

# Blood culture sample collection



## Blood culture sample collection

Revised: December 15, 2025

### ■ Introduction

Blood culture samples help detect the presence of bacteria in the blood (bacteremia) as well as the systemic spread of the infection (septicemia) through the bloodstream. To obtain a venous sample, venipuncture is performed at the patient's bedside. The sample is then transferred into two bottles, one containing an anaerobic medium and the other, an aerobic medium.<sup>[1]</sup> Alternatively, a winged (butterfly) needle attached to a blood culture collection device can be used to draw the blood directly from the vein into a blood culture bottle.<sup>[2][3]</sup> Some collection devices may include or allow the attachment of a diversion device, which reduces blood culture contamination rates.<sup>[4][5]</sup> The bottles are then incubated to promote organisms in the sample to grow in the media. If possible, blood culture samples should be collected before antimicrobial therapy begins to prevent antimicrobial therapy from interfering with bacterial growth.<sup>[4][6][7]</sup>

To reduce the risk of blood culture contamination, guidelines recommend using a dedicated phlebotomy team to obtain blood cultures by venipuncture.<sup>[4]</sup> Ideally, blood samples for culture should be drawn from two or three separate venipuncture sites rather than through a vascular catheter.<sup>[4]</sup> Blood samples should be collected simultaneously or within a few hours of each other.<sup>[8]</sup>

Because blood culture samples collected from central venous access catheters are associated with higher false-positive rates, samples should be collected by venipuncture; however, a central venous access catheter may be used if a peripheral site isn't available or if a catheter-related bloodstream infection is suspected.<sup>[8]</sup> For a suspected infection, one set of blood cultures should be drawn through the catheter and one set from a separate venipuncture.<sup>[4]</sup> Blood cultures from the catheter and venipuncture should both be positive for the same organism, the patient should have associated clinical signs and symptoms, and there should be no other recognized source of infection. A positive culture from the catheter only most likely results from a contaminant, and the patient shouldn't receive treatment.

### ■ Equipment

- 2" × 2" (5- × 5-cm) gauze pads
- Alcohol pads
- Antiseptic agent (alcoholic chlorhexidine gluconate solution containing at least 2% chlorhexidine gluconate [preferred]; if contraindicated, an iodophor [such as povidone-iodine] or 70% alcohol)
- Appropriately sized syringe(s) with winged (butterfly) or straight needle(s) or a winged needle attached to a blood culture collection device
- Blood culture bottles (aerobic and anaerobic bottles)
- Gloves

- Labels
- Laboratory biohazard transport bag
- Small adhesive bandages
- Optional: diversion device, laboratory request form, latex-free single-patient tourniquet, needleless transfer devices, sterile blood culture collection kit, sterile gloves<sup>4</sup>

*Note:* Consider using a standardized sterile blood culture collection kit *to reduce the risk of sample contamination.*<sup>4 8 9</sup>

## ■ Preparation of Equipment

Inspect all equipment and supplies. If a product is expired, is defective, or has compromised integrity, remove it from patient use, label it as expired or defective, and report the expiration or defect as directed by your facility.<sup>10</sup>

## ■ Implementation

- Verify the practitioner's order.
- Gather and prepare the necessary equipment and supplies.
- Perform hand hygiene.<sup>11 12 13 14 15 16</sup>
- Confirm the patient's identity using at least two patient identifiers.<sup>17</sup>
- Provide privacy.<sup>18 19 20 21</sup>
- Tell the patient that you need to collect a series of blood samples *to check for infection*. Explain the procedure to the patient and family (if appropriate) according to their individual communication and learning needs *to increase their understanding, allay their fears, and enhance cooperation.*<sup>22</sup> Explain that the procedure typically requires two blood samples collected from two different sites.
- Raise the bed to waist level before providing care *to prevent caregiver back strain.*<sup>23</sup>
- Perform hand hygiene.<sup>11 12 13 14 15 16</sup>
- Put on gloves *to comply with standard precautions.*<sup>24 25 26</sup>
- If the patient is receiving an infusion, choose a venipuncture site opposite that extremity. If venipuncture must be performed on the extremity with an infusion, use a vein below or distal to the site of infusion. Avoid venipuncture on the side of an axillary node dissection and in upper extremities with lymphedema or compromised circulation. Also, avoid venipuncture on extremities affected by radiation therapy, decreased sensation, paralysis, or hemiparesis from a stroke. When possible, restrict venipuncture to the dorsum of the hand in a patient with an actual or a planned dialysis fistula or graft.<sup>4</sup>
- Avoid using a tourniquet if possible.<sup>4</sup> If a tourniquet is necessary, apply it 2" (5 cm) proximal to the area chosen for the venipuncture and limit tourniquet time to less than 1 minute.<sup>4</sup> (See the "[Venipuncture](#)" procedure.)
- Prepare the venipuncture site using an antiseptic agent (alcoholic chlorhexidine gluconate solution containing at least 2% chlorhexidine gluconate preferred; if contraindicated, use an iodophor [such as povidone-iodine] or 70% alcohol). Apply using a single-use sterile applicator containing antiseptic solution. Allow the solution to dry completely without fanning, wiping, or blowing.<sup>27</sup>
  - For alcoholic chlorhexidine gluconate solution, apply with an applicator using a gentle back-and-forth motion for 30 seconds. Allow the area to dry completely (as shown below).<sup>27 28</sup>

- For povidone-iodine solution, apply using a swab. Begin at the intended venipuncture site and move outward in concentric circles. Allow the solution to dry completely (typically at least 2 minutes).<sup>[27][29]</sup>
- Don't palpate the site again *to avoid transferring microorganisms to the venipuncture site*. If palpation is required, put on a sterile glove.<sup>[30]</sup> 



- Disinfect the diaphragm tops of the blood culture bottles with alcohol pads and allow them to dry. Avoid using iodine-containing products *because they can degrade the diaphragm tops*.<sup>[4]</sup>
- If you're also drawing blood for other laboratory tests, draw blood for culture before drawing the sample for other tests.<sup>[4]</sup> Perform a venipuncture using a straight or winged needle and an appropriately sized syringe. If directed by your facility, discard the initial volume (1.5 to 7 mL) of the blood sample *to prevent induction of contaminant organisms contained on the skin*.<sup>[4]</sup> Then draw a quantity of blood that's sufficient for isolating organisms (10 mL per blood culture collection bottle); follow the manufacturer's recommendations for the blood sample volume required per bottle.<sup>[4]</sup> Alternatively, perform venipuncture using a winged needle attached to a blood culture collection device *for drawing blood directly into the blood culture bottle*. Use a diversion device if available. If you use this method, fill the aerobic bottle first *because air may be trapped in the cannula*. Maintain the bottle upright and follow the manufacturer's instructions for use *to ensure each bottle is filled properly*.<sup>[2][3][4][5]</sup>
- If a tourniquet was used, remove it immediately when blood begins to flow.<sup>[4]</sup> 
- Place a 2" × 2" (5- × 5-cm) gauze pad over the puncture site (taking care not to contaminate the needle) and remove the needle slowly and gently from the vein. Apply gentle pressure to the site for 2 to 3 minutes or until bleeding stops *to prevent extravasation into the surrounding tissue, which can cause a hematoma*. Then cover the site with a small adhesive bandage.

- If you drew blood into a syringe, divide the blood by injecting the appropriate amount into each blood culture bottle using a needleless transfer device *to ensure the most accurate culture results.*<sup>[4]</sup>
- Label the culture bottles in the presence of the patient *to prevent mislabeling.* Include the patient's name and identification number, the date and time of sample collection, and the contents of the culture bottles.<sup>[17]</sup> <sup>[31]</sup> <sup>[32]</sup>
- Invert the bottles gently 8 to 10 times *to mix the blood adequately with the medium inside the bottles.*<sup>[33]</sup>
- Discard syringes and needles in a puncture-resistant sharps disposal container.<sup>[24]</sup>
- Discard used supplies in appropriate receptacles.<sup>[24]</sup>
- Return the bed to the lowest position *to prevent falls and maintain the patient's safety.*<sup>[34]</sup>
- Remove and discard your gloves.<sup>[24]</sup>
- Perform hand hygiene.<sup>[11]</sup> <sup>[12]</sup> <sup>[13]</sup> <sup>[14]</sup> <sup>[15]</sup> <sup>[16]</sup>
- Place the samples in a laboratory biohazard transport bag and send them to the laboratory with the appropriate laboratory request form (if necessary) within 2 hours of collection.<sup>[4]</sup> Hold samples at room temperature. Never refrigerate or freeze them *because doing so may kill some microorganisms.*<sup>[4]</sup>
- Perform hand hygiene.<sup>[11]</sup> <sup>[12]</sup> <sup>[13]</sup> <sup>[14]</sup> <sup>[15]</sup> <sup>[16]</sup>
- Document the procedure.<sup>[35]</sup> <sup>[36]</sup> <sup>[37]</sup> <sup>[38]</sup>

## ■ Special Considerations

- Use blood conservation strategies when drawing blood *to reduce phlebotomy-related blood loss, which is a major cause of hospital-acquired anemia.* Collaborate with the laboratory staff about the minimum volume of blood required for each test.<sup>[4]</sup>
- If a patient has suspected sepsis, obtain blood culture samples before administering antimicrobial therapy *to identify pathogens and improve the outcome.* Antibiotic therapy shouldn't be delayed to obtain blood culture samples.<sup>[7]</sup>
- If the patient has no obvious source of infection and you suspect a vascular catheter–related bloodstream infection, withdraw one set of samples from the distal lumen of the catheter and one set of samples peripherally. (See [Collecting blood culture samples from a central venous access catheter.](#))



### EQUIPMENT

## COLLECTING BLOOD CULTURE SAMPLES FROM A CENTRAL VENOUS ACCESS CATHETER

If you need to obtain two sets of blood culture samples from the central venous access catheter, withdraw them through different lumens (if available).<sup>[8]</sup> If only one lumen is available, withdraw two separate samples through the same lumen on separate occasions.<sup>[8]</sup>

### Implementation

- Verify the practitioner's order.
- Gather and prepare the necessary equipment and supplies.
- Check the expiration dates on the culture bottles and replace outdated bottles.
- Perform hand hygiene.<sup>[11]</sup> <sup>[12]</sup> <sup>[13]</sup> <sup>[14]</sup> <sup>[15]</sup> <sup>[16]</sup>

- Confirm the patient's identity using at least two patient identifiers.<sup>[17]</sup>
- Provide privacy.<sup>[18] [19] [20] [21]</sup>
- Explain the procedure to the patient and family (if appropriate) according to their individual communication and learning needs *to increase their understanding, allay their fears, and enhance cooperation.*<sup>[22]</sup>
- Stop all infusions for a designated period, depending on the patient's condition. (Research hasn't established the length of time for stopping fluid flow. One study suggests a wait time of 10 minutes after stopping the infusion before obtaining the sample.)<sup>[4] [ ]</sup>
- Perform hand hygiene.<sup>[11] [12] [13] [14] [15] [16]</sup>
- Put on gloves *to comply with standard precautions.*<sup>[24] [25] [26]</sup>
- Disinfect the diaphragm tops of the culture bottles with alcohol pads and allow them to dry. Avoid using iodine-containing products *because they can degrade the diaphragm tops.*<sup>[4]</sup>
- Clamp the catheter *to prevent accidental exposure to blood and to reduce the risk of air embolism.*<sup>[31] [32] [ ]</sup>
- Change the needleless connector of the lumen that you'll be using to obtain the blood culture sample *to reduce the risk of contamination and false-positive results.* (See the "[Central venous access catheter needleless connector change](#)" procedure.)<sup>[4] [6] [31] [32] [ ]</sup>
- Perform a vigorous mechanical scrub of the needleless connector for at least 5 seconds using an antiseptic pad. Allow it to dry completely.<sup>[39] [40] [41] [ ]</sup>
- If you're also drawing blood for other laboratory tests, draw blood for culture first.<sup>[4]</sup> While maintaining sterility of the syringe tip, connect the empty syringe to the catheter, release the clamp, and withdraw sufficient blood to isolate organisms. Follow the manufacturer's recommendations for the blood sample volume required per blood culture collection bottle.<sup>[4]</sup> Don't discard this first-drawn blood; this is the blood sample that you'll inject into the culture bottles.<sup>[4] [6] [31] [ ]</sup>
- Alternatively, if you're using blood culture bottles designed to directly fill from the catheter, follow the manufacturer's instructions and maintain the bottles in an upright position *to avoid reflux of the medium.*<sup>[4]</sup>
- Clamp the catheter and remove the syringe or device used to fill the bottles from the catheter.
- Perform a vigorous mechanical scrub of the needleless connector for at least 5 seconds using an antiseptic pad. Allow it to dry completely.<sup>[39] [40] [41]</sup>
- While maintaining sterility of the syringe tip, connect the syringe with preservative-free normal saline solution, open the clamp, flush and lock the device, and close the clamp (according to the type of needleless connector), or resume the infusion, as ordered.<sup>[31] [32] [42]</sup> Consider using a pulsatile flushing technique *because short boluses of flush solution interrupted by short pauses may be more effective at removing deposits (for example, fibrin, drug precipitate, and intraluminal bacteria) than a continuous low-flow technique.*<sup>[42]</sup>
- If available at your facility, place a disinfectant-containing end cap on the needleless connector *to reduce the risk of vascular catheter-associated infection.*<sup>[39] [43]</sup>

♦ **Hospital-acquired condition alert:** Keep in mind that the Centers for Medicare and Medicaid Services considers vascular catheter-associated infection a hospital-acquired condition *because it can be reasonably prevented using a variety of best practices.* Make sure to follow evidence-based infection prevention practices, such as performing hand hygiene, performing a

vigorous mechanical scrub of the needleless connector with an antiseptic pad using friction for at least 5 seconds, using sterile no-touch technique, and using disinfectant-containing end caps (if available), *to reduce the risk of vascular catheter-associated infections.* [6](#) [9](#) [40](#) [41](#) [44](#) [45](#) ♦

- As needed, divide the blood by injecting the appropriate amount into each culture bottle using a needleless transfer device *to ensure the most accurate culture results.* [4](#)
- Label the culture bottles in the presence of the patient *to prevent mislabeling.* Include the patient's name and identification number, the date and time of sample collection, and the contents of the culture bottles. [17](#) [31](#) [32](#)
- Invert the bottles 8 to 10 times gently *to mix the blood adequately with the medium inside the bottles.* [33](#)
- Discard used syringes and needles in a puncture-resistant sharps container. [24](#)
- Discard used supplies in appropriate receptacles. [24](#)
- Remove and discard your gloves. [24](#)
- Perform hand hygiene. [11](#) [12](#) [13](#) [14](#) [15](#) [16](#)
- Place the samples in a laboratory biohazard transport bag and send them to the laboratory with the appropriate laboratory request form (if necessary) within 2 hours of collection. [4](#) [24](#) Hold samples at room temperature. Never refrigerate or freeze them *because doing so may kill some microorganisms.* [4](#)
- Perform hand hygiene. [11](#) [12](#) [13](#) [14](#) [15](#) [16](#)
- Document the procedure. [35](#) [36](#) [37](#) [38](#)

## ■ Complications

Complications associated with blood culture sample collection may include:

- hematoma (most common)
- sample contamination
- false-positive results (from improper technique)
  - inappropriate antimicrobial use.

## ■ Documentation

Documentation associated with blood culture sample collection includes:

- date and time of the venipuncture
- venipuncture site
- volume of blood collected
- specific laboratory test
- tolerance of the procedure
- teaching provided to the patient and family (if applicable)
  - understanding of that teaching
  - follow-up teaching needed.

*This procedure has been reviewed by the Academy of Medical-Surgical Nurses.*





## ■ Related Procedures

- [Blood culture sample collection, assisting, neonatal](#)
- [Blood culture sample collection, neonatal](#)
- [Blood culture sample collection, pediatric](#)
- [Implanted port blood sampling, pediatric](#)
- [IV catheter blood sampling](#)
- [Midline catheter blood sampling](#)
- [Peripherally inserted central catheter \(PICC\) blood sampling](#)
- [Peripherally inserted central catheter \(PICC\) blood sampling, pediatric](#)
- [Pulmonary artery catheter blood sampling](#)
- [Sepsis management, neonatal](#)
- [Sepsis, emergency patient care](#)
- [Sepsis, emergency patient care, oncology](#)
- [Umbilical artery catheter blood withdrawal, neonate](#)
- [Umbilical cord arterial blood gas sampling](#)
- [Venipuncture, neonatal](#)
- [Venipuncture, pediatric](#)

## ■ Related UpToDate Patient Teaching Handouts

- [Blood culture](#)

## ■ References

([Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions](#))

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## ■ Additional References

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## Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions

The following leveling system is adapted from *Evidence-Based practice in nursing & healthcare: A guide to best practice*, Fifth edition, by Bernadette Mazurek Melnyk and Ellen Fineout-Overholt (2023).

|                  |                                                                                                                                                                                   |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Level I</b>   | Evidence from a systematic review or meta-analysis of all relevant randomized controlled trials (RCTs)                                                                            |
| <b>Level II</b>  | Evidence from well-designed single RCTs (experimental)                                                                                                                            |
| <b>Level III</b> | Evidence from well-designed nonrandomized controlled trials (quasi-experimental), systematic reviews of a complete body of evidence, and intervention studies using mixed methods |
| <b>Level IV</b>  | Evidence from well-designed case-control and cohort studies (observational)                                                                                                       |
| <b>Level V</b>   | Evidence from systematic reviews of qualitative and descriptive studies                                                                                                           |
| <b>Level VI</b>  | Evidence from single descriptive and qualitative studies, evidence-based practice implementation, and quality improvement projects                                                |
| <b>Level VII</b> | Evidence from expert opinion, expert committee reports, and literature reviews                                                                                                    |

Data from Gyatt, G., & Rennie D. (2002). *Users' guides to the medical literature*. American Medical Association; Harris, R. P., et al. (2001). *Current methods of the U.S. Preventative Services Task Force: A review of the process*. *American Journal of Preventative Medicine*, 20, 21-35.