

Navigating Infection Challenges: A New York City Intensive Care Unit’s Triumph Over Central Line-Associated Bloodstream Infections with Precision

Kinta Alexander, DrPH, MS, MPH, CIC, Sean Brown, BSc, EMT-B, CIC, Charlotte Ozuna, BSc
 Department of Infection Prevention and Control, NYC Health + Hospitals/Harlem

Introduction

Central line-associated bloodstream infections (CLABSIs) present significant challenges, influencing hospital stays, finances, and patient outcomes. In a New York City level-one trauma hospital's 18-bed Adult Intensive Care unit (ICU), including four burn beds, four patients experienced CLABSIs between Q1 2021 and Q3 2023. This study assesses the impact of a refined **CLABSI Vigilance Matrix**, that integrated education, thorough documentation, and stringent maintenance of central lines.

Methodology

Data from the National Healthcare Safety Network (NHSN) database, spanning 2021 to 2023, were analyzed. Patients with CLABSIs were scrutinized to evaluate the impact of a modified vigilance matrix and standardized utilization ratio (SUR) before and after its implementation. The matrix involved daily review and visual inspections of central lines by an Infection Preventionist, enabling real-time intervention, review of line necessity, and active collaboration with medical providers to document potential secondary sources of infection within the infection window period.

Results

CLABSI occurrences plummeted from 4 to 0 during the intervention. The pre/post intervention t-test for CLABSI Vigilance Matrix compliance rate in the ICU significantly increased from an average of 53% pre-intervention to 73% post-intervention ($p < .025$) (table 1) The pre-intervention period ranged from Q1 2021 through Q4 2022 and the post-intervention ranged from Q1 2023 till Q3 2023. Remarkably, there was a significant reduction in SUR for ICU CLABSI data ($p < .011$). However, no significant variances were noted in pre/post-intervention comparisons for CLABSI infection counts from the ICU ($p < .385$).

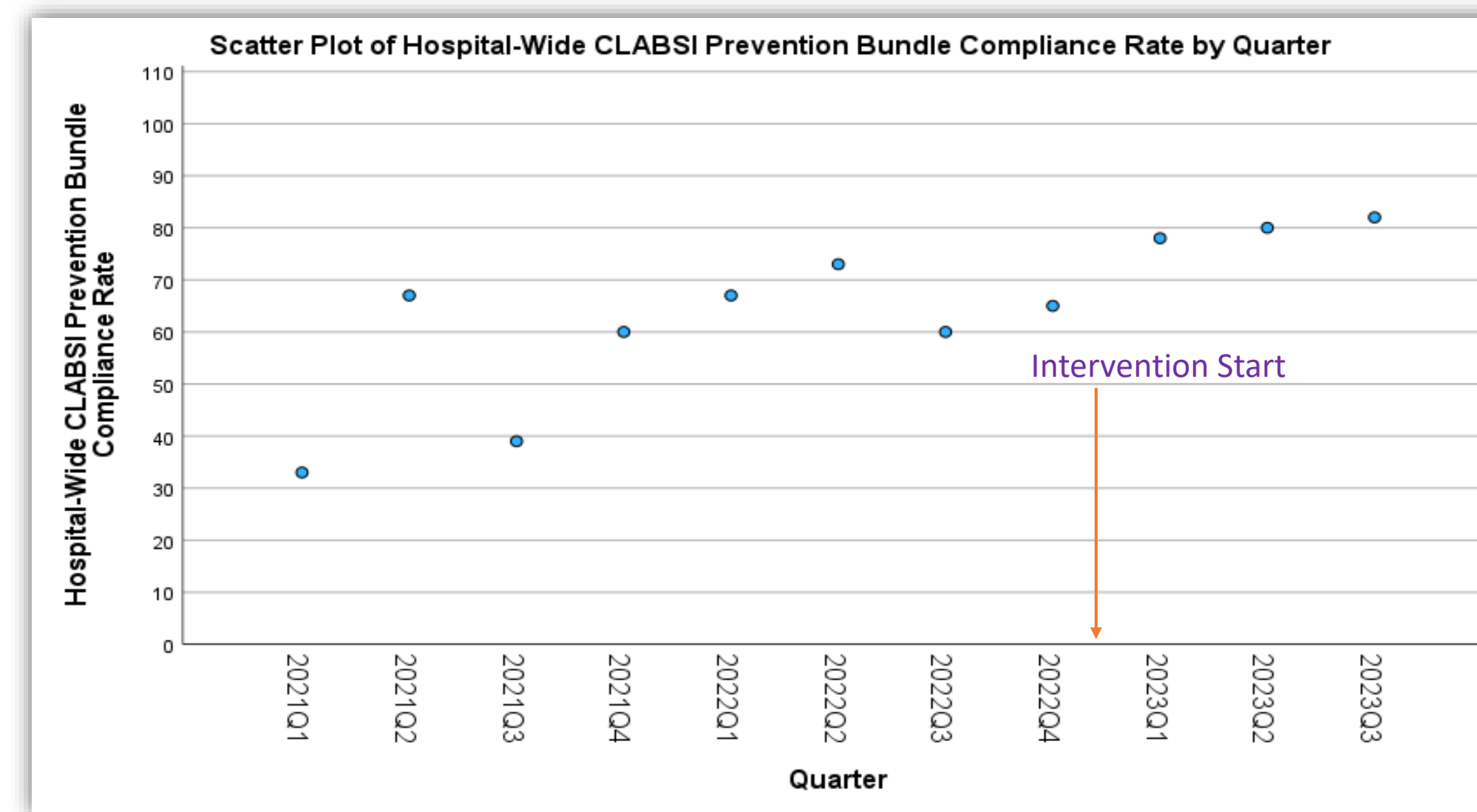


Table 1: Descriptive Statistics and t-Test Pre/Post-Intervention Comparison for HWCLABSI Prevention Bundle Compliance Rate

Variable	n	M	SD	t-Score	F-Ratio	Cohen’s d
Compliance Rate	5	53.2	16.1	2.46*	6.09*	1.57
	6	73.00	8.81			

Note. n = Sample size; M = mean; SD = Standard Deviation; Cohen’s d = Cohen’s effect size for the respective t-score. Compl Rate = HWCLABSI Prevention Bundle Compliance Rate; HW = Hospital Wide; CLABSI = Central line associated bloodstream infection. The first line for Compl Rate represents the statistics for Pre Intervention, and the second line is for Post Intervention. The F-Ratio value is for the test for variance homogeneity between the group levels (Pre and Post Intervention). * $p < .05$.

Conclusion

The intervention sparked a significant surge in the prevention bundle compliance rate and significant reduction in SUR for the ICU unit. These outcomes underscore the effectiveness of the modified CLABSI Vigilance Matrix, highlighting the ongoing necessity to enhance compliance with preventive measures in critical care settings with a touch of collaboration and a sense of proactiveness.

Citation

- Denkel, L. A., Schwab, F., Jörg Clausmeyer, Behnke, M., Golembus, J., Wolke, S., Gastmeier, P., & Geffers, C. (2023). Central-line associated bloodstream infections in intensive care units before and after implementation of daily antiseptic bathing with chlorhexidine or octenidine: a post-hoc analysis of a cluster-randomised controlled trial. *Antimicrobial Resistance & Infection Control*, 12(1). <https://doi.org/10.1186/s13756-023-01260-w>
- Harris, R., Rosser, M., Mehdiratta, N., Chowdhury, A., Smith, B., & Krishnamoorthy, V. (2023). An Analysis of Outcomes Following a Central Line Associated Blood Stream Infections (CLABSI) Reduction Quality Improvement Project in a Tertiary Care Center. *Cureus*. <https://doi.org/10.7759/cureus.42501>

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