Saving Lives: reducing infection, delivering clean and safe care

Taking blood cultures

A summary of best practice

Objective

To enable trusts to review their policies for taking blood cultures and implement procedures to improve the quality of blood culture investigations and reduce the risk of blood sample contamination.

Aim

Blood culture to detect bacteraemia is an important investigation with major implications for the diagnosis of patients with infection and the selection of appropriate treatment. This strategy presents recommendations which, if implemented, will improve the quality and clinical value of blood culture investigations and reduce the incidence of sample contamination and 'false positive' readings when taking blood cultures. This will help improve patient care and contribute towards the achievement of the meticillin-resistant *Staphylococcus aureus* (MRSA) target by reducing the number of wrongly reported MRSA infections.

These recommendations aim to ensure that blood cultures are taken:

- for the correct indication;
- at the correct time; and
- using correct technique in order to prevent contamination of the sample and minimise risk to patients and staff.

Context

There has been little consistent or definitive advice to the NHS on how and when to take blood cultures and how best to avoid sample contamination. There is also variation in practice among NHS staff in taking blood for culture.

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Contamination of blood samples during the process of taking blood produces a significant level of false positive readings which both complicates patient care and artificially raises the incidence rate of, for example, MRSA infection. This makes it more difficult to track progress towards the MRSA target and does not allow trusts to accurately show levels of improvement on infection rates. Reports from NHS trusts and equipment suppliers suggest that the contamination rate could be as high as 10%.

A false positive is defined as growth of bacteria in the blood culture bottle that were not present in the patient's bloodstream and were introduced during sample collection. Contamination can come from a number of sources: the patient's skin, the equipment used to take the sample and transfer it to the culture bottle, the hands of the person taking the blood sample, or the general environment.

Recommendations

A. Only take blood for culture when there is a clinical need to do so and not as routine

Blood cultures are taken to identify patients with bacteraemia. There are many signs and symptoms in a patient 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:

- core temperature out of normal range;
- focal signs of infection;
- abnormal heart rate (raised), blood pressure (low or raised) or respiratory rate (raised);
- chills or rigors;
- raised or very low white blood cell count; and
- new or worsening confusion.

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

All blood cultures should be documented in the patient's notes, including date, time, site and indications.

B. Competence

Blood cultures should only be collected by members of staff (medical, nursing, healthcare assistant, phlebotomist or technician) who have been trained in the collection procedure and whose competence in blood culture collection has been assessed.

C. Always make a fresh stab

In patients with suspected bacteraemia, it is generally recommended that two sets of cultures be taken at separate times from separate sites. **Do not** use existing peripheral lines/cannulae or sites immediately above peripheral lines. (If a central line is present, blood **may** be taken from this **and** from a separate peripheral site when investigating potential infection related

to the central line; the peripheral vein sample should be collected first.) Identify a suitable venepuncture site before disinfecting the skin. Avoid femoral vein puncture because of the difficulty in adequate skin cleansing and disinfection.

D. Thoroughly disinfect the skin before inserting the needle

Thoroughly cleanse the patient's skin before venepuncture. Use soap and water to clean visibly soiled skin and then clean your own hands. Use a 2% chlorhexidine in 70% isopropyl alcohol impregnated swab to disinfect the patient's skin and allow to dry.

E. Once disinfected, don't touch the skin again

To avoid cross-contamination from the collector's fingers (even when gloved), it is vitally important **not to palpate the site again once it has been disinfected**.

F. Disinfect the culture bottle cap before transferring the sample

Ideally, remove the plastic cover immediately before collecting the sample; the top of the bottle will be clean but not sterile. Disinfect the tops of the culture bottles with a 2% chlorhexidine in 70% isopropyl alcohol impregnated swab. Allow the alcohol to fully evaporate before proceeding with bottle inoculation.

NB: The use of blood collection adapter caps without winged blood collection sets is not recommended. It is not possible to accurately judge sample volume and there is the potential for possible backflow of blood culture media into patient veins.

Conclusion

All trusts, as a matter of urgency, should investigate their incidence of sample contamination and false positive reports, and review their policies for taking blood cultures and the training of staff to determine the most appropriate approach to ensuring compliance with these recommendations.

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Visit: www.clean-safe-care.nhs.uk

Step one: Skin preparation

- Wash your hands with soap and water then dry.
- Clean any visibly soiled skin on the patient with soap and water then dry.
- Apply a disposable tourniquet (if applicable) and palpate to identify vein.
- Clean skin with a 2% chlorhexidine in 70% isopropyl alcohol impregnated swab and allow to dry.
- If a culture is being collected from a central venous catheter, disinfect the access port with a 2% chlorhexidine in 70% isopropyl alcohol impregnated swab.

Step two: Kit preparation

- Label bottles with appropriate patient information. Ensure that barcodes on the bottles are not covered by additional labels and that any tear-off barcode labels are not removed.
- Clean the tops of culture bottles with a 2% chlorhexidine in 70% isopropyl alcohol impregnated swab and allow to dry.

Step 3: Sample collection – use either method A or B as outlined below

A: NEEDLE AND SYRINGE METHOD

- Wash and dry your hands again or use alcohol hand rub and apply clean examination gloves (sterile gloves are not necessary).
- Insert needle. **Do not palpate again after cleaning.**
- Collect sample and release tourniquet.
- Cover the puncture site with an appropriate dressing.
- If blood is being collected for other tests, always inoculate the blood culture bottles first.
- Inoculate blood into culture bottles; do not change the needle between sample collection and inoculation; inoculate anaerobic culture first.
- Discard needle and syringe in a sharps container.
- Wash hands after removing gloves.
- Record the procedure with indication for culture, time, site of venepuncture and any complications in the patient's record.

OR

B: WINGED BLOOD COLLECTION METHOD

- Wash and dry your hands again or use alcohol hand rub and apply clean examination gloves (sterile gloves are not necessary).
- Attach winged blood collection set to blood collection adapter cap.
- Insert needle into prepared site. **Do not palpate again after cleaning.**
- Place adapter cap over blood collection bottle and pierce septum.
- Hold bottle upright and use bottle graduation lines to accurately gauge sample volume and collect sample; inoculate aerobic culture first.
- If blood is being collected for other tests, always collect the blood culture first.
- Cover the puncture site with an appropriate dressing.
- Discard winged blood collection set in a sharps container.
- Wash hands after removing gloves.
- Record the procedure with indication for culture, time, site of venepuncture and any complications in the patient's record.