

[CD_SP_0075](#) Difficult Venepunctures Guidelines for APS collection staff.

[CSC_POL_009](#) Sites to Avoid for Venepuncture

[CSC_DDP010](#) Post Blood Collection Instructions

[CSC_POL_002](#) Ice Machine Instruction.

Alfred Health Guideline “Patient Identity Verification” Prompt Doc No: [AHG0079226](#)

Hand Hygiene (Prompt Doc No.: [AHG0080793](#))

Aseptic Technique (Prompt Doc No.: [AHG0001175](#))

Patients Requiring language Services (Prompt Doc No: [AHG0066856](#))

Blood Culture Collection: Adult (Prompt Doc No: [AHG0066884](#))

Venepuncture (Prompt Doc No: [AHG0066925](#))