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# Peripheral Intravenous Infiltrates: Engaging Staff to Increase Reporting

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# Peripheral Intravenous Infiltrates: Engaging Staff to Increase Reporting


## Abstract

A large free standing children's academic hospital aimed to improve patient safety and outcomes by decreasing the overall severity of peripheral intravenous infiltration and extravasations (PIVIEs). A care bundle was developed by creating a PIVIE measurement tool within the electronic medical record (EMR) and integrating the tool into standardized daily practice for nurses. The care bundle included creating a team of clinical leaders consisting of empowered bedside nurses acting as mobilized resources embedded into each unit. The initiative resulted in a large scale increase in reported PIVIEs system-wide within 1 month of education dissemination to bedside RN staff. The QI interventions captured a realistic interpretation allowing for a more global and accurate reflection of the number and severity of PIVIE events system-wide, while creating documentation for the PIVIE tool in the EMR and a clinical leader model. The results reflected a dramatic rise in the number of reported PIVIE events, increase in staff awareness of PIVIEs, increased peripheral intravenous line assessments, and decreased severity of PIVIEs that do occur.



## Keywords

• Peripheral intravenous infiltrations and extravasations, PIVIEs, electronic medical record, champion model, quality improvement, PIV

## Introduction

Quality healthcare drives positive patient outcomes. Discovering the gaps in healthcare quality is a powerful tool in the quest to improve patient safety. In the unwavering pursuit to seek improvement in patient care, a large free-standing academic children's hospital partnered with The Children's Hospitals' Association's Solutions for Patient Safety (SPS) Network to eliminate harm due to healthcare (SPS, 2019). The goal for the Solutions for Patient Safety initiative was a 40% reduction in pediatric hospital acquired conditions by December 2018. Peripheral intravenous infiltrations and extravasations (PIVIE) is one of the targeted hospital acquired conditions in the overarching SPS goal to reduce harm. The goal of the PIVIE collaborative is to reduce the severity of PIVIEs by 20% by December 2018.

Globally, there are over 150 million peripheral intravenous (PIV) catheters purchased for patient therapy annually (Dychter, Gold, Carson & Haller, 2012). 78% of the time, pediatric patients with PIVs experience infiltrations and extravasations with half of those resulting in harm to the patient (Tofani et al. 2012). PIVIEs can place hardship on the patient psychologically and physically, increase morbidity, mortality, length of stay, and are very costly.

### Problem

At the children's hospital, nurses lacked understanding of their role regarding the impact of the severity of PIVIEs, which in turn, resulted in a significant lack of reporting of PIVIE events. We identified an underreporting of PIVIE events when we determined that during a baseline period in a hospital with over 700 licensed inpatient beds, there were only 40 PIVIE events reported per month.

### Relevant Literature

Promoting frontline staff development in quality improvement activities creates better awareness and effectiveness in quality improvement initiatives (Hashjin et al., 2014). Shared governance supports change that is pushed from the bottom up that revolves around open communication, valuing staff input, and mandating knowledge-based decision making with direct dispersal of that knowledge and innovation (Creehan, 2015). The clinical leader model promotes all facets of shared governance from bedside nurses to executive leaders. Integrating staff into quality improvement allows for feedback regarding potential barriers to workflow that only those on the frontline are knowledgeable about (Hashjin et al., 2014) while engaging staff has proven to be a successful model when initiating large quality and safety initiatives (Flanagan et al., 2016). The clinical leader model allows for self-motivated staff to communicate practice changes, advocate through feedback, and develop their own organizational awareness (Agrell-Kann, 2015). Allowing the bedside nurse to act as an advocate in the clinical leader role allows for their expertise to impact the quality of care received. This clinical leader model design enables staff's bedside proficiency and knowledge to play a vital component in the decision-making process in the quest to improve patient care (Creehan, 2015).

Developing increased understanding and awareness surrounding where there are opportunities for improvement in healthcare is not only impactful but an integral part of moving forward in the pursuit to decrease patient harm. Miller et al. (2017) compared two reporting

systems and found that with one including the use of electronic medical record (EMR) reporting, the system using EMR reporting dramatically increased the return of adverse events for lab. This increased number of adverse events was a direct and immediate reflection of the ability to automate reporting within the EMR. EMR integration results in decreased length of stay and decreased mortality (Lee et al., 2013). Lee et al. (2013) found that the quicker pace of communication through EMR utilization allowed for more comprehensive and efficient care during admission to the hospital.

The journey to decrease patient harm through advancement of PIV care started decades ago at the children's hospital but this mission has recently surged ahead with advancements in electronic medical record (EMR) integration and a team of mobilized bedside nurse clinical leaders.

### Aim Statement

The implementation of the PIVIE initiative will increase reporting of PIVIEs by 25% within 3 months of implementation.

In accordance with the overall collaborative goal, the primary outcome measurement to improve is the rate of PIV infiltrations with moderate and severe injury on a daily and monthly basis.

## Methods

### Interventions

There are many components that impact infiltrations of peripheral intravenous lines. Two factors that are a focus of the PIVIE improvement project to reduce severity of PIV infiltrations are the accuracy of data collection in the post PIVIE outcome methodology and the engagement of frontline clinical staff.

### Accuracy of Data Collection in the Post PIVIE Methodology

Initially, the quality improvement team determined that IV severity outcomes would be collected through the organization's event reporting system. Each month, an average of 40 events entered for infiltrates occurred throughout the hospital system. Of these events, approximately 25% were classified as moderate to severe injuries. This self-reporting process resulted in a false impression that the incidents of injury were not significant. We established a strong foundation for understanding the baseline of PIVIE in order to make reduction of infiltrate severity in the future.

| PIV Infiltration/Extravasation | |
|---|---|
| Date of event | |
| Time of event | |
| Measure site swelling (x) cm | |
| Measure arm length (Y) cm | |
| Calculated percentage (X/Y*100) | |
| Medication/IVF name | |
| Medication stopped? | |
| Was the line discontinued? | |
| Did MD come to bedside if >30%? | |

Figure 1: PIV Nursing Flowsheet in EMR

## Development Phase of PIVIE Initiative

### Engagement of Frontline Staff

Nurses drive the processes involved in the care and maintenance of a PIV. Therefore, frontline staff engagement was critical to impact change that would reduce the severity of infiltrates. The hospital integrated the PIVIE clinical leader model by selecting bedside nurse applicants as unit clinical leaders to assist in creation, dissemination, and review of the PIVIE quality initiatives.

We identified embedded clinical resources for each clinical nursing area. A two-hour kick-off meeting introduced the team to the project, provided education on the Pediatric Intravenous Extravasation Assessment System and engaged staff to collect observational data regarding the care and maintenance of PIVs. Ongoing Clinical Leader meetings empowered staff to advance education on the PIVIEs, provide tools to share with their co-workers, and provide meaningful feedback to improve performance.

An educational action executed by the Clinical Leaders was the use of Training Boards to teach fellow team members how to measure the severity of an infiltrate using the Pediatric Intravenous Extravasation Assessment System. The boards were used throughout the nursing areas to facilitate learning.

*Figure 2: Pediatric Intravenous Extravasation Assessment Training Boards*

Recognizing that nurses documented infiltrations in the EMR nursing flowsheet upon removal of a PIV, the team worked with the EMR clinical informatics resources to see if meaningful data could be extracted into an electronic report. After adding rows to the flowsheet to capture the measurement swelling via the Pediatric Intravenous Extravasation Assessment System (granted permission of use by Cincinnati Children's Hospital), the EMR was able to generate reports that quantified the number and severity of infiltrates. Figure 1 demonstrates the documentation in the EMR.

**Implementation Phase**

The clinical leaders in conjunction with staff developed a protocol to systematically address the prevention and management of PIVIEs. The protocol included a systematic assessment of peripheral lines, which included hourly PIV assessments, appropriate standardization of dressings, and parental involvement in PIV care. The clinical leaders conducted monthly audits which included assessment of all components of the protocol. The number of monthly audits conducted since the initiation of the PIVIE clinical leader model has grown dramatically.

The clinical leaders became a vital resource at the unit level for the identification and reporting of PIV events. They implemented an in-depth curriculum for prevention and management of PIVIEs through education on best practices, and provided real-time observational data and feedback on their units. After project implementation, the PIVIE clinical leaders audited outcomes and provided peer feedback at multiple locations across the hospital system. All evaluation processes were mechanisms to understand the prevalence and current practice of our institution.

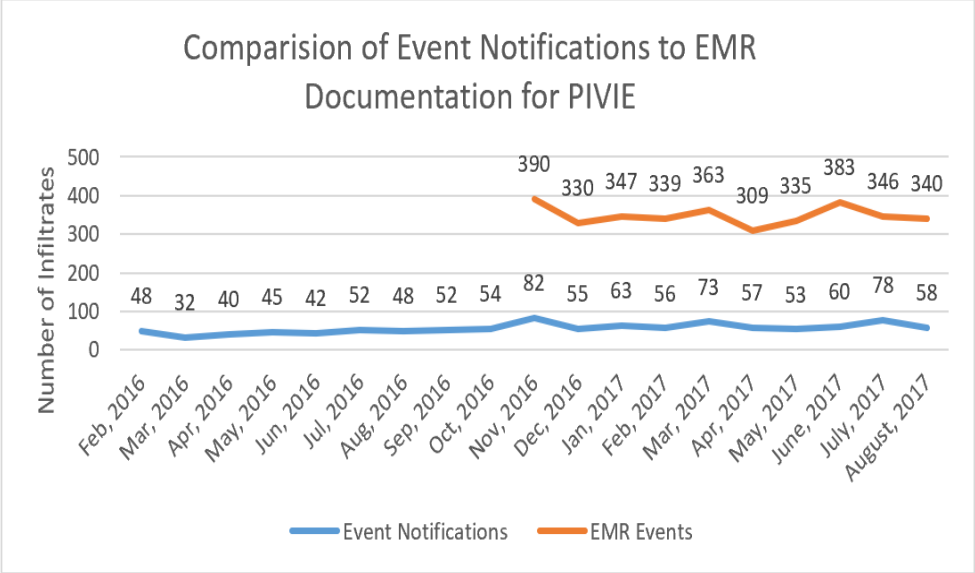
## Results

Prior to joining the multi-site collaborate, the impact of PIVIEs on the health and safety of the children was underappreciated in the organization. Some viewed PIVIEs as simply a known complication of IV therapy. Staff did not have a means to determine the severity of an infiltrate, nor the tools to understand how to prevent infiltration. Leaders did not have the knowledge of the incidence or severity of PIVIEs occurring within specific units or throughout the institution.

Through the use of accurate PIVIE data collection and engagement of front-line staff in the PIVIE clinical leader model, we have heightened organizational awareness and improved reporting and documentation.

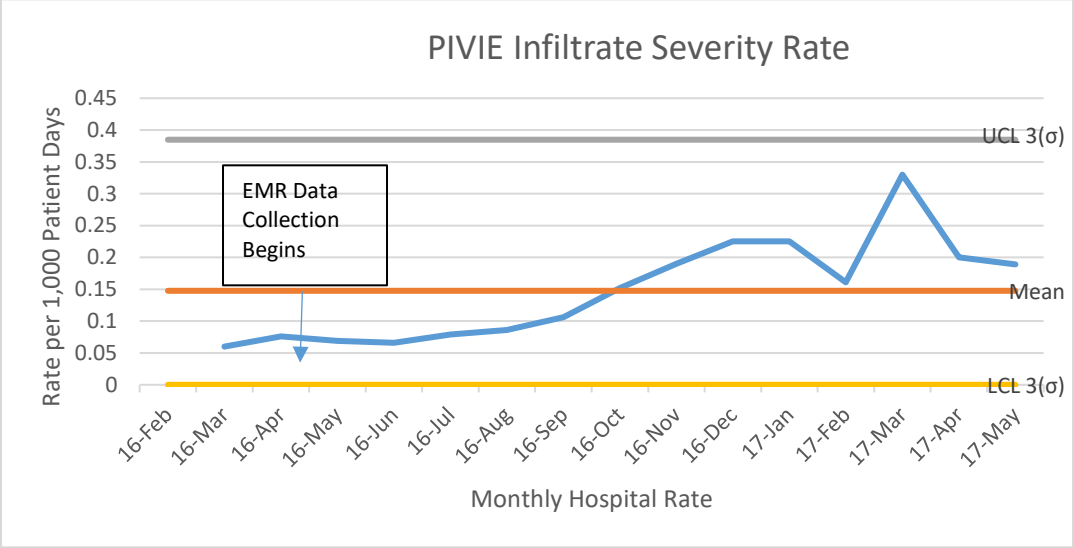
**Outcome Measures**

The overall collaborative goal was to identify PIVs and in turn, increase the number of reported PIVIEs that occurred in the institution. Once the organization began to pull data reports from the EMR, the number of PIVIE events increased by approximately 82%. This increase demonstrated a better reflection of the true incidence within the organization.




*Graph 1: Quantity of PIV Infiltrates*

On a monthly basis, data was reviewed to compare the incidence of PIVIE reported from the hospital's event reporting versus the incidences captured in the EMR reporting. There continued to be a stark difference in the number of self-reporting versus those captured from EMR documentation.




*Graph 2: PIV Infiltrate monthly rates*

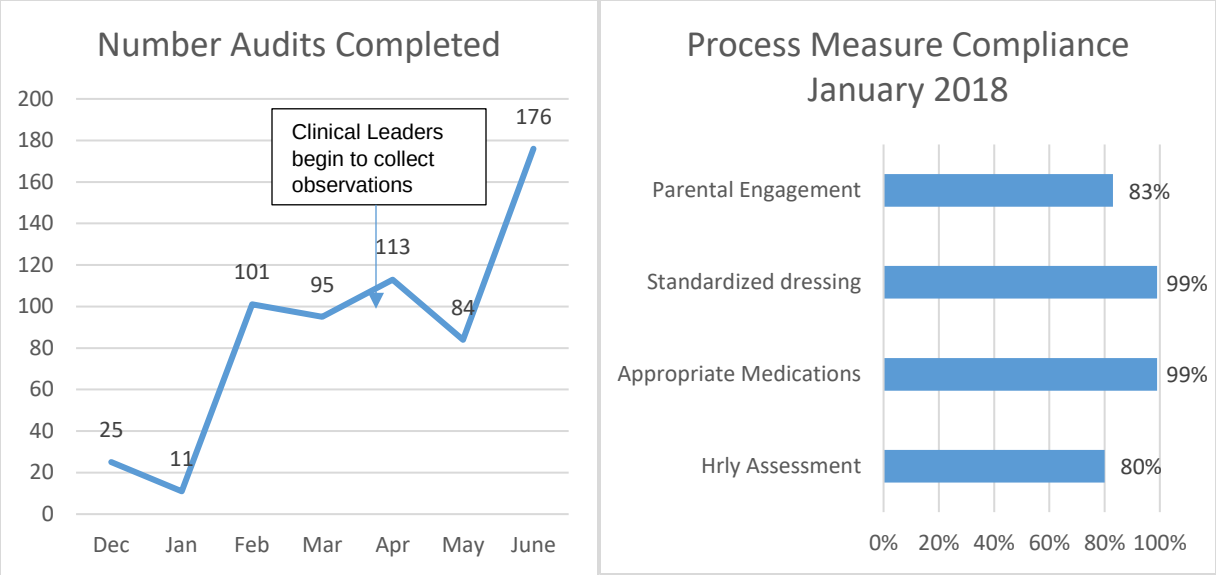
The rate demonstrated a 32% increase, which was a more accurate reflection of the PIVIEs occurring within the organization.

**Process Measures**

In addition to measuring the outcomes of the severity of IV infiltrates, the quality improvement team has focused on process measures that may contribute to preventing infiltrates from occurring. The role of the Clinical Leader has been important in conducting real time observations of the care and maintenance of lines. The Clinical Leaders also assessed parental engagement as parents can provide direct feedback if swelling of an IV is noted. The following graphs indicate the impact the clinical leaders had to both the number of observations conducted, and the compliance with the factors being observed.

**Sustainability**

The next steps for the PIVIE quality improvement work include additional training aimed at PIVIE measurement and documentation accuracy. The team will also focus its efforts on increased emphasis on prevention and standardized treatment of PIVIEs. To sustain the improvement work, there is ongoing leadership involvement and PIVIE clinical leader recruitment, as well as monthly meetings which include education curriculum and feedback sessions.




Graph 3: PIV Infiltrate Audits

**Limitations**

The reporting of incidences of PIVIEs is conducted through a combination of EMR data mining and event reporting. One limitation of the project is that the accuracy of reporting is dependent on the data integrity of EMR documentation of the bedside nurse. Another limitation of the data is that although the PIVIE is documented in the EMR, there is a high incidence of the nurse not documenting the measurement of the PIVIE. This missing measurement does not allow the PIVIE to be classified as mild, moderate, or severe.

**Conclusions/Next Steps**

In the PIVIE initiative, engagement of front-line clinical staff was an important part of the process in order important to achieve desired outcomes. Multiple interventions aimed at PIVIE reduction can actually produce an increased awareness and result in an increased reporting of incidences. Quality improvement efforts should continue to focus on the improvement of PIVIE management of hospitalized pediatric patients. By engaging our staff and increasing our reporting, the PIVIE quality team now understands where areas of focused quality work should occur. This children's hospital is now ready to make an organizational impact on decreasing the severity of PIVIEs that do occur.

**Summary**

Hospitalized pediatric patients with indwelling peripheral intravenous lines are at risk for developing PIVIEs. A large, free-standing academic children's hospital implemented a series of actions aimed at improving the early detection, measurement, and treatment of PIVIEs. The hospital implemented multiple interventions, including staff education of PIVs, engagement of front-line clinical staff in a clinical leader model, the implementation of a PIVIE protocol for staff to follow, and improved EMR data management, which increased awareness of PIVIEs. Through engagement of frontline staff, awareness of PIVIEs has increased peripheral

intravenous line assessments and decreased the severity of PIVIEs that do occur. This quality improvement work and education dramatically increased the reporting of PIVIEs, which is a more accurate report of the incidences occurring within the institution. This accurate data will assist with future PIVIE quality improvement efforts.

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