INTRODUCTION

Detection of bacteremia or fungaemia by blood culture is critical in managing patients with infection and directs the appropriate selection of antimicrobials.\(^1\)

Accuracy of test results will rely on correct blood volume, improving confirmation of bacteremia or fungaemia and minimising the risk of contamination.

This guideline does not take the place of local guidelines or policy. Anyone taking blood from a neonate must be accredited in their facility.

This guideline is intended for neonatal patients (0 - 28 days of age).

For adult (including maternal) and paediatric blood culture sampling guidelines refer to the CEC sepsis website.

Blood cultures are recommended for neonates with any of the following:

- criteria for commencement on the Newborn Sepsis Pathway
- criteria for commencement on the Paediatric Sepsis Pathway (for neonates who present to hospital after the birth admission)

IMPORTANT POINTS TO REMEMBER:

- Blood cultures remain the ‘gold standard’ for the detection of microbial pathogens related to bacteraemia and sepsis.\(^2\)

- The optimal recovery of bacteria and fungi from blood depends on culturing an adequate volume of blood.\(^1,3,4\)

- Always use aseptic technique - correct technique may help reduce the risk of a false positive test result.\(^3\)

- Ensure hand hygiene is attended as per ‘5 moments for Hand Hygiene’.\(^5\)
PROCEDURE

1. Explain procedure if parent(s) present. Use developmental care strategies such as facilitated tucking/oral sucrose/appropriate positioning for the neonate
2. Perform hand hygiene (Moment 1: Before patient contact)\(^5,6\)
3. Check identification
4. Perform hand hygiene, assemble and prepare equipment on a procedure trolley
   - Alcohol hand rub
   - One aerobic blood culture bottle\(^5\), check expiry date
   - Mark 0.5 – 1 mL above the broth for fill level
   - Sterile gloves, small dressing pack, tape, tourniquet(s)
   - Eye protection
   - Skin preparation relevant to gestational age as per local protocol (skin preparation solutions should be used sparingly in neonates with fragile skin and should not be allowed to pool, as they may produce skin burns)
   - Winged infusion set 23 gauge\(^7\) with leash – if unavailable use a winged infusion set with luer adapter and syringe or peripheral intravenous cannula; a blood culture from a neonate is nearly always taken from the hub of a newly inserted peripheral cannula
   - Sharps container
5. Put on protective eyewear and perform hand hygiene (Moment 1: Before patient contact)\(^5,6\)
6. Remove the cap of the blood culture bottle and scrub the vial stopper well using alcohol and allow to dry completely
7. Position child appropriately, apply tourniquet to palpate and identify appropriate vein
8. Perform hand hygiene (Moment 2: Before a procedure)\(^6\)
9. Put on sterile gloves (essential if re-palpation occurs post cleansing of the venepuncture site)\(^1,5,8\)
10. Disinfect the venepuncture site using a skin preparation relevant to gestational age as per local protocol, spiralling out from the planned venepuncture site. Use a fresh swab for each scrub. Use 2-3 scrubs and do this for a total of 1-2 minutes, allowing the site to dry
11. Perform venepuncture using winged infusion set with luer adapter and Vacutainer\(^8\) sleeve or peripheral cannula insertion
12. Fill the bottle to the pre-marked 0.5 mL line (in sepsis, aim for 1mL if possible to increase potential to identify causative organism)\(^2,3\) keeping blood culture bottle upright and below the level of the venepuncture. Invert bottle gently several times to prevent clotting
   - Always collect blood for the blood culture bottle FIRST then, if required, collect additional blood pathology tubes at this point
   - Release tourniquet, tape cotton ball across the skin site and apply pressure (where possible request parent/guardian to take over application of pressure)
13. Discard sharps, collect all rubbish/dirty items and dispose of appropriately
14. Remove gloves and perform hand hygiene (Moment 3: After procedure or body fluid exposure)\(^6\)
15. In the health record:
   - Label the bottle with the child’s name, MRN, date/time for collection of blood and location of site used. Do not cover the bar code or the bottom of the bottle
   - Place the bottle into a biohazard bag and arrange to send to the lab with request form. Transport the bottle at room temperature
   - Document in the health record, number of blood cultures that have been taken, site and reason for site choice if this differs from a peripheral site
   - Perform hand hygiene Moment 5: after touching surroundings
16. Explain to child’s family/carer/guardian that results may not be available for 48 hours.
FREQUENTLY ASKED QUESTIONS

1. Most blood cultures come back negative – why bother taking them?
Studies show that insufficient blood sample will return a negative result\(^1\,2\,3\,5\). Therefore it is important to follow the procedure for taking blood cultures and collecting a sufficient blood sample. The optimal recovery of bacteria and fungi from blood depends on culturing an adequate volume of blood. The direct correlation between the volume of blood cultured and yield relates to the low number of colony forming units (CFU) in a millilitre of adult blood. For each additional millilitre of blood cultured, the yield of microorganisms recovered from adult blood increases\(^5\).

A positive result provides direct evidence of infection, enabling the antibiotic treatment to be directed against the demonstrated pathogen. Furthermore, cumulative antibiograms can be constructed by summarising antibiotic susceptibility of blood isolates - this then supports development of reliable empiric antibiotic treatment guidelines.

Click here for National Healthcare Safety Network (NHSN) Centers for Disease Control and Prevention Organism list.

2. What should I do in the event that I collect only a very small amount of blood?
It is recommended that 0.5 mL to 1 mL of blood is collected for neonates\(^3\). Where possible, seek expert help in obtaining a larger blood sample. The volume of blood to be drawn for a culture should not exceed 1% of the child’s blood volume\(^5\).

3. Can I collect blood cultures from an intravenous cannula?
Peripheral venous or arterial punctures are optimal\(^4\). Blood cultures in neonates may be taken from a cannula that has just been inserted. If blood is drawn for culture from an intravenous cannula, ideally a second specimen should be obtained from another peripheral site to rule out false negative results\(^1\).

4. Following taking the blood culture, how should it be stored prior to transport to the laboratory?
Storage should be at room temperature and never refrigerated\(^5\). Where transport is delayed, the facility should liaise with the receiving laboratory to establish a simple guideline for sample storage.

REFERENCES:
4. Buttery, J. Blood Cultures in newborns and children: optimising an everyday test. Downloaded from http://fn.bmj.com/ on September 22, 2016 - Published by group.bmj.com
5. CLSI. Principles and procedures for blood cultures; Approved guideline. CLSI document M47-A. Wayne, PA: Clinical and Laboratory Standards Institute; 2007