WOMEN'S HEALTH AND PAEDIATRICS
PAEDIATRIC DEPT

Blood Culture Guideline

Amendments			
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In Consultation with:

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Target Audience: Doctors, nurses and support staff working in Paediatrics

Impact Assessment Carried Out By:

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BLOOD CULTURE POLICY FOR PAEDIATRICS

1. INTRODUCTION

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 (Department of Health 2007).

2. PURPOSE

This policy aims to promote good practice in the collection of blood for culture and thus reduce the number of false positive results. False positive results lead to complications in patient safety, quality of care and associated increased cost of care. (Department of Health 2010).

Early positive results provide information on which appropriate treatment can commence. These recommendations aim to ensure that blood cultures are taken:

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

Antibiotics and Source Control

Empiric antibiotics be administered within 1 hr of the identification of severe sepsis. Blood cultures should be obtained before administering antibiotics when possible but this should not delay administration of antibiotics. The empiric drug choice should be changed as epidemic and endemic ecologies dictate (eg H1N1, MRSA, chloroquine resistant malaria, penicillin-resistant pneumococci, recent ICU stay, neutropenia)

3. TAKING A BLOOD CULTURE

If on the neonatal intensive care unit please refer to the neonatal guidelines.

ONLY TAKE BLOOD FOR CULTURE WHEN THERE IS A CLINICAL NEED TO DO SO AND NOT AS ROUTINE. The "Broken Needle Technique" (breaking the hub of the needle to obtain blood from small infants) poses an additional risk of injury to the child and user and must NOT be used.

Detection of micro-organisms by culture of blood is essential in the diagnosis of bloodstream infections, including infective endocarditis, infections presenting as pyrexia of unknown origin, prosthetic material infections and intravenous catheter infections. Blood culture may also detect bacteraemia associated with primary infections such as pneumonia and septic arthritis. Accurate positive results provide valuable information to guide optimal antibiotic therapy, which can improve outcome from these conditions.

Contaminated blood cultures, on the other hand, can cause considerable diagnostic confusion and lead to unnecessary or sub-optimal antimicrobial therapy. They lead to

unwarranted investigation and treatments causing adverse effects for patients. The Department of Health's *Saving Lives* document estimates that blood culture contamination rates could be as high as 10%.

Contamination may be prevented by careful collection of the blood using a non-touch aseptic technique. If possible avoid palpating the vein after cleansing the skin. The specimen should also preferably be taken during pyrexial episodes as more bacteria may be present at that time.

Blood cultures should be taken when there is a clinical need to do so in response to any of the following clinical signs, as highlighted in the NICE CG47 guidelines for the febrile child (http://*guidance.**nice**.org.uk/**nice**media/live/11010/30523/30523.pdf)*. Clinical signs in the amber and green categories suggestive of sepsis and a deteriorating clinical picture include:

- abnormalities in:
  - Core temperature
  - Heart rate
  - Capillary refill time
  - Leukocyte count
  - Conscious level
- presence of rigors or chills
- vomiting/poor oral intake
- lymphadenopathy
- other focal signs of infection, such as pneumonia, septic arthritis, meningism, urinary tract infection including pyelonephritis and acute abdominal pathology

If unsure about the indication for blood culture please discuss with the on call paediatric registrar. All blood cultures should be documented in the patient's notes, including date, time, site and indications.

Blood Culture Pathology Request forms to be used and must have **TWO** signatures, one being a senior clinician (consultant/registrar).

If a patient has a history of MRSA colonisation/infection and is septic blood cultures are to be taken within 48 hours of admission.

Where possible cultures should be taken before commencement of antibiotic treatment though is not always possible.

4. COMPETENCE

Blood cultures should only be collected by members of staff who have been trained in the collection procedure and whose competence in blood collection has been assessed and maintained (see Appendix A).

5. PROCEDURE

KIT PREPARATION

- Wash and dry hands or use alcohol hand rub.
- Prepare equipment: plastic tray, sterile blood collection set OR needle and 10 ml syringe, 'Sani-cloth' or Clinell disinfecting swabs (2% chlorhexidine in 70% isopropyl alcohol impregnated swabs), culture bottle, clean Torniquet, non-sterile gloves, dressing for post procedure.
- Prepare the blood culture bottle(s). Check blood culture bottles are in date.
- The top of the bottle(s) will be clean but not sterile. Remove flip-off caps from the bottle(s) and disinfect the tops of the culture bottle(s) with a 2% chlorhexidine gluconate/70% isopropyl alcohol impregnated swab. (It is the drying of the alcohol which disinfects the caps. Leave for at least 30 seconds.)
- Ensure you have gained full consent where appropriate.

SKIN PREPARATION

- Wash your hands with soap and water then dry your hands.
- Clean any visibly soiled skin on the patient with soap and water then dry.
- Apply a disposable tourniquet (if applicable depending on age of child) and palpate to identify vein.
- >2 months clean skin with a 2% chlorhexidine gluconate/70% isopropyl alcohol applicator (SIPP). <2 months use an alcohol swab and allow to dry.
- If a culture is being collected from a central venous catheter, disinfect the access port with a 2% chlorhexidine gluconate/70% isopropyl alcohol impregnated swab.
- **To avoid cross-contamination from the collector's fingers (even when gloved), it is vitally important not to palpate the site once it has been disinfected.**

6. SAMPLE COLLECTION

Volume of blood is the most critical factor in the detection of blood stream infection. Place as much blood as possible. Minimum recommended is 1-2 mls of blood. The sensitivity of blood culture is increased by increased volume

CANNULA HUB METHOD (preferred technique at any age) :

The use of a closed needle and syringe technique for blood culture collection in neonates and babies is not practical due to the small size and scarcity of available veins. In older children repeated venepuncture causes distress, and decreases the amount of available veins for future cannulation for IV medication.

As peripheral cannulation is usually indicated at the same time as the taking of a blood culture it is acceptable to take the sample from the cannula hub. Even if a further cannula is not required you could insert a cannula for blood culture collection and then remove it after the procedure. The first blood out of the hub should be used for culture, not other blood tests. No other method of blood culture taking should be routinely used.

- Wash and dry your hands again and use alcohol hand rub and apply clean examination gloves (sterile gloves are not necessary)
- Use a 70% isopropyl alcohol impregnated swab and allow the skin to dry.
- **Do not palpate the site of insertion after it has been cleaned**.
- Insert the cannula into the vein.
- Using a 2ml syringe and a 21g (green) needle aspirate recommended amount of blood from the cannula hub: 1-2 ml for neonate, 2-3 ml for infants, 3-5 ml for pre-teen children and 10 ml in young adults.
- Immediately and without changing or contaminating the needle insert it into the top of the blood culture bottle and allow the blood to flow into the bottle via the vacuum.
- After collecting other required samples secure the cannula according to the recommended technique.
- Dispose of sharps in a sharps container.
- Wash hands after removing gloves.
- Record the procedure with indication for culture, time, site of insertion and any complication in the patient's record.

NEEDLE AND SYRINGE METHOD (This method can be used with or without cannulation)

- Wash and dry your hands again or use alcohol hand rub and apply clean examination gloves (sterile gloves are not necessary) (off following cannulation).
- Insert needle (either into cannula or vein). **Do not palpate again after cleaning.**
- Collect sample and release tourniquet.
- If using vein only apply pressure for venestasis after the needle has been removed from the patient.
- Cover the puncture site with an appropriate dressing.
- If blood is being collected for other tests, always inoculate the blood culture bottle(s) first.
- Inoculate blood into culture bottle(s); do not change the needle between sample collection and inoculation
- 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 complication in the patient's record.

WINGED BLOOD COLLECTION METHOD – >8 years

- 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(s) and pierce septum.
- Hold bottle(s) upright and use bottle graduation lines to accurately gauge sample volume and collect sample
- If blood is being collected for other tests, always collect the blood culture first.
- Ensure tourniquet is released.
- Remove the needle from the vein using the in-vein activator on the collection set.
- Only apply pressure for venestasis after the needle has been removed from the patient.
- Cover the puncture site with an appropriate dressing.
- Discard winged blood collection set into a sharps container.
- Wash hands after removing gloves.
- Record the procedure with indication for culture, time, site of venepuncture and any complication in the patient's record.

IMPORTANT – The vacuum in the bottle(s) will exceed 10 ml. DO NOT OVERFILL.

Taking blood through iv lines/central lines

In children in whom line sepsis is suspected, blood for culture may be taken from a peripheral vein stab and also from the appropriate intravascular lines to enable colonisation of the line. In cases of bacterial endocarditis three blood cultures should be taken from separate venepunctures to optimise recovery of bacteria which may be present in low numbers.

- Shut off any iv fluids going through port.
- Clean hub with chlorhexidine/alcohol, then use needle and syringe.
- The first 'discard' blood must be used for blood culture to ensure that internal contents of the catheter can be tested for infection.
- Blood culture will be required from all lumens separately.
- Blood samples for electrolytes, blood counts and other tests would require that initial 2-3 mls of blood is discarded.
- Please see Oncology supportive care protocol on the ward for further information.

7. LABELLING OF BOTTLES

- Clearly label the bottle(s) with appropriate patient information after the blood has been taken and prior to leaving the patient's bedside.
- Ensure that barcodes on the bottle(s) are not covered by additional labels and that any tear-off bar-code labels are not removed.
- Clear and accurate documentation at the time of taking the sample aids subsequent interpretation.

8. TRANSPORTATION TO THE LABORATORY

- Send the inoculated bottle(s) to the laboratory immediately or arrange to have them placed in the 37°C incubator outside Pathology. No other specimens should go in this incubator. The bottle(s) must not be refrigerated. DO NOT use the pod system for transporting blood cultures to the laboratory.
- Include information on recent/proposed antibiotic therapy and all relevant clinical details on the request form.

9. BLOOD CULTURE RESULTS

All significant positive blood culture results will be telephoned as soon as they are available. Once the culture flags positive a gram stain will be available +/- a provisional identity. Formal identities will usually be available 24 hours afterwards.

It is **NOT** necessary to phone the Laboratory to request blood culture results.

Please do use follow up results guide to inform parents in case the child has discharged from home

10. DISSEMINATION AND IMPLEMENTATION

The policy has been written by the Infection Control Team, agreed by the Control of Infection Committee and ratified by the Clinical Governance Committee. The policy will be available on TrustNet and as a hard copy at ward/department level for ease of access. This policy is intended for the general paediatric population. For the neonatal population please refer to the neonatal guidelines.

All healthcare practitioners who undertake this practice shall undergo training via practical demonstration or by the Training Tracker package.

11. PROCESS FOR MONITORING COMPLIANCE WITH THE EFFECTIVENESS OF POLICIES

All staff who undertake blood culture taking must be competent and have completed competency training for this procedure.

12. EQUALITY IMPACT ASSESSMENT

The Trust has a statutory duty to carry out an Equality Impact Assessment (EIA) and an overarching assessment has been undertaken for all infection control policies.

13. ARCHIVING ARRANGEMENTS

This is a Trust-wide document and archiving arrangements are managed by the Quality Dept. who can be contacted to request master/archived copies.

14. REFERENCES

- Dellinger RP, Levy MM, Rhodes A, et al: Surviving Sepsis Campaign: International guidelines for management of severe sepsis and septic shock: 2012. *Crit Care Med.* 2013; 41:580-637
- Department of Health. (2010). Taking blood culture, a summary of best practice. Saving Lives Department of Health. (DRAFT)
- NICE guidelines. (2007). CG 47: Feverish illness in children - Assessment and initial management in children younger than 5 years.

APPENDIX A

Competency for taking Blood Cultures

Name:_____ **Position held:** _____

	Formative Assessment			
	Date	**Self**	**Mentor**	**Dat**
Demonstrate an understanding of Trust's Blood Culture Policy for Paediatrics				
Identify rationale for aseptic technique whilst taking blood culture				
Explain procedure and rationale to the patient/ parents and obtain consent				
Identify and prepare appropriate equipment				
Demonstrate aseptic technique				
Demonstrate correct disposal of equipment used for procedure				
Ensure documentation including label of bottle(s) and correct completion of microbiology form is completed				
Final date of completion of all elements				

Once completed Medical Staff to send to Directorate Lead/Clinical Governance
Nursing and Support Staff to send to Line Manager