

CONTAGIOUS COMMENTS

Department of Epidemiology

Blood Cultures at TCH - 2010 (and Beyond)

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Introduction:

Blood cultures are an essential part of any workup for suspected serious bacterial infection (SBI). Both the number and volume of blood cultures are important in interpretation. Many children with SBI may not be bacteremic so appropriate cultures of any focus of infection should also be obtained prior to starting antibiotics. Below are some of the frequently asked questions in relation to the blood culture collection policy here at TCH.

FREQUENTLY ASKED QUESTIONS:

How many blood cultures do I need to draw and when?

Only 1 culture is needed in any of the following:

- A previously healthy child
- The clinician is not planning to start antibiotics or change the patient's current antibiotics
- You are drawing repeat cultures after initiation of antibiotics to assure adequate treatment

Two cultures are needed in the following circumstances:

- Planning to start (or change) antibiotics immediately AND the patient has one or more of the following:
 - Central line (Broviac, Mediport, PICC, UAC, UVC, femoral lines, IJ, Subclavian, etc.)
 - Neonate
 - Immunocompromised
 - Acutely ill (e.g. new onset fever)
 - ICU setting

Why do we only use aerobic blood culture bottles at TCH (Pink or Blue) and when is the addition of an anaerobic culture warranted?

Anaerobes (e.g. *Fusobacterium*, *Bacteroides fragilis*) are an infrequent cause of sepsis in children. Therefore, we recommend getting two separate aerobic blood cultures for most high risk patients. Anaerobic cultures would be recommended for Lemierre's disease (*Fusobacterium*) and deep seated abscesses (liver, abdominal, etc.) and need to be specifically ordered by the clinician. Anaerobic bottles are obtained by calling the TCH Microbiology Lab.

Where should I draw the two cultures from?

For a patient with one or more central line or lines:

You can draw these two cultures from the same line or one from each of two different lines. A peripheral culture is not necessary. When drawing the two cultures from a central line(s), you must re-prepare the catheter hub and use a new blue-threaded lock cannula and blood culture kit for each culture. These two cultures can be from the same lumen or different lumens. For example, if one lumen is being used for infusion, and one is not in use, use the one that is not in use to draw both cultures but be sure to do a prep of the hub before each culture.

For a patient that does not have central lines:

When doing a peripheral stick, or drawing the culture with placement of a new peripheral IV (PIV), you need to prep the skin once at the start, perform venipuncture or arterial stick, and then you can draw both samples consecutively from the same venipuncture or arterial stick device. (See Blood Culture Policies & Procedures for details – <http://planetttch/policiesfitz/general/pdf/5801.pdf>).

Due to a variety of issues, we do not recommend drawing blood cultures from existing PIVs.

Why do I have to use a pre-packaged blood culture kit?

Research has shown that by using a pre-packaged kit and following the procedure correctly, it is possible to significantly decrease the false-positive blood culture "contamination" rate. At TCH, we (Dolan, S and Henry, D) did such a study. In 1994, assessment by laboratory and clinical staff indicated a concern regarding the presence of a higher than expected level of false positive blood cultures in our patient population resulting in increased resource utilization and unnecessary therapy. A blood culture kit with staff education was implemented. Pre-intervention (5.4%) and post-intervention blood culture contamination rates (2.9%) were compared. Results revealed a significant reduction in the contamination rate ($p=0.05$). When the number of false positives was compared to the total number of positive cultures (number of false positive/total number of positive cultures) before and after the intervention, results also revealed that there was significant reduction ($p=0.01$).

Which TCH blood culture kit do I use? Pink or Blue?

TCH has 4 types of blood culture collection kits. It will depend on the age of the patient and whether you are drawing the culture from line or peripheral stick. The 4 kits are as follows:

- Pink peripheral draw kit (use for less than 3y)
TCH order # 428701
- Pink central line draw kit (use for less than 3y)
TCH order # 428703
- Blue peripheral draw kit (use for 3y and greater) TCH order # 428702
- Blue central line draw kit (use for 3y and greater) TCH order # 428704

What type of prep should I use?

- For peripheral draws, cleanse the skin using 2% chlorhexidine/70% alcohol (e.g. ChlorPrep®) for 30 seconds using a back and forth motion. Let dry before puncturing the skin.
- For catheter draws, scrubbing the hub for 15 seconds with alcohol and friction and then letting it dry is necessary before accessing the line to get the specimen.

The clinician used to order a blood culture and then indicate in the order which line it was to be drawn from. Is this changing?

Yes. The physician will no longer have the ability to check which line you draw the culture from when ordering the culture. They often do not know which location the nurse can obtain the specimen from. However, they will now be prompted in EPIC on the criteria for when a second blood culture is needed. The nurse will now be the one to note (on the lab requisition) where they actually drew the specimen from. This will help facilitate the correct specimen source and type being entered into the computer by the lab when they receive the specimen.

How much discard do I need to draw off (discard/waste) before drawing the blood culture?

- Peripheral draw (e.g. inserting new PIV, direct stick (arterial or venous) – no waste is needed but draw the blood culture(s) before drawing any other labs.
- Implanted Port – 5mls

- Other CVCs (tunneled, non-tunneled, and other) – it is recommended to waste 3 times the internal volume of the catheter (catheter volume can be found on the outside of the catheter tubing or also in the Central Line Manual on Planet TCH). You will need to add this internal catheter volume (times 3) volume, the volume of the injection cap (0.2ml) and the single T connector (0.4ml) if they are connected. For example, if the internal volume of the catheter is 0.3ml and it has an injection cap on the end, then you need to draw (0.3ml x 3) plus 0.2ml which equals a 1.1ml discard.

Do I discard the waste blood or can I give it back to the patient?

Approximately 50% of the discards can be contaminated with organisms that may not yet be causing an infection therefore you should never use waste blood for blood culture. It is the practice at TCH to not return discard/waste blood to patients except in the following circumstances:

- Physician order (e.g. volume over time increases the propensity for needing a blood transfusion)
 - This does not apply to Hematology/Oncology/BMT patients.
- Unit specific policy/procedure that indicates when it is acceptable.

Note: When returning the blood per either of the above two exceptions please refer to the policies and procedures for how to safely return blood to the patient using a heparinized system or syringe.

How much blood volume does each culture need to be?

To calculate how much blood you need for each blood culture, you should take a minimum of 1ml (even in a small preemie) plus 1ml per year of the patient's age up to a maximum of 10mls per culture. Therefore, a child that is 3 years old is to have 4mls of blood drawn for each culture that is obtained. For kids less than 1 year of age, the minimum volume is 1ml. (See Table 1)

Table 1. Patient age, blood culture volume needed and bottle selection chart

Age	Minimum ml's Needed Per Each Blood Culture	Blood Culture Bottle Type
0y (less than 1y)	1ml	(Pink) BD Bactec Peds Plus
1y	2ml	(Pink) BD Bactec Peds Plus
2y	3ml	(Pink) BD Bactec Peds Plus
3y	4ml	(Blue) BD Bactec Plus
etc.	etc	(Blue) BD Bactec Plus
9y and older	10ml	(Blue) BD Bactec Plus

What do I do if I cannot get the correct amount per the table above?

Get as much as you can. Be sure to put the amount taken (mls) on the lab slip for every culture.

Isn't this too much volume for our little patients?

No! It's much worse to get too little and not culture the organism or to continue antibiotics along with the associated monitoring tests when not really indicated. In addition, the percent of the patient's total blood volume you are collecting using the table above is approximately $\leq 2\%$.

How should I document the source and how much blood I was able to obtain for each blood culture?

There is a section on the laboratory requisition form to enter the source and also a new section to enter the ml's of blood you are putting into the blood culture bottle. This also needs to be put on the blood culture bottle. This information will then be entered into the laboratory system by the lab. Reports will be shared with each area to show compliance with age and required volume for each blood culture.

What is our current blood culture contamination (false positive) rate?

In the past several years, the TCH blood culture contamination rate has been below 2.4% with the lowest year being 2008 (1.9%). A contaminated blood culture results in unnecessary increased length of stay, antibiotic treatment and testing, and an increase in adverse events.

Have the pre-packaged blood culture kits been updated? Yes, these kits have been updated in the summer of 2010. Direct input by nursing staff from inpatient units, ED and NOC locations resulted in a few changes to the kits such as bigger biohazard transport bags, and removal of some items that are not used consistently. We will use up our current supply before transitioning to the new kits. This should not affect your practice of drawing blood cultures.

Are any audits of this practice clarification/change being planned?

Yes, automated unit/department reports from EPIC are close to completion that will provide you with information on if two cultures were drawn based on the criteria noted above. Blood culture contamination rates will also be measured. The volume of blood being obtained per age of the patient is also being monitored to provide feedback on staff implementation of the new procedure.

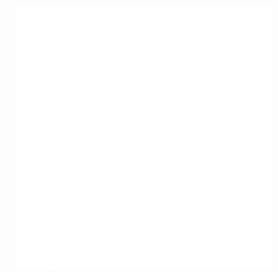
Final reminders:

- The appropriate volume of blood cultured is imperative to maximize/enhance the retrieval of pathogenic organisms and recognition of contaminants.
- When drawing from a central line, two cultures should be drawn with separate preps with first fever before antibiotics are initiated.
- For peripheral draws, cleanse the skin using 2% chlorhexidine/70% alcohol (e.g. Chloraprep®) for 30 seconds using a back and forth friction motion and let dry before puncturing the skin.
- For catheter draws, scrubbing the hub for 15 seconds with alcohol and friction and then letting it dry is necessary before accessing the line to get the specimen.
- Always document the source and volume of blood for each culture on the lab requisition slip and the blood culture bottle.



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