

SEPSIS KILLS

ADULT BLOOD CULTURE GUIDELINE

UPDATED SEPTEMBER 2016

INTRODUCTION

Detection of bacteremia or fungaemia by blood culture is critical in managing patients with infection, and directs the appropriate selection of antimicrobials¹.

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 for blood culture sampling and is written in line with the NSW Health, [Peripheral Intravenous Cannula \(PIVC\) Insertion and Post Insertion Care in Adult Patients](#) (GL2013_013).

Selected patients with fever of unknown origin who appear unwell or are at risk of sudden deterioration, such as the elderly (age ≥ 65) or chronically ill, but do not meet criteria for the sepsis pathway may benefit from blood cultures. Discuss these patients with the Staff Specialist or senior doctor in charge, or overseeing care.

This guideline is intended for adult patients (16 years and older).

For Paediatric and Neonatal Blood Culture sampling guidelines refer to the [CEC sepsis website](#).

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

- criteria for commencement on the [Adult or Maternal Sepsis Pathway](#)
- severe pneumonia as scored by CORB/SMARTCOP
- fever or history of fever and suspected or proven neutropenia
- fever and immunocompromised
- fever or evidence of infection and a vascular access device or recent surgery
- fever and recent overseas travel
- altered cognition or delirium

IMPORTANT POINTS TO REMEMBER:

- Blood cultures remain the 'gold standard' for the detection of microbial pathogens related to bacteraemia and sepsis²
- The optimal recovery of bacteria and fungi from blood depends on culturing an adequate volume of blood^{1,3}
- Always use aseptic technique - correct technique may help reduce the risk of a false positive test result³
- Ensure hand hygiene is attended as per '[5 moments for Hand Hygiene](#)'.



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PROCEDURE

1. Inform patient of the procedure and purpose and obtain verbal consent
2. Perform hand hygiene (Moment 1: Before patient contact)⁴
3. Check patient identification and chlorhexidine allergy history
4. Perform hand hygiene, assemble and prepare equipment on a procedure trolley
 - Alcohol hand rub
 - Two blood culture sets, each set comprising one aerobic and one anaerobic bottle (4 bottles in total): check expiry date for each bottle
 - Mark 10mL above the broth for fill level
 - Sterile gloves, small dressing pack, tape, tourniquet(s)
 - Eye protection
 - Alcohol (ethanol or isopropyl alcohol), or alcohol with chlorhexidine, according to local protocol
 - 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 (Moment 1: Before patient contact)^{3,4}
6. Remove the cap of each blood culture bottle and scrub the vial stoppers well using alcohol, or alcohol with chlorhexidine, and allow to dry completely
7. Position patient appropriately, apply tourniquet to palpate and identify appropriate vein
8. Perform hand hygiene (Moment 2: Before a procedure)⁴
9. Put on sterile gloves (essential if re-palpation occurs post cleansing of the venepuncture site^{1,3,5})
10. Using alcohol, or alcohol with chlorhexidine⁵ disinfect the venepuncture site using a scrubbing motion, 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® sleeve
12. Fill each bottle only to the pre-marked 10mL line^{2,3} keeping blood culture bottle upright and below the level of the venepuncture. 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 at this point
 - Release tourniquet, tape cotton ball across the skin site and apply pressure (where possible request patient to take over application of pressure)
13. Repeat steps 7 – 12 to collect the second set of blood cultures at a different peripheral site
14. Discard sharps, collect all rubbish/dirty items and dispose of appropriately
15. Remove gloves and perform hand hygiene (Moment 3: After procedure or body fluid exposure)⁴
16. In the health record:
 - Label each bottle with patient name, 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
 - Place bottles into biohazard bag and arrange to send to the lab with request form. Transport bottles at room temperature
 - Document in the health record, number of sets of blood cultures that have been taken, sites and reason for site choice if this differs from a peripheral site
 - Perform hand hygiene
17. Explain to patient/patient'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}. 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 increases³.

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 I collect less than 10mLs of blood?

If you are only able to collect less than 10mLs of blood you should inoculate the entire sample into the aerobic bottle. The volume of blood drawn for culture is the most important determinant of the sensitivity of detection of bacteraemia or fungaemia. Therefore the more blood collected; the easier it is to detect bloodstream infections. Where possible, seek expert help in obtaining a larger blood sample.

3. Why two (2) sets (4 bottles) of blood cultures from different sites?

A single set (2 bottles) provides an inadequate sample volume for adults and significantly reduces the sensitivity of the culture process. Collection of 2 sets (4 bottles) is the standard of care in adults³. Potential contaminant organisms may also cause infection and isolation of the same organism from more than one blood culture set provides good evidence that the bacteraemia is not caused by contamination. The two sets should always be collected from separate venepunctures³.

4. Can I collect blood cultures from an intravenous cannula?

Collection of cultures via a cannula is NOT the preferred method¹. However, if used it should only be 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 a peripheral site¹.

5. Following taking the blood cultures, how are they stored prior to transport to the laboratory?

Storage should be at room temperature and never refrigerated³. Where transport is delayed, the facility should liaise with the receiving laboratory to establish a simple guideline for sample storage.

REFERENCES:

1. Ntusi, N et al 2010, 'Guideline for the optimal use of blood cultures', SAMJ vol. 100, no. 12 pp 839-843
2. Critical Care and Emergency Medicine "Sepsis – An ongoing and significant challenge" Published October 3, 2012, Chapter 15 Blood Culture Systems: from Patient to Result, A, Dreyer [accessed 6 July 2016] <http://dx.doi.org/10.5772/50139>
3. CLSI. Principles and procedures for blood cultures; Approved guideline. CLSI document M47-A. Wayne, PA: Clinical and Laboratory Standards Institute; 2007
4. NSW Health Hand Hygiene Policy (PD2010_058) http://www0.health.nsw.gov.au/policies/pd/2010/pdf/PD2010_058.pdf
5. Peripheral Intravenous Cannula (PIVC) Insertion and Post Insertion Care in Adult Patients GL2013_013 http://www0.health.nsw.gov.au/policies/gl/2013/pdf/GL2013_013.pdf