

Get a CLUE: Central Line Utilization & Entry-Reducing Central Line Associated Blood Stream Infections (CLABSIs) in the PICU

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1 Background

Central Line Associated Blood Stream Infections (CLABSIs) prolong hospital stays, increase costs and the risk for mortality (Pronovost et al., 2009). The PICU at Johns Hopkins Hospital is part of the National Association of Children's Hospitals and Related Institutions (NACHRI) Quality Improvement collaborative dedicated to reducing the incidence of these infections. CLABSIs can be prevented through proper insertion techniques and maintenance or management of central lines (CL) (Miller et al., 2011). Since 2007, when the PICU joined the NACHRI collaborative, until 2012, there was a steady decline in PICU CLABSI rates, but in 2013, despite continued compliance with evidence based insertion and maintenance protocols, there was a spike in infections. In 2013 there were 13 CLABSIs in the PICU and the trend is similar thus far in 2014. One hypothesis to explain this sudden spike in CLABSIs, is that these children's CLs are being over utilized.

2 Objectives

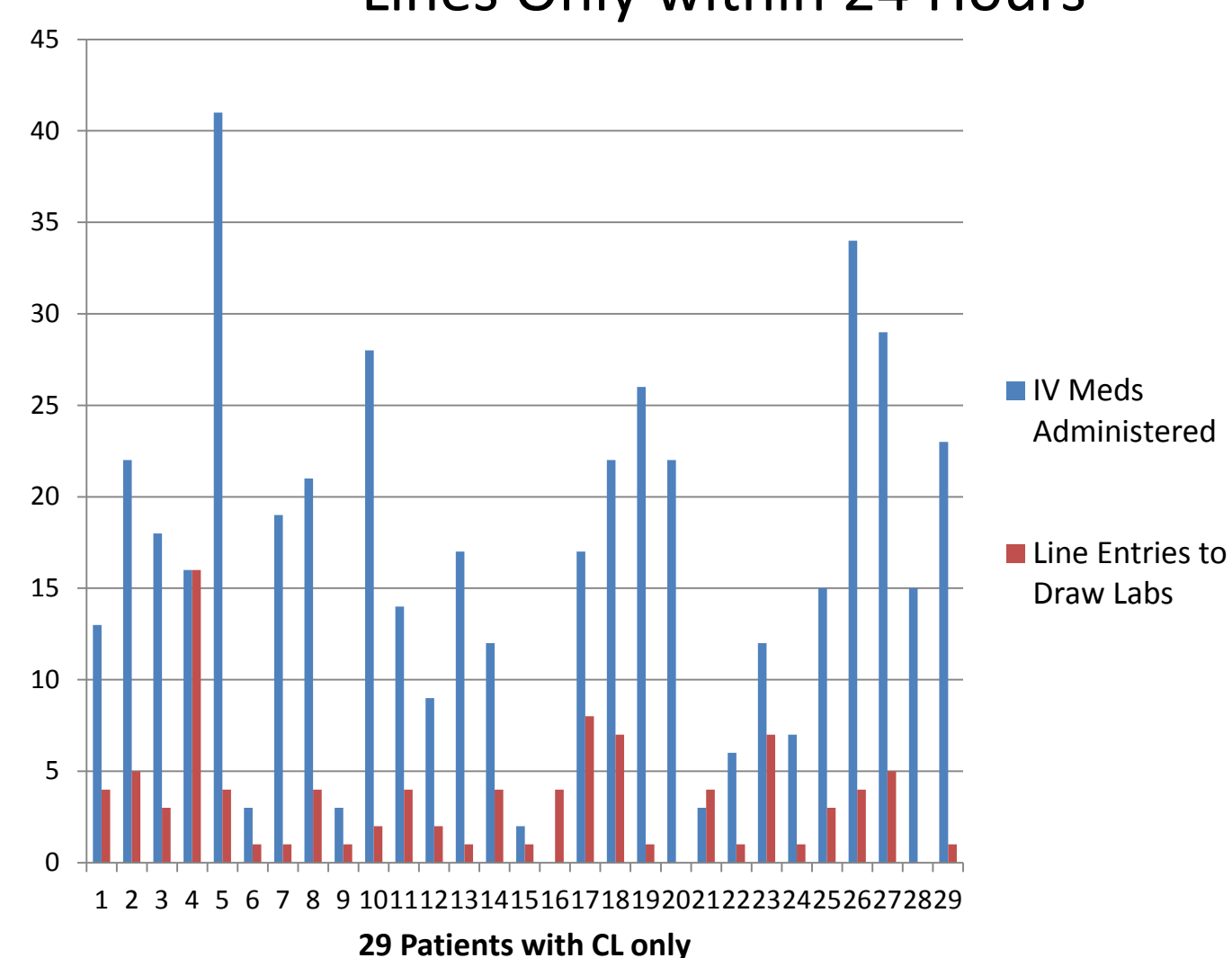
- o Short term: reduce unnecessary central line utilization and entry.
- o Long term: reduce PICU CLABSI rate.

3 Methods

1. Collect CLUE data on a weekly basis by filling out NACHRI generated forms.
2. Record data on NACHRI database.
3. For the month of February, evaluate and analyze utilization and entry data by comparing children with central lines only to children with both central lines and arterial lines (a-lines) to determine if they are being over utilized.
4. Participate in PICU patient safety meetings.

4 Results

Line Entries to the 29 Patients with Central Lines Only within 24 Hours



Line Entries for 19 Patients with Both Central and Arterial Lines Within 24 Hours

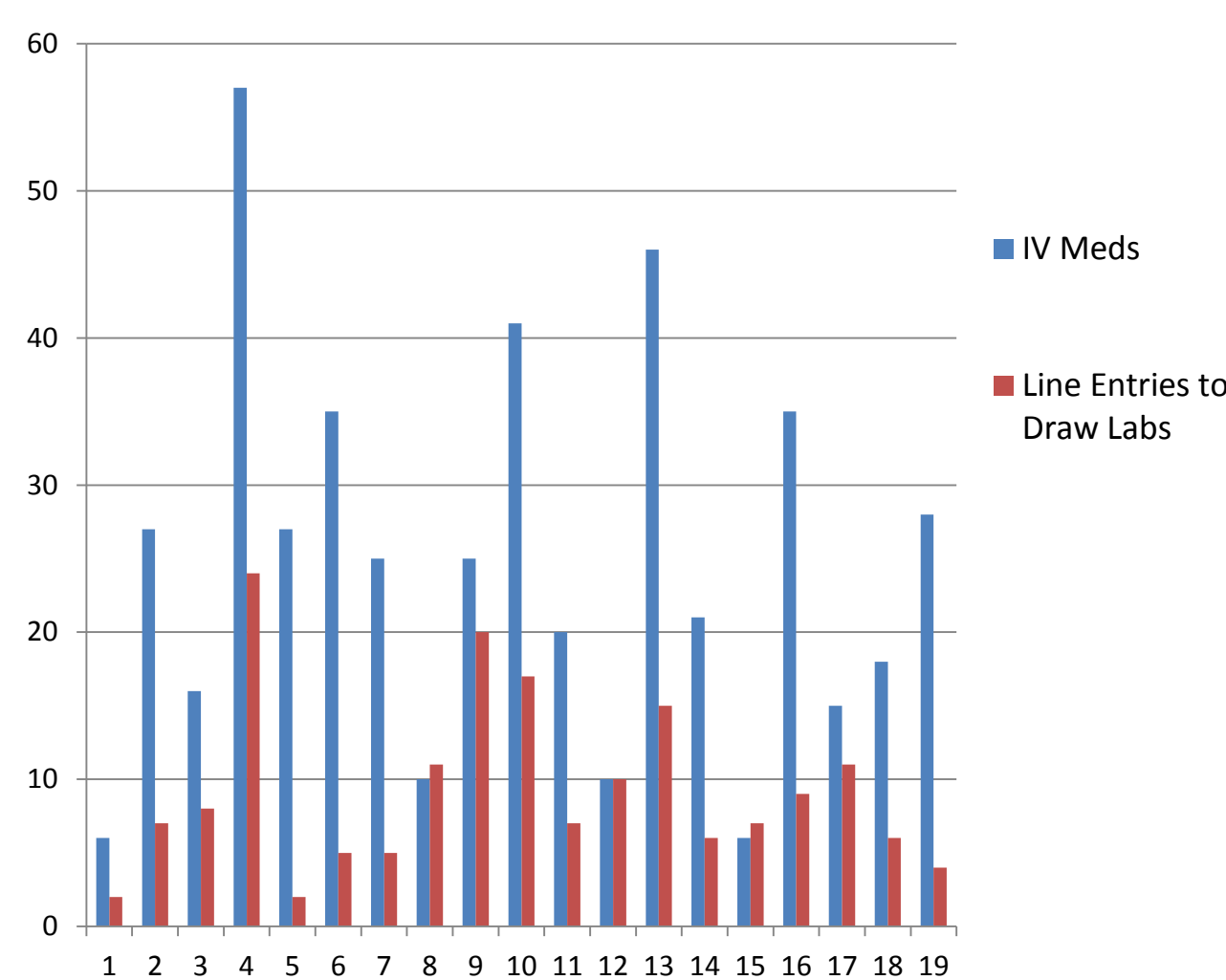


Fig 2. Patients with both CL and A-lines. Average number IV meds: 24.6 Average number lab draws: 9.3.

During three observation days in February 2014, 48 patients had central lines. 29 patients had CL only and 19 patients had both central and arterial lines. For patients with CL only, an average of 16.2 IV meds were administered, 3.4 labs were drawn through their CL which required on average 3.5 cc of blood, and the average PEW score of these children was 6.2 (PEW Score: Pediatric Early Warning System/Score designed as an objective measurement to identify at risk patients/ those who need a higher level of care. Scores are based on 3 systems: neuro, cardiovascular and respiratory system. Scores range form 0-9. Patients who score a 0-2 are ready to go to the floor. 3-5: patient's status should be discussed with the team. Patients who score >5 need to remain in the PICU.) For children with both central and a-lines: the average amount of IV meds given was 24.6, average number of line breaks to draw labs 9.3, average amount of blood lost through lab draws was 8.7 cc, and their average PEW scores was 7.3.

	Children with CL only	Children with both CL and A-lines
Average PEW Score	6.2	7.3
Average # IV meds	16.2	24.6
Average # Lab Draws	3.4	9.3
Average of Blood Lost from Lab Draws	3.5	8.7

5 Conclusions

- o The evidence: obtaining blood from an a-line is less associated with an infection risk as compared to obtaining blood from a CL, which is why we anticipated more labs being draw from children with a-lines.
- o Furthermore, the sicker children should have a-lines and therefore more lab draws and more IV meds, which is consistent with our findings; children with CLs only have a lower PEW scores.
- o Latest expert NACHRI opinion: a CL line should only be accessed 14 times within a 24 hour period; including both IV meds and lab draws. PICU's average was much higher.
- o Within a 24 hour period, children's CL are being over utilized and every line break or entry is another opportunity for infection.

6 Future Directions

1. Continue to monitor/record CLUE data on NACHRI forms.
2. Develop multidisciplinary strategies to continue to reduce daily number of CL entries by:
 - Implementing Gem4000: one finger stick can draw multiple labs which discontinues the need to enter CL and a-lines for labs and decreases the amount of blood lost!
 - Continue to monitor to determine if IV medications can be given through another route; PO or enteral.
3. Continue to do a root cause analysis on every child that develops a CLABSI to identify best practices especially focusing on 72 hours immediately prior to infection.

7 References

- Miller, M. R., Niedner, M. F., Huskins, C. H, Colantuoni, E., Yenokyan, G., Moss, M., et al. (2011). Reducing PICU central line-associated bloodstream infections: 3 year results. *Pediatrics*, 128(5), e1077-1083.
- Pronovost, P., Needham, D., Berenholtz, S., Sinopoli, D., Chu, H., Cosgrove., ... Goeschek, C. (2006). An intervention to decrease catheter-related bloodstream infections in the ICU. *The New England Journal of Medicine*, 355 (26).

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Fig 1. 29 Patients With CL only. Average Number Meds: 16.2. Average Number Lab Draws: 3.4 versus unit recommendation: 2.