1. Introduction and Who Guideline applies to

1.1 This document sets out University Hospitals of Leicester (UHL) NHS Trust procedure for taking an arterial blood gas sample via a radial artery in adults with the aim to provide safe and effective care and prevent infection caused by the introduction of micro-organisms

1.2 This procedure uses the principles of Aseptic Non-Touch Technique (ANTT) and protecting the key parts

1.3 The ABG is used to evaluate respiratory diseases and conditions that affect the lungs. It is used to determine the effectiveness of oxygen therapy. The acid-base component of the test also gives information on how well the kidneys are functioning and metabolic components.

1.4 This procedure applies to all Medical Staff involved in undertaking this procedure including those on a Bank or Locum Contract.

1.5 This procedure applies to non-medical practitioners (for example (not a definitive list) Nurses, ODP's and Physiotherapists in advanced / specialist roles and Physician Associates) working within the Trust who have been authorised by their line manager to carry out this activity as an integral part of the key responsibilities within their role, it is included in their job description/role competencies and not considered outside their scope of professional practice.

1.6 To undertake this skill all staff must undergo training and a period of supervised practice and deemed competent. See Section 3 for training requirements

2. Guideline Standards and Procedures

2.1 Key Parts of the Procedure

Key parts are items which come into contact with broken skin or mucosal layers creating a potential portal of entry for micro-organisms. They include: Syringe tip, Needle.

No.	2.2 Procedure for Arterial Blood Gas Sampling via Radial Artery in Adults
1.	**Pre Procedure**
1.1	Clean hands, as per UHL hand hygiene policy (B32/2003) Check hands for any visibly broken skin and cover with a waterproof dressing Put on a plastic apron and clean gloves from a dedicated box (e.g. one that has not been kept in the sluice) You only need to wash rather than use alcohol hand rub on your hands if you have been in contact with bodily fluids, an infected patient or your hands are visibly soiled Clean both sides of a large plastic tray with Chlorclean, starting on the inside and then the outside, the tray will be the aseptic field for the procedure. Either allow to air-dry (for a minimum of three minutes) Alternatively dry the tray with paper towels and then disinfect using 70% Industrial Methylated Spirits Remove gloves and apron, clean hands
1.2	Assemble necessary equipment. To enable procedure to be performed safely and effectively Equipment required: • Heparinised arterial sampling syringe/22G needle • Non-sterile gloves • Cotton wool balls/gauze swab • 2% Chlorhexidine Gluconate in 70% alcohol skin cleaner • Non sterile cleanable plastic tray

No.	2.2 Procedure for Arterial Blood Gas Sampling via Radial Artery in Adults
1.3	Identify correct patient to undergo arterial blood gas sampling.
1.4	Approach the patient in a confident manner, Clean hands when entering the patient zone Confirm the patients identity as per the UHL Patient ID Policy (Trust reference number B43/2007)
1.5	Explain and discuss the procedure with the patient / family / carer. Allow the patient to ask questions and discuss any problems that may have arisen previously and establish consent to perform the procedure
1.6	Check allergy status of patient, including skin preparation, dressings, latex, medications
1.7	Ensure there is sufficient lighting, ventilation and privacy to perform the procedure Support the chosen arm with a pillow Protect the patient's clothing and surrounding area with drape.
1.8	Before contact with the patient clean hands. Check for contraindications – do not perform through a lesion, infected site or distal to an ipsilateral surgical shunt. Caution in coagulopathy. Identify the radial artery and site for sample taking into consideration any specific sites that should be avoided, discuss with the patient any preferences- re, dominant hand, previous trauma, patient experience and perform the Allen's Test. **Allen's Test** The radial and ulnar arteries are occluded by firm pressure while the fist is clenched. The hand is opened and the arteries released one at a time to check their ability to return blood flow to the hand. Healthcare professionals should have appropriate expertise and training before other puncture sites are to be consider due to patient safety considerations (e.g. femoral site has a higher potential risk for infection)
1.9	If clinically indicated apply local anesthetic cream (AmetopTM) or injecting local anaesthetic over artery to the potential sample site(s) to minimize pain. This may be beneficial for some groups of patients who may find obtaining the sample a distressing experience. The local anesthetic cream/injection must be prescribed
1.10	Fully record the patients inspired oxygen concentration. Changes to inspired oxygen alter the change in PaO_2, the degree of hypoxia cannot be assessed without knowing the inspired oxygen concentration. (Check that oxygen concentration has remained constant for at least 30 minutes before sampling, unless emergency situation)
1.11	Record patient's temperature as changes in temperature can influence oxygen released from haemoglobin
2	**During the Procedure**
2.1	Ensure the patient is in a comfortable position with the wrist extended 20-30° with the radial artery easily accessible and palpable.
2.2	Perform an Allen's test if you have not already done so to ensure that there is sufficient blood flow to the hand as caution must be taken with patients who have peripheral vascular disease. In cases where a negative Allen's test is performed seek further medical advice.
2.3	Clean hands and put on apron and gloves

No.	2.2 Procedure for Arterial Blood Gas Sampling via Radial Artery in Adults
2.4	Palpate the artery with three fingers to locate point of maximum pulsation. This facilitates access and ensures minimum discomfort to the patient. Clean the patient's skin carefully using a 2% chlorhexidine gluconate in 70% alcohol wipe or ChoraPrep, rubbing for at least 30 seconds and allow to dry naturally without fanning, blotting or blowing the skin.
2.5	Remove the cover from the needle and inspect the device carefully for any defects, expel excess heparin if required (be familiar with the particular product used in your clinical area) Re-palpate artery, using gloved fingers, close to intended insertion site to re-ascertain land marks. Do not re-palpate intended needle insertion site.
2.6	Advance the prepared syringe with needle bevel up at about 45-60 degrees to skin surface. This facilitates optimal arterial access and ensures minimal discomfort to the patient. Needle to be inserted slowly to prevent arterial spasm. Insert only through cleaned and not re-palpated skin.
2.7	After a minimum of 2ml arterial blood is obtained withdraw needle and apply direct pressure to puncture site for five minutes or longer for warfarinised / heparinised patients or if the site continues to bleed. This will reduce the risk of haematoma formation and ensure patient safety.
2.8	If ABG procedure is unsuccessful after 2 attempts seek expert advice and assistance – new ABG syringe MUST be used after each attempt.
3	**After the Procedure**
3.1	Activate needle safety device as applicable to syringe used. Dispose of the needle safely in sharps bin in accordance to UHL Waste management policy.
3.2.	Ensure the patient is comfortable and they know how to contact staff if they have any concerns
3.3	Follow manufacturer's guidelines for preventing air entry /contamination to the syringe contents.
3.4	Remove gloves and apron and dispose as clinical waste, clean hands before leaving patients side
3.5	Label the syringe with the patients' addressograph noting the time, date, inspired fi02 and temperature – this information will need to be entered into the analyser. Transport sample to analyser within five minutes. For transportation taking longer than five minutes the sample must be placed on ice to reduce the risk of misleading results. Note that if staff are using a networked blood gas machine then the results will be available on ICE.
3.6	Document procedure, results and any actions taken upon the results in the patient's case notes, communicate with the medical Team outreach nurse chest physiotherapist or other relevant staff (this is not an exhaustive list) to promote patient safety and deliver required therapy as per the UHL Oxygen prescription/administration policy (Trust reference number B27/2010)
4	**Aftercare**
4.1	Ensure patient has regained normal movement and sensation of hand and fingers post procedure. If there is any doubt about this the practitioner must seek immediate medical advice.

3.Education and Training

3.1 Staff undertaking this procedure must have had the necessary training and assessment of competence using a suitable competency assessment tool such as Leicester Clinical Assessment Tool (LCAT) or Direct Observation of Supervised Practice (DOPS)

3.2 Medical students (at Leicester University) need to attend a theory session provided by Clinical Skills and complete their Direct Observation of Supervised Practice Book (DOPS book).

ABG sampling is integral to Medical training and is also covered through FY1/2 curriculum.

3.3 Non-Medical Practitioners as defined in section 1.5 wishing to undertake this procedure must do the following:

a) Complete the free E-Learning for Healthcare module "08_05 Arterial Blood Gas Sampling and Interpretation" – quick link 000-1017accessed via https://www.e-lfh.org.uk/

b) Observe a practical demonstration and undertake a period of supervised practice within their clinical environment, completing a minimum of three summative supervised assessments

c) Complete a final competency assessment overseen by a competent expert practitioner.

d) This skill must be recorded as a competency on HELM

3.4 Staff new to the Trust who have been trained elsewhere must:

a) Provide evidence of the training and assessment programme they have successfully completed

b) Comply with the relevant Trust policies and guidelines and undertake additional training relating to equipment and documentation as required

c) Undertake a one off practical assessment by an appropriate assessor within own CMG/Ward/Unit if deemed necessary or insufficient evidence of previously competence provided

4.Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
Incidents reported on Datix of incorrect procedure followed	Via DATIX reports provided to CMG's	CMG Quality and Safety Board (as per usual DATIX Reporting Process)	As reported	CMG Quality and Safety Board

5.Supporting References (maximum of 3)

H.P. Loveday et al (2014) epic3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England, Journal of Hospital Infection, Elsviere, London

6.Key Words

ABG, arterial stab

CONTACT AND REVIEW DETAILS	
Guideline Lead (Name and Title) **Lee Rowley, Clinical Skills Unit Manager**	**Executive Lead:** **Andrew Furlong, Medical Director**
Details of Changes made during review: Feb 2023 - Procedure Table – Section 1.5 included establishes Consent, Section 1.8 incorporated Allen's Test into checking for contraindication section, Section 2.2 move Allen's Test Defintion to Section 1.8.	