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ASSESS THE LEVEL OF AWARENESS REGARDING PREVENTION OF VENTILATOR-ASSOCIATED PNEUMONIA AMONG NURSES

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Abstract

Background: *Ventilator-associated pneumonia (VAP) is a serious hospital-acquired infection that increases morbidity, mortality, and healthcare costs among mechanically ventilated patients. Nurses play a pivotal role in VAP prevention; therefore, adequate awareness of evidence-based preventive measures is essential.*

Materials & Methods: *A descriptive cross-sectional study was conducted at Jinnah Hospital Lahore from February to June 2025. A total of 109 registered nurses were selected through random sampling. Data were collected using a structured, validated questionnaire assessing awareness of VAP prevention. Responses were scored and categorized as poor (≤60%) or good (>60%) awareness. Data were analyzed using SPSS version 27.0 with descriptive statistics.*

Results: *Most participants were female (67.9%) and aged 25–28 years. Overall, 62.39% of nurses demonstrated a good level of awareness, while 37.61% showed poor awareness. Knowledge gaps were identified in areas such as head-of-bed elevation, hand hygiene, oral care frequency, and subglottic secretion drainage.*

Conclusion: *Although most nurses had adequate awareness of VAP prevention, significant gaps persist, highlighting the need for targeted educational interventions.*

INTRODUCTION

In critical care units, ventilator-associated pneumonia (VAP) is one of the most common and fatal HAIs. In patients on ventilators, nosocomial pneumonia is characterized by "a new or progressive filtrate, fever, altered white blood cell count, and purulent tracheobronchial secretions that develop more than 48 hours after initiation of mechanical ventilation." In an intensive care unit (ICU), infections acquired in hospitals (HAI) are among the most common wards. The risk of HAI is higher for patients in low-income countries than for those in hospitals in countries with higher incomes (Bankanie, Outwater et al. 2021).

VAP is becoming more common due to a number of factors, including prolonged ventilation (ICU) stay, advanced age (≥60 years), emergency intubation, coma, re-intubation, tracheostomy, before antibiotic medication, bronchoscopy, transfusion, and evacuation from the ICU. Significant morbidity is associated with VAP, a serious healthcare-acquired consequence of mechanical ventilation. It can increase the length of time patients are on mechanical breathing, extend hospital and critical care stays, increase healthcare expenditures (up to $10 billion is believed to be wasted annually), increase the usage of antibiotics, and increase the chance

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of mortality in an intensive care unit (Getahun, Belsti et al. 2022).

VAP offers an important concern in medical settings, particularly for critically ill patients who require artificial respiration. Nurses' professional knowledge along with the implementation of evidence-based practices make them crucial in preventing VAP. There is, however, a dearth of information about nurses' understanding of the need to avoid VAP in order to improve patient outcomes and reduce healthcare expenses. The three diagnostic criteria for VAP include a lung infection with fever, purulent discharges, leukocytosis, bacteriologic evidence of pulmonary illness, and radiologic signs of pulmonary infection. Radiologic penetration combined with two clinical criteria produced a 75% specificity and 69% sensitivity for diagnosing VAP in patients on mechanical ventilation (Alreshidi, AlRashidi et al. 2024).

The suggestions based on evidence were created in 2004 and revised by the Institute for Healthcare Improvement (IHI) in 2011 in an attempt to reduce the incidence rate of VAP in hospitals. The VAP Prevention Bundle is a set of evidence-based strategies and guidelines that have been confirmed to lower VAP. This bundle includes daily "sedation vacations" along with an inspection of extubating readiness, prevention of peptic ulcer disease and deep vein thrombosis, daily oral hygiene with chlorhexidine, keeping the endotracheal cuff pressure between 25 and 30 cm H2O, and an endotracheal tube with inline and subglottic suctioning (Shudaifat, ALBashtawy et al. 2021).

Critical care unit nurses must be aware of preventative measures and strategies so they may integrate them into their daily clinical practice. Examples of these techniques and strategies include endotracheal secretion suctioning, hand hygiene (washing with soap and water or an alcohol-based antiseptic solution before and after each suctioning), the use of sterile suctioning equipment, aseptic technique (wearing sterile gloves), and the use of personal protective equipment (facemask, goggles) during the procedure. Applying non-pharmacological preventive strategies is essential for nurses in order to reduce the probability of VAP. Nurses are hesitant to utilize scientific evidence in their practice due to a variety of reasons, including a lack of knowledge, work arrangements, demotivation, high workloads, a lack of time, and problems with the organizational structure and the working environment of the system. Nurse workload may increase unfavorable event risk and reduce VAP standard compliance (Shudaifat, ALBashtawy et al. 2021).

Materials and Methods

This study employed a descriptive cross-sectional design to assess the awareness level of registered nurses regarding the prevention of ventilator-associated pneumonia (VAP). The study was conducted at Jinnah Hospital Lahore, a government tertiary care hospital, and included registered nurses working across morning, evening, and night shifts. Awareness level was defined as nurses' understanding and knowledge related to VAP prevention and was measured using a structured questionnaire. Each item was scored as incorrect (1) or correct (2), with overall awareness categorized as poor (≤60%, ≤24 out of 40) or good (>60%, >24 out of 40).

A random sampling technique was used to select participants. The sample size was calculated using a standard formula with a 5% margin of error, resulting in a required sample of 109 nurses from a total population of 150. Data collection was carried out from February to June 2025. Registered nurses present during data collection were invited to participate, while students and staff on leave were excluded. Prior to data collection, the study objectives were explained and written informed consent was obtained. The questionnaire required approximately 10–15 minutes to complete.

The validity of the tool was established through expert review by ICU specialists, and reliability was confirmed using Cronbach's alpha, which demonstrated acceptable internal consistency. Data were analyzed using SPSS version 27.0, applying descriptive statistical techniques to summarize awareness levels and related variables. Ethical approval was obtained from the relevant university ethics committee, and confidentiality,

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anonymity, voluntary participation, and the right to withdraw at any stage were strictly ensured throughout the study.

Results

Table 1: Demographic characteristic of participants:

Gender	Frequency	Percentage
Male	35	32.1%
Female	74	67.9%
Age		
25-28	53	48.6%
29-31	17	15.6%
32-35	39	35.8%
Marital Status		
Single	83	76.15%
Married	26	23.85%
Education level		
BSN	50	45.8%
General nursing	59	54.2%

The demographic characteristics of the participants indicate that the majority were female nurses (67.9%), while male nurses constituted 32.1% of the sample. Most participants were young adults, with nearly half (48.6%) falling within the 25–28 year age group, followed by 35.8% aged 32–35 years and 15.6% aged 29–31 years. Regarding marital status, a large proportion of nurses were single (76.15%), whereas less than one-quarter were married (23.85%). In terms of educational background, more than half of the participants held a general nursing qualification (54.2%), while 45.8% had completed a Bachelor of Science in Nursing (BSN). Overall, the sample predominantly comprised young, single, female nurses with varied professional educational backgrounds.

Table 2: Questionnaire for level of awareness.

Sr	Statements	Correct 2	Incorrect 1
1	Is oral intubation the recommended Endotracheal route of intubation?	64 (58.7 %)	45(41.3%)
2	Is Semi recumbent the recommended type of positioning for ventilated Patient If there is no contraindication?	77(70.64%)	32(29.36%)
3	Is reducing the risk of VAP an advantage of Endotracheal tubes with an extra lumen for drainage of subglottic secretions?	42(38.53%)	67(61.47%)
4	Do Contaminated hands of health workers, contaminated respiratory therapy equipment and aspiration of secretion contribute to bacterial colonization of the aero-digestive tract?	55(50.45%)	54(49.45%)

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5	Should a nurse discard a suction catheter immediately after a single use?	90(82.56%)	19(17.44%)
6	Is closed suction system the recommended type of system for intubated patients?	81(74.31%)	28(25.69%)
7	Is suction catheter insertion into the Endo-tracheal tube a sterile procedure?	66(60.55%)	43(39.45%)
8	Should head of the bed elevation be range from 30–45◦?	43(39.44%)	66(60.56%)
9	Is a nurse caring for a ventilated patient required to wear sterile gloves during ETT suctioning?	52(47.70%)	57(52.30%)
10	Is a nurse caring for a ventilated patient required to wash hands before ETT suctioning?	41(37.61%)	68(62.39%)
11	Is oral care by using a swab moistened with mouth wash and water is recommended every 4–6 h?	53(48.62%)	56(51.38%)
12	Does Prolonged use of Stress ulcer prophylaxis to a ventilated patient increase the colonization density of the aerodigestive tract?	44(40.36%)	55(59.64%)
13	Is maintenance of a high nurse to patient ratio in the ICU associated with decreased risk for VAP?	57(52.29%)	52(47.71%)
14	Is chest physiotherapy recommended for ICU patients to reduce the risk for VAP?	34(31.19%)	75(68.81%)
15	Do adjustable beds reduce the risk of VAP?	49(44.95%)	60(55.05%)
16	Should the frequency of ETT suctioning be done to the patient as needed?	42(38.53%)	67(61.47%)
17	Does early weaning of mechanical ventilator mode results reduce the risk for VAP?	70(64.22%)	39(35.78%)
18	Does overfeeding a ventilated patient increase the risk of aspiration leading to increase the risk for VAP?	49(44.95%)	60(55.05%)
19	Does ETT tube with well-maintained pressure cuff for ventilator patient helps to decrease the risk for VAP?	68(62.38%)	41(37.62%)
20	Does unplanned extubation increase the risk of aspiration leading to increased risk for VAP?	61(55.96 %)	48(44.04%)

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Table 02 presents the responses of nurses to the questionnaire assessing their awareness regarding the prevention of ventilator-associated pneumonia (VAP). Overall, nurses demonstrated better awareness in areas related to infection control practices, such as discarding suction catheters after single use (82.56%), use of closed suction systems (74.31%), early weaning from mechanical ventilation (64.22%), and maintaining adequate endotracheal tube cuff pressure (62.38%). Moderate awareness was observed for oral intubation as the recommended route, sterile suctioning technique, and the role of nurse-to-patient ratio in reducing VAP risk.

However, notable knowledge gaps were identified in several key preventive measures. A substantial proportion of nurses responded incorrectly regarding head-of-bed elevation, hand hygiene before suctioning, oral care frequency, stress ulcer prophylaxis, chest physiotherapy, and the benefits of adjustable beds. Limited awareness was also evident about subglottic secretion drainage and the appropriate frequency of endotracheal suctioning. These findings indicate that, while nurses possess adequate knowledge in certain aspects of VAP prevention, significant deficiencies persist in evidence-based practices, highlighting the need for targeted educational and training interventions to enhance overall awareness and compliance with VAP prevention guidelines.

Table 3: Sum of knowledge

Variable	Frequency	Percentage
Poor level of awareness ≤60% (≤24 out of 40)	41	37.61
Good level of awareness >60% (>24 out of 40)	68	62.39

Table 3 summarizes the overall level of awareness among nurses regarding ventilator-associated pneumonia prevention. The findings show that a majority of the participants (62.39%) demonstrated a good level of awareness, scoring more than 60% (>24 out of 40) on the knowledge assessment questionnaire. However, a considerable proportion of nurses (37.61%) exhibited a poor level of awareness, with scores at or below 60%. These results indicate that although most nurses possess adequate knowledge about VAP prevention, a substantial knowledge gap remains among over one-third of the participants, emphasizing the need for continuous education and refresher training programs to ensure consistent adherence to evidence-based practices.

Discussion

It is a descriptive cross-sectional study which is designed to assess the level of awareness among nurses regarding prevention of ventilator associated pneumonia. This study showed that 68 (62.39 %) participants out of 109 had good level of awareness regarding VAP and 41(37.61%) participants out of 109 had poor level of awareness regarding VAP.

In contrast a study to assess CCNs' knowledge of EBGs related to lowering VAP, a descriptive cross-sectional study was carried out. Data was gathered from 45 nurses in the medical and surgical care units of the Benghazi Medical Center using a validated questionnaire. The study found that nurses' knowledge was low at 45%, with no correlation between their knowledge and gender, and that there was a slight increase in knowledge among nurses with a bachelor's degree compared to those without. On the other hand, nurses with over 11 years of experience possessed a higher level of knowledge than those with fewer than 11 years. The critical care nurses at Benghazi Medical Center lacked sufficient understanding

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of the scientifically proven recommendations for preventing VAP. This study suggested comprehensive training and education initiatives to improve the medical staff's level of expertise in intensive care units.

In another study, 116 intensive care unit nurses from major Tanzanian hospitals completed a structured questionnaire. The mean self-reported compliance score for EBGs for VAP prevention was 15.20 (SD=0.93), or 60.8% based on 25 questions. Lack of skills (96.6%), lack of adequate staff (95.5%), and lack of knowledge (79.3%) were among the greatest barriers to implementing the use of EBGs for VAP prevention.

Conclusion

The results of this study showed that most of the nurses has good level of awareness regarding VAP and its prevention. Most of the nurses who participated had a very good working experience that helped in their enhanced level of awareness. Participants who had completed BSN had a very good knowledge base regarding VAP which helped in their increased level of awareness. The results showed that 37.61% participants had poor level of awareness. This shows lack of training of nurses and VAP prevention practices.

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