

Bridging the I.V. access gap with midline catheters

If your patient needs I.V. therapy for more than 5 days, a midline catheter may be the answer.

By Kelli Rosenthal, RN,BC, ANP, APRN,BC, CRNI, MS

WITH A SINGLE venipuncture, a midline catheter can meet the infusion therapy needs of a patient who requires more than 5 days of intravenous (I.V.) therapy, has poor or limited peripheral access, or needs reliable access in a care setting where immediate I.V. restarts aren't available (such as in the home or in many long-term-care facilities). The patient doesn't have to be "stuck" multiple times for I.V. restarts—a frequent complaint on patient satisfaction surveys—and time is saved because an X-ray isn't needed to confirm placement unless there's a complication.

In this article, I'll clue you in on the ins and outs of infusion therapy with a midline catheter, including insertion and removal, potential complications to watch out for, and what you need to teach your patients. See *Midline catheter basics* for a quick breakdown.

Midline advantages

A midline catheter is 3 inches (7.5 cm) to 8 inches (20 cm) long, and it's inserted via the veins near the antecubital fossa into the basilic, cephalic, or brachial veins (see *Site selection for midline catheters*). The tip is advanced no farther than the distal axillary vein in the upper arm. Because veins increase in diameter as they travel proximally up the arm, a midline directs infusate into much larger veins than does a shorter catheter placed in the more distal veins of the forearm and hand. A midline also offers significantly better hemodilution

than a catheter placed in smaller, more distal veins because the tip is placed in one of the larger veins of the upper arm.

Isotonic is ideal

The Infusion Nurses Society (INS) classifies midlines as peripheral I.V. catheters, but they're managed somewhat differently than other peripheral catheters. For example, while a short peripheral catheter may dwell for up to 72 hours, a midline is appropriate for therapy lasting 2 to 4 weeks. Only drugs and solutions that can be safely infused through any peripheral catheter should be infused through a midline catheter. These include isotonic or near isotonic drugs and solutions (250 to 350 mEq/L) with a pH greater than 5 or less than 9, such as plain I.V. fluids, cephalosporin-type antibiotics, and amphotericin B (AmBisome).

Don't use a midline to infuse continuous vesicants or irritants like most cancer chemotherapies or dopamine, parenteral nutrition solutions containing more than 10% dextrose, or medications with extremely high or low pH values like vancomycin (Vancocin), with a pH of 2.4, or phenytoin (Dilantin), with a pH of 12. Also, don't use a midline to administer radiologic contrast media with a pressure injector because the gauge and length of midlines aren't designed to withstand extremely high pressures, which could cause a catheter rupture or embolus.

Handle with care

A midline catheter may be inserted by a specially trained and competency-verified registered nurse or physician. Prerequisites for becoming credentialed to insert midlines include demonstrated competency with peripheral I.V. insertion and completion of an education program focused on the anatomy and physiology, pharmacology, and infection control issues specific to midline insertion, as well as hands-on instruction in insertion. Every institution using midlines should have written policies and procedures that relate to their care and maintenance and that address initial and ongoing competency assessment.

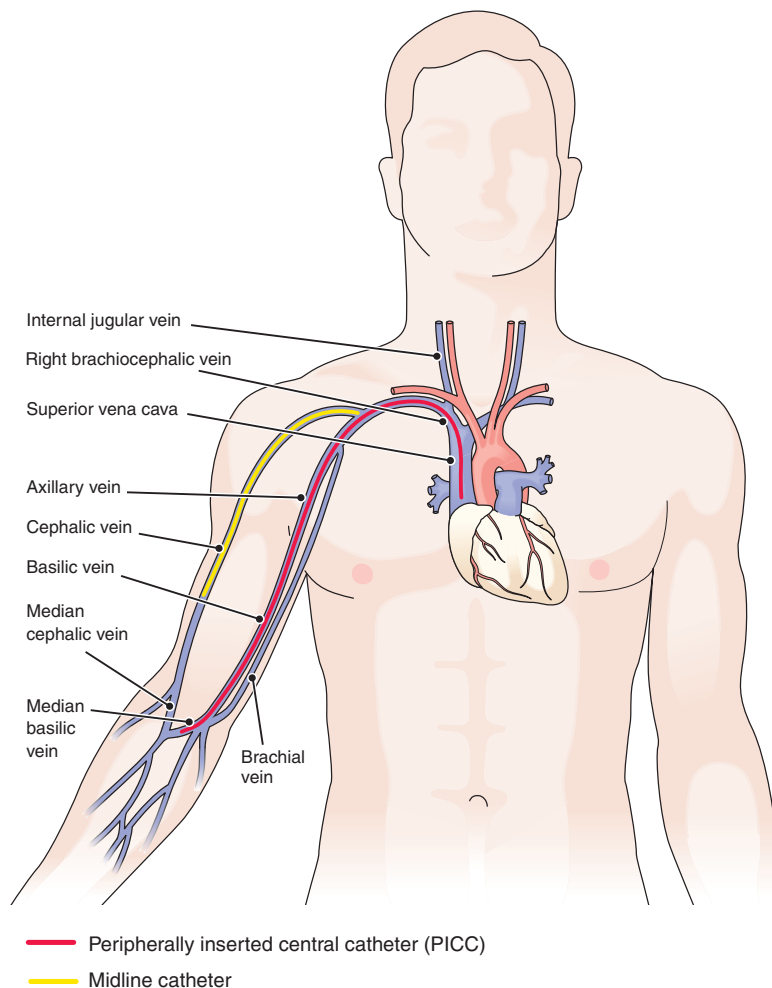
A midline catheter should be inserted using sterile technique and maximal barrier precautions like its longer, central cousin—the peripherally inserted central catheter (PICC)—after a thorough sterile preparation with prepping agents recommended by the Centers for Disease Control and Prevention (CDC). The revised *INS Infusion Nursing Standards of Practice* recommend using visualization technology to aid in vein identification and selection.

In general, a midline isn't sutured in place, and a sterile adhesive securement device is ideal for maintaining catheter position. Because the midline insertion site may bleed slightly in the first 24 to 48 hours after insertion, the first dressing applied at the time of insertion is usually a combination of a transparent membrane dressing and gauze to wick drainage away from the insertion site. This will need to be changed 24 hours after insertion. The CDC recommends moisture vapor-transmissible dressings for subsequent dressing changes. Dressing changes should be performed using sterile technique, usually every 7 days or whenever the dressing becomes damp, soiled, or nonadherent.

Between infusions, maintain patency with saline or heparin flushes (unless this isn't indicated for the brand of catheter in use), depending on flush frequency, as you would with a central venous catheter. Never flush a midline with any syringe smaller than 10 mL until patency is established to avoid rupturing the catheter, and never flush against resistance.

Site selection for midline catheters

Midline catheters are inserted into the basilic, cephalic, or brachial veins.



Watch out for phlebitis

The most common complication associated with midline catheter use is insertion-related phlebitis, which occurs when the catheter irritates the lining of the vein as it's advanced into the vein. Most patients with phlebitis will complain of a feeling of achiness or fullness before you'll notice redness, heat, or edema surrounding the site. Phlebitis will usually resolve with continuous application of heat to the site for 2 to 3 days. Be sure to use a regulated source of heat, like a heating pad or an Aqua K pad.

Be on the lookout for chemical phlebitis, which appears first proximal to the tip of the catheter in the vein. This can occur when a midline is mistaken for a more

Midline catheter basics

Indications	Parenteral nutrition, I.V. fluid replacement, and administration of analgesics and antibiotics
Insertion sites	Venipuncture is performed two to three fingerbreadths above the antecubital fossa or one fingerbreadth below the antecubital fossa into the cephalic, basilic, or brachial veins.
Catheter placement	The tip terminates in the proximal portion of the extremity below the axilla and proximal to the central veins; it's advanced 3 inches (7.5 cm) to 8 inches (20 cm).
Insertion method	The catheter is inserted at the bedside using sterile technique; it may stay in place for 2 to 4 weeks.
Catheter maintenance	The dressing should be changed every 7 days or whenever damp, soiled, or nonadherent.
Postplacement	A chest X-ray to assess placement may be obtained if the catheter doesn't flush, if there's no free flow blood return, if there's difficulty with catheter advancement, or if the guidewire is difficult to move or bent on removal.
Removal	The catheter should be removed when it's no longer indicated for use, if it's contaminated, or if complications occur; the arm is abducted during removal.
Advantages	Reduces cost, avoids repeated venipunctures, and decreases incidence of catheter-related infections

deeply placed PICC, as can happen when a PICC is trimmed to midline length for use. Good communication is the key to ensuring that all health care providers caring for the patient are aware that he has a midline so that only the appropriate drugs and solutions are infused through it. Besides telling others about the midline, establish and use a standard place on the patient's chart to document midline use.

Protecting the site

Teach patients to avoid heavy lifting with the arm in which the midline is placed. The arm should be covered with a plastic bag or waterproof cast cover whenever the patient bathes to prevent the site from becoming infected or the catheter from migrating out. Remember that blood pressure cuffs and tourniquets shouldn't be applied over a midline catheter site. Also, teach patients and caregivers to report any discomfort, redness, or swelling at the site or drainage from the site.

Resistance means stop

Removing a midline should be addressed in your facility's policies and procedures. If you're permitted to remove this type of catheter, pull gently from the insertion site no more than ¼ inch (0.6 cm) to ½ inch (1.3 cm) at a time to prevent vasospasm. If you encounter resistance, stop, cover the site with a transparent dressing, and apply heat to the upper

arm for about 30 minutes; then try again. If you're still unsuccessful in removing the midline at that time, notify the health care provider.

Access granted

A midline catheter is an effective tool to preserve a patient's peripheral access. It offers a cost-effective alternative to frequent I.V. site rotations when a patient needs intermediate-term I.V. therapy, as well as reliable venous access. This improves the likelihood that the patient will receive his ordered therapy, which may lead to a shorter hospital stay and improved patient satisfaction. ■

RESOURCES

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Kelli Rosenthal is president and CEO of ResourceNurse Continuing Education, Inc., in Malverne, N.Y., and past president of Association of Vascular Access in Clinton, Mass.

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