Society of General Internal Medicine
Choosing Wisely Five Things Physicians and Patients Should Question

Don't place, or leave in place, peripherally inserted central catheters for patient or provider convenience.
Peripherally inserted central catheters (or "PICCs") are commonly used devices in contemporary medical practice that are associated with two costly and potentially lethal healthcare-acquired complications: central-line associated bloodstream infection (CLABSI) and venous thromboembolism (VTE). Given the clinical and economic consequences of these complications, placement of PICCs should be limited to acceptable indications (long-term intravenous antibiotics, total parenteral nutrition, chemotherapy, and frequent blood draws). PICCs should be promptly removed when acceptable indications for their use end.

Discussion
Peripherally inserted central catheters (or "PICCs") are non-tunneled, central venous catheters that are inserted in the veins of the upper extremity in adults. Because placement of PICCs in the arm bypasses complications associated with placement of central venous catheters (CVC’s) into the veins of the neck and chest, and trained personnel increasingly place PICCs at the bedside, use of PICCs in hospitalized and ambulatory patients has grown across the country.

Although PICCs were originally intended to provide short-term venous access, they frequently remain in place for weeks or months. In this context, an accumulating body of evidence suggests that PICCs are associated with important complications. For instance, PICCs are often implicated in the development of central-line associated bloodstream infections in hospitalized patients and while they provide long-term and durable venous access, they are also associated with an increase of deep vein thrombosis of the upper extremity and pulmonary embolism. These outcomes are not solely related to PICCs themselves; rather, a trifecta of patient characteristics (e.g., history of prior deep vein thrombosis, neutropenia), device characteristics (e.g., multi-lumen PICCs, thicker-gauge devices), and provider characteristics (e.g., infusions of vancomycin, use of anticoagulation), interact to influence the risk of PICC-related complications. As the use of PICCs frequently involves patients at high-risk of these very complications (e.g., those with cancer and critically-ill populations), a sense of urgency in improving PICC utilization exists.

The recommendation to not place PICCs outside of acceptable indications and promptly remove them thereafter is supported by an emerging body of evidence:

1. Several systematic reviews have reported an increased risk of complications among patients who receive PICCs compared to central venous catheters. For instance, in a systematic review and meta-analysis, PICCs were associated with a more than two-fold increase in the risk of VTE compared to CVCs. In another systematic review comparing the risk of bloodstream infection with PICCs to CVCs, PICCs were associated with higher rates of bloodstream infections than cuffed and tunneled devices in hospitalized patients. PICCs have also been associated with higher risk of catheter-thrombosis, mechanical complications such as coiling and kinking, and superficial thrombosis relative
to central venous catheters.  

2. Growing evidence suggests widespread variability in current use and appropriateness of PICCs. For instance, a study at a tertiary care academic medical center reported that PICCs were frequently associated with "idle-days" of non-use. In a statewide survey of 180 hospitalists in Michigan, approximately half of all respondents reported that 10-25% of PICCs placed at their facilities might have been inappropriate or avoidable. Interestingly, in the same survey in Michigan, over 90% of hospitalists reported having encountered a patient who specifically requested a PICC owing to prior experiences with this device.

3. Finally, greater use of PICCs in non-critically ill, hospitalized patients has important implications. As monitoring for central line-associated infection and assembly of homogenous care teams are technically challenging in these areas compared to intensive care units, growing PICC use in these settings necessitates fundamental changes to existing paradigms of care. Moreover, as patients frequently transition with PICCs to outpatient treatment, fragmentation and non-uniform post-discharge care represent veritable perils to safe PICC use. It is necessary to raise awareness of these issues to help ensure positive outcomes and patient safety.

As with other healthcare innovations, the use of PICCs began in a defined population to solve an important clinical problem. However, over time, PICC insertion has evolved to span other indications and patient populations. This diffusion has led to recognition that the known advantages associated with PICC use may be offset by risks, costs, and complications in particular instances. Restricting the use of PICCs to specific indications and ensuring timely removal of these devices may help mitigate these risks. Choosing to insert and remove PICCs wisely is thus critical to patient safety and outcomes.

References

**SGIM Choosing Wisely Ad hoc Committee:**
Laurence F McMahon, MD, MPH \(^1,2\), Jr, Rebecca Jennifer Beyth MD \(^3\), Alfred Burger MD \(^4\), Vineet Chopra MD \(^1,5\), MSc David Feldstein \(^6\), MD, Deborah Korenstein MD \(^7\), Usha Subramanian, MD \(^8\), Jeremy Sussman, MD, MSc \(^1,5\), Brent Petty MD \(^9\), Jeff Tice, MD

1. Department of Internal Medicine, University of Michigan
2. Department of Health Management and Policy, University of Michigan
3. Department of Internal Medicine, University of Florida
4. Department of Internal Medicine, Beth Israel Medical Center, Albert Einstein College of Medicine
5. Ann Arbor VA Medical Center
6. Department of Internal Medicine, University of Wisconsin
7. American College of Physicians
8. Department of Internal Medicine, Indiana University
9. Department of Internal Medicine, Johns Hopkins University
10. Department of Internal Medicine, UCSF