

Phlebotomy from Peripheral and Central Lines

Study Guide

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Completion education. No accredited nursing contact hours awarded.

Course Description

Best practices for obtaining blood specimens from peripheral and central vascular access devices, including discard volumes, push-pull technique, order of draw, contamination prevention, and specimen integrity per CLSI and INS standards.

How to Use This Guide

This is a condensed, high-yield reference. Skim the key terms and the quick-reference tables, confirm you can explain each high-yield point, then read the section summaries to spot any gap. Return to the on-site lesson for full detail, and attempt the post-test cold. Passing score: 90%.

Key Terms at a Glance

Term	What it means
Appropriate	Patient with poor peripheral access, hospice/palliative care, repeated daily draws, sampling for differential time-to-positivity in suspected CRBSI, hemodynamically unstable patient with existing central access.
Avoid when possible	Routine draws when good peripheral access exists, coagulation studies (still possible but require careful clearance), drug-level sampling for the drug being infused through that line, or any time the line cannot be reliably cleared.
Coagulation samples	6 mL (or 6× the dead-space volume) discard.
Blood culture	bottles (aerobic, then anaerobic).
Light blue	(citrate, coagulation).
Serum tubes	with or without clot activator (SST/red).
Hemolysis	caused by small-bore catheter aspiration with a vacuum tube, fast/forceful aspiration, or shaking specimens.
Dilution / falsely low chemistries	inadequate clearance of saline/heparin lock — always clear the line per discard or push-pull technique.
Falsely elevated potassium	hemolysis, prolonged tourniquet, fist clenching, drawing above an infusing IV.

Term	What it means
False-positive blood cultures	inadequate hub disinfection or contamination — scrub the hub at least 15 seconds and allow to dry.
Coagulation interference	heparinized line not cleared sufficiently — discard, then verify aPTT trend with peripheral sample if uncertain.

Section-by-Section Summary

The key idea of each lesson section, condensed to the essentials. Use it to review fast and spot any gap before the post-test.

Phlebotomy from Peripheral and Central Lines

Estimated time: 1–2 hours | Completion education; no accredited contact hours | Aligned to CLSI GP41 and INS Standards (2024)

Why specimen-source matters

Blood drawn from indwelling catheters is convenient and patient-friendly but carries unique risks: contamination from the lock or infusate, hemolysis from suction or small lumens, and dilution from residual flush. A poorly drawn sample may delay diagnosis, prompt unnecessary repeat sticks, or lead to inappropriate therapy.

When to draw from a CVAD

- Appropriate: Patient with poor peripheral access, hospice/palliative care, repeated daily draws, sampling for differential time-to-positivity in suspected CRBSI, hemodynamically unstable patient with existing central access.
- Avoid when possible: Routine draws when good peripheral access exists, coagulation studies (still possible but require careful clearance), drug-level sampling for the drug being infused through that line, or any time the line cannot be reliably cleared.

Discard vs. Push-Pull (Mixing) Technique

- Stop infusion (and maintenance flushes) for at least 1 minute.
- Cleanse needleless connector with 70% alcohol or CHG/alcohol; scrub for ≥ 15 seconds; allow to dry.
- Aspirate the discard volume: Adult, peripheral IV/midline: 3–5 mL discard.
- Adult, CVAD: 5–10 mL discard.
- Pediatric: per institutional weight-based protocol.
- Coagulation samples: 6 mL (or 6 $\times$ the dead-space volume) discard.
- Draw the specimen into the appropriate tubes in the correct order.
- Flush with 10–20 mL of 0.9% saline (20 mL after CVAD draws) using pulsatile push-pause.
- Lock per protocol.
- Cleanse connector and stop infusion as above.
- Attach a 10 mL syringe; alternately aspirate 5 mL and reinject 5 mL — repeat 3 times — to mix and clear the lumen without specimen waste.
- Replace syringe with a fresh one and aspirate the specimen.
- Flush and lock.

Push-pull is preferred for pediatric patients and adults with clinical anemia where blood conservation matters. Do not use push-pull for blood cultures — the discard method is required to avoid contamination from the line.

Order of Draw (CLSI GP41)

- Blood culture bottles (aerobic, then anaerobic).
- Light blue (citrate, coagulation).

- Serum tubes with or without clot activator (SST/red).
- Green (heparin).
- Lavender (EDTA — CBC).
- Gray (glycolytic inhibitor — glucose, lactate).

If the only source available is a CVAD and a coagulation sample is required, draw and discard a tube before the citrate (blue) tube to clear residual lock; never draw a coagulation sample directly from a heparin-locked port without sufficient clearance.

Blood culture from a CVAD

- Standard for suspected CRBSI: paired peripheral and CVAD cultures (each lumen of multilumen CVAD when feasible).
- Differential time-to-positivity ≥ 120 minutes (CVAD positive earlier than peripheral) supports CRBSI diagnosis.
- Use a fresh, sterile syringe; vigorous scrub-the-hub for ≥ 15 seconds; sterile technique throughout.
- Inoculate aerobic bottle first if a single syringe is used; inoculate to the manufacturer's fill line.

Common errors and how to avoid them

- Hemolysis: caused by small-bore catheter aspiration with a vacuum tube, fast/forceful aspiration, or shaking specimens. Use a syringe transfer device, draw slowly, mix gently by inversion.
- Dilution / falsely low chemistries: inadequate clearance of saline/heparin lock — always clear the line per discard or push-pull technique.
- Falsely elevated potassium: hemolysis, prolonged tourniquet, fist clenching, drawing above an infusing IV.
- False-positive blood cultures: inadequate hub disinfection or contamination — scrub the hub at least 15 seconds and allow to dry.
- Coagulation interference: heparinized line not cleared sufficiently — discard, then verify aPTT trend with peripheral sample if uncertain.

Specimen handling

- Label at the bedside immediately after collection — never pre-label or post-label.
- Mix gently by inversion per tube manufacturer (typically 8–10 inversions; not shaking).
- Transport per analyte requirements (light protection, ice, room temp).
- Document time of draw, source (peripheral vs. CVAD lumen), discard volume, and any difficulties.

Pediatric considerations

- Total blood volume is small — minimize cumulative loss and use micro-collection containers when possible.
- Push-pull method is generally preferred to limit waste.
- Use weight-based discard volumes per institutional policy.
- Consider topical anesthesia and child-life support for peripheral draws.

Documentation

Record source (peripheral site or specific CVAD lumen), method (discard or push-pull), discard volume, flush volume, lock solution, and any complications.

Key take-aways

- Stop infusions, scrub the hub for ≥ 15 seconds, and clear the lumen before aspirating.
- Use the discard method for blood cultures; consider push-pull for blood-sparing situations.
- Follow CLSI order of draw — coagulation tubes especially are sensitive to contamination.
- Flush with 20 mL saline after CVAD draws and lock per protocol to prevent occlusion.

Concepts Tested on the Post-Test

Each item is a topic the post-test probes. Exact wording may differ; the underlying concept is what you must be able to reason through. If any feels unfamiliar, revisit that section above.

1. The minimum scrub time for a needleless connector before drawing blood is:
2. Which method is required for blood culture sampling from a CVAD?
3. Standard adult discard volume from a CVAD prior to specimen collection is approximately:
4. The CLSI-recommended order of draw begins with:
5. After completing a blood draw from a CVAD, the recommended saline flush volume is:
6. Push-pull (mixing) technique is BEST suited for:
7. Differential time-to-positivity supporting CRBSI diagnosis is defined as:
8. Hemolysis in a blood specimen is most often caused by:
9. When transferring blood to vacuum tubes, the safest device is:
10. Falsely elevated potassium can result from all EXCEPT:
11. When drawing a coagulation specimen from a heparin-locked CVAD, the clinician should:
12. Specimen labeling should occur:
13. After drawing blood from a CVAD, the line should be locked:
14. Which scenario most strongly favors a peripheral venipuncture over a CVAD draw?
15. Vigorous shaking of a blood specimen tube is:
16. Dilution of a CVAD specimen with residual flush most commonly causes:
17. Which patient population most benefits from the push-pull method?
18. When a multi-lumen CVAD is in use, blood culture sampling should ideally:
19. Inadequate hub disinfection most commonly causes:
20. An infusion of dextrose-containing fluid through a CVAD should be:
21. Topical anesthetic for pediatric peripheral venipuncture:
22. After drawing a coagulation specimen, the tube must be:
23. Phlebotomy from a midline catheter is generally:
24. Documentation after a CVAD blood draw should include all EXCEPT:
25. The MAIN reason to scrub the hub is to:

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