
Date: October 21, 2019
To: North Zone Physicians, Pharmacists, Nursing Staff, Laboratory Staff
From: Alberta Public Laboratories (APL) and DynaLIFE Medical Labs
Re: Update on Adult Blood Culture Collection – Increase in Blood Volume Recommended

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Key Message:

- A province-wide standardization in the definition of what constitutes a set of blood cultures in adults has recently been made. This change was made to improve the diagnostic sensitivity of this test.
- In **ADULTS**, each **SET** will now consist of **1 aerobic vial + 1 anaerobic vial**.
 - **Two (2) SETS (40 mL total)** are indicated for all suspect bacteremia or candidemia cases. Collect both sets immediately[#] **before antimicrobials**[^].
 - If **infective endocarditis** is suspected, **3 SETS (60 mL total)** are indicated. Collect 2 sets immediately[#] & 3rd set at least 1 hour apart^{**}.

[^] *Blood culture collection prior to antimicrobials is essential for optimal organism recovery. Prompt start of empiric antimicrobial therapy (within 1 hour of onset of sepsis) is associated with improved patient survival outcomes.* [#] *Spaced interval between sets has not been shown to improve recovery of organisms and is, therefore, not required.* ^{**} *This is according to the AHA Infective Endocarditis Guideline. Several studies have however shown no difference in blood culture yield within a 24h period whether blood samples were collected simultaneously or serially.*

Background:

- The single **MOST IMPORTANT FACTOR** for optimal diagnostic sensitivity is the **VOLUME** of blood drawn. For patients >10 years of age and >30 kg of body weight, a **total of 40 mL** (10 mL for each of the 4 vials) has clinically significantly higher sensitivity than previously recommended 30mL.
- The optimal volume of blood (40 mL) must be drawn from **2 different venipuncture sites** (20 mL from each site) to differentiate contamination from true bacteremia.

Action Required:

- **Documentation of BACTEREMIA CLEARANCE** by repeating 2 SETS of blood culture every 48 hours is recommended for clinical circumstances as exemplified below. In certain cases, and in consultation with Infectious Diseases, repeating 2 SETS of blood cultures daily may be indicated.
 - Gram positive bacteremia (mainly *Staphylococcus aureus*, *Enterococcus* species, *Abiotrophia/Granulicatella* species).
 - Candidemia
 - Prosthetic vascular grafts, intravascular lines, or cardiac pacemakers present
 - Infective endocarditis
 - Epidural source
 - Unknown source of bacteremia

- In general, **AVOID REPEATING** blood cultures **WITHIN **48 hours**** of the initial collection as this often does not add any further clinical value and risks harming the patient. Examples of exception include:
 - Lack of clinical improvement despite appropriate empiric antimicrobial therapy, raising concern for the possibility of a complicated infection
 - Transfusion reaction
 - Poor quality of initial blood culture collection (i.e. inadequately low blood volume obtained in the first collection, contamination of first blood culture set with skin commensals, etc.)
- **REPEATING** blood cultures **AT/ AFTER **48 hours**** of the first collection is of very low diagnostic yield when the latter tests negative. It should only be considered if:
 - Initial blood cultures are negative and bacteremia is still suspected
- Unless daily documentation of bacteremia clearance is indicated as per Infectious Diseases, the **practice of standing daily blood culture orders** following the first blood culture collection is not recommended as this does not confer further diagnostic advantage and poses risk of harm to patients.
- Fever is not a sensitive nor a specific indicator of bacteremia. It should not be used to time blood culture collection. Large studies have shown that bacterial yields were similar over a 24-h period before and after temperature spikes.

OTHER CONSIDERATIONS

- **FUNGAL CULTURE:** Collect using ACD or SPS vacutainer tube (Yellow top). BACTEC vials are only reliable for the detection of candidemia, but not fungemia. Consult the ProvLab Guide to Services for collection details when fungaemia with a filamentous or dimorphic fungus is suspected:
https://www.albertahealthservices.ca/webapps/labservices/indexProvLab.asp?id=5130&tests=&z_oneid=1 &details=true
- **MYCOBACTERIAL CULTURE:** Collect using ACD or SPS vacutainer tube (Yellow top). Collection in regular blood culture vials is not appropriate as mycobacteria do not grow well in this culture medium.
- **FOR PATIENT ALREADY ON ANTIBIOTICS:** if blood culture is required, consider drawing blood samples when antimicrobial agents are at their lowest concentration (trough). A negative culture may still represent a false negative result.
- **DRAWING BLOOD FROM INDWELLING INTRAVASCULAR CATHETER** should be avoided whenever possible as there is an increased likelihood of a false (+) result due to catheter colonization. If intravascular catheter-associated infection is suspected, 1 set (2 vials) should be obtained from the catheter along with a simultaneous peripheral blood culture set (2 vials).

NUMBER OF SETS, VOLUME and TIMING of BLOOD CULTURE COLLECTION

ADULTS	Venipuncture Site #1	Venipuncture Site #2	Total Collection Volume	**NEW** Total Number of Sets
> 10 years of age and >30 kg	1 Aerobic Vial (10 mL): Blue top 1 Anaerobic Vial (10 mL): Purple top	1 Aerobic Vial (10 mL): Blue top 1 Anaerobic Vial* (10 mL): Purple top	40 mL*	2 Sets* (4 vials total)

* Denotes new change

IF...	THEN...
Bacteremia or candidemia suspected	2 sets immediately before antimicrobials
Endocarditis	3 sets (2 sets immediately before antimicrobials + 3 rd set at least 1 hour apart).

Information on collection and volumes can be accessed at:

- Refer to **DynaLIFE Medical Labs** website: www.dynalife.ca > Test Directory > Search for "Blood Culture" under Microbiology

REFERENCES WILL BE PROVIDED UPON REQUEST

Inquiries and feedback may be directed to:

- Dr. M.C. Lee MD, FRCPC, M.Sc., Medical Microbiologist at *DynaLIFE* Medical Labs : Mao-Cheng.Lee@Dynalife.ca or the Medical Microbiologist-On-Call (MOC) at *DynaLIFE* Medical Labs at (780) 451-3702.

This bulletin has been reviewed and approved by:

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