Nurses Preparedness in prevention of Ventilator Associated Pneumonia

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DOI: https://doi.org/10.51584/IJRIAS.2026.11010086

Received: 23 January 2026; Accepted: 29 January 2026; Published: 11 February 2026

ABSTRACT

Ventilator Associated Pneumonia (VAP) is a common and serious nosocomial infection affecting 20-36% of the critically ill Patients. Implementation of evidenced based guidelines is an effective way to reduce the incidence of VAP. The main objective of the study was to assess the knowledge of the nursing students regarding VAP and to identify the association of Knowledge with selected variables. Identifying the gaps will help to plan future strategies towards nurses' preparation as professionals. Exploratory survey using a structured questionnaire was used to collect the data from the nursing students using nonprobability sampling technique. The findings revealed that 50.6% of the students had ICU clinical exposure. The study found 40.6 % were able to identify the common bacteria causing VAP and 56.8 % were aware regarding the preventive measures for VAP. 29.4% had an excellent knowledge regarding VAP implying the need for better education and reinforcement, especially in prevention and management of VAP. Nursing students with ICU exposure had significantly better knowledge scores than those without ICU exposure ($P<0.05$). In conclusion, study revealed that gap exists in knowledge regarding VAP among nursing students.

Implications: The study findings imply the need for continuous student support through innovative simulative teaching, monitoring, and evaluation of practices regarding VAP.

Keywords: Assess, Knowledge, Nursing Students, Ventilator Associated Pneumonia.

INTRODUCTION

Ventilator-Associated Pneumonia (VAP) is a nosocomial infection occurring in patients on mechanical ventilation, typically developing 48 hours or more after intubation. **(1)** It's a significant concern in ICUs due to high prevalence, morbidity, and mortality rates. Intubation compromises the oropharynx and trachea, allowing microorganisms to enter the lower airways. VAP diagnosis is challenging, relying on clinical, radiographic, and microbiological criteria. Treatment involves antibiotics, but overuse contributes to multidrug-resistant pathogens and increased mortality. Prevention strategies, including evidence-based guidelines, are crucial to reducing VAP incidence, hospital stay, and healthcare costs. Despite efforts, VAP remains a challenging problem, especially in pediatric populations, highlighting the need for continued research and improvement in prevention and treatment. **(2)**

VAP increases hospital length of stay by an average of four to nine days and healthcare costs. Despite preventative measures, there is a rising prevalence of MDR and persistently high mortality and healthcare costs associated with VAP. The pathobiological heterogeneity and diagnostic challenges associated with VAP remain of significant importance in global healthcare **(3)**

The study conducted by Wenze Li et al. (2024) found a VAP incidence of 30% in ICU patients. Risk factors for VAP included male gender (OR: 1.50), smoking (OR: 1.30), and high APACHE II score (WMD: 1.30). Antibiotic prophylaxis was associated with a lower risk of VAP (OR: 0.79). VAP patients had longer durations of mechanical ventilation (WMD: 6.96), ICU stays (WMD: 7.91), and total hospital stays (WMD: 8.09). However, VAP did not significantly affect the mortality rate (OR: 1.13) **(4)**

Need for the Study

Nurses are at the forefront of patient care in intensive care units (ICUs) and are responsible for implementing preventive measures. Adequate knowledge and adherence to standard guidelines are essential in minimizing VAP rates.

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue I January 2026

Studies have shown that despite the availability of VAP prevention guidelines, there are gaps in knowledge and inconsistent adherence to protocols among nursing staff, which highlights the need for assessing and enhancing their knowledge.

Nursing students are exposed to theoretical and practical knowledge during their academic training, but there is often a disconnect between theoretical knowledge and its application in clinical practice. Assessing their knowledge ensures that they are adequately prepared to apply evidence-based practices to prevent VAP once they transition to clinical role

Problem Statement: A study to assess the knowledge regarding Ventilator Associated Pneumonia (VAP) among selected nursing students in Mumbai.

Aim: To evaluate the knowledge of Ventilator-Associated Pneumonia (VAP) among nursing students.

Objectives

1.To assess the knowledge of (VAP) Ventilator Associated Pneumonia among nursing students.

2. To assess the relationship of knowledge score with selected demographic variables among nursing students.

Operational Definitions

Assess: In this study assess refers to, evaluating the knowledge regarding ventilator associated pneumonia by using structured questionnaires among selected nursing students and categorizing the knowledge based on the score.

Knowledge: In this study knowledge refers to the score obtained by the nursing students for the correct responses regarding ventilator-associated pneumonia. The assessment will be done based on general knowledge of VAP , risk factor ,clinical manifestation, prevention strategies, treatment, management and nursing consideration .

The maximum score will be 25.

The knowledge will be graded as follows:

GRADE	SCORE
Excellent	20-25
Very good	15-19
Good	11-14
Poor	10 or Less

Ventilator associated pneumonia

Ventilator-Associated Pneumonia (VAP) is a type of hospital-acquired pneumonia (HAP) that occurs 48 hours or more after endotracheal intubation in patients receiving mechanical ventilation**.**

Selected nursing student: In this study selected nursing students refer to GNM and BSC undergraduate nursing students who are studying in the selected nursing college which is recognized by statutory bodies.

Delimitation

The present study is delimited to:

1. It focuses only on assessing knowledge regarding ventilator-associated pneumonia (VAP).

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2.The study does not include registered nurses or other healthcare professionals.

3.The sample size is limited and may not represent all nursing students in Mumbai.

4. The study does not evaluate the effectiveness of specific textbooks or training material.

5. There is no intervention.

6. Practices are assessed through questionnaires and are not being evaluated through actual observation.

Research Design

This study employed an exploratory survey research design to investigate the knowledge of nursing students regarding Ventilator-Associated Pneumonia (VAP).

Study Setting

The study was conducted at a selected nursing college in Mumbai, recognized by statutory bodies, offering undergraduate diploma and degree courses in nursing.

Sample Size: 180 nursing students, comprising 68 GNM students and 112 BSc Nursing students.

Inclusion Criteria

- Students who were willing to participate in the study.
- Students who were present on the day of the survey .
- Students who were studying in selected nursing colleges.

Exclusion Criteria

- Students who were absent on the date of data collection.
- Students who were studying in different nursing programs.
- Graduate and alumni students who have completed their course.
- Internship students who were working as trainees in the hospital

Sampling Technique: Non-Probability Convenience sampling technique was used to collect the data.

Development of tool

The tool used was a structured Google assessment form which consisted of a total 25 multiple choice questions. It had 6 sections. The sections were as follows:

1. General knowledge regarding VAP
2. Risk Factors of VAP
3. Clinical Manifestations of VAP
4. Prevention Strategies of VAP
5. Treatment and Management of VAP
6. Nursing Considerations in VAP

Technique for data collection: Self reporting technique

Data Collection Process: The researchers explained the need and purpose of the study to the concerned class coordinators and took permission to conduct the study. A feasible date and convenient time was decided in

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue I January 2026

consensus and the researchers ensured that they explained the study to the students. Consent was taken from each and the Google assessment form was shared via link to the students.

The students were supervised when they were answering and it was ensured that the students do not talk or copy the answers from each other or from any other source.

The students were given 25 minutes to answer the questionnaire and the link was closed for receiving the responses after the time was up.

Thus, the researchers ensured the confidentiality, accuracy and completeness of the data.

FINDINGS OF THE STUDY

Section 1: Demographic Profile

Table 1 Demographic profile of the nursing students

N=180

Sr.no	Demographic parameter	Demographic profile	Frequency	Percentage (%)
1	Age (years)	17-18	31	17.2
		19-20	81	45
		21-22	57	31.7
		23 & above	11	6.1
2	Gender	Male	38	21.1
		Female	142	78.9
3	Course	GNM	69	38.33
		B.Sc	111	61.67
4	ICU Exposure	Yes	91	50.6
		No	89	49.4

Age: Majority of the students (45%) were in the age group of 19-20 yrs and 31.7% of the students in the age group of 21-22 yrs.

Gender: 78.9% of the nursing students were females and the male nursing students were only 21.1%.

Course: The Majority(61.67%) of the students selected belonged to the B.Sc Nursing course, while 38.33 % of the students were studying in the GNM Course.

ICU Exposure: 50.6 % of the students had clinical exposure in ICU, while 49.4 % of the students were not exposed to the ICU.

Section 2: Students Knowledge regarding VAP

General Knowledge of VAP: 77.2% of the nursing students knew the meaning of VAP; 75.6% students were able to classify the infection. Only 40.6 % of the students knew the common bacteria responsible for VAP

Knowledge regarding risk factors of VAP: 77.2% of the nursing students knew the meaning of VAP; 75.6% students were able to classify the infection. Only 40.6 % of the students knew the common bacteria responsible for VAP

Knowledge of nursing students about the clinical manifestations of VAP: 76.7% of the students knew the indicative sign of VAP, 68.3% of the students were able to identify the most common diagnostic test of VAP, and 77.8% of the students were aware of the laboratory findings that support the diagnosis of VAP.

Knowledge of the nursing students regarding the preventive strategies of VAP: Only 47.8 % were aware of the most effective way to prevent VAP. 52.2% of the students knew the nursing intervention that would prevent aspiration in ventilated patients, and only 56.7 % of the samples were aware of the interventions included in the VAP bundle. 70.6% of the students could provide the rationale for the head elevation.

Knowledge regarding treatment and Management of VAP: 86.7% of the nursing students knew the parameter to be monitored in a patient with VAP. 59.4% were aware of what should be done before starting the antibiotics, 56.1% knew de-escalation of antibiotics, and 56.1% were aware of the antibiotic treatment.

Student's knowledge regarding the nursing considerations in VAP: 58.3% were aware of the ventilator settings that reduce the risk of VAP, 59.4% knew the preventive intervention, 56.1% were aware of the duration of the antibiotic therapy, 67.2% were able to provide the rationale for sedation to be interrupted, 72.2% were able to state correctly the signs of improvement in VAP and 57.8% stated the correct strategy included in VAP.

Table 2 Distribution of knowledge regarding Nursing Consideration in VAP

N=180

Sr.No	Question	Frequency of Correct Responses	Percentage (%)
1	Which of the following ventilator settings may help reduce the risk of VAP?	105	58.3
2	What is an important nursing intervention in VAP prevention?	107	59.4
3	What is the recommended duration of antibiotic therapy for VAP?	101	56.1

4	Why is daily sedation interruption recommended in ventilated patients?	121	67.2
5	Which of the following is a key sign of improving the condition of patients with VAP?	130	72.2
6	Which strategy should be included in a ventilator care bundle?	104	57.8

Average knowledge of the nursing students: The knowledge of the students is least in preventive strategies of VAP(56.8%), followed by knowledge of nursing considerations(61.8%). Average Awareness regarding general information and risk factors of VAP was 62%, treatment and management (64.5%), and that of clinical manifestations was 74.2%.

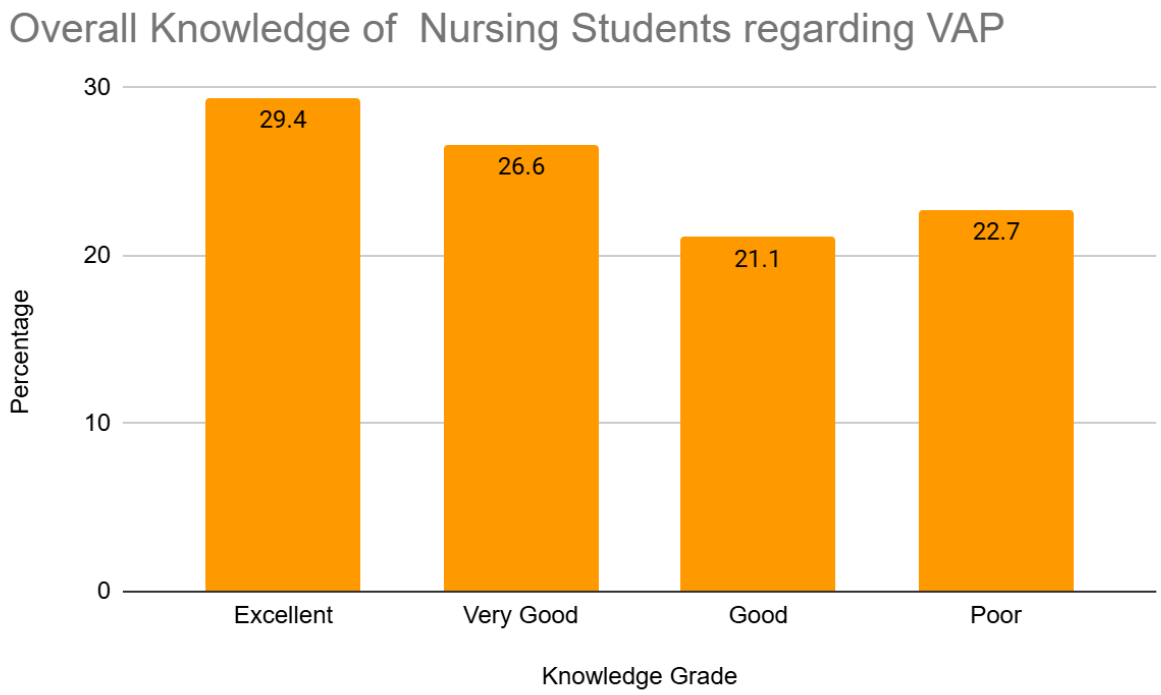
Table No: 3 Section Wise Average Knowledge Score regarding VAP of Nursing Students

N=180

Section No	Section	Average Knowledge Score (%)
1	General knowledge regarding VAP	62
2	Knowledge regarding risk Factors of VAP	62
3	Knowledge regarding Clinical Manifestations of VAP	74.2
4	Knowledge regarding Preventive strategies of VAP	56.8
5	Knowledge regarding treatment and Management of VAP	64.5
6	Knowledge regarding Nursing Considerations in VAP	61.8

Overall grade of the knowledge of the nursing students regarding VAP: Excellent grade was received by only 29.4% of the students, Very Good by 26.6%, 21.1 % received good grade, while 22.7 % of the students scored poor grade.

Figure 1



Section C: Association of knowledge of nursing students regarding VAP with selected demographic variables

Table No: 4 Association of Knowledge regarding VAP with selected demographic variables.

Sr No	Demographic Variable	Chi- Square value	P Value	Level of Significance
1.	Course of Study	7.292	0.0069	Significant P<0.01
2.	Gender	3.14	0.0767	Not Significant P<0.05
3.	ICU Exposure	36.313	0.000	Highly Significant P< 0.05

1. The knowledge score of B Sc nursing students was significantly higher than the nursing students from GNM. (P<0.01)

2. There was no association of knowledge regarding VAP with gender. Gender did not impact the knowledge score of VAP.

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue I January 2026

3. Highly Significant Correlation was found between knowledge regarding VAP and ICU Exposure. The nursing students who had ICU Exposure had significantly better knowledge scores than the students who were not exposed to ICU. ($P<0.05$).

DISCUSSION

The findings suggest the need for continuous assessment of knowledge and practices regarding VAP. These findings are in line with the findings observed through a study conducted by Khaled M. Al-Sayaghi etal.(2021) showed that prior education related to ventilator-associated pneumonia prevention influenced the nurses' compliance. **(5)**

The study conducted by María Jesús Pérez-Granda et al. (2012) found that the simple questionnaire effectively measured both knowledge and practices related to VAP prevention. The study revealed that healthcare workers with more than one year of ICU experience scored significantly higher in personal knowledge than those with less experience (6 vs. 4, P = .004) which confirms with the findings in the present study.**(6)**

The study done by Khalid Al-Mugheed et al. (2022) found that nurses had low levels of knowledge **(7)** and insufficient compliance with VAP prevention practices. These findings are like the present study emphasizing the need for interventions to improve nurses' knowledge and adherence to VAP protocols.

Training using various methods like workshop/ webinar/ in service could be planned after analysis of knowledge gaps. Critical thinking should be emphasized using innovative teaching methods.

Limitations of the study

1. The study involved only assessment of knowledge of nursing students regarding VAP and no intervention was involved.
2. Generalization is not possible as the data lacks randomization.
3. The data was collected in a classroom setting and the chances of forging or using unfair means for answering cannot be ruled out completely.
4. The knowledge was assessed using multiple choice questions, hence there are chances of trial and error. Thus, the tool might not serve as a real tool for knowledge assessment.
5. The study did not assess implementation of practices regarding VAP.
6. The study did not involve any intervention.

Nursing implications

Nursing Education

The study has shown the major implications that need to be considered in nursing educational institutions. There is a need to revise the curriculum to ensure that students' analytical and critical thinking abilities are developed in all nursing courses. The knowledge regarding various bundles needs to be initiated right from entry into the profession and upgraded and updated as they go into higher levels of education. Emphasis on knowledge and practice needs to be done through demonstrations, return demonstrations, competency checklist.

Nursing Service

Nursing Service is the backbone of healthcare. The implications of the findings of the study demonstrate the need for continuous training and supervision of staff nurses in relation to VAP. It emphasizes the need for simulated based learning for quality improvement in patient care. Inservice education, Staff development programs are the need of the hour to prevent the hospital acquired infections which determine the patient's safety.

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Nursing Management

1. Nursing leaders at middle and Top-level management have a lot of takeaways from the findings of this study.
2. It emphasizes the need for an induction program to bridge the gaps between knowledge and practices before posting the students in ICU.
3. The leaders need to ensure that emphasis on VAP bundles is created among healthcare teams through posters.
4. Surprise round, nursing audits and competencies need to be observed and evaluated by the team leaders, ward in charges and nursing supervisors. Staff nurses should be made responsible and accountable while taking care of a patient on a ventilator.
5. Any negligence or incompetencies need to be dealt with strictly by the nurse managers.
6. Policies and care standards should be formulated and included in the job descriptions of ICU Nurses.
7. The leaders can create a post for a senior nurse named respiratory Nurse, to ensure observation and analysis of health conditions of ventilated patients.
8. The leaders can introduce innovative programs for reduction in incidence of VAP.
9. Managers could motivate nurses to do action research on various aspects pertaining to VAP.
10. Thus, the study findings gave an insight into the various implications in nursing education, service and administration.

RECOMMENDATIONS

1. A similar study using a larger sample could be undertaken.

2. A study assessing the knowledge and practices and correlation of knowledge with practice could be undertaken.

3. An interventional study involving training of VAP using control and experimental group could be done to assess the effectiveness of the training

4. A longitudinal study of the impact of the capacity building program regarding VAP could be undertaken.

5. An exploratory study to identify the attitude of nurses regarding the preventive measures of VAP could be undertaken.

6. A similar study using a semi structured and scenario-based questionnaire could be done to assess the knowledge regarding VAP of various health professionals

7. A comparative study of knowledge and practices regarding VAP of various health professionals could be taken up.

8. A Quasi experimental two group pretest post design study could be implemented using innovative teaching pedagogies like simulation training.

CONCLUSION

In conclusion, we can say that there exists a gap in knowledge regarding VAP among nursing students. The study emphasized the need for continuous support to students through teaching, simulation training, monitoring and evaluation of practices regarding VAP. The study has created a base and has laid the foundation for further research studies.

Acknowledgements: The researchers are grateful to the institute for permitting us to conduct the study and we acknowledge the students who participated in the study with enthusiasm.

Ethical Considerations: The research proposal was presented in the research ethical committee and approval was taken.

The nursing students were explained the need and purpose of the study and consent was taken before actual data collection.

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