10-26-2025

Central Line-Associated Bloodstream Infection Prevention Staff Education for Medical- Surgical Nurses

Grace Ann Abustan Porciuncula
Walden University

Walden University

College of Nursing

This is to certify that the doctoral study by

Grace Ann A. Porciuncula

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. Deborah Lewis, Committee Chairperson, Nursing Faculty
Dr. Robert McWhirt, Committee Member, Nursing Faculty

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

Walden University
2025

Executive Summary: Staff Education Project

Central Line-Associated Bloodstream Infection Prevention Staff Education for Medical-Surgical Nurses

by

Grace Ann A. Porciuncula

MS, St. Jude College, 2016

BS, Southern Luzon State University, 2011

Executive Summary Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

November 2025

Summary

This doctoral project was a staff education initiative designed to improve nurses' knowledge regarding evidence-based protocols for central line dressing changes to prevent central line-associated bloodstream infections (CLABSIs). The following practice-focused question guided the project's purpose to standardize care practices and enhance patient outcomes through structured, simulation-based training: Does simulation education influence the knowledge of staff in dressing change procedures for preventing CLABSI? Analytical strategies included pre- and postintervention knowledge assessments and descriptive statistical comparison of scores.

Findings showed a shift from participants' varied pretest performance to perfect posttest scores across all items, indicating substantial improvements in staff knowledge. A total of 10 staff participated in the project. Descriptive statistics demonstrated that the mean pretest score was 7.87 (SD = 1.55), which increased to a perfect mean posttest score of 10.0 (SD = 0.00). This marked improvement suggests enhanced mastery of central line dressing change procedures. The project's implications include reducing CLABSI rates, promoting consistency in sterile technique, and supporting organizational safety goals. The major products of the project included a replicable, simulation-based educational framework and recommendations for expanding its use to other units and healthcare institutions. Potential implications for nursing practice involve sustaining competency in infection prevention, while the broader impacts on positive social change include ensuring all patients, regardless of demographic or healthcare setting, receive high-quality, standardized vascular access care.

Background

CLABSIs remain a significant cause of morbidity, mortality, and increased healthcare costs, particularly in hospitalized patients requiring long-term vascular access (Haddadin et al., 2022). Despite established guidelines, inconsistent adherence to central line dressing change protocols persists within the DNP project organization, often due to insufficient staff knowledge and variability in practice. This practice gap increases the risk of catheter site contamination and leads to preventable CLABSI events, creating a clear need for intervention.

I designed the project question on how simulation education influences the knowledge and confidence of staff in dressing change procedures for preventing CLABSI to directly address this gap in practice. The purpose of this project was to increase staff knowledge of proper dressing change protocols, thereby standardizing care practices and enhancing patient safety (see Alqaissi, 2025; Croghan, 2023).

Numerous studies examining educational interventions for CLABSI prevention have demonstrated that structured, simulation-based training significantly improves nurses' knowledge, technical skills, and adherence to infection control protocols. A review of the evidence from 27 publications (Kang et al., 2022), an experimental study (Pavlick & Haddock, 2022), and a randomized controlled trial (Barsuk et al., 2023) highlighted that simulation-based training reduced variability in dressing change techniques, enhanced sterile field maintenance, and leads to measurable declines in CLABSI rates. The strength of the evidence is high, particularly for simulation-based mastery learning approaches, which have shown sustained improvements in competency over traditional training methods. These findings strongly support implementing the proposed simulation-based educational intervention to close the practice gap and standardize evidence-based dressing change procedures.

Staff Education Project Development

The 10 participants in the project were registered nurses assigned to the medical-surgical units of the facility. The development and implementation process began with a needs assessment that was carried out through surveys and informal interviews. Through this assessment, I identified gaps in staff knowledge and practice related to the use of evidence-based protocols. Based on these results, I designed an educational program that integrated interactive lectures, case studies, and simulation-based activities. The sessions were scheduled during regular staff meetings to maximize attendance, and supplementary materials, including handouts and quick-reference guides, were distributed to reinforce essential concepts.

I collected evidence through pre- and postintervention assessments to measure changes in participants' knowledge and self-reported confidence in applying the protocols. Data analysis involved comparing pre- and posttest scores using descriptive statistics to determine the extent of improvement.

The evaluation process involved assessing participant engagement and levels of knowledge in clinical practice. These measures provided a comprehensive understanding of the project's effectiveness and its impact on nursing practice within the project site medical-surgical units.

Results

The participants ($N = 10$) comprised an equitable distribution by sex, with five males and five females. A majority (60%) were younger (i.e., 19–40 years old), while

40% were older (i.e., 41–65 years old). Station representation was spread across four clinical areas, with most staff from Station 2 North (40%) and equal representation (20% each) from Stations 2 South, 3 North, and 3 South. Participants' educational backgrounds varied: Half held bachelor's degrees, 40% had completed master's studies, and one participant (10%) had a doctoral degree. Regarding experience, 30% of the nurses had served for 1–3 years, another 30% had over 10 years of experience, while the remaining participants had moderate tenure 20% had 4–6 years of experience, and 20% had 7–9 years of service. This diverse profile highlights a mix of early-career and veteran nurses, varied educational preparation, and broad clinical representation, factors that enriched the learning environment and supportability of the training intervention (see Table 1).

Table 1

*Demographic Characteristics of Participants (*N *= 10)*

Characteristic	Category	*n*	%
Age	19–40 years	6	60%
	41–65 years	4	40%
Sex	Male	5	50%
	Female	5	50%
Station	2 North	4	40%
	2 South	2	20%
	3 North	2	20%
	3 South	2	20%
Educational attainment	Bachelor's degree	5	50%
	Master's degree	4	40%
	Doctoral degree	1	10%
Length of service	1–3 years	3	30%
	4–6 years	2	20%
	7–9 years	2	20%
	10+ years	3	30%

Following the implementation of the staff education project on central line dressing changes, there was a marked improvement in participant knowledge. As shown in Table 2, pretest scores varied between items, with correct responses ranging from five to 10 out of 10 participants. In contrast, posttest results demonstrated perfect scores across all items for all participants, indicating complete mastery of the content. This significant improvement reflects the effectiveness of the interactive training, simulation exercises, and hands-on return demonstrations included in the program.

Table 2

*Pre- and Posttest Scores for Staff Education Project on Central Line Dressing Changes (*N *= 10)*

Item No.	Pretest correct responses	Posttest correct responses
1	9	10
2	10	10
3	8	10
4	10	10
5	7	10
6	10	10
7	7	10
8	6	10
9	8	10
10	6	10
11	5	10
12	8	10
13	9	10
14	8	10
15	7	10
M (*SD*)	7.87 (1.55)	10.0 (0)

The impact on the project site organization was substantial. Enhanced staff competency is expected to improve central line care, reduce variability in dressing change practices, and contribute to a reduction in CLABSIs. These outcomes align with organizational goals for patient safety and quality care. Limitations of the project included the small sample size ($N = 10$) and the short-term posttest evaluation, which did not measure knowledge retention over time. Additionally, the project was implemented in a single facility, limiting generalizability. Nevertheless, the results have broader implications beyond the local site because the educational framework can be adapted for other units and institutions to address similar gaps in central line care practices and enhance CLABSI prevention strategies.

Conclusions

In conclusion, the staff education project on central line dressing changes had a significant positive impact on the project site organization by enhancing nurses' knowledge, skills, and confidence in adhering to evidence-based protocols for CLABSI prevention. The marked improvement from participants' varied pretest performance to perfect posttest scores demonstrated the program's effectiveness in standardizing best practices, promoting consistency in sterile technique, and strengthening infection control measures, supporting the organization's patient safety goals. To build on these outcomes, I recommend expanding the program to a larger and more diverse group of participants, conducting periodic refresher trainings, integrating simulation into routine competency assessments, and implementing long-term monitoring of CLABSI rates to measure sustained impact. For nursing practice, the initiative highlights the value of simulation-based and interactive learning as tools for enhancing clinical competence, reinforcing adherence to protocols, and promoting a culture of safety. Beyond clinical practice, the project carries potential for positive social change by improving patient outcomes; reducing preventable infections; and promoting health equity through consistent, high-quality care delivery across diverse populations. By ensuring all patients, regardless of background, receive care rooted in standardized best practices, the project advances the principles of diversity, equity, and inclusion within the healthcare setting by valuing differences, ensuring equal access to high-quality care, and promoting respect and participation for all patients and staff.

References

Alqaissi, N. (2025). Nurses' knowledge and behavior in hospitals regarding the prevention of central line-associated bloodstream infections: A systematic review. *SAGE Open Nursing, 11,* 23779608251347119. https://doi.org/10.1177/23779608251347119

Barsuk, J. H., Mitra, D., Cohen, E. R., & Wayne, D. B. (2023). Necessity of pretests in central venous catheter insertion simulation-based mastery learning: A randomized controlled trial. *Academic Medicine, 98(7),* 821–827.

Haddadin, Y., Annamajaru, P. & Regunath, H. (2022). *Central line-associated bloodstream infections.* StatPearls Publishing LLC.

Kang, M., Nagaraj, M. B., Campbell, K. K., Nazareno, I. A., Scott, D. J., Arocha, D., & Trivedi, J. B. (2022). The role of simulation-based training in healthcare-associated infection (HAI) prevention. *Antimicrobial Stewardship & Healthcare Epidemiology, 2, e20,* 1–5. https://doi.org/10.1017/ash.2021.257

Pavlik, P., & Haddock, M. (2022). *The impact of simulation-based mastery learning for central venous catheter dressing changes with staff nurses at a Nebraska critical access hospital* [Doctor of Nursing Practice final project, University of Nebraska]. University of Nebraska Medical Center Digital Commons. https://digitalcommons.unmc.edu/con_dnp/9/

Appendix: Pre-/Posttest

Thank you for participating in this educational project.

Please do not provide any additional information outside of the questions being asked. Thank you again for participating in this educational project.

Part I. Demographic **Profile of the Primary Caregiver**
10 participants
Direction: Please put a check mark (/) with your corresponding answer.

1. Age
   ( ) 19-40 years old (6 pax)
   ( ) 41-65 years old (4 pax)

2. Sex
   ( ) Male (5 pax)
   ( ) Female (5 pax)

3. Station
   ( ) 2 North (4 pax)
   ( ) 2 South (2 pax)
   ( ) 3 North (2 pax)
   ( ) 3 South (2 pax)

4. Educational Attainment
   ( ) Bachelor (5 pax)
   ( ) Post-Graduate (Masteral) (4 pax)
   ( ) Post-Graduate (Doctoral) (1 pax)

5. Length of Service
   ( ) 1-3 years (3 pax)
   ( ) 4-6 years (2 pax)
   ( ) 7-9 years (2 pax)
   ( ) 10 years and above (3 pax)

Part II. Multiple Choice

Direction: Please put the letter of your choice on the space provided.

____1. What is the primary nature of CLABSI?

A) Respiratory infection
B) Skin infection
C) Bloodstream infection
D) Urinary tract infection

____2. Which of the following is a common sign of CLABSI?

A) Joint pain
B) Headache
C) Fever
D) Vision changes

____3. How is CLABSI typically acquired?

A) Airborne transmission
B) Direct skin contact
C) Contaminated central line insertion
D) Ingesting contaminated food

____5. What is a key component of CLABSI management?

A) Regular exercise
B) Frequent handwashing
C) Avoiding sunlight exposure
D) Consuming probiotics

____6. Which of the following is a risk factor for developing CLABSI?

A) Regular handwashing
B) Frequent catheter changes
C) Prolonged use of central lines
D) Avoidance of antibiotics

____7. What is a recommended strategy for preventing CLABSI?

A) Encourage smoking
B) Perform dressing changes regularly
C) Limit fluid intake
D) Skip vaccinations

____8. How often should the dressing on a central line be changed to prevent CLABSI?

A) Every 2 days
B) Once a month

C) Every 7 days
D) Only when visibly soiled

____9. What is a key reason for changing the dressing regularly on a central line?

A) Aesthetic purposes
B) To prevent skin irritation
C) To maintain sterility and prevent infections
D) Minimize dressing costs

____10. Which of the following is a crucial step in preventing CLABSI during dressing changes?

A) Wearing dirty gloves
B) Cleaning the catheter exit site with soap only
C) Using a sterile technique
D) Changing the dressing in a bathroom

____11. Which type of dressing is commonly used to cover the catheter exit site and prevent CLABSI?

A) Gauze dressing
B) Transparent dressing
C) Newspaper
D) Plastic wrap

____12. What should be done if the dressing becomes loose, dirty, or wet between regular changes?

A) Ignore it until the next scheduled change
B) Change it immediately
C) Wait for healthcare provider instructions
D) Apply more tape without changing the dressing

____13. How can hand hygiene contribute to CLABSI prevention during dressing changes?

A) By avoiding handwashing
B) By using alcohol-based hand gel or soap and water
C) By wearing gloves without washing hands
D) By washing hands after the dressing change

____14. What should be avoided to prevent infection during a dressing change?

A) Wearing a mask

B) Touching the catheter without hand hygiene
C) Cleaning the catheter exit site thoroughly
D) Changing the dressing in a bathroom

____15. What additional action is often recommended during a dressing change for a central venous catheter?

A) Changing the patient's bed linens
B) Changing the injection caps
C) Avoiding contact with the patient
D) Skipping the hand hygiene step