NATIONAL INSTITUTES OF HEALTH
CLINICAL CENTER
CLINICAL CENTER NURSING DEPARTMENT

Procedure: Obtaining Blood Cultures from Peripheral and Central Venous Access Devices

SUMMARY OF SIGNIFICANT CHANGES SINCE LAST REVIEW

- Implementation of a standardized procedure
- Peripheral and central venous access device collection addressed
- Needleless connection devices on CVADs are to be cleansed with chlorohexidine prior to blood culture collection.
- All culture bottles are to be marked prior to collection to prevent over and under fill
- Cleanliness of the environment prior to collection addressed
- Importance of hand hygiene prior to collection
- (Appendix addressing alternative skin cleansing agents) To be developed
- Information added for HAI Prevention Bundle
  - Wiping of bedside area before using
- Included clarification of SoftID information

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Primary Stakeholder(s): Stephanie Wildridge

Deletes or Replaces - CVAD Obtaining Blood Specimens (11/15)

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Procedure: Obtaining Blood Cultures from Peripheral and Central Venous Access Devices

Approved:

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Procedure: Obtaining Blood Cultures from Peripheral and Central Venous Access Devices

Essential Information

1. Critical elements involved in obtaining blood cultures include:
    a. Hand hygiene practice performed by the collecting healthcare worker prior to collection
    b. Adequate skin disinfection
    c. Ensuring required blood volume is collected AND
    d. One set of blood cultures equals one aerobic and one anaerobic bottle.
    e. Chlorhexidine pads and applicators are not to be reused once they have been utilized to cleanse a surface of the lumen, culture bottle, or skin. Chlorhexidine pads are to be used when cleansing the tops of the blood culture bottles and the needleless connector. Swab sticks are to be used to cleanse skin.
2. Site selection:
    a. Peripherally drawn blood cultures are the optimal specimen. Blood cultures obtained via central venous catheters are more likely to be contaminated by organisms residing in the device itself or device components (i.e., tubing, end caps).
    b. It is preferable not to use arterial lines for blood cultures.
3. For **adults:**
    a. It is recommended that blood cultures be drawn in two (2) sets from two different site as ordered. The two cultures sets may be drawn sequentially without waiting between draws, but must be drawn from different peripheral sites or catheters/lumens.
    b. The volume for each blood culture bottle **for adults** should be a minimum of 3mL and a maximum of 10mL.
    c. It is preferable not to draw blood cultures from a peripheral IV site in adults. Blood drawn from a peripheral IV site can result in contamination of the culture.
    d. If under fill (less than 3 mL) is needed for the adult population, the LIP should state so in the blood culture order and microbiology should be notified of the under fill.
4. For **pediatrics**:
    a. The volume for each blood culture bottle for pediatric patients is weight based. (see Appendix A)
5. Collection:
    a. Blood cultures should be obtained prior to initiating antibiotics whenever possible.
    b. All culture bottles should be marked prior to collection to ensure required amount is obtained.
    c. If drawing other labs, blood cultures should be obtained first.
    d. Wait 30-60 minutes for peripheral draw after removal of central venous catheter.
    e. A waste sample is not drawn from a central venous access device.

f. Each blood culture set is prepared individually with its own collection devices.
g. The aerobic bottle sample is obtained first. The anaerobic sample is obtained last.
h. If using a vacutainer to draw the blood culture, the culture bottle must remain upright to prevent culture media from flowing back into the patient and to insure that the proper volume of blood is obtained.

6. Transport:
   a. All blood cultures are sent via the Pneumatic Tube System (PTS) to Microbiology. Only one set of blood cultures maybe placed in a well-padded PTS tube. If the PTS is not working, all blood cultures are sent via stat escort request.
   b. Blood cultures should be received by Microbiology within 120 minutes for accurate results.

Equipment for Peripheral Blood Culture:

1. Non-sterile Gloves
2. Tourniquet
3. Butterfly needle
4. Chlorhexidine (CHG) applicator
5. Chlorhexidine (CHG) pads (2)
6. One aerobic and anaerobic bottle for each site of blood culture
7. Vacutainer
8. Appropriate syringes and needle-less cannula (for use with pediatric reservoir system)

Steps:	**Key Points/Rationale:**
1. Provide an age-appropriate explanation of the procedure to patients and families.	1. Alleviates anxiety and promotes understanding.
2. Verify correct patient. Indicate site of collection using dropdown pick list in barcoding system. Print labels.	2. Use barcoding system pick list to indicate collection site.
3. Prepare the environment by cleaning area where placing supplies with hospital approved wipes per CCND Policy. .	3. Minimizes microbial bioburden of the area.
4. Perform hand hygiene and apply gloves.	4. See Appendix B.
5. Mark each blood culture bottle with a pen to the appropriate volume to be drawn.	5. This is to ensure the proper volume is obtained. For adults, the volume should be marked for 10ml volume. Refer to Appendix A for pediatrics.
6. Once the hard plastic top from the blood culture bottles is removed, swab the rubber septum with a CHG pad for 30 seconds. It is very important to allow the prepared site to dry unassisted (i.e., without blotting, blowing, fanning, or wiping dry); the CHG	6. The top of the culture bottle is a dust cover only and is not sterile so cleansing with CHG pads disinfects the surfaces. CHG pads are not to be reused.

dries in about 30 seconds.	
7. A tourniquet is applied and the vein is identified. The tourniquet is released if a delay of more than one minute is expected before performing venipuncture and reapplied immediately before venipuncture.	7. N/A
8. Swab designated blood draw site using a bidirectional scrub with chlorhexidine applicator for 30 seconds. It is very important to allow the prepared site to dry unassisted (i.e., without blotting, blowing, fanning, or wiping dry); the CHG dries in about 30 seconds. If allergy or sensitivity to CHG, use povidone-iodine. See appendix B.	8. The prepared area of skin is left untouched to prevent recontamination of the disinfected site. If the sterile site must be touched due to difficulty locating the vein or any other reasons the entire disinfection process shall be repeated. Povidone-iodine dries slower than CHG.
9. Collection using a vacutainer: a. Attach vacutainer to butterfly and perform venipuncture b. Insert aerobic bottle into the vacutainer to obtain sample. Hold the bottle upright so volume can be visualized. c. Repeat with the anaerobic bottle. d. After the necessary blood volume is obtained, tourniquet is released. e. The needle is removed from the patient and the safety device is activated. f. Pressure is applied to the venipuncture site and is covered with gauze and/or adhesive dressing.	9. Draw aerobic bottle first.
10. Invert bottles for gentle mixing.	10. N/A
11. Repeat above steps for separate venipuncture site.	11. N/A
12. Tube cultures to DLM as soon as possible, but no later than 2 hours after draw.	12. Cultures need to be processed by microbiology within 2 hours for accurate results.
13. Document in CRIS.	13. N/A

Equipment for Central Venous Access Device Blood Cultures:

1. Non-sterile gloves
2. Sterile 4x4
3. (3) CHG pads (one for each lumen and one for each culture bottle)
4. Aerobic and anaerobic culture bottles for each lumen
5. Stopcock
6. (1) empty 10 mL syringe

7. Vacutainer
8. (2) 10ml-Saline flushes (20ml total)
9. Heparin flush, if ordered

1.	Provide an age-appropriate explanation of the procedure to patients and families.	1.	Alleviates anxiety and promotes understanding.
2.	Verify correct patient. Indicate site of collection using dropdown pick list in barcoding system. Print labels	2.	Use barcoding system pick list to indicate collection site.
3.	Prepare the environment by cleaning area where placing supplies with hospital approved wipes per CCND Policy. Consider laying absorbent pad under supplies to maintain asepsis.	3.	Minimizes microbial bioburden of the area.
4.	Perform hand hygiene and apply gloves.	4.	See Appendix B
5.	Mark each blood culture bottle with a pen to the appropriate volume to be drawn.	5.	This is to ensure the proper volume is obtained. For adults, the volume should be marked for 10ml volume. Refer to Appendix A for pediatrics.
6.	Once the hard plastic top from the blood culture bottles is removed, swab the rubber septum with a CHG pad for 30 seconds. It is very important to allow the prepared site to dry unassisted (i.e., without blotting, blowing, fanning, or wiping dry); the CHG dries in about 30 seconds.	6.	The top of the culture bottle is a dust cover only and is not sterile so cleansing with CHG pads disinfects the surfaces. CHG pads are not to be reused.
7.	Set up stopcock(s) with syringe, vacutainer and saline as shown in CVAD Blood Collection Procedure.	7.	Do not flush central line. Do not draw a waste. No waste ensures that the blood sample contains that fill space of the central vascular access device. One stop cock setup per each set of blood cultures. Please see Figure 1.
8.	Select lumen of central line from which sample will be obtained. Place sterile 4x4 under lumen.	8.	A sterile 4x4 will decrease the risk of the catheter becoming contaminated during the blood culture collection.
9.	Scrub needleless connector with CHG pad for 30 seconds. It is very important to allow the prepared site to dry unassisted (i.e., without blotting, blowing, fanning, or wiping dry); the chlorhexidine dries in about 30 seconds	9.	Ensure that end and threads of needleless connector are cleansed with CHG pad. CHG pads are not to be reused.
10.	Connect stopcock to needle-free connector.	10.	N/A
11.	Withdraw 8-10ml, for adults, or appropriate volume for pediatric patients into empty syringe and transfer to the blood culture bottle with the stopcock	11.	Do not draw samples directly from central vascular access device into bottle. Hold bottle upright when filling bottles from syringe. This aids in preventing over and

	turned off to the patient.		under fill of blood culture bottles. Please refer to Appendix A for pediatric patient sample volume to collect.
12.	Repeat step 11 for the collection of the anaerobic culture bottle.	12.	Draw aerobic culture bottle first.
13.	Flush line with saline post draw.	13.	Refer to PRO: Appendix A: CVAD Flushing Guidelines Table, Adult and Pediatric
14.	Tube cultures to DLM as soon as possible, but no later than 2 hours after draw.	14.	Cultures need to be processed by microbiology within 2 hours for accurate results.
15.	Document in CRIS.	15.	N/A

FIGURE 1: Double Stopcock and Vacutainer or Syringe Method (Closed Loop System)

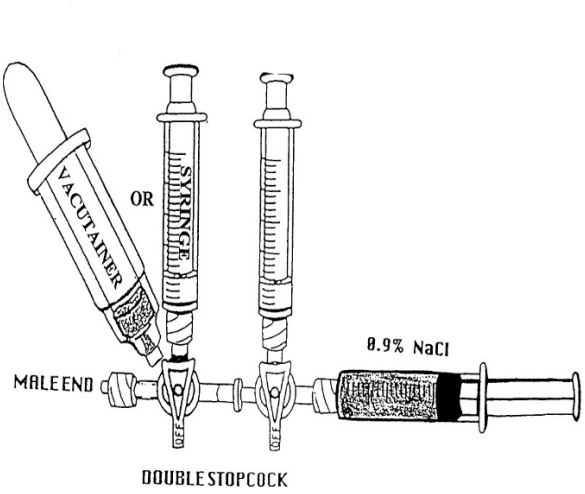

FIGURE 1

1. Attach vacutainer holder or syringe for drawing blood (sampling syringe) to stopcock port closest to patient-end of the stopcock. Turn valve off in direction of vacutainer OR sampling syringe.
2. Attach empty 10 mL syringe to next port. Turn valve off to syringe.
3. Attach syringe of 0.9% Sodium chloride to female end of stopcock and flush air out of stopcock. Turn valve off to 0.9% sodium chloride syringe.

References:

1. Chandrasekar P, Brown W. (1994). Clinical Issues of Blood Cultures. *Archives of Internal Medicine, 154*:841-849.
2. Ernest D. (1999). Collecting Blood Culture Specimens. *Nursing,* 29(7):56-8
3. Murray, et al. (1995). Bacteriology and Mycology Specimen Collection Guidelines. *Manual of Clinical Microbiology,* 21-22.
4. Pennsylvania Hospital (2002). *Blood culture collection.* Policy and Procedure.
5. Schifman R, Pindur A. (1993). The Effect of Skin Disinfection Materials on Reducing Blood Culture Contamination. *American Journal of Clinical Pathology.* 99:536-538.
6. University of Kentucky (2014). *Peripheral Blood Culture Collection Policy and Procedure*. Policy A08-100.

7. Weinbaum F, Lavie S. (1997). Doing It Right the First Time: Quality Improvement and the Contaminant Blood Culture. *Journal of Clinical Microbiology, 35*:563-565.

Contributing Policy, Procedure, Standard of Practice:

1. CCND Hospital Acquired Infection (HAI) Prevention Policy
2. PRO: CVAD Flushing a Central Line, Apheresis, or Dialysis Catheter, Appendix A : CVAD Flushing Guidelines Table, Adult and Pediatric

Appendix A

NIH CCND Pediatric Blood Culture Fill Volume Guide

Weight (kg)	Volume for culture	Maximum volume of blood drawn within a 24 h period
5-10	At least 2 mL into each "Aerobic Plus" and "Anaerobic Plus" bottles.	12 mL
10-20	At least 3 mL into each "Aerobic Plus" and "Anaerobic Plus" bottles.	18 mL
20-30	At least 5 mL into each "Aerobic Plus" and "Anaerobic Plus" bottles.	30 mL
30-40	At least 8 mL into each "Aerobic Plus" and "Anaerobic Plus" bottles.	48 mL
>40	8-10 mL into each "Aerobic Plus" and "Anaerobic Plus" bottles.	60 mL

Caution is advised when drawing repeated blood cultures in a pediatric patient within a 24 h period. If the total volume exceeds the recommendations in the chart, recheck volumes with the attending physician before drawing additional cultures.

Appendix B

How to Perform Hand Hygiene