Peripherally Inserted Central Catheters for Adult and Pediatric Patients: A Review

Context
Peripherally inserted central catheters (PICCs) are tubes inserted into one of the large veins of the upper extremities. The catheter is advanced through the veins until its tip rests in the distal superior vena cava, where it provides prolonged central venous access. In addition to being used to administer medication or nutrition intravenously, PICCs are also used for venous blood sampling, thus reducing the number of times a vein must be punctured. While generally safe, some complications are associated with PICCs, such as central line-associated bloodstream infection (CLABSI), line occlusion, phlebitis (inflammation of the vein), and blood clots in the vein (venous thrombosis).

Technology
To minimize the occurrence of complications associated with PICCs, a number of strategies have been proposed. PICCs impregnated with chlorhexidine (an antiseptic) have been suggested for preventing CLABSI, and catheter valves and catheter flushing agents have been suggested for reducing occlusion and line infection.

Issue
It is unclear if strategies for reducing PICC-associated complications are effective and, if they are, whether the reductions are experienced by all age groups. The purpose of this report is to determine the clinical evidence for the use of chlorhexidine-impregnated PICCs versus non–chlorhexidine-impregnated PICCs, valved versus non-valved PICCs, and saline versus heparin flushing for non-valved catheters, with neutral displacement caps, in both adult and pediatric populations.

Methods
A limited literature search was conducted of key resources, and titles and abstracts of the retrieved publications were reviewed. Full-text publications were evaluated for final article selection according to predetermined selection criteria (population, intervention, comparator, outcomes, and study designs).

Key Messages
- No clinical evidence was found comparing the use of chlorhexidine-impregnated or -coated PICCs with non-chlorhexidine PICCs.
- In adult ICU patients, no difference was found in the frequency of line occlusion in valved versus non-valved PICCs.
- In neonates, the use of normal saline was associated with a longer duration of patency compared with heparin.
- In pediatric patients, no difference was found in patency, occlusion, pain, burning, and swelling in those patients who received heparin compared with those who received normal saline.

Results
The literature search identified 365 citations, with 5 additional articles being identified from a search of the grey literature. Of all these, 19 were deemed potentially relevant and 3 met the criteria for inclusion in this review.