	The Johns Hopkins Hospital Interdisciplinary Clinical Practice Manual Patient Care	<i>Policy Number</i>	PAT063	
		<i>Effective Date</i>	12/01/2010	
		<i>Approval Date</i>	11/30/2010	
	<i>Subject</i>	Blood Cultures: Ordering, Procurement and Transport	<i>Page</i>	1 of 6
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Keywords: Blood culture, cultures, infection, catheter sepsis, bacteremia, CRBI, blood stream infection

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I. OBJECTIVES


Blood cultures are intended to provide information for the diagnosis and management of patients with suspected bacteremia or fungemia. The objective of this policy is to standardize optimum procedures for the ordering, procurement, and transport of blood cultures in a manner designed to provide accurate information.

II. INDICATIONS FOR USE

Used in the ordering, procurement and transportation of blood cultures.

III. DEFINITIONS

Blood Culture	<ul style="list-style-type: none"> A specimen of blood that is submitted for bacterial or fungal culture. NOTE: This is irrespective of the number of bottles or tubes into which the specimen is divided or distributed
Blood Culture Series	<ul style="list-style-type: none"> A group (usually two sets) of temporally related blood cultures that are collected to determine whether a patient has bacteremia or fungemia, and to help determine if a recovered organism is significant, or a likely contaminant.
Blood Culture Set	<ul style="list-style-type: none"> The combination of blood culture bottles or tubes into which a single blood specimen is inoculated
Contaminant	<ul style="list-style-type: none"> A microorganism isolated from a blood culture that was introduced into the culture during specimen collection or processing and that was not pathogenic for the patient from whom the blood was collected (i.e., the isolates were not present in the patient's blood when the blood was sampled for culture).
CR-BSI	<ul style="list-style-type: none"> Catheter-related bloodstream infection
Aerobic Blood Culture Bottle	<ul style="list-style-type: none"> Used primarily for isolation of organisms that require oxygen as a hydrogen acceptor in their metabolic pathways. Optimum volume 8-10 ml of blood.

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Anaerobic Blood Culture Bottle	<ul style="list-style-type: none"> Used primarily for isolation of organisms that require a substance other than oxygen as a hydrogen acceptor and are inhibited by oxygen. Optimum volume 8-10 ml of blood. NOTE: Many microorganisms are facultative, that is, able to live aerobically or anaerobically, and thus can grow in either blood bottle type.
Aerobic Resin Containing Blood Culture Bottle	<ul style="list-style-type: none"> Aerobic blood culture bottle with antimicrobial binding or absorbing agents added to enhance the recovery of microorganisms from the blood of patients receiving antimicrobial therapy. Optimum volume 8-10 ml of blood.
Isolator Tube(Lysis centrifugation system)	<ul style="list-style-type: none"> Tube containing light-sensitive media, used for the optimal recovery of Bartonella, Cryptococcus, and filamentous and dimorphic fungi. It is used primarily for the recovery of intracellular pathogens. The tube must be sent to the lab immediately in a brown paper bag.
Pediatric Blood Culture Bottle	<ul style="list-style-type: none"> Aerobic blood culture bottle with antimicrobial binding or absorbing agents added, similar to the resin containing culture bottle listed above, but requiring smaller volume of blood than the adult bottle (See Appendix B).
Test of Cure	<ul style="list-style-type: none"> Blood culture obtained after treatment of a previously positive blood culture purely to check if it is now negative.

IV. RESPONSIBILITY


- A. Authorized Prescribers
 1. Order blood cultures according to this policy.
 2. Indicate the time frame in which the cultures are to be drawn (or obtained per unit protocols/pathways).
 3. Indicate any special media requirements.
 4. Order no more than 4 sets of blood cultures per 24 hour period.
 5. Draw the blood culture(s), if required. (See Appendix A)
- B. Registered Nurses (RN)/ Licensed Practical Nurses (LPN)
 1. With demonstrated/documentated competency, may draw blood cultures according to Appendix A.
 2. RN/LPN, do not perform femoral or lower extremity venous or arterial sticks.
 3. Exception: Lower extremities can be used to obtain specimens for pediatric patients under 10 years old.
- C. Microbiology Laboratory
 1. Perform the analytical portion of blood culture processing.
 2. Communicate positive results according to the critical action values policy.
 3. Monitor blood culture contamination rates.
 4. Provide education and training for proper blood culture procurement and transportation procedures

V. PROCEDURE


- A. Standard Procedures
 1. General Considerations:
 - a. Ordering a Blood Culture:
 - i. The prescriber must specify the site(s) of cultures to be obtained, i.e., peripheral, central line, other.
 - ii. The prescriber must specify the type(s) of cultures needed: i.e., bacterial, fungal, isolator, mycobacterial, other.
 - iii. The prescriber must specify number required and timing preferred, especially if antibiotics are to be held prior to obtaining the initial diagnostic cultures.
 - b. Preparing the phlebotomy site:

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- i. Chlorhexidine Frepp preparation must be used unless, in a given patient, the product is contraindicated. This product has been proven to provide the most rapid and complete sterility of the skin site, and the lowest incidence of skin contamination and resulting false positive cultures.
 - ii. If the patient is allergic to Chlorhexidine, tincture of iodine may be substituted. Povidone iodine products must be avoided, except in the rare patient who cannot tolerate an alcohol-based product.
 - iii. The water-based, povidone products fail to dry in a timely manner, and release their iodine content too slowly to predictably de-fat skin, and kill underlying flora. These deficits greatly increase contamination rates.
 2. Timing and Site Source:
 - a. Except when not medically feasible, a minimum of two sets of blood cultures, from two separate sites, shall be drawn peripherally.
 - i. If a different peripheral site is possible, the second set may be drawn immediately.
 - ii. If using the same site (same vein), wait at least 10 minutes prior to obtaining the second set. A new sterile field must be created and site must be re-prepped.
 - iii. If unsuccessful with second peripheral attempt, obtain one peripheral set and one set from a central venous access device, if present.
 - iv. Up to two additional sets may be drawn within 24 hours.
 - b. The practice of drawing blood from a catheter shall be avoided when a peripheral (non-catheterized) site is available.
 - i. Blood cultures may not be drawn through an existing peripheral IV catheter.
 - ii. A central catheter site is much more likely to give false positive results and may result in unnecessary interventions (antibiotics, line changes, etc.). Whenever possible, unless ruling out catheter sepsis, or unless the sample is drawn when the line is initially inserted, blood cultures shall not be drawn from an indwelling catheter site.
 - c. Blood cultures for diagnostic purposes must be obtained prior to implementing or changing antibiotics, unless the authorized prescriber ordered otherwise. Cultures must be drawn promptly to prevent delay in initiation of antibiotic therapy. Blood cultures are most likely to be positive if the blood sample is collected as soon as possible after the development of fever.
 - d. Surveillance or "test of cure" blood cultures are rarely indicated, and shall not be performed as a routine.
- B. Specialized Blood Culture Procedures
 1. Suspected catheter sepsis:
 - a. Draw two culture sets simultaneously.
 - i. One set is to be obtained aseptically from the catheter hub or through the implanted venous access port (VAP).
 - ii. The second set must be drawn from a peripheral site.
 - iii. If a medical reason precludes drawing from a peripheral site, obtain a second culture from a different catheter lumen.
 - iv. If the catheter is removed and culture is desired, a 5 cm section including the tip is to be cut aseptically, and sent to Microbiology in a dry sterile container. Catheter hardware cultures must always have an accompanying peripheral or line blood culture specimen sent within 24 hours to help validate the significance of any recoveries made from the hardware.
 2. Suspected acute endocarditis and endovascular infection or source
 - a. Draw 2-3 culture sets from two separate sites, within 30 minutes of each other and before beginning antimicrobial therapy.
 - b. At least one set shall be from a peripheral site.
 - c. Begin therapy after cultures are obtained.
 3. Suspected subacute endocarditis:

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- a. Draw 2- 3 blood culture sets on day 1, spaced 30-60 minutes apart. This may help to document a continuous bacteremia.
- b. At least one of the cultures shall be from a peripheral venipuncture site; preferably all shall be from peripheral sites, but if sites are not available, one may come from a central line. If all cultures are negative at 24 hours, two additional sets shall be drawn on day 2. (No more than 4 sets in a 24 hour period.)
- c. Immediate antibiotics are less important than establishing a specific microbial pathogen for this diagnosis.
4. Follow-up blood cultures
 - a. Most patients with bacteremia or fungemia do not require follow-up blood cultures to document clearance. There are two exceptions for which at least two sets of blood cultures are to be drawn at 48 - 96 hours.:
 - i. Patients with infective endocarditis.
 - ii. Patients with Staphylococcus aureus bacteremia not related to endocarditis.
5. Mycobacterial blood cultures (AFB):
 - a. Use a mycobacterial blood culture bottle (BD BACTEC Myco F Lytic bottle). Because the media is unstable, it must be obtained from the Mycobacteriology (AFB) Lab, Meyer B1-124, 5-6470 on dayshift, or the main Microbiology Lab, 5-6510, during evening hours. The media is kept in a brown paper bag to protect it from light. The pneumatic tube can be used to obtain the culture bottles.
 - b. Prepare the skin as for routine aerobic blood cultures.
 - c. Inoculate 5 ml blood into a BACTEC Myco F Lytic bottle.
 - d. Deliver the blood bottle in the brown bag promptly to the Microbiology Lab. The pneumatic tube can be used as long as sample is sent directly to the Microbiology Lab, and is sent within the brown paper bag. Shipment must be prompt to permit the timely inoculation of the additives that may be required.
 - e. An authorized prescriber must have specifically placed an order for a Mycobacterial blood culture.
6. Fungal Cultures:
 - a. Follow the routine procedure described above for bacterial cultures. If the order is specific for Histoplasma or Cryptococcus, an isolator tube culture must be inoculated. Obtain an isolator tube from the Microbiology Lab (call 5-6510). Because Isolator media is light sensitive, it also is stored in brown paper bags.
 - i. Inoculate the isolator tube with 5cc of blood (absolute minimum is 3cc).
 - ii. Send the culture in its brown paper bag directly to the Microbiology Lab. The pneumatic tube can be used as long as sample is sent directly to the Microbiology Lab.
7. Viral blood cultures:
 - a. Only herpes simplex viruses (HSV) are tested by conventional culture.
 - i. Obtain one 3 ml green top tube (heparinized) by standard venipuncture.
 - ii. Deliver the tube promptly to the Microbiology Lab. The pneumatic tube can be used as long as sample is sent directly to the Microbiology Lab.
 - iii. Indicate suspected (HSV) on the requisition to permit optimization of the culture technique and reduction in cost.
 - b. Submit an extra 3 ml purple top for the detection of viruses other than HSV by molecular testing if multiple viruses are in the differential.
 - i. Molecular testing is available for detection of cytomegalovirus (CMV), Epstein Barr virus (EBV), enteroviruses, parvovirus B19 and adenoviruses.
 - ii. Obtain one 3 ml purple top tube or plasma partitioning tube for detection of CMV, enteroviruses, parvovirus B19 and adenoviruses by molecular methods.
 - iii. Obtain two 3 ml purple top tubes for EBV detection/quantification.
8. When rare organisms such as Brucella, Campylobacter or Bartonella are suspected:
 - a. An ID physician shall be consulted.
 - b. The Microbiology Lab shall be consulted to advise which type of specimen would be most likely to support the suspected organism.

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9. Pediatric Blood Cultures:
 - a. Pediatrics shall follow the same policies and procedures as described in this policy. See Appendix B for guidelines regarding blood culture volumes.

VI. REPORTABLE CONDITIONS

- A. Report to the authorized prescriber:
 1. When unable to obtain the required blood specimens for any reason.
 2. Any complications that occur during the procurement or transport procedures.

VII. DOCUMENTATION

- A. The date and collection time of a blood culture is automatically recorded in the laboratory if a blood culture specimen was scanned at the time of procurement. This is important for result interpretation, especially if the culture is negative. It permits correlation with the time of initiation of antibiotics.
- B. If a manual process is used, document the blood culture order in the medical record, noting the date and procurement time.
- C. Document any complications which may have occurred while obtaining a blood culture such as sub-optimal specimen amount or inability to obtain specimen from a peripheral site.

VIII. EDUCATION AND COMMUNICATION

- A. This policy will be communicated through Johns Hopkins Hospital publications.
- B. Placement of policy on-line at www.Hopkinsmedicine.org/heic
- C. This policy will be placed in the Interdisciplinary Clinical Practice Manual on the JHH Intranet site <http://www.insidehopkinsmedicine.org/hpo> . Paper distributions will be made to the Functional Unit Nursing offices in the event of web access difficulty.

IX. SUPPORTIVE INFORMATION

See Also:

The Johns Hopkins Hospital, Interdisciplinary Clinical Practice Manual


- [Adult Vascular Access Device Policy, IFC035](#)
 - [Mislabelled or Unidentified Patient Specimens, PAT027](#)
- [Microbiology Department. Guidelines for Drawing Blood Cultures.](#)

Children's Center Pediatric Policies, Procedures and Protocols

- [Pediatric VAD Central Maintenance Protocol](#)

References:

1. Elekes, S., & Weinstein, M. (1993). Blood cultures. *Infectious Disease Clinics of North America*, 7(2): 221-234.
2. Hanker, R. (2000). Infection Control: Use of blood cultures in critically ill patients. *Critical Care Nurse*, 20(1), 45-50.
3. Jennings, J. (2002). *APIC Text of Infection Control and Epidemiology*. Washington, DC: Association for Professionals in Infection Control and Epidemiology.
4. Kumholtz, H., Cummings, S., & York, M. (1990). Blood culture phlebotomy: Switching needles does not prevent contamination. *Annals of Internal Medicine*, 113(4): 290-292.

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5. Little, J.R., Murray, P.R., Traynor, P.S., & Spitznagel, E. (1999). A randomized trial of povidone-iodine compared with iodine tincture for venipuncture sites disinfectant: effects on rates of blood culture contamination. *American Journal of Medicine*, 107(2): 119-125.
6. Mimos, O., Karim, A., Mercet, A., Cosseron, M., Falissard, B., Parker, F., et al. (1999). Chlorhexidine compared with povidone-iodine as skin preparation before blood culture. A randomized, controlled trial. *Annals of Internal Medicine*, 131(11): 834-837.
7. Schiffman, R.B., Strand, C.L., Meier, F.A., & Howanitz, P.J. (1998). Blood culture contamination: A College of American Pathologists Q-Probes study involving 640 institutions and 497,134 specimens from adult patients. *Archives of Pathology and Laboratory Medicine*, 122(3): 216-221.
8. Society of Critical Care Medicine. (1998). Practice parameters for evaluating new fever in critically ill adult patients. Des Plaines, IL: Author.
9. Strand, C.L., Wajsbort, R.R., & Sturmann, K. (1993). Effect of iodophor vs. iodine tincture skin preparation on blood culture contamination rate. *JAMA*. 269(8): 1004-1006.
10. Tonneson, A., Peuler, M., & Lockwood, W. (1997). Cultures of blood drawn by catheters vs. venipuncture. *JAMA*. 235(17): 1877.
11. Weinstein, M.P. (1996). Current blood culture methods and systems. *Clinical Concepts, Technology and Interpretation of Results. Clinical Infectious Diseases*, 23: 40-46.
12. CLSI. Principles and Procedures for Blood Cultures; Approved Guideline. CLSI document M47-A. Wayne, PA: Clinical and Laboratory Standards Institute; 2007

Sponsor:

- Medical Care Evaluation Committee

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- Laboratory Advisory Committee
- VAD Committee
- Microbiology Lab
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