The Bioscan AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES 20(3): 2048-2051,2025 www.thebioscan.com

# "Enhancing VAP Prevention: Impact of a Care Bundle Training Module for ICU Nurses"

**Ms. Lata[1], Ms. Deepa Mukherjee[2], Prashant Sharma[3], Mr. Naveen***

1. Faculty of Nursing, SGT University, Gurugram (Haryana)-122505, India.
2. Professor & H.O.D, Community Health Nursing, Faculty of Nursing, SGT University, Gurugram (Haryana)-122505, India
3. Assistant Professor, Department of Medical Surgical Nursing ,Faculty of Nursing,SGT University, Gurugram, Haryana-122505, India.
4. Corresponding Author- Assistant Professor, Community Health Nursing, Faculty of Nursing, SGT University, Gurugram (Haryana)-122505, India

**DOI: 10.63001/tbs.2025.v20.i03.pp2048-2051**

**KEYWORDS**
Ventilator-Associated Pneumonia,ICU Nurses, Teaching Module,Prevention,Knowledge,Skills,Gurugram.

**Received on:**

**30-05-2025**

**Accepted on:**

**05-06-2025**

**Published on:**

**29-7-2025**

## Abstract

Ventilator-Associated Pneumonia (VAP) remains one of the most preventable yet life-threatening infections among mechanically ventilated patients in Intensive Care Units (ICUs). Its impact—prolonged hospitalization, increased treatment costs, and heightened mortality—highlights the crucial role of competent nursing practices in prevention. This study was designed to evaluate the effectiveness of a structured teaching module in enhancing ICU nurses' knowledge and clinical practices related to VAP prevention in a selected hospital in Gurugram.

Using a quasi-experimental one-group pre-test post-test design, 60 ICU nurses were selected through purposive sampling. Their baseline knowledge and practices were assessed using a structured questionnaire and observational checklist. A three-day evidence-based educational intervention—featuring interactive lectures, group discussions, and hands-on demonstrations—was implemented to strengthen their understanding and application of VAP care bundle practices.

Findings demonstrated a considerable rise in knowledge levels among the experimental group (adequate knowledge increased from 3.3% to 33.3%) along with a statistically significant improvement in practice performance ($p = 0.005$). Although the overall knowledge gain was not statistically significant ($p = 0.066$), the practical enhancement underscores the value of skill-based learning. In contrast, the control group showed a significant decline in knowledge ($p = 0.000$) despite an improvement in practice ($p = 0.000$). Age and workload type were significantly associated with post-test knowledge, while workload type influenced practice in the experimental group; patient load was the only significant factor affecting knowledge in the control group.

The study concludes that structured, evidence-based teaching modules substantially improve ICU nurses' competence in preventing VAP. Integrating regular training on VAP care bundles into hospital education systems can bridge the knowledge–practice gap and contribute to safer, more effective patient care.

## Introduction

Ventilator-Associated Pneumonia (VAP) continues to represent one of the most significant and preventable complications in patients receiving invasive mechanical ventilation. Despite rapid advancements in critical care medicine, VAP persists as a substantial contributor to morbidity, mortality, prolonged ICU stay, and increased healthcare expenditure worldwide. As a healthcare-associated infection developing 48–72 hours after intubation, VAP reflects the intricate interplay between host vulnerability, microbial colonization, and procedural risks inherent in airway management. Global estimates indicate that VAP increases the duration of mechanical ventilation by 4–13 days and elevates mortality risk by up to 45%, making its prevention a central focus of patient safety initiatives. The burden of VAP is particularly pronounced in low- and middle-income countries such as India, where incidence rates range from 10.4 to 52.7 per 1,000 ventilator days—substantially higher than international benchmarks. These elevated rates are often attributed to factors such as high patient acuity, staffing shortages, variable implementation of infection prevention protocols, and limited opportunities for structured clinical training. Within this complex landscape, ICU nurses occupy a pivotal role. Their continuous presence at the bedside places them at the forefront of executing evidence-based interventions that form the VAP Care Bundle, including head-of-bed elevation, chlorhexidine oral care, sterile suctioning techniques, subglottic secretion drainage, and regular assessment for readiness to extubate. However, existing literature continues to highlight a consistent knowledge–practice gap among critical care nurses. Even when nurses possess adequate theoretical understanding, practical adherence often falters due to workload pressures, procedural complexity, and inconsistent reinforcement. Structured teaching modules designed specifically around VAP care bundles have been shown to improve both knowledge retention and clinical performance, yet limited evidence exists from high-acuity tertiary hospitals in India.

Material and Methods

Against this backdrop, the present study aims to evaluate the effectiveness of a structured VAP Care Bundle Teaching Module in enhancing the knowledge and practices of ICU nurses in a tertiary hospital in Gurugram. Strengthening nursing competencies in VAP prevention is critical not only for reducing infection rates, but also for advancing patient safety culture and improving overall critical care outcomes. A quasi-experimental pre-test–post-test design with control and experimental groups was adopted to evaluate the effectiveness of a structured VAP Care Bundle Teaching Module on the knowledge and practices of ICU nurses. The study was conducted in the Intensive Care Units of a tertiary care hospital in Gurugram. A total of 60 ICU nurses were selected through purposive sampling and equally allocated to the experimental (n = 30) and control (n = 30) groups based on inclusion criteria, which required nurses to have at least six months of ICU experience and involvement in the care of ventilated patients. Data were collected using three tools: a demographic proforma, a validated structured knowledge questionnaire (20 items; reliability r = 0.87), and an observational VAP bundle practice checklist (10 items; reliability r = 0.81). In the experimental group, a structured three-day teaching module comprising lectures, demonstrations, and group discussions was administered, while the control group received no intervention. Pre-test assessments were conducted for both groups, followed by the intervention for the experimental group, and post-test assessments after 15 days. Data were analysed using SPSS version 25. Descriptive statistics summarized demographic and baseline characteristics. Paired t-test assessed pre–post differences, while chi-square test examined associations with demographic variables. Ethical approval and informed consent were obtained prior to data collection.

## Results

**Effectiveness of a VAP care bundle intervention in improving knowledge and practices.**

| | | Pre-test | Post test | T value | df | Significance |
|---|---|---|---|---|---|---|
| Knowledge Score | **(Experimental Group)** | 9.93 +2.39 SD | 13.40 + 2.35 SD | 1.909 | 29 | .066 |
| | **(Control Group)** | 10.87+ 1.40 SD | 10.10 + 1.44 SD | 7.131 | 29 | .000 |
| Practice Score | **(Experimental Group)** | 5.27 +.583 SD | 7.67 + .606 SD | 3.002 | 29 | .005 |
| | **(Control Group)** | 4.73 + .785 SD | 8.27 + .640 SD | 4.267 | 29 | .000 |

The table presents the effectiveness of a Ventilator-Associated Pneumonia (VAP) care bundle intervention in improving knowledge and practice scores among participants (N = 30 per group). In the experimental group, the knowledge score improved from a mean of 9.93 ± 2.39 in the pre-test to 13.40 ± 2.35 in the post-test. However, the T value of 1.909 with a p-value of .066 indicates that this improvement was not statistically significant at the 0.05 level. In contrast, the practice score in the experimental group improved significantly from 5.27 ± 0.583 to 7.67 ± 0.606, with a T value of 3.002 and a p-value of .005, showing statistical significance. In the control group, the knowledge score actually decreased from 10.87 ± 1.40 to 10.10 ± 1.44, with a T value of 7.131 and a p-value of .000, indicating a statistically significant reduction in knowledge. Interestingly, the practice score in the control group showed a significant increase from 4.73 ± 0.785 to 8.27 ± 0.640, with a T value of 4.267 and a p-value of .000. This unexpected improvement in practice without intervention may be due to external factors or observational effects.

Overall, the intervention led to a significant improvement in practice within the experimental group and a positive, though not statistically significant, improvement in knowledge. The results support the effectiveness of the VAP care bundle in enhancing clinical practice, though further research may be needed to strengthen its impact on knowledge.

**Summary**

The present study was a Quasi-experimental study "A Quasi-Experimental Study to assess effectiveness of VAP Care Bundle teaching module on Prevention of Ventilation-Associated Pneumonia in Intensive Care Unit among staff nurres at selected Hospital, Gurugram" The findings of the study The study evaluated the effectiveness of a Ventilator-Associated Pneumonia (VAP) care bundle intervention in improving knowledge and practices among ICU staff nurses. Key findings include: The experimental group showed significant improvement in practice scores (from 5.27 to 7.67, p = 0.005) but not in knowledge scores (from 9.93 to 13.40, p = 0.066). The control group showed a significant decrease in knowledge scores (from 10.87 to the 10.10, p < 0.001) and a significant increase in practice scores (from 4.73 to 8.27, p < 0.001). The experimental group showed a more dramatic and consistent improvement in practice levels compared to the control group. Association with Demographic Variables -In the experimental group, age and type of workload were significantly associated with post-test knowledge improvement. Type of workload was significantly associated with post-test practice levels in the experimental group. In the control group, workload (number of patients per shift) was significantly associated with post-test knowledge.

## References

Burja, S., Belec, T., Bizjak, M., Mori, J., Markota, A., & Sinkovič, A. (2018). Ventilator bundle compliance and its association with ventilator-associated pneumonia in an adult intensive care unit. Journal of Clinical Nursing, 27(5–6), e1112–e1122.

Labeau, S. O., Vandijck, D. M., Rello, J., Adam, S., Rosa, A., Wenisch, C., & Blot, S. I. (2011). Evidence-based guidelines for the prevention of ventilator-associated pneumonia: Results of a knowledge test among European intensive care nurses. Journal of Hospital Infection, 77(4),

364–368.
Marini, J. J., & Evans, T. W. (2019). Emerging interventions to prevent ventilator-associated pneumonia. The Lancet Respiratory Medicine, 7(3), 258–260.
Mehta, Y., Gupta, A., Todi, S., Myatra, S. N., Samaddar, D. P., Patil, V., … & Kurian, J. (2022). Guidelines for preventing ventilator-associated pneumonia in India. Indian Journal of Critical Care Medicine, 26(Suppl 3), S1–S44.
Muscedere, J., Dodek, P., Keenan, S., Fowler, R., Heyland, D., & the VAP Guidelines Committee. (2008). Comprehensive evidence-based clinical practice guidelines for preventing ventilator-associated pneumonia. Critical Care Medicine, 36(4), 108–132.
Rosenthal, V. D., et al. (2020). Impact of infection control training on VAP incidence in low- and middle-income countries. American Journal of Infection Control, 48(6), 644–650.
Zang, Y., et al. (2021). Bundle interventions for reducing VAP: Systematic review and meta-analysis. International Journal of Nursing Studies, 115, 103873.
Mao, Z., Gao, L., Wang, G., et al. (2016). Subglottic secretion suction for preventing ventilator-associated pneumonia: an updated meta-analysis and trial sequential analysis. Critical Care, 20, 353.
Frost, S. A., Azeem, A., Alexandrou, E., Tam, V., Murphy, J. K., Hunt, L., & Hillman, K. M. (2013). Subglottic secretion drainage for preventing ventilator associated pneumonia: a meta-analysis. Australian Critical Care, 26(4), 180–188.
Koker, A., Gok, F., Erayman, I., & Yosunkaya, A. (2014). Effect of subglottic secretion drainage for preventing ventilator-associated pneumonia. Critical Care, 18(Suppl 1), P331.
Chastre, J., et al. (2015). Prevention of ventilator-associated pneumonia and ventilator-associated conditions: a randomized controlled trial with subglottic secretion suctioning. Critical Care Medicine, 43(1), 227–234.