

<b>PROCEDURE NO.:</b> <u>SC50</u>
<b>SUBJECT:</b> <u>Blood Culture Collections</u>
<b>Effective Date:</b> <u>9/1/07</u>
<b>Supersedes:</b> <u>2/03</u>
<b>Medical Director:</b> <u>Vincent DeRisio, D.O.</u>
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<b>Annual Review:</b> _____

All specimen material should be considered potentially hazardous and thereby handled according to practices of Universal Precautions.

**PRINCIPLE:**

Blood culture is one of the most important procedures performed by the laboratory. Proper specimen collection is vitally important to the success of this culture. Guidelines regarding timing, steps to minimize contamination, and perhaps most important of all adequate volume, must be followed closely. Rapid detection and recovery of organism in the blood are critical to the management of the septic patient.

**SPECIMEN:**

Blood

**REAGENT - SPECIAL SUPPLIES and EQUIPMENT:**

1. Chloraprep® One-Step Frepp® applicator (2% Chlorhexidine Gluconate and 70% Isopropyl alcohol) **Note: Chloraprep® is not recommended for children less than 2months old.**
2. Alcohol pads
3. Aerobic and Anaerobic ESP bottles
4. 20 mL syringe
5. Needle
6. Sharps container
7. Gloves
8. Tourniquet
9. Band-Aid or tape
10. 2x2 gauze
11. Isolator tube or Peds Isolator tube

**CALIBRATION:** N/A

**QUALITY CONTROL:** N/A

**LABORATORY INFORMATION SYSTEM:** N/A

**PROCEDURE:**

A. Timing and Numbers of Cultures Collected

The following recommendations are intended to maximize the chances of recovering organisms from the blood, and to assure proper test utilization. In all instances the ordering physician must specify the draw times.

**If the physician does not specify the time of collection, but instead orders “Blood Cultures times 2 or 3,” draw these specimens one hour apart. If the one-hour interval is not possible, collect the specimen no less than ½ hour apart.**

1. Continuous bacteremia--For each septic episode, draw no less than two and no more than three separate sets within a twenty-four hr. period. These should be drawn one hour apart, or if one hour is not possible, not less than 1/2 hour apart.
2. Intermittent bacteremia--For clinical picture of intermittent chills, blood should be obtained for culture during the hour before the expected chill or temperature spike. This corresponds to the usual one-hour lag time between the influx of bacteria into the blood stream and subsequent chills and fever. Draw no less than two and no more three separate sets within a twenty-four hr. period. These should be drawn one hour apart, or if one hour is not possible, not less than 1/2 hour apart.
3. Acute septicemia--in acute clinical situations where antibiotics are to be given, two sets should be drawn, preferably from separate anatomic sites, immediately prior to therapy.
4. Bacterial endocarditis--draw three separate sets 1/2 hour apart, immediately prior to antibiotic therapy. Collection of more than three sets has shown to be of diminishing value.

**NOTE:** Filling multiple sets of bottle from blood collected by a single venipuncture, or from multiple venipunctures performed less than five minutes apart will be considered a single draw.

B. Blood Culture Bottles

The blood culture system used is the ESP. Two bottles: the ESP 80A (blue cap) which is intended for culture of aerobes, and the ESP 80N (red cap) formulated for recovery of anaerobes should be used for each set of cultures drawn.

1. **Adult Patient**--draw 20 mL of blood. Following the chart below, place a maximum of 10 mL into both an ESP 80A and an ESP 80N bottle. Do not overfill. Note: If less than 5 mL of blood is collected, inoculate an ESP 80 A (blue cap) only. Otherwise follow the chart at the end of this procedure.
2. **Infants and Children**—(refer to procedure for collecting blood from pediatrics SC027) collect a maximum of 5 mL of blood. Inoculate an ESP 80A only.

3. **Blood for Fungus and/or AFB**--blood for these cultures must be collected in an Isolator tube. Collect the full 10 mL of blood and mix the contents of the tube by inverting 4 - 5 times. Do not collect this specimen in ESP bottles.

Note: For infants collect 1.5 mL and use Peds Isolator tube.

Patient	Aerobic Bottle	Anaerobic Bottle	Blood Volume
Adult	ESP 80A (blue cap)	ESP 80N (red cap)	20 mL  maximum of 10 mL in each bottle
Adult--low volume draw less than 5 mL	ESP 80A (blue cap)	None	Less than 5 mL use aerobic bottle only
Infant or small child	ESP 80A (blue cap)	None	1-5 mL

### C. Preparation of the Site

The two most important factors to remember when collecting blood for culture are:

- a) Careful preparation of the phlebotomy site to avoid contamination and
- b) Collection of an adequate volume of blood.

1. Apply the tourniquet. Palpate the area and select site of vein for venipuncture. Remove tourniquet.
2. Clean the venipuncture site with a Chloraprep® One-Step Frepp® applicator.
3. Pinch the wings on the applicator to break the ampule and release the antiseptic. Do not touch sponge.
4. Wet the sponge by repeatedly pressing and releasing the sponge against the treatment area until liquid is visible on the skin.
5. Completely wet the area and scrub the puncture site using repeated back and forth motion with the applicator, for at least 30 seconds. Allow the area to air dry completely, for at least 30 seconds. Do not blot or wipe away. This removes skin cells (that harbor contaminating bacteria) and natural oils. In addition, it kills surface bacteria.
6. Re-apply the tourniquet. To avoid contamination - Do not touch/palpate the cleansed site. If you must search for the vein, clean the tip of the finger of your gloved hand with a fresh Chloraprep,® let it dry, and then palpate the site.
7. Rub the top of the rubber stopper on each blood culture bottle with a 70% alcohol pad.
8. Perform the venipuncture. Draw 20 mL of blood in adults (1 to 5 mL in infants and small children).

Note: For infants or young children, use alcohol pad, not the Chloraprep.®

Wipe the area for at least 30 seconds with the alcohol pad. With a fresh alcohol pad, wipe the puncture site in a circular motion, moving concentrically outward **for at least 30 seconds**. **Allow the area to dry completely, 30-60 seconds**. Repeat if necessary.

### D. Method of Collection

#### I. Syringe Method:

1. Distribute up to 10 mL of blood into each of the bottles, beginning with the aerobic bottle (blue cap), following the chart below. Remember, to control the plunger on the syringe. The vacuum in the bottles is not calibrated to give a specific volume, thus you must be careful not to overfill the bottle

2. Do not recap the syringe or change needles between bottles.
3. Dispose of the uncapped syringe in a biohazard sharps container.

I. Line Method:

This method is not considered optimal for collection of blood cultures and should be used only as a last resort or at the request of the physician (See procedural Notes). At some institutions, only nurses or physicians are permitted to draw blood from lines; adhere to your institution's policy.

1. After choosing a suitable port of entry, if contamination of that site is probable, wipe the area with alcohol and allow to dry. If the port is protected, this step may not be necessary.
2. Any blood or fluid resident in the line must be removed and discarded. This is to assure that the blood being is sampled is coming directly from the patient's circulation.
3. If the line is contaminated or the entry site is likely a nidus of infection, the value of a sample through the line is low and may only reveal an organism colonizing the entry site.
4. Use a syringe and withdraw enough blood to be certain you have removed all of the fluid in the line and brought blood from peripheral circulation to the syringe. Discard this sample.
5. Attach a second syringe and withdraw a sample of blood. Proceed as above under "syringe method".

I. Labeling of bottles

1. Label both bottles with Last and First name of the patient, Patient ID number, time and date of collection, your initials and site (R arm, L hand, Central line, etc.). Do not make marks on or cover the barcode on the bottle. If computer labels are available, apply to bottle in same direction as barcode on bottle North to South. Do not cover other barcode label.
2. Indicate the amount of blood distributed into each bottle.

I. Complete the Microbiology requisition (if culture not ordered across Hospital interface)

1. All information (e.g., date, time, requesting physician, phlebotomist, etc) must be recorded on the requisition.
2. Specify if the blood was drawn from a Hickman catheter, central line, Swan Ganz catheter, or A - line. (Of indicate if Right Arm, Left hand, etc.)

## BLOOD CULTURE GUIDELINES FOR PHLEBOTOMISTS

TOTAL BLOOD DRAWN (ML)	AEROBIC BOTTLE (BLUE CAP)	ANAEROBIC (RED CAP)
20	10	10
19	10	9
18	10	8
17	10	7
16	10	6
15	10	5
14	10	4
13	9	4
12	8	4
11	8	3
10	7	3
9*	6	3
8*	6	2
7*	5	2
6*	4	2
5*	5	0
4*	4	0
3*	3	0
2*	2	0
1*	1	0

\* Whenever the total volume of blood collected is less than 10 mL, enter the comment "IBBC" into the Lab computer. This comment reads "Total blood drawn was < 10 mL."

**CALIBRATION/INTERPRETATION:** N/A

**REPORTING RESULTS:** N/A

**NORMAL RANGE:** N/A

**CRITICAL VALUES:** N/A

**LIMITATION OF THE PROCEDURE:** N/A

**PROCEDURAL NOTES:**

The drawing of Blood Cultures from intravascular catheter lines is discouraged. When blood is drawn from a catheter, it is difficult to differentiate catheter colonization from infection with or without bacteremia.

1. Unless a blood culture is specifically drawn to evaluate a possible episode of catheter-related sepsis, blood cultures **should not be drawn** through an indwelling catheter.
2. When catheter-related sepsis is suspected, peripheral blood cultures should be drawn through venipuncture to document bacteremia or fungemia.

**ALTERNATIVE METHODS:** N/A

**REFERENCE:**

Dunne, Jr., W. M., F. S. Nolte, and M. L. Wilson April 1997. Blood Cultures III. J. A. Hindler (coordinating ed.), Cumitech 1B. American Society for Microbiology, Washington, D. C.

Ernst, D.J. 2002, Q&A – Site preparation for infant blood cultures, MLO 34, No.1.

Package insert: ChloraPrep® One-Step Frepp®, mrk-251-11/00, 2000. Medi-Flex Hospital Products, Inc. Overland Park, KS 66210. 1-800-523-0502.

Package insert: ChloraPrep® One-Step 3 mL Applicator, mrk-403-9/02, 2002. Medi-Flex Hospital Products, Inc. Overland Park, KS 66210. 1-800-523-0502.

Sewell, D. L. (ed.) 1992. Processing and Interpretation of Blood Cultures. pp. 1.7.1-1.7.11. *In:* H.D. Isenberg (ed.), Clinical Microbiology Procedure Handbook vol. 2. American Society for Microbiology, Washington, D. C.