

Short-term use of IV devices is common—and risky—study shows

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Many hospital patients get medicine or nutrition delivered straight into their bloodstream through a tiny device called a PICC. In just a decade, it's become the go-to device for intravenous care.

But a new study finds that one in every four times a PICC gets inserted, the patient didn't need it long enough to justify the risks that it can also pose.

In fact, in just the five days or less that they had a PICC implanted in their vein, nearly one in ten of these [patients](#) suffered a blocked line, an infection, a blood clot or another complication linked to the device.

One in three short-term PICC patients also had serious kidney problems that could make them potential dialysis candidates, the study also shows. They face special risks from the devices, which can harm blood vessels and jeopardize a patient's ability to receive dialysis later, if their kidneys fail.

The study, published in the February issue of the *Journal of Hospital Medicine*, is based on data from 52 hospitals around the state of Michigan taking part in a massive quality improvement and patient safety effort. It's a detailed analysis of records from 15,397 PICC placements over a two-year period from 2014 to 2016, just before and after guidelines for safe and appropriate PICC use made their debut.

The study is a large-scale examination of real-world use of PICCs, or

peripherally inserted central catheters, and the factors associated with their short-term use.

It highlights the need for efforts to reduce short-term use of PICCs and help medical care teams understand current practice and consider other alternatives for short-term IV access that pose less risk.

"When PICCs first came out, they became an 'easy button' for vascular access, and the safety issues weren't recognized," says David Paje, M.D., M.P.H., the University of Michigan hospitalist who led the research team. "Now the dynamics have changed, and we need to be more thoughtful with their use."

Paje, an assistant professor of internal medicine, also helps lead the Medical Short Stay Unit at Michigan Medicine, U-M's academic medical center.

For the new study, he worked with senior author and Division of Hospital Medicine chief Vineet Chopra, M.D., M.Sc., and co-author Scott Flanders, M.D., who directs the Michigan Hospital Medicine Safety Consortium that provided the data for the study. Colleagues from several Michigan hospitals are co-authors.

Moving to MAGIC

Based on previous studies of PICC-associated risks, the team assembled an expert panel that developed a guideline for choosing IV devices appropriately, called MAGIC. They unveiled it in 2015, and turned into a mobile and web app in 2017.

Hospitals in the Michigan consortium, which is funded by Blue Cross Blue Shield of Michigan, began receiving training in MAGIC during the study period, but were still implementing it.

MAGIC guides clinicians to the appropriate option for the individual patient they're treating. For instance, instead of a PICC, it recommends that patients who will need intravenous access for less than five days should receive a different form of IV device, such as a midline or peripheral IV.

"This study helps illustrate how medical devices such as PICCs can be both helpful and harmful," says Chopra, who led the development of MAGIC and is a member of the U-M Institute for Healthcare Policy and Innovation. "Understanding how best to balance appropriate use - using tools like MAGIC - is the way to safe and better patient care."

Factoring into PICC use

As part of the study, Paje and his colleagues looked at which patients were more likely to receive a PICC for short-term use.

The strongest factor was difficult vascular access - a catch-all phrase that means it had been hard to start an IV in the patient in previous visits or earlier in the hospital stay.

Clinicians may default to choosing a PICC in these patients in order to keep an intravenous access point open, rather than having to find a vein each time, Paje says. Or, some experienced patients may even ask for a PICC to avoid so many "pokes."

Patients whose physicians ordered a multilumen IV device, to avoid contact between different medications or nutrition solutions, were also more common among short-term PICCs. But Paje notes that few of the patients' records actually said that they were receiving multiple IV substances that had to be kept separate. And patients who had a short-term multilumen PICC were much more likely to suffer a complication.

Interestingly, patients treated in teaching hospitals were more likely to receive a short-term PICC than those treated in non-teaching hospitals. This could actually be seen as an opportunity to address the issue of inappropriate short-term PICC, if hospitals make a plan to teach their residents about the risks and benefits of PICCs and other IV devices.

A recent paper by members of the consortium showed that at one [hospital](#) that implemented MAGIC, inappropriate PICC use decreased compared with hospitals that didn't implement it, and PICC-related complications also decreased modestly.

Paje notes that the body's own reaction to foreign material, and the mechanical stress put on veins when a PICC is inserted, can combine to damage veins and increase the risk of clots or scarring. The damage can keep a dialysis candidate from being able to successfully establish a vascular fistula, which would have been the preferred way to receive long-term dialysis.

In all, 9.6 percent of the short-term PICC patients experienced a complication, including 2.5 percent who experienced a blood clot forming in their vein that could have broken off and caused more serious consequences, and 0.4 percent developing a CLABSI, or central line associated blood stream infection.

"The use of PICCs exploded because the safety issues were not initially recognized, including those associated with clots and infections," says Paje. "Now we're coming back full circle, and we need to adapt and implement quality improvement processes to be more judicious with their use. We need to recognize that PICCs are not without any consequence, even for short-term use."

He notes that most of the reasons cited for PICC use in the patient records used in the study - such as delivering antibiotics—do not require

the deep access to the central bloodstream that PICC provides.

Even as clinicians get the word about the MAGIC guidelines and implement measures to right-size PICC uses, Paje calls on patients and family members to speak up and ask questions before a PICC gets placed.

"Patients or their representatives should be actively engaged, and informed," he says. "Find out what lines they're putting in, and ask questions."

More information: David Paje et al, Patterns and Predictors of Short-Term Peripherally Inserted Central Catheter Use: A Multicenter Prospective Cohort Study, *Journal of Hospital Medicine* (2018). [DOI: 10.12788/jhm.2847](https://doi.org/10.12788/jhm.2847)

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