

Paths to Precision: Device Decision

Ten Tips to Tackle Vascular Access Device Selection



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Selecting the appropriate vascular access device is crucial for effective patient care and treatment outcomes. With options ranging from peripheral intravenous catheters (PIVCs) to central venous catheters (CVCs), making the right choice can be complex. Here are ten top tips to help you navigate this critical decision.

1. Assess the need for intravenous therapy

Before you dive into device selection, ask yourself if intravenous (IV) therapy is the best option. Is there a less invasive route that can achieve the same outcomes? If so, consider those alternatives first.¹

2. Evaluate the type of medication or fluid

Assuming IV therapy is the way to go, the next step is to assess whether the medication or fluid can be administered peripherally. This decision will significantly impact your device choice.

- › **PIVC (including midline):** Suitable for low-osmolarity fluids, simple medications, and routine blood draws.
- › **CVC:** Required for solutions of high osmolarity, extremes of pH 1–5 and 7–9, and those likely to irritate the vessel endothelium. **BEWARE:** you may not realize this, but it includes some parenteral nutrition solutions and many common medications, including antibiotics such as vancomycin and flucloxacillin.

3. Consider the duration of therapy

So, you reckon your IV therapy plan is peripherally compatible? That's great, but how long is the intended

therapy?²⁻⁴ Will your peripheral IV therapy last the distance? But how do you know? Well, a great question to ask yourself is, "How long does the average PIVC last in your hospital?" You may not know the answer to this, so here is a guide to help you.

- › **PIVC:** ≤ 4 days assuming all the above elements indicate peripherally compatible therapy
- › **Midline catheter:** 5–14 days (may be longer)^{5,6}
- › **Non-cuffed CVC such as a peripherally inserted central catheter (PICC) or a tunneled non-cuffed CVC:** > 15 days–3 months or greater
- › For durations greater than 3 months, a more nuanced CVC should be discussed, whether this be a tunneled cuffed CVC or totally implanted venous port device.

Knowing the duration will guide you toward the appropriate device, ensuring safety and clinical effectiveness.⁷

4. Assess the patient's vein quality

Does your patient have visible, palpable, and bounceable veins?^{4,8,9}

- › **PIVC:** Best for patients with healthy, accessible peripheral veins that are easily visible and palpable. Also, consider if there are few or many veins.
- › **CVC:** May be necessary if the patient has poor peripheral vein quality or limited IV insertion sites, even if the medication and duration suit a peripheral site.

Evaluate vein quality to ensure successful and painless device insertion.

5. Understand the risk of complications

Different devices carry different risks and complications.^{6,7}

To quote Dr. Robert Helm, peripheral IV catheter failure is “accepted, but unacceptable.”¹⁰

Vascular access device complications disrupt the delivery of treatment through the intended IV therapy route. Complications generally interrupt and delay treatment for underlying medical conditions, negatively affecting patient outcomes. They may increase morbidity and mortality. All vascular access devices carry their own risk profile. It is important to understand the nuanced risk of PIVC compared to CVC.

- › **PIVC:** Increased risk of phlebitis and extravasation
What to consider: insert in area of reduced flexion and ease of visibility.
- › **CVC:** Increased risk of central line-associated bloodstream infections (CLABSIs) and thrombosis.
What to consider: catheter to vein ratio and application of vigilant infection prevention measures, including removing catheter when no longer needed

Weigh the risks to make an informed decision that prioritizes patient safety.

6. Consider complexity of insertion

The complexity of the insertion procedure is another important consideration.

- › **PIVC:** Can be quickly and easily inserted by trained healthcare professionals at the bedside
- › **CVC:** Requires more complex insertion, often with imaging guidance and in a sterile environment

Logistics should be considered based on the available expertise and procedure setting.

7. Analyze cost implications

Cost is always a factor in healthcare.⁵

- › **PIVC:** PIVC options for short-term therapy vary in cost, from basic straight catheters to higher-cost integrated or guidewire-assisted types. Depending on therapy needs, not all patients may require the more expensive options.¹¹
- › **CVC:** Higher cost due to insertion and maintenance, making them less economical for short-term use.

Consider the financial impact alongside clinical needs.

8. Assess infusion needs

Some treatments require multiple infusions or blood draws.²

- › **PIVC:** Limited to single or simple infusions
- › **CVC:** Multiple lumens allow for simultaneous administration of different medications and frequent blood draws.

Evaluate the complexity of the treatment plan to choose the right device.

9. Prioritize patient comfort

Patient comfort and convenience should not be overlooked. For all vascular access devices, consider logistics of insertion including comfort support and use of topical anesthetic.¹²

- › **PIVC:** Less invasive and generally more comfortable for short-term use
Practice point: This is only true if it is inserted in an area of no flexion and does not impact usual movement of limbs.²
- › **CVC:** Can be more comfortable for long-term use as it avoids repeated needlesticks
Practice point: Same as for PIVCs. Consider comfort when choosing the location of insertion. For PICCs, choose an insertion point in the middle third of the upper arm.¹³ For non-tunneled CVC's catheters inserted vertically in the neck are painful, difficult to care for and demonstrate lack of insertion skill. Consider a lateral approach for all CVC insertions in the neck regions.¹⁴

Select the device that offers the most comfort for the duration of the treatment.

10. Collaborate with the healthcare team

Last, but by no means least, involve the entire healthcare team in the decision-making process.²

- › **Interdisciplinary approach:** Collaborate with physicians, nurses, pharmacists, infection preventionists, and other specialists to evaluate the patient's needs and conditions comprehensively.
- › **Patient-centered care:** Include patient preferences and concerns in the discussion to ensure a holistic approach.

A collaborative approach ensures that the chosen device aligns with the overall treatment plan and patient well-being.

Conclusion

As you can see, selecting the right vascular access device is a nuanced decision that requires careful consideration of various factors, including therapy duration, medication type, vein quality, and patient comfort.

By following these ten tips, you can make more informed choices that enhance patient care, minimize complications, and improve treatment outcomes. Whether opting for a PIVC compared to CVC, the goal remains the same: safe, effective, and patient-centered vascular access.

References

1. Australian Commission on Safety and Quality in Health Care. Management of Peripheral Intravenous Catheters - Clinical Care Standard. ACSQHC. Accessed 25th June, 2021. https://www.safetyandquality.gov.au/sites/default/files/2021-05/management_of_peripheral_intravenous_catheters_clinical_care_standard_-_accessible_pdf.pdf
2. Nickel B, Gorski L, Kleidon T, et al. Infusion Therapy Standards of Practice, 9th Edition. J Infus Nurs. Jan-Feb 01 2024;47(1S Suppl 1):S1-s285. doi:10.1097/nan.0000000000000532
3. Chopra V, Flanders SA, Saint S, et al. The Michigan Appropriateness Guide for Intravenous Catheters (MAGIC): Results From a Multispecialty Panel Using the RAND/UCLA Appropriateness Method. Ann Intern Med. Sep 15 2015;163(6 Suppl):S1-40. doi:10.7326/m15-0744
4. Ullman AJ, Bernstein SJ, Brown E, et al. The Michigan Appropriateness Guide for Intravenous Catheters in Pediatrics: miniMAGIC. Pediatrics. Jun 2020;145(Suppl 3):S269-S284. doi:10.1542/peds.2019-3474l
5. Kleidon TM, Gibson V, Cattanach P, et al. Midline Compared With Peripheral Intravenous Catheters for Therapy of 4 Days or Longer in Pediatric Patients: A Randomized Clinical Trial. JAMA Pediatr. Sep 11 2023;doi:10.1001/jamapediatrics.2023.3526
6. Marsh N, Rickard CM. Peripheral intravenous catheter failure—is it us or is it them? The Lancet Haematology. 2021;8(9):e615-e617. doi:10.1016/S2352-3026(21)00234-9
7. Schults JA, Rickard CM, Kleidon T, et al. Building a Global, Pediatric Vascular Access Registry: A Scoping Review of Trial Outcomes and Quality Indicators to Inform Evidence-Based Practice. Worldviews Evid Based Nurs. Jan 2 2019;16(1):51-59. doi:10.1111/wvn.12339
8. Hallam C, Weston V, Denton A, et al. Development of the UK Vessel Health and Preservation (VHP) framework: a multi-organisational collaborative. J Infect Prev. Mar 2016;17(2):65-72. doi:10.1177/1757177415624752
9. Schults JA, Kleidon TM, Gibson V, et al. Improving peripheral venous cannula insertion in children: a mixed methods study to develop the DIVA key. BMC Health Serv Res. Feb 17 2022;22(1):220. doi:10.1186/s12913-022-07605-2
10. Helm RE, Klausner JD, Klemperer JD, Flint LM, Huang E. Accepted but unacceptable: peripheral IV catheter failure. J Infus Nurs. May-Jun 2015;38(3):189-203. doi:10.1097/nan.0000000000000100
11. Rickard CM, Larsen E, Walker RM, Mihala G, Byrnes J, Saiyed M, et al. Integrated versus nonintegrated peripheral intravenous catheter in hospitalized adults (OPTIMUM): a randomized controlled trial. J Hosp Med 2023;18(1):21e32. <https://doi.org/10.1002/jhm.12995>
12. Sharp R, Muncaster M, Baring CL, Manos J, Kleidon TM, Ullman AJ. The parent, child and young person experience of difficult venous access and recommendations for clinical practice: A qualitative descriptive study. J Clin Nurs. May 19 2023;doi:10.1111/jocn.16759
13. Dawson RB. PICC Zone Insertion Method™ (ZIMTM): a systematic approach to determine the ideal insertion site for PICCs in the upper arm. The Journal of the Association for Vascular Access. 2011;16(3):162-165.
14. Balaban O, Aydin T, Musmul A. Lateral oblique approach for internal jugular vein catheterization: Randomized comparison of oblique and short-axis view of ultrasound-guided technique. North Clin Istanbul. 2020;7(1):11-17. doi:10.14744/nci.2019.86658



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