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Rebecca Hunt

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## **Establishing a Neonatal Peripherally Inserted Central Catheter (PICC) Team**

**Rebecca L. Hunt**

### **Introduction of the Problem**

Infants admitted to the neonatal intensive care unit (NICU) have a plethora of diagnoses. While many of the infants are premature, full-term newborns with genetic, neurological, surgical, and cardiac problems are also treated in the NICU (Linck, Donze, & Hamvas, 2007). The nature of all of these disease processes usually precludes enteral feedings (Linck et al., 2007). Providing the infant with appropriate nutrition and hydration is a priority; this usually requires central venous access, which allows the physician or neonatal nurse practitioner (NNP) to infuse IV fluids that have a higher osmolality and increased calorie content (Linck et al., 2007). PICC placement not only allows for a reliable route of administration for total parenteral nutrition (TPN) but also vasoactive drugs (Sharpe, 2014).

The project location was a NICU located in a 596-bed hospital, which serves as a major regional medical center for the area. The hospital includes a Level 1 trauma center and a women's and children's hospital. The NICU has 30 beds with the ability to expand up to six additional beds on the pediatric floor. Due to a sustained increase in the average daily census, the NICU has an additional 12 beds under construction.

Previously in this hospital, a pediatric surgeon would place the PICC lines. In addition, members of the neonatal medical staff would place catheters via a peripheral vein utilizing a cutdown procedure (in which the peripheral vein would be identified, an incision to the skin would be made, and then the catheter would be inserted into the vein until central placement was obtained). However, this hospital has now been without a pediatric surgeon for over two years and all of the neonatologists who performed the cutdown procedure have retired.

In the last seven months, the hospital has expanded the neonatal nurse practitioner team to five members, including two who can place PICC lines. However, due to the increased daily census and patient acuity, the nurse practitioners have limited availability to place PICC lines. Subsequently, this was causing a delay in umbilical line removal (which is known to be related to an increased risk of infection) and/or an increase in the number of peripheral IV attempts by the nursing staff. Therefore, a proposal was made to hospital administration to begin a nurse-led neonatal PICC line team. The NICU team presented administrators with studies that 1) showed the high success rate of nurse-led PICC teams (while also having minimal complications) and 2) showed that the bedside placement of a neonatal PICC line could be less expensive when performed by a dedicated neonatal nursing team (Linck et al., 2007). After hospital administration verified with the risk management department that bedside PICC placement was within the scope of nursing practice, the NICU received permission to begin a neonatal nurse-led PICC team. This would allow for more timely placement of PICC lines and, ultimately, better care for the neonatal population at this hospital.

### **Literature Review**

PICC lines have been used commonly in the neonate since the beginning of the 1980s (Linck et al., 2007). Previously, central venous access was obtained via percutaneous subclavian catheters as well as surgically placed central venous catheters (CVCs) (Linck et al., 2017). Due to the need for an operating room and the wide range of complications/risks associated with both CVCs and percutaneous subclavian catheters, there was a need for less invasive techniques that could be performed directly in the NICU (Linck et al., 2007). Linck et al. (2007) discussed that in 1980, a study was conducted that found that PICC lines were successfully inserted in 15 of 17 infants with no infections and only minor complications noted. Another study from 1980 showed that 53

infants in the PICC cohort had significantly fewer infections and complications (Linck et al., 2007). Based upon these early studies, the placement of a PICC line in the neonate was found to be safe, with significantly fewer complications and infections than with surgically placed CVCs (Linck et al., 2007).

Rainey et al. (2019) also discussed that PICC lines are being utilized more often in pediatrics for reliable long-term venous access. In addition, PICC lines are now routinely being placed by dedicated nursing teams (Rainey et al., 2019). Recent data has suggested that more than 60% of United States hospitals now utilize specialized nurse-led PICC teams (Rainey et al., 2019). The continued growth of the use of PICC lines has been directly linked to the ability of nurses, who have received additional training, to safely and cost-effectively perform the procedure (Krein et al., 2015). These nurse-led teams function as independent units, often being better known as a “PICC team” (Krein et al., 2015). Thus, PICC teams have become an extremely vital part of the health care team (Rainey et al., 2019).

The use of a dedicated PICC line team can be viewed as an important component of improving patient care while, potentially, decreasing the length of stay and healthcare costs for infants in the NICU. There is a large amount of evidence showing that nurse-led PICC programs not only become efficient in catheter placement, but that team members also become advocates for improving clinical practice regarding the insertion and care of PICC lines (Legemaat et al. 2015).

### **Project Methods**

PICC placement is a commonly performed procedure in the neonatal population, especially after specialized education and training have been received (Rainey et al., 2019). The purpose of this doctor of nursing practice (DNP) project was to establish a nurse-led PICC line team in the NICU. The four steps to this project were: a. selection of the PICC line team, b. defining the

structure of the team, c. training of the PICC team members, and d. evaluation of outcomes after the implementation of a nurse-led PICC line team. Along with the stakeholder, two NNPs, who are experienced in PICC line insertion and maintenance, served as resources. The facility at which the project occurred was a 30+ bed NICU located in a 596-bed hospital, which serves as a major regional medical center for the area.

NICU administrators believed that the establishment of a nurse-led PICC line team would improve the three main outcome measures. Additional study variables chosen for collection and review were based upon a comprehensive literature review of relevant research and performance improvement projects in conjunction with the institution's specific goals.

### **Evaluation**

There were three main outcome measures for this DNP project. The first measure was the length of time between PICC line consultation to successful PICC line placement. The second measure was the average number of umbilical lines days. Finally, the third measure was the number of peripheral IV attempts that took place between the time of PICC line consultation to successful PICC line placement.

One year of retrospective data analysis of patient medical records was completed to gather information regarding outcome measures before the establishment of a nurse-led PICC line team.

One year of retrospective data analysis of patient medical records was then completed after the establishment of the neonatal PICC line team. By successfully establishing a neonatal PICC line team in the hospital, the NICU was able to: a. decrease the length of time between PICC line consultation to successful PICC line placement, b. decrease the average number of umbilical line days, and c. decrease the number of peripheral IV attempts that took place between the time of

PICC line consultation to successful PICC line placement. In addition, all of the above goals were achieved while also decreasing the CLABSI rate in the NICU.

### **Impact on Practice**

Multiple practice improvements were achieved with the implementation of this DNP project. Five-day shift and five-night shift NICU registered nurses (RNs) were recruited to join the neonatal PICC line team. This allowed the team to provide 24-hour PICC line coverage year-round. Neonatal PICC team members were then trained regarding PICC placement and management. Finally, a neonatal PICC line team was successfully established with all members being able to place PICC lines independently.

The long-term impact of this project is continued successful PICC line placement in the hospital's neonatal population without any delays and/or additional risks for infection. This, ultimately, allows for better care of the neonatal population at this hospital. This project can be replicated in any NICU that has a desire to establish a neonatal PICC line team if the proper support can be identified and maintained. The identification and training of team members can be easily replicated and/or reproduced.

### **Conclusions**

PICC lines are an important resource in the neonatal population. PICC lines allow the infant to receive the most appropriate nutrition, hydration, and medications. The high success rate of nurse-led PICC teams, while also having minimal complications, had already been established in multiple studies. By successfully establishing a neonatal PICC line team in the NICU, the hospital was able to decrease the length of time between PICC line consultation to successful PICC line placement, therefore, decreasing the average number of umbilical line days and the number of peripheral IV attempts that took place between the time of PICC line consultation to

successful PICC line placement. Establishing a well-trained, dedicated neonatal nurse-led PICC line team is important to providing this fragile population with the best care and treatment available.

**Author Contact Information**

Rebecca L. Hunt: rebehun@siue.edu