

Closed Systems: Are Conventional Arterial Line Monitoring and Sampling Systems Contributing to Central Line Associated Bloodstream Infections (CLABSI(s))?

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ABSTRACT

Arterial catheters are commonly used in the critical care setting to monitor blood pressure and obtain blood samples making them among the most heavily manipulated vascular access devices. Frequent accesses can lead to higher blood contamination rates, bacteremias, and antibiotic administration. Many of these patients also have other central vascular accesses that are at risk of microbial contamination and colonization. Struggling to reduce CLABSIs post COVID in both Medical and Surgical Intensive Care Units, a deep dive into contributing factor was performed. Through root cause analysis, opportunities identified included a need for intensive in person back to basic education on central line maintenance, dedicated quality program manager presence on the units during physician rounds with the ability to assess line necessity and the implementation of a closed arterial line system. These interventions were implemented over a 21-month period with constant attention to tracking and trending infection causes in efforts to meet our goal of Reaching Zero central line infections.

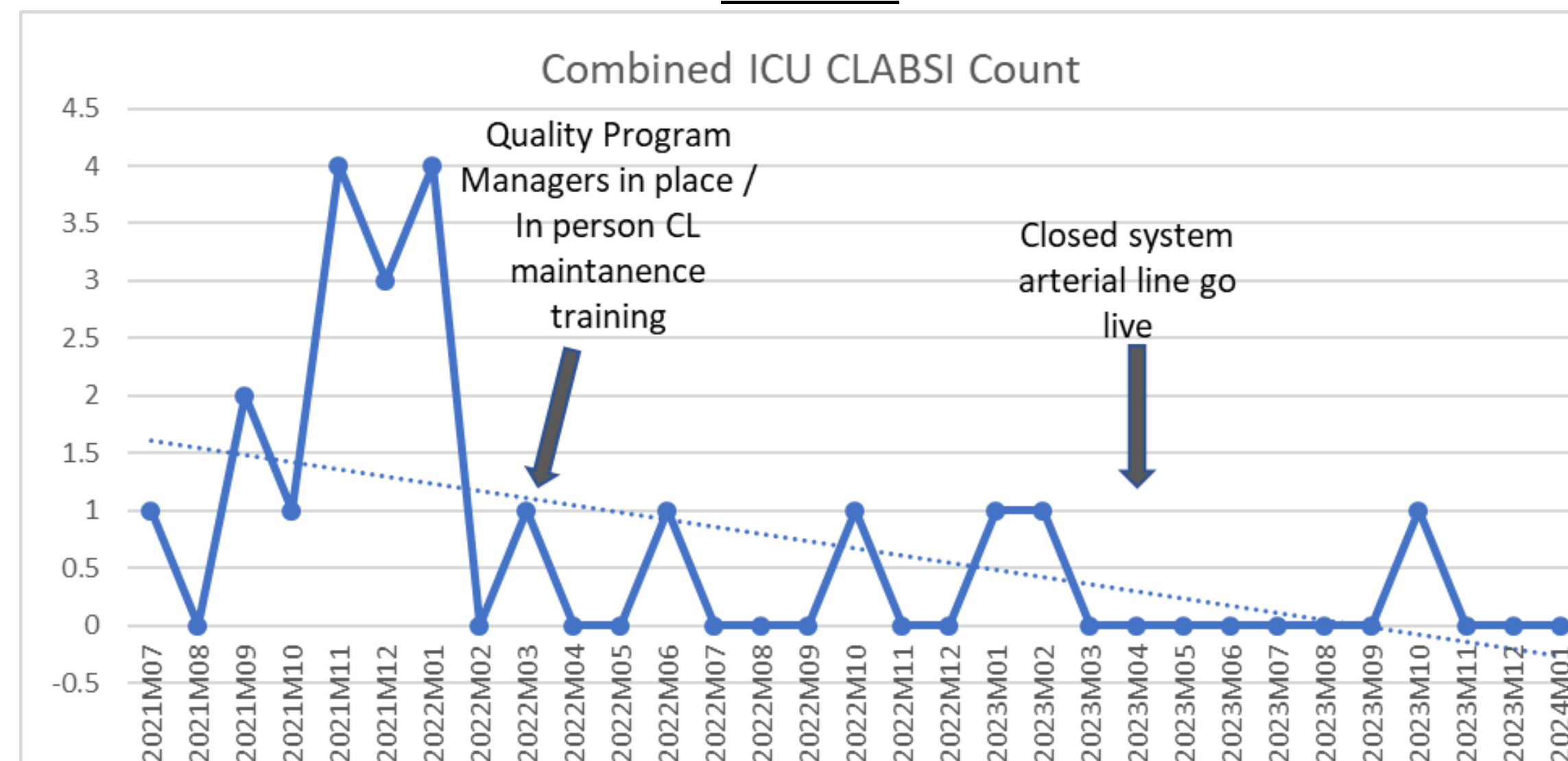
OBJECTIVES

- Describe the key contributing factors in CLABSI reduction.
- Compare different results in phased approach improvement planning.

MATERIALS AND METHODS

In late 2021, our region was still having surges of COVID patients needing critical care services. Both our 12 bed Medical and 14 bed Surgical ICUs were having one to three CLABSI events, as defined by CDC guidelines, each month. A collaborative group consisting of Infection Prevention & Control, IV Therapy, ICU nursing leadership and ICU physicians performed a review of cases which identified contributing factors with patient having long lengths of stay with high acuity of care needs resulting in a lack of attention to daily central line maintenance along with concerns for proper hand hygiene with Staph Epi being the leading organism identified. There was also no routine review for line necessity each day. In mid-2022, infections lessened to one to two each quarter. Still on our Reaching Zero journey, the ICU Quality Program Managers along with ICU leaders identified a link to patients with a CLABSI also having an open arterial line system in place potentially contributing to a portal of entry for infectious organisms into vascular access catheters.

RESULTS



These interventions did produce a positive reduction in CLABSI event for both the Medical and Surgical ICU. After the first phase of interventions (February 2022 to March 2023), there was an 83% reduction in CLABSI from the baseline data (July 2021 to January 2022) attributed to in person central line maintenance education, reinstatement of Quality Program Managers for daily line necessity reviews and timely PSRT huddles. After the second phase of intervention (April 2023 to January 2024) with transitioning to a closed arterial line system in place, there was an overall 95% reduction in CLABSI events from baseline data with only one infection identified during this 9-month timeframe. The decreased incidence of CLABSIs from baseline to phases 1, 2, and combined 1&2 is very statistically significant to $p < .001$ in all cases.

CONCLUSION

The use of a closed arterial monitoring and sampling system along with proper line maintenance, daily chlorhexidine bathing, and strict hand hygiene practices reduced the incidence of CLABSIs in patients within the surgical and medical critical units by 95% in an 8-month period.

REFERENCES

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