SEPSIS KILLS Program

Neonatal Blood Culture Guidance

INTRODUCTION

Blood cultures enable the detection of bacteria and/or fungus in the blood and guide the appropriate selection of antimicrobials[1,2]. Accuracy of test results rely on correct blood volume to improve confirmation of bacteraemia or fungaemia and minimise the risk of contamination.

This guidance is written in line with the NSW Health Policy Directive *Intravascular Access Devices (IVAD) – Infection Prevention and Control* (PD2019_040).

It is intended for **neonatal patients only** (0 - 28 days of age).

For adult and paediatric blood culture sampling guidance refer to the Clinical Excellence Commission (CEC) sepsis website.

WHEN TO TAKE BLOOD CULTURES IN NEONATES

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

- criteria for commencement on the Newborn Sepsis Pathway (for neonates during the episode of care associated with the newborn's birth)
- criteria for commencement on the Paediatric Sepsis Pathway (for neonates who present to hospital after the birth admission)
- clinician concern that the infant has serious infection

IMPORTANT POINTS TO REMEMBER

- Blood cultures are the 'gold standard' for the detection of microbial pathogens related to bacteraemia and sepsis[3]
- Adequate volume of blood is needed to be able to culture bacteria and fungi[1,4]
- Always use aseptic technique - correct technique may help reduce the risk of cross contamination and a false positive test result[3,5]
- Ensure hand hygiene is performed as per the 5 Moments for Hand Hygiene[5]
- In infants with a central venous access device (CVAD) and suspected sepsis, one set of blood cultures should be taken from the CVAD as well as one from a peripheral site [6]

BLOOD CULTURE PROCEDURE

1. Explain procedure if parent(s) present and gain consent. Use developmental care strategies such as facilitated tucking/oral sucrose/appropriate positioning for the neonate.
2. Perform hand hygiene.
3. Check pathology request form, patient identification and chlorhexidine allergy history.
4. Perform hand hygiene, assemble and prepare the following equipment on a procedure trolley:

   - Alcohol-based hand rub
   - Appropriate blood culture bottles (aerobic +/- anaerobic bottle) based on likelihood of anaerobic infection and blood sample volume; check expiry date of each bottle
   - Label each bottle with infant name, Medical Record Number (MRN), date/time for collection of blood and location of site used for each set; do not cover bar codes or the bottom of the bottle.
   - Gloves or sterile gloves, small dressing pack, tape, tourniquet(s), eye protection
   - Alcohol (ethanol or isopropyl alcohol), or alcohol with chlorhexidine, according to local procedure
   - Winged infusion set with leash and Vacutainer® sleeve designed to fit over the neck of the blood culture bottle; if unavailable use a winged infusion set with luer adapter and syringe
   - Sharps container

5. Put on protective eyewear and perform hand hygiene.
6. Remove the cap of each blood culture bottle and scrub the vial stoppers using alcohol, or alcohol with chlorhexidine, and allow to dry completely.
7. Position infant appropriately, gently apply tourniquet to palpate and identify appropriate vein.
8. Using alcohol, or alcohol with chlorhexidine[5] disinfect the venepuncture site using a circular motion, spiralling out from the planned venepuncture site. Use a fresh swab for each 'scrub'. Perform 2-3 'scrubs' and do this for a total of 1-2 minutes, then allowing the site to dry. After cleaning if re-palpation of the site is expected, use of sterile gloves and sterile procedure is recommended.
9. Perform hand hygiene.
9. Put on gloves and use aseptic non-touch technique. If re-palpation of the venepuncture site occurs, it must be re-cleansed (return to step 8)[1,4,6].
11. Perform venepuncture using winged infusion set with luer adapter and Vacutainer® sleeve.
12. Fill each bottle with a minimum of 0.5 mL of blood keeping blood culture bottle upright and below the level of the venepuncture. Aim for 1mL where possible; the accuracy of the result correlates with the volume of blood collected [3,4]. Invert bottles gently several times to prevent clotting.
    - Always collect the blood culture bottles FIRST (inoculating the aerobic bottle first) then, if required, collect additional blood pathology tubes.
    - Release tourniquet, remove needle (with safety sheath applied), apply cotton ball across the skin site and apply pressure until bleeding has stopped and discard appropriately (where possible request parent/guardian to take over application of pressure).
13. Repeat steps 8-13 if collecting a second set of blood cultures from a different peripheral site.
14. Discard sharps, collect all rubbish/dirty items and dispose of appropriately.
15. Remove gloves and perform hand hygiene. Remove eye protection and perform hand hygiene.
16. Place bottles into the biohazard bag and arrange to send to the laboratory with the request form. Transport bottles at room temperature.
17. Document in the health record the number of sets of blood cultures that have been taken, the sites and reason for site choice if this differs from a peripheral site.
18 Perform hand hygiene.
19. Explain to infant's family/carer/guardian that results may not be available for 48 hours.

FREQUENTLY ASKED QUESTIONS

Why bother taking blood cultures when most results come back negative?

Studies show that insufficient blood sample volume increases the risk of a false negative result.[1,3,4] The optimal recovery of bacteria and fungi from blood depends on culturing an adequate volume of blood. It is therefore important to follow the procedure for taking blood cultures to collect a sufficient blood sample. The direct correlation between the volume of blood cultured and yield relates to the low number of colony forming units in a millilitre of blood. For each additional millilitre of blood cultured, the yield of microorganisms recovered from blood increases.[4]

A positive result provides direct evidence of infection, enabling the antibiotic treatment to be directed against the demonstrated pathogen(s). Furthermore, cumulative antibiograms can be constructed by summarising antibiotic susceptibility of blood isolates which 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.

What should I do if only a very small amount of blood is collected?

It is recommended that 0.5 mL to 1 mL of blood is collected for neonates[2,4]. This should be placed in an aerobic bottle. The rationale for this is that most bacteraemia is caused by aerobic and facultative bacteria, which will be recovered better from aerobic bottles. In addition, pathogenic yeasts are recovered almost exclusively from aerobic bottles, as are strict aerobes, such as *Pseudomonas and Stenotrophomonas.*

The volume of blood drawn for culture is the most important determinant of the sensitivity of detection of bacteraemia or fungaemia. 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 infant's blood volume[6]

Can I collect blood cultures from an intravenous cannula?

Collection of blood cultures via an intravenous cannula is NOT the recommended method[1] 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, a second specimen should be obtained from another peripheral site to rule out false negative results[1,7].

How are blood cultures stored prior to transport to the laboratory?

Storage should be at room temperature and never refrigerated[3]. Where transport is delayed, the facility should liaise with the receiving laboratory to establish guidance on sample storage.

REFERENCES

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