

Blood Culture Sampling Policy for Adult and Paediatric Patients

Trust reference		Version number	8.0
Description	This policy lists indications for taking blood cultures and describes how to carry out the procedure in adult and paediatric patients.		
Level and type of document	Level 1		
Target audience	All Clinical Staff		
List related documents / policies (do not include those listed as appendices)	<ul style="list-style-type: none"> • Standard Infection Control Precautions Policy • Standard Principles for the use of Personal Protective Clothing Policy • Sharps Safety Policy • Waste Management Policy • Hand Hygiene Policy • Venepuncture – Adults (over 18 years) and Children (16-18 years) • Venepuncture in children (0-18 years) Policy • Aseptic non touch technique Policy • Incident reporting and management Policy • Adult Sepsis Screening and Action Tool/ Escalation of clinical deterioration form 		
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1 Version control

Date	Author(s)	Version created	Approval committee	Date of approval	Date next review due	Key changes made to document
Feb 2022	Sarah Jeremiah	8.0	Infection Prevention Committee	25.03.2022	25.03.2025	Reformatted to new format. Change Chloraprep SEPP to Chloraprep due to discontinuation of SEPP. MEWS changed to NEWS2.

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3 Executive summary/introduction

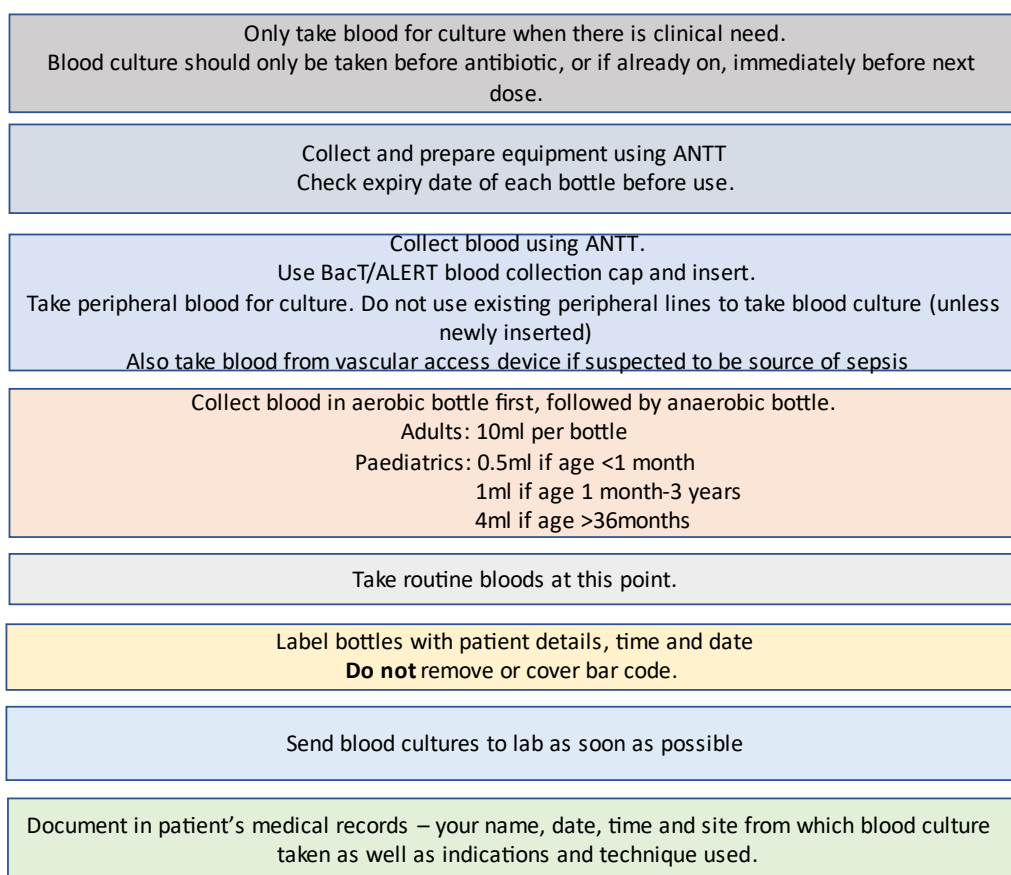
Blood culture is considered to be the “gold standard” investigation for the detection of micro-organisms in blood. The culture of micro-organisms from blood is essential for microbiological diagnosis of bacteraemia, fungaemia, infective endocarditis and conditions associated with a clinical presentation of pyrexia of unknown origin. Blood culture is also important for the diagnosis of prosthetic device infections (e.g. joints and vascular grafts) and intravascular line-associated sepsis. Blood cultures may also detect bloodstream infections associated with other conditions such as pneumonia, septic arthritis and osteomyelitis.

The result provides a guide to the appropriate treatment of the patient. False positives may occur if micro-organisms from a site outside of the bloodstream are introduced into the sample of blood obtained for culture which can then result in inappropriate antibiotic therapy and a waste of healthcare resources. False negatives may also occur if inadequate volumes of blood are put into the blood bottles.

If the incorrect technique is used when taking the blood cultures there is an increased risk of sharps or splash injuries.

This policy describes the indications for collecting blood for culture and provides instructions on how to carry out the procedure safely, reducing the risk of sharps injury and contamination of the sample.

Summary flowchart:



4 Scope and purpose

This policy applies Trust wide across University Hospital Southampton NHS Foundation Trust, to all staff who carry out the procedure of adult and paediatric blood culture sampling.

The objectives of this Policy are:

- To ensure patients have blood cultures taken only when a need is indicated
- To minimise the risk of contaminated blood culture samples by using the correct technique for blood culture sampling
- To reduce the risk of sharps or splash injuries by using the correct technique for blood culture sampling
- To ensure documentation of appropriate information is documented for each blood culture taken

5 Definitions

Aseptic Technique: Clinical practices used to protect the patient from microorganisms by preventing contamination of wounds, manipulated devices and other susceptible sites. Aseptic technique involves the use of appropriate hand hygiene, use of sterile equipment and robust patient skin / site decontamination.

Aseptic non touch technique: A specific type of aseptic technique adopted by the trust as standard approach.

Bacteraemia: The presence of bacteria in the bloodstream.

Contaminant (false positive): Organism inadvertently introduced into the sample from the environment, skin of the practitioner or patient's skin, which leads to a false positive result.

Culture and sensitivity: A microbiological investigation to assist in the clinical management of the septic patient, identification of the causative organism and antibiotic sensitivity profiles will inform effective antibiotic therapy.

Sepsis: Clinical evidence of infection in the presence of a systemic inflammatory response.

Red Flag Sepsis: Refer to the Trust Adult Sepsis Screening and Action Tool or the Escalation of clinical deterioration form and the Wessex Paediatric Critical Care Network Paediatric Sepsis Screening Tool.

Red Flag Sepsis in Adult patients: Consider infection in patients with a NEWS2 of 5 or more or where there is clinical concern. If infection is possible and one or more red flag features, seek urgent registrar or consultant review, refer to Critical Care Outreach Team and complete Red Flag Sepsis Six actions **including blood cultures** (see Trust Adult Sepsis Screening and Action Tool/ Escalation of clinical deterioration form).

Red Flag Features

- Systolic BP \leq 90mmHg
- Heart Rate >130 per minute
- Respiratory Rate \geq 25 per minute
- Increased Oxygen to maintain SpO₂
- Alteration in mental state
- Mottled / ashen appearance, or non-blanching rash
- Lactate >2 mmol/L
- Suspected severe immunosuppression

Red Flag Sepsis in Children: The 2+1 criteria

Look for 2 of:

- Temperature <36 or $>38.5^{\circ}\text{C}$ ($>38^{\circ}\text{C}$ for oncology patients)
- Tachycardia*
- Tachypnoea*

Plus 1 of:

- Altered mental state (sleepy, floppy, lethargic or irritable)
- Mottled skin OR prolonged capillary refill time OR 'flash' capillary refill time
- Clinical concern regarding possible sepsis (seek review if significant concern, even if trigger criteria not met)

*Age-appropriate PEWS						
Age	<1yr	1-2yrs	3-5yrs	6-11yrs	12-16yrs	16+
Tachycardia = Heart rate:	>160	>150	>140	>120	>100	>90
Tachypnoea = Respiratory rate:	>50	>50	>40	>25	>20	>20

Are 2+1 criteria present? IF YES, THINK SEPSIS: This is an emergency. Immediate Senior Clinician review (ST4+) and follow Sepsis 6 actions **including blood cultures** (see Wessex Paediatric Critical Care Network Paediatric Sepsis Screening Tool).

Vascular Access Device: Any device utilised to gain access to the vascular blood system, including peripheral cannulae, central venous catheters, peripherally inserted central catheters (PICC).

6 Details of policy

6.1 Indications for taking blood cultures

A blood culture should only be taken if there is a clinical need to do so and the result will affect patient management. A blood culture should not be taken if there is no intention to treat (e.g. terminally ill).

In any severe bacterial infection, organisms may enter the blood stream from the original site of infection (bacteraemia). Bacteraemia may result in a systemic inflammatory response, seeding of distant sites or most severely an overwhelming septic shock, which carries a significant mortality. Sampling blood for cultures allows identification of bacteria involved and their sensitivity to antibiotics.

There are many signs and symptoms which may suggest bacteraemia and clinical judgement is required but the following indicators should be taken into account when assessing a patient for signs of bacteraemia or sepsis:

- Unexplained deterioration in the patient's condition and clinical suspicion of bacteraemia
- Red Flag Sepsis
- Core temperature out of normal range
- Focal signs of infection
- Abnormal heart rate (raised), BP (low or raised) or respiratory rate (raised)
- Chills or rigors
- Raised or very low WBC
- New or worsening confusion

NB. Signs of sepsis may be minimal or absent in the very young and elderly.

Blood cultures should be taken **after** identification of possible bacteraemia or sepsis and **before** the administration of antibiotics. If a patient is on antibiotics, blood cultures should ideally be taken immediately before the next dose, with the exception of paediatric patients.

6.2 Actions Required

Each individual practitioner is responsible for preventing microbial contamination by maintaining the principles of asepsis throughout the blood sampling procedure. Blood culture sampling should only be undertaken by members of staff who have been trained in the collection procedure and whose competence in blood culture sampling has been assessed.

6.3 Blood Culture Sampling Procedure (Appendix B)

In adults with suspected bacteraemia, it is generally recommended that two sets of cultures are taken at separate times from separate sites. (A blood culture set for diagnosing bloodstream infection is defined as 1 aerobic and 1 anaerobic bottle.)

Blood cultures should always be taken using a new venepuncture site. **Do not** use existing peripheral lines / cannulae (unless at the time of insertion) or sites immediately above peripheral lines. The only exception to this is if it is believed that a central line may be the source of bacteraemia. It is then appropriate to take blood from both the central line and from the peripheral vein.

Do not take bloods from a lumen through which parenteral nutrition is running as this increases the risk of infection occurring.

Blood cultures should not be taken from the femoral vein as it is very difficult to disinfect the skin adequately, so there is a high risk of contamination.

6.4 Preparation

- Blood culture sampling must be undertaken or supervised by a trained, experienced, competent practitioner.
- Discuss the procedure with the patient and gain their consent.
- The sampling should preferably take place in an environment that is clean, free from extraneous items such as patient belongings and readily cleanable if a blood spillage occurs.
- All equipment for procedure should be assembled on a clean tray or trolley and expiry dates checked. List of equipment required can be found in Appendix: A.
- Perform hand hygiene as per policy at the appropriate stages i.e. wash hands with soap and water and dry thoroughly, or apply alcohol gel to visibly clean hands.
- A personal protective equipment (e.g. apron, facial protection) risk assessment should be undertaken prior to commencing the procedure and the correct equipment selected and worn.
- Wearing of clean (non-latex) gloves rather than sterile gloves is acceptable for this procedure **if** the puncture site is not touched after the application of skin antiseptics and the procedure can be carried out without touching key parts.
- Place disposable tourniquet on limb to be used for sampling.
- Select the site of venepuncture, palpate as required to confirm site for venepuncture. (Femoral veins should be avoided because of the difficulty in adequate skin cleansing and disinfection (DH 2007).)

6.5 Skin Preparation

Thoroughly cleanse the patient's skin before venepuncture using soap and water if visibly soiled. Wipe the venepuncture site gently but firmly with 2% chlorhexidine in 70% isopropyl alcohol single use applicator (follow manufacturers' instructions). **This should be allowed to air dry. Do not repalpate the vein** following use of skin antiseptics.

6.6 Bottle Preparation

Prepare the culture bottles (anaerobic and aerobic) for inoculation. Flip the cap off each blood bottle and then disinfect the top of each culture bottle with a 2% chlorhexidine in 70% isopropyl alcohol impregnated wipe for medical equipment. Allow to air dry. Do not touch the top of the blood culture bottle once decontaminated.

6.7 Venepuncture and Bottle Inoculation

Direct Draw with blood collection set: Use the BacT/ALERT Blood collection Cap & Insert.

NB: Blood collection adapter caps should not be used without winged blood collection sets.

- Connect the Adapter Cap to the luer connector of the blood collection set.
- Perform venepuncture using ANTT; only the sterile needle tip should come into contact with the prepared venepuncture site.
- When the needle is in the vein, hold in place.
- Place Adapter Cap on the aerobic culture bottle septum and press down to penetrate and obtain blood flow. Hold the Adapter Cap down on the bottle.
- Using the fill indicator lines on the label, obtain the specified amount of blood. Move the Adapter Cap from the aerobic bottle to the anaerobic bottle and continue the collection.
- Routine bloods may be taken at this point.
- After blood collection is complete, remove the Adapter Cap from the culture bottle and then remove the needle from the patient's vein.
- Place needle and collection system in appropriate sharps bin.
- If necessary, use sterile gauze to stem bleeding and cover site with sterile gauze dressing or sterile adhesive plaster.

Taking blood from central venous access devices_(Appendix C, D and E)

Blood cultures should not normally be taken through a pre-existing central indwelling Vascular Access Device (VAD) **unless** sepsis is associated with the vascular device. In this case, a set of peripheral blood culture samples will be drawn simultaneously.

- The principles of ANTT must be adhered to throughout the procedure.
- Prior to blood sampling the access port of the VAD to be used to draw blood must be thoroughly decontaminated using 2% chlorhexidine in 70% isopropyl alcohol wipe. Allow to air dry prior to use.
- Collect blood sample from the line without pre-flushing using a vacutainer device.
Adults 20ml portion of blood is required per set of bottles.

Paediatrics: 0.5ml if age < 1 month
1ml if age 1 month to 3 years
4ml if age > 36 months
(the maximum fill volume for paediatric blood culture bottles is 4 ml)

- Apply a sterile needle directly on to syringe to inoculate the culture bottles.

6.8 Labelling

- Remove gloves, dispose of in clinical waste bag, and decontaminate hands.
- Label the blood bottles with patient details, time and date before leaving the patient, to prevent labelling errors. **DO NOT REMOVE OR COVER THE BARCODES.** Complete request form.
- The bottles and request form must be delivered to the laboratory by the specimen porter immediately.
- The sender of a specimen for culture is responsible for checking the culture result, and the patient's medical team should amend antimicrobial therapy accordingly.

6.9 Sharps injuries or contaminations

In the event of a splash or sharps injury, the Management of Sharps and Contamination Injury Policy must be followed. Wash the area with soap and water (for a sharps injury) or irrigate copiously with water (for a muco-cutaneous splash) and immediately call the sharps hotline extension 6353. Attend Occupational Health (or ED out of hours) at the earliest opportunity.

6.10 Documentation

After the blood culture has been taken, the person who has taken it must document in the patient's medical records:

- their name
- date
- time
- the site the blood was taken from
- indications
- the technique used.

If the sample was not taken using an adapter cap (the Trust's preferred method), the reason why should also be recorded.

6.11 Action Cards

Equipment required for taking a peripheral blood culture sampling can be found in Appendix A; the ANTT clinical guideline for peripheral blood culture collection can be found in Appendix B; and sampling from central venous access devices in Appendix C, D and E (paediatrics).

7 Roles and responsibilities

Chief Executive has overall responsibility and is accountable for ensuring that there is a managed environment, which minimises the risk of infection to patients, visitors and staff.

Chief Nursing Officer /Director of Infection Prevention & Control holds delegated Executive responsibility for the management and control of healthcare associated infection, including implementation of this policy.

Divisional and Care Group Management Teams are responsible for monitoring implementation of this policy and for ensuring action is taken when staff fail to comply with the policy.

Ward and Department Managers are responsible for ensuring that all possible measures are taken to reduce the spread of infection to patients, visitors and staff. All managers are responsible for ensuring this policy is implemented in their areas and for ensuring all staff who work within the area adhere to the principles at all times. All managers are responsible for ensuring that staff have access to up-to-date training to enable them to adopt safe working practices at all times and are appropriately trained to minimise risks to themselves and others.

Consultant Medical and Surgical staff are responsible for ensuring that all possible measures are taken to reduce the spread of infection to patients, visitors and staff. Consultant Medical and Surgical staff are responsible for ensuring their junior staff read and understand this policy, adhere to the principles contained in it at all times, access up to date training to enable them to adopt safe working practices at all times and are appropriately trained to minimise risks to themselves and others.

Microbiology Staff process microbiological specimens, providing immediate notification of a bacteraemia to the patient's clinician, this allows prompt identification of infection and subsequent investigation and treatment.

The Infection Prevention Team is responsible for the development and dissemination of this policy and for ensuring this policy remains consistent with the evidence-base for safe practice, and for reviewing the policy 3 yearly.

All staff working on Trust premises, including agency and locum staff are responsible for adhering to this policy and for reporting breaches of this policy to the person in charge and to their line manager.

Non-compliance with a Trust Policy, Procedure, PGD, protocol or patient information standard may result in disciplinary action after an appropriate investigation.

8 Communication and training plans

8.1 Communication and Dissemination Plan

- Policy update will be communicated via the Infection Prevention Newsletter and email alert.
- Divisional and care group leaders to cascade to all ward and department leaders
- Policy to be placed on Infection Prevention section of Staffnet

8.2 Education and Support Plan

- Skills for Practice will provide training on the updated policy in their routine sessions on taking blood cultures.
- All clinical areas will have an easily accessible copy of the ANTT clinical guideline for blood culture collection.
- All clinical staff will undertake ANTT theory training and be assessed competent in practice.

9 Equality impact assessment (for policies only)

Equality and diversity are at the heart of Trust values. Throughout the development of the policies, we give regard to the need to eliminate discrimination, harassment and victimisation, to advance

equality or opportunity, and to foster good relations between people who share a relevant protected characteristic (as cited in under the Equality Act 2010) and those who do not share it.

As part of its development this Blood Culture Sampling Policy for Adult and Paediatric Patients and its impact on equality has been analysed and no impact.

The Policy & Guidance Team hold all equality impact assessments centrally. These are available upon request from Policy&Guidance@uhs.nhs.uk

10 Document review

This Blood Culture Sampling Policy for Adult and Paediatric Patients will be reviewed by the Infection Prevention Team in the following circumstances:

- When new national or international guidance is issued
- When newly published evidence demonstrates need for a change to current practice
- Every 3 years routinely

11 Process for monitoring compliance

The purpose of monitoring is to provide assurance that the agreed approach is being followed. This ensures that we get things right for patients, use resources well and protect our reputation. Our monitoring will therefore be proportionate, achievable and deal with specifics that can be assessed or measured.

Key aspects of this policy will be monitored:

Element to be monitored	Compliance with all aspects of policy
Lead (name/job title)	Ward/ department/ Clinical leads, IPT
Tool	Post Infection Review (PIR) investigation tool
Frequency	When a contaminated blood culture sample is identified/Incident is reported
Reporting arrangements	Reported to Infection Prevention Committee, clinical team involved and Divisional Governance

The Infection Prevention Team will carry out a review periodically of blood culture data to identify numbers of potential contaminants and identify actions required in relation to practice.

Compliance with all aspects of the policy will be reviewed as part of the post infection review (PIR) process relating to episodes of identified healthcare associated bacteraemia. Where monitoring identifies deficiencies, action plans will be developed to address them.

12 Appendices

Appendix A: List of Equipment Needed for Peripheral Blood Culture Sampling:

- Clean tray
- Personal Protective Equipment (minimum gloves and apron)
- 2% chlorhexidine in 70% isopropyl alcohol for skin antisepsis (ChloraPrep 1ml applicator)
- Set of blood culture bottles (one each of anaerobic and aerobic)
- Disposable tourniquet
- Blood collection system – safety butterfly and adapter cap
- 2x wipes containing 2% chlorhexidine in 70% isopropyl alcohol for disinfection of top of culture bottle
- Sterile dressing for puncture site (plaster or sterile gauze and hypoallergenic tape)
- Sharps bin
- Clinical waste bag
- Correctly completed form & specimen bag
- Alcohol hand gel

Appendix B – ANTT Card for Blood Collection

<http://staffnet/Media/DepartmentsAndCareGroups/DepartmentOfInfection/InfectionControl/ANTT/Proceduralcards/ANTT-blood-culture-collection-v2.pdf>

Appendix C – ANTT Card for Blood Culture Sampling from a CVC Device without a Transducer

<http://staffnet/Media/DepartmentsAndCareGroups/DepartmentOfInfection/InfectionControl/ANTT/Proceduralcards/ANTT-blood-culture-sampling-from-CVAD-without-transducer-action-card.pdf>

Appendix D – ANTT Card for Blood Culture Sampling from a CVC Device with a Transducer.

<http://staffnet/Media/DepartmentsAndCareGroups/DepartmentOfInfection/InfectionControl/ANTT/Proceduralcards/ANTT-blood-culture-sampling-from-CVAD-with-transducer-action-card.pdf>

Appendix E – Paediatric - ANTT Clinical Guideline for Blood Culture Sampling from a CVC Device without a transducer

<http://staffnet/Media/DepartmentsAndCareGroups/DepartmentOfInfection/InfectionControl/ANTT/Proceduralcards/ANTT-guideline-for-taking-blood-cultures-via-CVC-child-health.pdf>

13 **References**

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