Blood Culture Collection and Interpretation

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Blood Cultures

- Indications for blood culture collection
- Proper method for blood culture collection
- Interpreting a blood culture report
- Causes of blood culture contamination

Standards, Guidelines & Best Practices

Clinical and Laboratory Standards Institute
M47-A Principles and Procedures for Blood Cultures; Approved Guideline

American Society for Microbiology
Cumitech 1C

Center for Disease Control

Emergency Nurses Association
Clinical Practice Guideline: Prevention of Blood Culture Contamination
Indications
To rule in or rule out septicemia
Besides the culture, gram stain and sensitivities are always performed

Sources of Septicemia
Intravascular Sources
• Colonized intravascular devices
• Infected vascular grafts
• Direct introduction into bloodstream

Sources of Septicemia
Extravascular
• Infected organs, cavities & fluids
• Urinary tract infections
• Respiratory infections
• Infected foreign devices
• Open wounds, abscessed teeth
Collecting a blood culture sample......

What do I need?
Does this procedure require sterile technique?
How much blood is needed?
What about other labs?

Method of Collection
Peripheral Stick or With IV Start
1. Site selection
   • Appropriate location
   • Adequate blood flow
   • Skin can be properly cleansed

Method of Collection
Peripheral Stick / IV Start
2. Cleanse site
   • Friction scrub
   • Antiseptic must dry
   • No recontamination
Method of Collection
Peripheral Stick / IV Start

3. Prepare Supplies
- Open packages
- Connect supplies
- Mark bottles with minimum
- Clean bottle tops

4. Obtain blood sample
- Reapply tourniquet
- Insert needle into vein
- Fill bottles
- Label & send to lab

5. Blood for labs?
- Follow order of draw
- Mix additive
- Label at bedside
- Send to lab
Method of Collection

Peripheral Stick / IV Start

6. Complete Procedure
   • Remove needle or
   • Connect IV tubing
   • Document per facility policy

Method of Collection

Central Venous Access Devices

1. Discontinue administration of infusates.
2. Assemble supplies.
3. Determine quantity of blood that will be needed.
4. Mark blood culture bottles.
5. Cleanse bottle tops.

Method of Collection

Central Venous Access Devices

6. Clean needleless connector
7. Attach a 20ml syringe and withdraw blood
8. Remove syringe, attach transfer device to syringe.
9. Press transfer device into anaerobic bottle.
**Method of Collection**

Central Venous Access Devices

10. Fill anaerobic bottle to optimal fill line & remove.
11. Do same with aerobic bottle.
12. Gently invert both bottles to mix.
13. Replace needleless connector per facility policy.

**Method of Collection**

Central Venous Access Devices

14. Flush CVAD per facility policy.
15. Resume infusion if ordered.
16. Label blood culture bottles at patient bedside.
17. Place in Biohazard bag and route to laboratory.

**Syringe to Tube Transfer**

Wrong

![Wrong Syringe Transfer](image)

Right

![Correct Syringe Transfer](image)
Infection or Contamination?

- S. aureus;
- viridans strep;
- Corynebacterium spp.;
- Bacillus spp.;
- Propionibacterium spp.;
- Aerococcus spp.;
- Micrococcus spp.

Why Multiple Sets?

1 set has very little predictive value
2 sets create additional confusion
3 sets provide most assurance
Infection or Contamination?

- S. aureus;
- viridans strep;
- Corynebacterium spp.;
- Bacillus spp.;
- Propionibacterium spp.;
- Aerococcus spp.;
- Micrococcus spp.

Laboratory Report 03/07/12
TEST: BLOOD CULTURE AND SENSITIVITY
SOURCE: BLOOD
SPECIMEN: L-ARM, 1 OF 3 DATE: 03/3/12
RESULT:.... FINAL 03/06/12
GRAM STRAIN: BOTTLE GRAM POSITIVE COCCI IN CLUSTERS 03/06/12
CULTURE RESULT: A BOTTLE NO GROWTH TO DATE
ORGANISM: 1. STAPHYLOCOCCUS AUREUS

Blood Culture Interpretation

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Contamination</th>
<th>Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency within multiple sets</td>
<td>Only one of multiple sets</td>
<td>All sets are positive</td>
</tr>
<tr>
<td>Gram stain results</td>
<td>Frequently a contaminate</td>
<td>Not usually a contaminate</td>
</tr>
<tr>
<td>Number of species</td>
<td>Multiple species</td>
<td>Singular species</td>
</tr>
<tr>
<td>Growth phase</td>
<td>Delayed</td>
<td>Immediate</td>
</tr>
<tr>
<td>Clinical symptoms</td>
<td>Asymptomatic</td>
<td>Fever, chills, WBCs elevated</td>
</tr>
</tbody>
</table>
Blood Culture Interpretation

**CDC Recommendations**
Venipuncture sample - treat as positive infection if:

- One positive blood culture with a recognized pathogen
- Two positive cultures with same organism drawn on separate occasions and the patient is symptomatic

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Blood Culture Interpretation

**CDC Recommendations**
Line sample - always also do a venipuncture. Treat as positive infection if:

- Both line draw and venipuncture are positive with the same organism and patient symptomatic.

If only the line draw is positive, it is likely a contaminate and to not treat for infection.

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Blood Culture Errors

- Taking short-cuts with cleansing
- Accidental supply contamination
- Inadequate blood in culture bottles
- Repalpating the site after cleansing