

# Reducing the Incidence of PIV Infiltration and Extravasation in the Neonatal Intensive Care Unit

Melissa Chiaputti MSN, RN, CCRN-K, VA-BC, Katie Bryant BSN, RN, RNC-NIC, Fauzia M Shakeel MD

<sup>1</sup> Maternal Fetal Neonatal Institute, Johns Hopkins All Children's Hospital, St. Petersburg FL



## Define: Background

Ninety percent of neonatal intensive care unit (NICU) patients require treatment with a peripheral intravenous catheter (PIVC), with a reported PIVC fail rate of 45.6%. PIVC failure results in medications leaking into tissues causing prolonged hospitalization and increased costs. Neonates and infants are at increased risk for injury due to fragile veins, lack of subcutaneous tissue, and the catheter in areas of flexion. A timely and thorough PIV assessment is crucial to prevent infiltration and extravasation injury leading to severe harm and long-term morbidity. Staff is trained on assessing the PIV site hourly using TLC (Touch, Look, and Compare) for early infiltrate detection. Several initiatives were done to reduce infiltrations; however, challenges persisted in the NICU, and a focused collaborative quality improvement initiative was conducted to reduce events and sustain improvement.

## Aim of the Project

This quality improvement initiative aimed to reduce the incidence of advanced PIVC infiltration and extravasation events per 1,000 patient days in all patients admitted to the NICU. The goal was a 50% reduction in the event rate by the end of the fiscal year 2022.

## Intervention

The Model for Improvement guided this work with several Plan-Do-Study-Act (PDSA) cycles. The third cycle was developing an incentive program using meaningful recognition to acknowledge staff who identify early PIVC infiltration. Nurses are recognized monthly by having their names posted in the unit and the electronic unit communication, with one nurse being featured with a picture and a recognition package.

PDSA Cycles	Intervention	Purpose
#1	Mentor Nurse PIV Rounds	Reinforce Education & Identify Concerns
#2	Premature Neonate Extremity Board	Addressed Identified Barrier to Joint Stabilization
#3	PIVIE Lookout Program	Positive Reinforcement of Early Infiltration Identification
#4	Early PICC Placement	Reduce occurrence of Vesicants infusing in PIVs

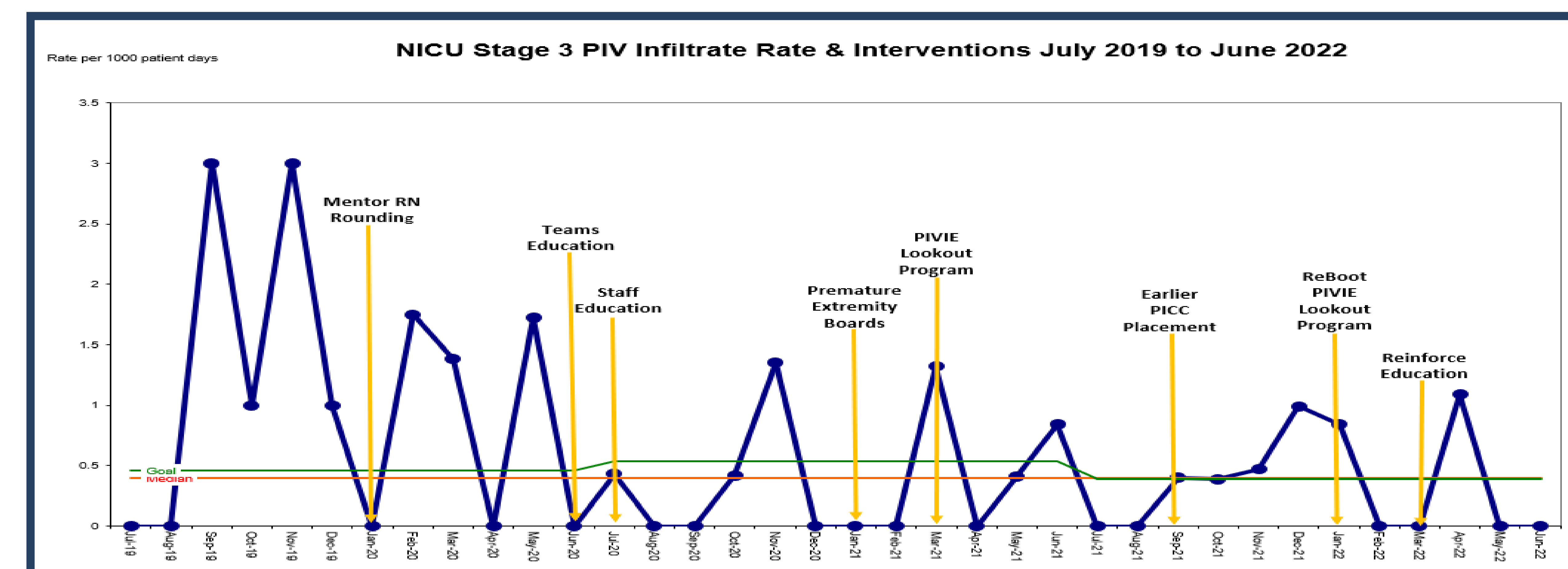
## Data Collection & Analysis

Project Measures	
Outcome	Stage 3 PIV Events
Process	<ul style="list-style-type: none"> <li>Staff Education</li> <li>Extremity Board Use</li> <li>Early PICC Placement</li> </ul>
Balancing	<ul style="list-style-type: none"> <li>CVL Lines Days</li> <li>CLABSI</li> <li>Pressure Injuries</li> </ul>

The monthly rate of advanced PIVC infiltration, defined as 60% or greater extremity swelling with or without blisters or tissue damage, was tracked by the quality improvement team as the outcome measure of the project. Data collection included the review of electronic health records and the institution's safety event reporting system. The project leader monitored the process measures, including PIVC securement using an extremity board and early PICC insertion. The team closely tracked balancing measures, including central venous line days, central line-associated bloodstream infection rate, and pressure injuries related to PIVCs.

## Outcome Measures

The advanced infiltration and extravasation rate was reduced by 43% from 0.68 in the fiscal year 2020 to 0.39 in the fiscal year 2021. The continued rate improvement was seen in the fiscal year 2022, with a rate reduction of 10% to 0.35 events per 1,000 patient days. The PIVC infiltrate rate was reduced by 49% by the end of the fiscal year 2022. The outcome measure remained the same throughout the project, but the additional interventions required more consideration of the balancing measures.



## Implications for Practice

Several initiatives were done to reduce infiltrations; however, challenges persisted, including adding new staff and fluctuations in the unit census. Combining staff education with increased monitoring of PIVC sites is an evidence-based strategy. Still, there is limited literature on the impact of meaningful recognition in reducing harm from PIVC failures. The use of an innovative approach is essential not only to a healthy work environment but also to improve patient safety.

## References

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