Think Before You Enter: Decreasing Central Line Entries on the Children’s Cancer and Blood Disorders Unit

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Introduction:
Central line associated bloodstream infections (CLABSIs) are a costly and deadly problem in the healthcare field. In the pediatric population, there is an average of 0.7 to 7.4 CLABSIs per 1000 catheter days. In our hospital, Palmetto Health Children’s Hospital (PHCH), there is a 10-20% attributable mortality per CLABSI. In addition to this risk, there is an estimated direct cost of $35,000 per CLABSI, in addition to indirect costs such as missed work or school and downstream related complications. Because of these risks and huge financial burdens, the reduction of CLABSIs is a large area in need of continuing quality improvement. As with the spread of most infections, the need for adherence to proper hand hygiene is essential, and in the area of central line infections the use of aseptic technique during line entries is the most important area for prevention of these infections. Compliance with insertion and care and maintenance bundles is essential. Unfortunately, children with hematologic or oncologic disease often need their central venous lines for the duration of their therapy. While these measures are crucial, it’s also important to be cognizant of how often central lines are being accessed and to continually seek ways in which to decrease these entries.

Reducing CLABSIs has been a major initiative for PHCH for quite some time. PHCH PICU has participated in the Children’s Hospital Association PICU CLABSI Quality Transformation Network (QTN) since January 2011 and focus has been reduction of unnecessary central line entries, so we began a similar project on the Cancer and Blood Disorders (CBD) unit focusing on attempts to reduce the number of central line entries. Immunocompromised children are at greater risk for health care-associated infections. As many of these children have central lines, we chose to evaluate procedures to enter these lines, focusing on attempts to reduce the number of line entries in these patients. There are a number of reasons for which a central line may be entered, such as medication administrations, laboratory draws, total parenteral nutrition, chemotherapy, tubing/valve/dressing/needle changes, and flushes just to name a few. The goal of this project was to evaluate the average number of central line entries on the CBD unit and decrease this number by 50% over a 4 month period.

Methods:
To begin, a meeting between several nurses from the Cancer and Blood Disorders (CBD) unit, pharmacist, and attending physician was held to discuss the project with a goal of decreasing central line entries. In collaboration with this team, a data collection form was created (Figure 1) modified from the form used by PICU CLABSI QTN and originally developed by our PICU RNs and pharmacists. The form was reviewed and discussed with the team prior to beginning the project. The form was then distributed to the nursing team on CBD. Anytime a central line was entered on a patient, the entry was recorded on the worksheet according to its category. For each entry, the nurse was then asked whether they felt the entry could have been avoided. If the answer was ‘yes’, the nurse was asked if it was brought to the attention of the rest of the healthcare team (physicians and pharmacist). The form was not included in the official medical record, but rather was used solely for quality improvement purposes. Three total PDSA cycles were completed, each lasting one week (Figure 2). The first PDSA occurred in January 2013 in which the nurses completed the forms accordingly, but no involvement from the pharmacist or physician occurred other than the regular
daily multidisciplinary rounds. The second PDSA cycle was completed in March 2013, and the forms were completed in the same way, but additionally, the forms were reviewed by pharmacy on daily rounds. During this review, the team assessed whether any of the line entries could have been combined with others or eliminated all together. A third and final PDSA was completed one month later in April 2013. Before this final round was done, a meeting with the nurses and pharmacists was held to ensure that the forms were being reviewed daily on rounds and to be sure attending physicians were involved as well. The overall goal of decreasing line entries was reviewed again. The forms were gathered following each round and reviewed for possible changes. We assessed the data collected using an outcome measure. The outcome measure was as follows:

### Outcome Measure:

Average Number of Line Entries per Patient with Central Line =

$$\frac{\text{(Total # of line entries in project period)}}{\text{(Total # of patients with central lines in project period)}}$$

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**Figure 1**: Form used by nursing to track central line entries

![Figure 1](image_url)
Results:
Review of the results from each PDSA revealed that there was a decrease in the total number of line entries in patients with central lines per day (Figure 3). Following PDSA #1, the average number of line entries per day was 3.6. After PDSA #3, the number of line entries had decreased to 0.8 entry per day. The data was also broken down by the type of line entries for each PDSA (Figure 4). The three most common reasons for line entry were medications, lab draws and flushes. The total number of entries for these three reasons was also decreased after the three rounds. Total medication entries for a one week period decreased from 90 to 8; total lab entries decreased from 24 to 4; and total entries for flushes decreased from 35 to 9.

Figure 2: PDSAs over time

Figure 3: Average number of central line entries per day
Discussion:
The Cancer and Blood Disorders unit at Palmetto Health Children’s Hospital (PHCH) has a large number of patients with central lines. CLABSIs are extremely costly and carry a higher risk of morbidity and mortality in patients. The overall goal of this project was to decrease the number of line entries in patients with central lines with the theory that by doing so would decrease the incidence of CLABSIs. By nature of the medicine and treatments for patients with central lines on the CBD floor, there are some line entries which are unavoidable. However, when starting this project, we wanted to see if, by involving the entire healthcare team (nurses, pharmacists and physicians) in addition to their usual practice of multidisciplinary rounds, there could potentially be a decrease in the number of avoidable line entries. Baseline data prior to initiation of this project was unavailable. Data available in the electronic health record significantly underestimates the number of line entries.

The number of line entries per day among patients with central venous lines on CBD decreased over the course of the project from 3.6 to 0.8 (PDSA #1 and PDSA#3, respectively). There were a relatively small number of patients with central lines during this project period. So while these results may not be statistically significant, there is clinical significance. For example, the largest number of total entries in round one was for medication. As some of the nurses noted in their chartings, there were medications which were being given through the lines which were thought to be either unnecessary or could have been switched to another route, such as by mouth, for administration. Likewise, the number of lab draws during round one was 24. By the end of round 3, that number had decreased to 4.

Before this project began, the healthcare team on the CBD unit felt that they were efficient in minimizing central line entries when they were able. At the conclusion of the project, the team did not feel there was a large change from their routine practices though they had not yet seen the results. However, it was anecdotally noted that awareness was improved. Though the changes were small, the addition of recording

![Graph showing number of line entries by type for each PDSA cycle.](image-url)
each line entry and making an effort to discuss these entries with the entire team during daily rounds seemed to have favorably impacted the number of central lines entries. As noted before, the number of central lines on the CBD unit during this project was small. We plan to reassess the average number of line entries in the future on this unit to assess sustainability of this change in practice on this unit. The cost of the intervention is trivial and, anecdotally, providers did not feel there was much additional time involved. Assessing barrier to generalizing this practice may be useful as well.

References: