

BLOOD CULTURE COLLECTION

PRINCIPLE

Blood cultures may be ordered when there is fever of unknown origin or to rule out or confirm septicemia and/or bacteremia. The presence of microorganisms in the circulatory system of humans is indicative of a potentially life threatening condition and is associated with a significant mortality rate. Blood culture is therefore one of the most important and critical procedures performed in the microbiology laboratory. Blood cultures help determine the presence and extent of infection, as well as indicate the type of organism responsible and the antibiotic susceptibility of that organism. Once septicemia is diagnosed and treatment is initiated, blood cultures are useful in assessing the effectiveness of the antibiotic therapy. Blood cultures are often collected in a series (e.g. X2 or X3) and are usually timed to be performed just before the patient's next expected temperature rise and immediately after. If the physician suspects the bacteremia to be the result of a localized infection, the cultures may be ordered all at the same time from different sites. Blood cultures for adults are collected in sets of two: one aerobic (with air), and one anaerobic (without air). Blood normally is sterile, whereas bacteria do normally exist on the skin surface. Aseptic technique is the most important part of the blood culture collection process. Failure to follow sterile technique can introduce skin surface bacteria into the blood culture bottle and interfere with interpretation of results.

Covenant HealthCare Laboratory Microbiology Department utilizes the Biomerieux BacT/Alert Microbial Detection System®. This system, with compatible blood culture bottles, provides both a microbial detection system and a culture media with optimal nutritional and environmental conditions for organisms commonly encountered in blood infections. Inoculated bottles are placed in the instrument where they are incubated and continuously monitored for the presence of aerobic and/or anaerobic organisms. Positive samples are then further processed using routine microbiological methods.

EQUIPMENT

- A. Gloves: non-latex or powder-free latex only
- B. Tourniquet
- C. 70% isopropyl alcohol preps
- D. Povidone-Iodine/Iodine preps

1. PDI® Povidone-Iodine Swabstick (1's)
 2. PDI® Povidone-Iodine U.S.P. Prep Pad
 3. Medi-Flex Sepp® 2% Iodine Tincture ampules
 4. Chlorascrub™ Swabstick 1.6 mL prep
 5. Chlorascrub™ Swab 1.0 mL prep
- E. Vacutainer or syringe blood collection system
1. BacT/Alert® blood culture bottle/needle adapter set
 2. Portex Saf-T Wing™ “butterfly” blood collection set
- F. Evacuated bottles/tubes for ordered tests
1. BacT/Alert® Aerobic blood culture bottle (Blue cap)
 - a. Minimum blood volume: 5cc
 - b. Maximum blood volume: 10cc
 2. BacT/Alert® Anaerobic blood culture bottle (Purple cap)
 - a. Minimum blood volume: 5cc (see NOTES: H)
 - b. Maximum blood volume: 10cc
 3. BacT/Alert® Pedi-BacT blood culture bottle (Yellow cap)
 - a. Minimum blood volume: 0.5cc
 - b. Maximum blood volume: 4cc
 4. Appropriate tubes for any other tests ordered
 5. NOTE: Blood cultures are collected as a set (both aerobic and anaerobic, #1 and #2 above) on all patients five years and older. Under the age of five years, a single pediatric bottle (#3 above) may be obtained
- G. Clean gauze squares
- H. Appropriate bandages
- I. Sharps disposal unit
- J.

PROCEDURE

- A. Review test requisitions
 1. Verify time and date of collection
 2. Check for any special draw requirements or patient restrictions
- B. Introduce self
- C. Identify patient according to Patient Identification Procedure
- D. Assemble equipment and supplies
- E. Put on gloves
- F. Position patient and visually assess patient's arm (arms) for most likely venipuncture site
- G. Secure tourniquet
- H. Select the actual venipuncture site
- I. Release the tourniquet
- J. Prepare site for collection
 1. Patients over 2 months of age
 - a) Scrub site with Chlorascrub™ Swabstick 1.6 mL prep
 - b) Scrub site in a back and forth manner for 15 seconds

- c) Flip swab and scrub site in a back and forth manner for an additional 15 seconds
 - d) Allow site to air dry for 30 seconds
- 2. For infants under 2 months of age
 - a) Do not use Chlorascrub™ Swabstick 1.6 mL prep
 - b) Cleanse the site with an alcohol prep to rid site of excess dirt and surface debris
 - c) Check for allergy to iodine (if patient is allergic to iodine cleanse site twice with alcohol)
 - d) Scrub cleansed site with Povidone-Iodine/Iodine prep
 - e) Scrub site beginning in the center and rubbing the swab outward in concentric circles covering an area approximately 3-4 inches in diameter
 - f) Do not go back over any area that has been prepped
- K. Prep blood culture bottles while site air dries
 - 1. Using alcohol prep pad, wipe down, then remove plastic flip top
 - 2. Scrub back and forth vigorously across the top of each bottle using a separate alcohol prep pad for each bottle and leaving pad in place until ready to draw
- L. Reapply tourniquet being careful not to touch the prepped area
- M. Do not repalpate
 - 1. Repalpating the site is not recommended
 - 2. If patient has "difficult" veins and repalpating is anticipated, the phlebotomist's gloved finger should be cleaned in the same manner as the venipuncture site during the time allowed for the draw site to dry
- N. Anchor vein, taking care not to contaminate site
- O. Perform venipuncture
 - 1. Using Blood Culture Adapter and Winged (Butterfly) Blood Collection Set:
 - a) Attach butterfly to blood culture adapter
 - b) Proceed as with regular Vacutainer® making sure to fill aerobic culture first because of air in tubing
 - c) As needed, use insert to fill vacutainer tubes for other testing
 - 2. Using Winged (Butterfly) Blood Collection Set and Syringe, or using Syringe with Safety Needle
 - a) Attach syringe to butterfly or safety needle
 - b) Proceed to fill syringe as per venipuncture procedure
 - c) Engage safety shield on butterfly or needle and remove
 - d) Attach MONOJECT® Angel Wing Multi-sample female transfer set to the syringe
 - e) Remove alcohol prep from top of blood culture bottle prior to filling
 - f) Fill blood culture bottles beginning with aerobic to prevent introducing any air into the aerobic bottle
 - g) Note previously stated minimum and maximum volumes
 - h) Fill tubes for additional tests in correct order of draw using appropriate transfer device
- P. Release tourniquet-tourniquet should not be on longer than one minute
- Q. Apply pressure to the puncture site or if appropriate ask patient to do this
 - 1. Pressure should be applied for a minimum of 30 seconds
 - 2. Patients on anticoagulants require pressure application for longer periods

- R. Place needle and collection device in sharps disposal unit
- S. Mix blood culture tubes and any vacutainer tubes by gentle inversion

- T. Check puncture site for cessation of bleeding
- U. Use alcohol to remove any iodine used
- V. Apply appropriate bandage
- W. Label all tubes according to labeling protocol
- X. Properly dispose of all biohazard materials
- Y. Remove gloves and wash hands
- Z. Thank patient and ask if you can provide further assistance

NOTES

- A. If draw is unsuccessful and must be repeated, the sterile prep must be repeated
- B. Central Venous Catheter lines may be used by nursing for blood culture collection under certain circumstances
 1. According to Nursing protocol in Clinical Practice Manual: Long Term Vascular Access Devices
 - Observe catheter connector for contamination and change if necessary
 - Prepped catheter connector with Chlorascrub™ Swab
 2. Physician wants to determine if line is source of contamination
 3. Sterile technique must be followed during specimen collection
 4. If more than one set of blood cultures is ordered, alternate sites must be used for each set. Both sets cannot be collected from the line, unless specifically requested by the physician.
 5. Line collections should be labeled as such on the blood culture bottle(s) and be accompanied by the remaining part of the label with documentation of who drew the specimen.
- C. As with all draws, blood should be collected below any existing intravenous (IV) line
- D. Blood cultures are always the first in draw order because of possible contamination of needle (and thus the culture itself) from the non-sterile stoppers of other tubes
- E. Under filling of blood culture bottles can result in false-negative results
- F. When collecting blood cultures on adults, every attempt should be made to obtain full blood culture draws including both aerobic and anaerobic bottles--if unable to obtain a full set of cultures, the aerobic bottle should be filled first, up to 10 ml. Put any remaining specimen in the anaerobic bottle.
- G. Pediatric bottles should not be collected on patients over 12 years of age.
- H. Underfilling the anaerobic bottle in order to maximize (10 ml) the fill of the aerobic bottle is acceptable if a full set of cultures cannot be obtained.
- I. More than one set of blood cultures should never be collected in a single venipuncture or from a line.

REFERENCES

- A. McCall, R.E. & Tankersley, C.M., Phlebotomy Essentials, Second Edition, Lippincott-Williams and Wilkins
- B. National Committee for Clinical Laboratory Standards, H3-A6. (2007). *Procedures for the collection of diagnostic blood specimens by venipuncture* (6th ed.). Villanova, PA: NCCLS
- C. Phelan, S., Phlebotomy Techniques: A Laboratory Workbook, 1993, American Society of Clinical Pathologists, Chicago
- D. Garza, D. & Becan-McBride, K., Phlebotomy Handbook, Fifth Edition, 1999, Appleton & Lange
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