

12-23-2025

## Adapter Changes of Central Line Patients on Total Parenteral Nutrition

Courtney Erin Schappell  
*Walden University*

Follow this and additional works at: <https://scholarworks.waldenu.edu/dissertations>



Part of the [Nursing Commons](#)

---

This Dissertation is brought to you for free and open access by the Walden Dissertations and Doctoral Studies Collection at ScholarWorks. It has been accepted for inclusion in Walden Dissertations and Doctoral Studies by an authorized administrator of ScholarWorks. For more information, please contact [ScholarWorks@waldenu.edu](mailto:ScholarWorks@waldenu.edu).

# Walden University

College of Nursing

This is to certify that the doctoral study by

Courtney Schappell

has been found to be complete and satisfactory in all respects,  
and that any and all revisions required by  
the review committee have been made.

Review Committee

Dr. Robert McWhirt, Committee Chairperson, Nursing Faculty  
Dr. Diane Whitehead, Committee Member, Nursing Faculty

Chief Academic Officer and Provost  
Sue Subocz, Ph.D.

Walden University  
2025

Executive Summary: Staff Education Project  
Adapter Changes of Central Line Patients on Total Parenteral Nutrition  
by  
Courtney Schappell

MS, Walden University, 2019

BS, Stevenson University, 2015

Executive Summary Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Doctor of Nursing Practice

Walden University

October 2025

## **Summary**

Central line-associated bloodstream infections (CLABSIs) remain a significant and preventable patient safety issue, especially among hospitalized patients receiving total parenteral nutrition (TPN). Patients on TPN face a higher risk of infection due to the high glucose content of the solution and the frequent access required for central line therapy. The Centers for Disease Control and Prevention and the Agency for Healthcare Research and Quality have recognized CLABSI prevention as a national priority. In addition, there is emphasis on high-risk groups like patients receiving TPN. The Infusion Therapy Standards of Practice, an evidence-based guideline, recommends catheter care, including timely adapter (i.e., clave) changes, to reduce the risk of infection.

Observations at the project site and quality data revealed inconsistent practice with adapter changes, demonstrating a need for a practice intervention. Data from the last 2 fiscal years at the project site indicated that in fiscal year 2024, there were four CLABSIs outside the intensive care unit (ICU) setting, two involving patients on TPN, resulting in a rate of 0.32 per 1,000 central line days. Furthermore, in fiscal year 2025, there was one patient outside the ICU setting that involved a patient on TPN for a rate of 0.08.

Implementing a structured staff education project is a crucial step in reducing preventable CLABSIs and improving patient outcomes for this low-volume, high-risk population.

## **Background**

At the project site, a review of patient safety and quality indicators demonstrated two CLABSIs in fiscal year 2024 and one CLABSI in fiscal year 2025 among patients receiving TPN on the medical-surgical units. Although the absolute number of infections appears small, CLABSI remains a low-volume, high-risk priority for the project site.

Each CLABSI is associated with extended hospital stays and overall poorer patient outcomes. Current practice involves central line dressing changes every 7 days and clave changes every 72 hours. However, responsibility for clave changes rests primarily with intravenous therapy nurses rather than bedside staff, resulting in inconsistent implementation of best practices. Observational data confirmed that bedside nurses were not routinely performing adapter changes before TPN administration. TPN has been consistently identified as a risk factor for CLABSI across multiple patient populations and care settings. For example, Diamond et al. (2012) demonstrated an increased rate of CLABSI in surgical/trauma ICU patients receiving TPN, while Fonseca et al. (2018) found that, although overall CLABSI rates continue to decline, infection rates in TPN patients did not decrease with additional measures. In a systematic review and meta-analysis, Lafuente Cabrero et al. (2023) confirmed that TPN is an independent predictor of CLABSI due to its high dextrose content and recommended bundling preventive strategies to mitigate this risk. This was the identified practice gap at the project site.

Evidence has also highlighted ongoing uncertainty regarding the best practice of central line maintenance. Gavin et al. (2016) found no conclusive evidence that more frequent dressing or adapter changes reduced infection rates compared to standard intervals. Ongoing large-scale randomized controlled trials, such as the INSPIRATION study, provided further clarity on infusion set replacement intervals and their effect on CLABSI risk (Xu et al., 2024). Most importantly, Gaur and Natha (2023) demonstrated that structured nurse education programs significantly improved knowledge of preventing CLABSI through skills related to central lines, suggesting that staff education may be the most effective intervention to address current gaps. Collectively, this evidence highlights

the importance of enhancing nursing practice in response to changes in care before TPN administration.

### **Staff Education Project Development**

I designed this staff education project to evaluate the impact of a staff education program on adapter (i.e., clave) changes for patients receiving TPN on the Tower 1 medical-surgical unit at the project site. The evidence-based practice question for this project: Will a staff education program on adapter changes of central line patients on TPN increase staff knowledge towards the goal of reducing central line-associated bloodstream infection on Tower 1? The initiative was guided by the Johns Hopkins evidence-based practice model, which provided a structured framework for translating evidence into clinical decision-making and quality improvement. The intervention consisted of structured education sessions during daily huddles on the unit. The target population was bedside nurses on Tower 1.

I measured the project outcomes by participants' increased knowledge of TPN and adapter practices, with the ultimate goal that this knowledge will translate to decreased CLABSI rates. Providing the bedside staff with a pre- and posttest of knowledge surrounding the focused education allowed me to measure if there was an increase in staff knowledge. The test included 11 questions focused on the interval of adapter changes, risk factors of noncompliance, and general central line maintenance and infection control measures. I administered the pretest to the participants before the educational sessions and collected posttests after the educational sessions.

## Results

Participants were individually and anonymously identified, and I compared their pretest scores to their post-test scores. The education was provided over six sessions that included both day and night shift nurses across multiple shifts of the Tower 1 nursing staff. In total, 22 participants took the pretest, received the education, and completed the posttest. While others took the pretest, they did not complete the education and/or take the posttest. I removed their scores from this data collection.

I compared the results of the 22 participants' pre- and the posttests to each other to determine if their overall knowledge increased, as demonstrated in Figure 1. The intended outcome of the education was that participants' overall test scores would increase in the posttest results. The results indicated a mean increase of 29.48% in expertise related to adapter changes for central lines in patients receiving TPN, which is shown in Table 1. The median score for the pretest was 73, and the median score for the posttest was 91. In 21 of the 22 participants, higher posttest scores were demonstrated compared to their baseline, indicating that the intervention was highly effective in improving staff knowledge as demonstrated in Table 2.

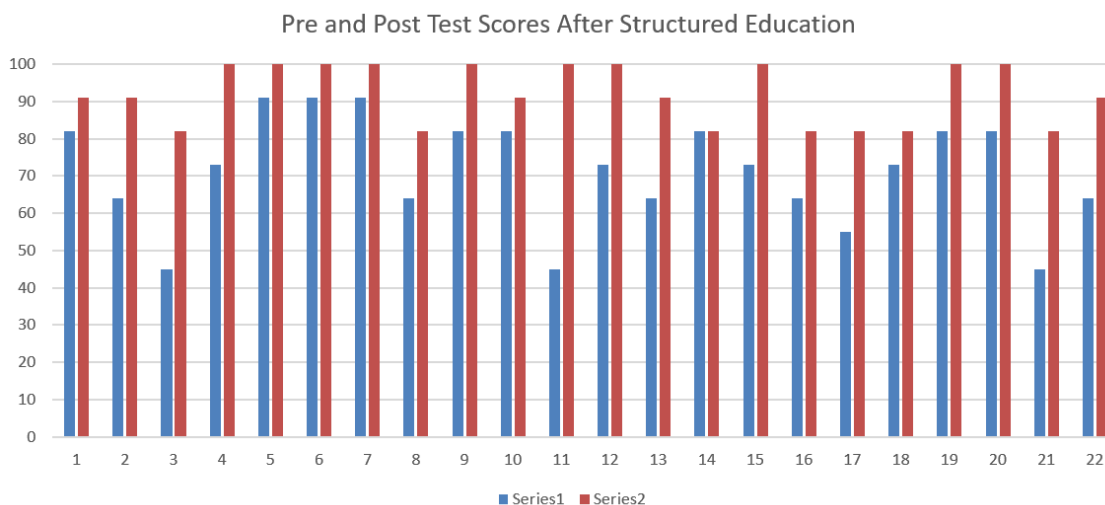
**Table 1**

*Overall Test Scores*

Measure	Pretest (N = 22)	Posttest (N = 22)	Change
<i>Mean Score</i>	71.22727273	92.22727273	29.48%
<i>Median Score</i>	73	91	
<i>Range</i>	45–91	82–100	

**Table 2***By Participant ID Pre and Post Test Scores*

Participant ID	Pretest Score	Posttest Score	Percent increase
Participant 1	82	91	10.98%
Participant 2	64	91	42.19%
Participant 3	45	82	82.22%
Participant 4	73	100	36.99%
Participant 5	91	100	9.89%
Participant 6	91	100	9.89%
Participant 7	91	100	9.89%
Participant 8	64	82	28.13%
Participant 9	82	100	21.95%
Participant 10	82	91	10.98%
Participant 11	45	100	122.22%
Participant 12	73	100	36.99%
Participant 13	64	91	42.19%
Participant 14	82	82	0.00%
Participant 15	73	100	36.99%
Participant 16	64	82	28.13%
Participant 17	55	82	49.09%
Participant 18	73	82	12.33%
Participant 19	82	100	21.95%
Participant 20	82	100	21.95%
Participant 21	45	82	82.22%
Participant 22	64	91	42.19%

**Figure 1***Pre- and Posttest Scores After Structured Education*

The participants' range of improvement also highlighted the impact across their different baseline knowledge levels. The lowest pretest score recorded was 45, which increased to 82 in the posttest, reflecting an individual increase of over 80%. On the other hand, participants with already strong baseline knowledge (e.g., scoring in the 90s pretest) also demonstrated posttest scores consistently reaching the maximum score of 100. This consistency suggests that the intervention not only elevated knowledge among those with lower baseline scores but also reinforced and solidified knowledge among more seasoned staff. There was one participant whose test results remained flat, with the same scores at the pre- and posttest, but they answered different questions incorrectly in the pre- and posttest. Taken together, the results provide compelling evidence that the intervention was effective, equitable across varying baseline knowledge levels, and may improve patient outcomes.

Limitations of the project were related to the small sample size of one specific unit of nursing staff that included registered nurses and a few licensed practical nurses. Other limitations regarding the project were related to nurses included in the pre- and posttest data who were exclusive to nursing staff who attended the huddles on Tower 1. Nurses who are not engaged in the unit and do not participate in the daily huddle might benefit from more structured education. One question still demonstrated difficulty on the posttest related to needless adapters, which may warrant additional exploration regarding staff knowledge. The findings might warrant expansion at the project site to provide additional structured education across various departments and units. Expanding the program would not only enhance staff confidence and skill but also translate into improved patient outcomes, including reduced complications.

The secondary outcome of this project is to reduce CLABSI, which will necessitate ongoing monitoring over a more extended period. The participants' knowledge change percent outcome, when combined with the previously discussed literature, suggests that this strategy will ultimately improve patient outcomes related to CLABSI.

Beyond the project site, the results of this project suggest that other sites struggling to improve patient outcomes of CLABSI may benefit from reviewing their local data to identify whether structured education could help improve their outcomes. This project highlights the importance of equipping nurses with additional knowledge to inform their practice and, ultimately, enhance patient outcomes. Continuing to educate nursing staff across a wide range of care sites will support overall patient outcomes on a much broader scale.

## **Conclusions**

In conclusion, the project demonstrated that staff knowledge increased after they were provided education on TPN and central lines. In this project, I addressed the identified knowledge gap by implementing a structured staff education program designed to enhance nursing knowledge and standardize practice surrounding adapter changes before TPN administration. The results suggest that the organization would benefit from including additional units in structured education. Improvement in staff knowledge will support patient outcomes, with the overall goal of reducing CLABSI rates in the long term. This reduction will help the project site achieve their organizational quality goals and contribute to fiscal stewardship by minimizing costs associated with hospital-acquired infections. Reducing hospital-acquired infections in a vulnerable population, such as patients requiring TPN for nutrition, and promoting a positive social change will provide better patient outcomes. Empowering bedside nurses with knowledge, tools, and standardized best practices can promote equitable care, which ensures patients receive consistent care regardless of their background.

## References

- Diamond, N., Coritsidis, G., Papamanoli, A., & Coritsidis, N. (2012). Central line associated bacteremias in critically ill patients on total parenteral nutrition: Should catheter management be different? *Critical Care Medicine*, *40*(12), 1–328.  
<https://doi.org/10.1097/01.ccm.0000424587.08027.17>
- Fonseca, G., Burgermaster, M., Larson, E., & Seres, D. S. (2018). The relationship between parenteral nutrition and central line-associated bloodstream infections: 2009–2014. *Journal of Parenteral and Enteral Nutrition*, *42*(1), 171–175.  
<https://doi.org/10.1177/0148607116688437>
- Gaur, A., & Natha, H. (2023). Evaluating the efficacy of a programme to educate nurses on CLABSI linked to total parenteral nutrition administration. *British Journal of Nursing*, *32*(21), S22–S30. <https://doi.org/10.12968/bjon.2023.32.21.S22>
- Gavin, N. C., Webster, J., Chan, R. J., & Rickard, C. M. (2016). Frequency of dressing changes for central venous access devices on catheter-related infections. *Cochrane Database of Systematic Reviews*, *2016*(2), CD009213.  
<https://doi.org/10.1002/14651858.CD009213.pub2>
- Infusion Nurses Society. (2024). Infusion therapy standards of practice updates. *Journal of Infusion Nursing*, *47*(1), 1–144.
- Lafuente Cabrero, E., Terradas Robledo, R., Civit Cuñado, A., García Sardelli, D., Hidalgo López, C., Giro Formatger, D., Lacueva Perez, L., Esquinas López, C., & Tortosa Moreno, A. (2023). Risk factors of catheter-associated bloodstream infection: Systematic review and meta-analysis. *PLoS ONE*, *18*(3), e0282290.  
<https://doi.org/10.1371/journal.pone.0282290>

Xu, D., Hu, C., Xiong, J., Huang, H., Wang, S., Ding, X., Zhou, J., Deng, J., Guo, C., Li, M., You, T., Cheng, W., Li, B., Tang, X., Li, X., Li, H., Li, J., Ma, J., Xiao, M.,... INSPIRATION Study Group. (2024). Effect of infusion set replacement intervals on central line-associated bloodstream infection in the intensive care unit: Study protocol of the INSPIRATION study. *Infectious Diseases and Therapy*, 13(4), 941–951. <https://doi.org/10.1007/s40121-024-00953-y>