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Subject:	BLOOD CULTURE COLLECTION				
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BLOOD CULTURE COLLECTION

General Considerations

The cumulative yield of pathogens in the blood is optimized by collecting 2-3 sets of blood cultures (a set comprises 1 aerobic and 1 anaerobic bottle). Single blood cultures should never be drawn from adult patients. Such practice results in inadequate blood volume for culture. Also, the results of single blood cultures are more difficult to interpret. Due to mandatory compliance guidelines, multiple blood culture collections should be obtained at least 1 minute apart. Culture bottles for adults should be inoculated with 8-10 mL of blood. The studies have shown that the yield of pathogens increases in direct proportion to the volume of blood from 2 to 30 mL. The volume of blood is more critical than the number of cultures (e.g. two draws of 10 mL yield more than 3 draws of 5 mL).

1. Acute sepsis
 - Collect two or three cultures from separately prepared sites prior to starting therapy.
2. Endocarditis
 - Acute/Subacute - Obtain three blood cultures in the first 24 hours with three separate venipunctures prior to antibiotic therapy.
 - Antimicrobial therapy 1 to 2 weeks before admission - Obtain two separate blood cultures on each of three successive days.
3. Fever of unknown origin
 - Obtain two separate blood cultures at least 1 h apart. If these are negative, then 24 to 36 h later, obtain two more blood cultures 1 h apart. The yield of information beyond four cultures is usually minimal.

Volume of Blood

An optimal volume of blood per culture is critical because the concentration of organisms in most cases of bacteremia is low, especially if the patient is on antimicrobial therapy. In infants and children, the concentration of organisms during bacteremia is higher than in adults, so less blood is required for culture.

- Neonates and Children: 3 mL of blood per venipuncture in PEDS Plus bottle. (A minimum of 0.1-0.5 may be inoculated into a PEDS bottle from an infant if circumstance warrants.)
- Adults: 8-10 mL of blood per bottle aerobic and anaerobic. If less than optimal volume is obtained due to difficult circumstance aliquot as follows:

Amount per Venipuncture	Amount in Bactec Plus Aerobic Vial	Amount in Bactec Plus Anaerobic Vial
13-16 mL	8 mL	5-8 mL
10-12 mL	5-7 mL	5mL
4-9 mL	Entire blood amount	0
≤3 mL	Entire blood amount into PEDS Plus bottle	0

- TB/Fungal Culture: 1-5 mL in a Mycolytic bottle.

Blood Collection

Blood can be collected by venipuncture of peripheral veins, arteries, or from intravascular catheters (see notes below). Do not draw blood cultures from an artery since the increase oxygen level can cause erroneous results. *Observe universal precautions. Wear gloves.*

1. Disinfect the venipuncture site and the stoppers of culture bottles and collection tubes prior to blood collection (*Note: Do not use iodine to disinfect the stoppers of BACTEC bottles as it will cause the septicum of the BACTEC bottle to disintegrate.*) Collection of blood using a large gauge needle or needleless system will cause blood leakage from bottles.
2. Clean the site with 70% isopropyl or ethyl alcohol until clean.
3. Swab concentrically, starting at the center with 1-2% tincture of iodine (10% povidone ampoule) to approximately 2 inches. A double prep with alcohol is acceptable in patient with iodine allergies and infants less than two months.
4. Allow the disinfectant to dry then wait an additional 30 seconds after (*Note: Do not palpate the vein after disinfecting skin prior to inserting needle.*)
5. Draw blood. In order to prevent reflux of the medium into the patient, do not draw directly into the vials. Use a sterile syringe or a winged collection set. (Butterfly) The Bactec blood culture bottles are not vacuum calibrated to draw a specific volume. Mark each bottle with a black line to achieve adequate volume of blood into each bottle.
 - Syringe with transfer device – Collect blood in a syringe. Activate the safety needle device, remove needle from syringe and discard in biohazard sharp's container, attach transfer device to the syringe. Inoculate blood culture bottles. Do not enter air into the anaerobe bottle (gold topped bottle). A new needle or transfer set should be used for each venipuncture.
 - Butterfly with hub – Mark each blood culture bottle with a black line at the level to collect adequate volume of blood. Attach hub to the end of the butterfly tubing; collect the aerobe bottle first then the anaerobe bottle. Do not enter air into the anaerobe bottle (gold topped bottle).

- Butterfly with syringe – Collect blood in a 20 mL syringe. Detach butterfly then attach syringe to a transfer device to inoculate blood culture. When less than the recommended volume of blood is drawn for culture, the blood should be inoculated into the aerobic vial first; any remaining blood should then be inoculated into the anaerobic vial. Do not enter air bubbles into the anaerobe bottle.
6. Never draw blood into any other collection tube and transfer to the blood culture vial. Not only does this contaminate the specimen, but the additives in the other tubes are toxic to microorganisms.
 7. After venipuncture and after inoculation of culture collection bottle or tube, wipe residual iodine from the skin with alcohol to prevent irritation of skin. This is especially important in neonates due to the risk of subclinical hypothyroidism. Dispose of collection system in accordance with universal precautions.
 8. Label each blood culture bottle with date, time, and collector's initials. Deliver blood culture bottles to the laboratory as soon as possible. Note on bottles if the blood was a site other than venipuncture like a central line catheter draw. Do not cover the blood culture bottle barcode with the patient label.
 9. If blood is drawn from an indwelling central venous catheter by the nurse, it should be labeled as such and encouraged to have at least one set collected by venipuncture method. Aseptic technique should be followed. After disinfection, the connection between the extension tubing and hub is disconnected. The hub is then disinfected. A second sterile syringe is then attached, and an additional volume (beyond the 8-10 mL per bottle volume) of 0.5 mL is withdrawn.

Notes:

- **Proper labeling is required to determine that separate sets have been drawn. If upon receipt they are not dated, timed, and initialed as above policy states, then we will have to bill and treat as one set, not two.**
- If suspecting atypical gram negative rods, such as Haemophilus, Actinobacillus, Capnocytophaga, Eikenella, Kingella, etc. note this on the request. These organisms are fastidious and require special processing procedures. The cultures should be held for 21 days.
- Blood to be cultured for fungi, Brucella, Francisella and Mycobacteria should be collected in a Myco/F Lytic Bactec Bottle. Call the microbiology laboratory prior to collection for a Myco/F Lytic Bactec Bottle.
- Blood cultures to be obtained from catheters will be collected by a nurse or physician and should be labeled as such.

References:

- Clinical and Laboratory Standards Institute (CLSI). *Principles and Procedures for Blood Culture; Approved Guideline*. CLSI document M47-A (ISBN 1-56238-641-7). Clinical and Laboratory Standards Institute, 940 West Valley Road, Suite 1400, Wayne, Pennsylvania 19087-1898 USA, 2007.
- BD Bactec™ Plus Culture Vials. Becton, Dickinson and Company, 7 Loveton Circle, Sparks, MD 21152 USA. 2009