

Peripherally Inserted Central Catheters: The Most Chosen Venous Access Device in Newborns

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Received: October 22, 2018; **Published:** November 16, 2018

Keywords: *Central Catheters; Venous Access; Newborns; Personalized Medicine; Multidisciplinary Healthcare; Good Medical Practice*

Advances in scientific knowledge coupled with new medical technologies in recent years have resulted in a higher survival rate of preterm newborns, especially those of very low birth weight (VLBW) and a decrease in the biological limits of fetal viability. The technology has provided the survival of infants until recently considered unfeasible, but these newborns are more likely to present innumerable morbidities from their prematurity and with this there is a growing need of venous access in this newborns (NB) [1].

Critically ill infants, mainly the very low birth weight, require intravenous access for an extended period for total parenteral nutrition and antibiotic therapy [2].

At 1973, Shaw report a technique of a catheter inserted percutaneously via a peripheral vein with the tip residing in a central vein. Since then, the practice of insertion of peripherally inserted central catheters (PICC) has been improved with the technological advances obtained in the manufacture of PICC catheters and to the insertion devices [3].

PICCs have become popular in newborn because they allow safe long-term intravascular access, comfort, and ease of transition to home therapy [4].

The National Institute of Child Health and Human Development Neonatal Research Network is a consortium of tertiary neonatal centers in USA. They maintain a prospective registry of all VLBW neonates admitted to participating centers within 14 days of birth. Their data document the widespread use of central catheters among VLBW infants; 46% of all infants had a percutaneously inserted central catheter (PICC) at some time during their hospital course, 15% had a peripheral arterial line (PAL), and 8% had a surgically placed central line (CVL). Umbilical lines were also used frequently: 51% had an umbilical arterial (UAC) and 40% had an umbilical venous catheter (UVC) [5].

A scoping review of randomized controlled trials published between 1 January 2006 and 31 December 2015, evaluate the effectiveness of interventions to improve central venous access device outcomes. In total, 178 trials were included, 2009 patients were newborns. In this review, 1,572 (78%) newborns had a PICC, only 87 (4%) had a non-tunneled central venous access device and 350 (18%) had a combined central venous access device [6].

Some techniques were described at the turn of the century to improve the success rate PICC insertion: the microintroducer technique for peripherally inserted central catheter placement, and ultrasound-aided bedside PICC placement [7,8].

Late nineties data from University of Washington Medical Center demonstrated that the bedside PICC placement was successful approximately 60% to 65% of the time, and 35% to 40% of patients were referred to interventional radiology (IR). Since they began to use the microintroducer technique, the bedside insertion success rate increased to 91% [8].

Ultrasound-aided bedside PICC placement was performed at first time in 1997. It began to use with success placing PICCs at or above the antecubital fossa [8].

A retrospective study was performed with 757 patients who had PICC. 431 patients who had such catheters placed using the conventional landmark method was compared with a second group of 326 patients, who had the access device placed using ultrasonography. The data demonstrate a 42% decrease in the number of needle penetrations needed to successfully cannulate veins when ultrasound was used during placement. There is a 26% greater chance of successful cannulation of the vein on the first attempt with ultrasound-guided placements than with those using the traditional landmark method [9].

Besides that, USG placement PICC has a low cost when compared with PICC placement in interventional radiology. A cost comparison of PICC placement at bedside by nurses has been calculated at \$155.50 in contrast to placement in an IR department at \$978.00 [10].

Advances in technological development of infusion devices have yielded many new products intended to improve patient outcomes and increase the efficiency of infusion therapy.

To finish, a dedicated team to PICC insertion has a great impact on patient care and PICC placement costs. A comprehensive, multi-disciplinary team dedicated to evaluating patients, approving PICC placement, and inserting PICCs when appropriate should become the “gold” standard of care in institutions using PICCs in high volumes [11].

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Volume 7 Issue 12 December 2018

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