Year: 2025, NAME OF THE STUDENT: Mahmood Jan, ROLL NO: SU91-MSAHW-F23-065 FAHS

Association between Healthcare Providers' Knowledge and Adherence to Ventilator Associated Pneumonia Prevention Guidelines

SUPERIOR UNIVERSITY

Thesis Submitted to

The Superior University Lahore

In Partial Fulfillment of the

Requirement for the Degree of

Master of Science in Allied Health Sciences

By

MAHMOOD JAN

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Session: Fall 2023-Spring 2025

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I hereby state that my MS thesis titled **"Association between Healthcare Providers' Knowledge and Adherence to Ventilator Associated Pneumonia Prevention Guidelines"** is my work and has not been submitted previously by me for any degree from this University, **The Superior University, Lahore,** or anywhere else in the country/world.

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Supervisor Name: Dr. Hafiz Shehzad Muzammil
Designation: HoD Allied Health Sciences, Superior University, Lahore.

Certificate of Approval

This is to certify that the research work presented in this thesis, titled **"Association between Healthcare Providers' Knowledge and Adherence to Ventilator Associated Pneumonia Prevention Guidelines"** was conducted by **"Mahmood Jan"** under the supervision of **"Dr. Hafiz Shehzad Muzammil."**

No part of this thesis has been submitted anywhere else for any other degree. This thesis is submitted to the Faculty of Allied Health Sciences, The Superior University, Lahore, in partial fulfillment of the requirements for the degree of Master of Science in the field of "**Allied Health Sciences"** in the Faculty of Allied Health Sciences at The Superior University, Lahore.

Student Name: **Mahmood Jan** Signature: _____

Examination Committee:

Session Chair: Signature: _____

a) External Examiner: Signature: _____

b) Internal Examiner: Signature: _____

c) Supervisor Name: Dr. Hafiz Shehzad Signature: _____

d) PL/HOD: Dr. Hafiz Shehzad Signature: _____

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DEDICATION

I dedicate this thesis to my beloved parents, whose unwavering love, prayers, and sacrifices have been the backbone of my journey. To my dear brothers and sisters, your constant encouragement, support, and belief in me have meant the world.

A heartfelt thank you to my respected supervisor, whose invaluable guidance, patience, and mentorship have shaped this research and helped me grow both academically and personally.

This work is a reflection of all your support and inspiration.

Student Name:

Mahmood Jan

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In the name of Allah, the most Gracious, the most Merciful.

I am extremely thankful to Almighty Allah, who is the entire source of knowledge and wisdom endowed to mankind, for providing me with the acumen and vision to complete this endeavor.

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In the end, I would like to extend my deepest gratitude to my family members. Without their encouragement, I would not have been able to complete this endeavor.

Student Name

Mahmood Jan

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VAP	Ventilator-associated pneumonia
ICUs	Intensive Care Units
HCPs	Healthcare Providers'
RTs	Respiratory Therapists
CDC	Centers for Disease Control
VAEs	Ventilator-associated Events
LRH	Lady Reading Hospital
KTH	Khyber Teaching Hospital
HMC	Hayatabad Medical Complex
HAI	Healthcare Associated Infection

ABSTRACT

Ventilator-associated pneumonia (VAP) represents a prevalent and serious healthcare-associated infection among mechanically ventilated ICU patients. While evidence-based preventive measures can substantially reduce VAP incidence, their effectiveness depends on healthcare providers' (HCPs) knowledge and compliance. This study evaluate the relationship between HCPs' knowledge and adherence to VAP prevention guidelines in ICUs of public sector tertiary care hospitals in Peshawar, Pakistan.

A cross-sectional study was conducted with 140 HCPs (nurses, respiratory therapists, and physicians) using convenience sampling. Data was collected through a structured questionnaire assessing demographics, knowledge, and self-reported practices.

Participants were predominantly male (60%), respiratory therapists (46.4%), with 79.3% having 1 month to 5 years ICU experience. While 73.6% reported formal VAP training, significant knowledge-practice gaps emerged: 92.9% knew the correct head-of-bed elevation (30-45°), but only 78.6% consistently practiced it; 70.7% recognized ideal oral care frequency ("every shift"), yet 57.1% performed it twice daily. Although 75% identified chlorhexidine as the preferred antiseptic, application remained inconsistent.

Significant profession-based variations were observed. Chi-square tests revealed associations between professional role and oral care frequency ($p=0.040$) and antiseptic selection ($p=0.041$). ANOVA showed differences in early mobility understanding across professions ($p=0.027$). Despite adequate knowledge, adherence to critical practices (sedation interruption, subglottic suctioning) varied substantially by role.

The study demonstrates persistent gaps between VAP prevention knowledge and practice, influenced by professional background, training inconsistencies, and systemic factors. Findings underscore the need for role-specific training, clinical audits, and strengthened institutional protocols to bridge these gaps. A multidisciplinary approach combining education, monitoring, and system-level support is essential to reduce VAP incidence and promote evidence-based critical care.

Keywords: Ventilator-associated pneumonia, healthcare professionals, knowledge-practice gap, ICU.

Chapter 1

INTRODUCTION

Ventilator-associated pneumonia (VAP) is a significant healthcare-associated infection (HAI) that occurs in patients receiving mechanical ventilation for more than 48 hours. Ventilator-associated pneumonia (VAP) significantly contributes to increased morbidity, mortality, prolonged hospital stays, and higher healthcare costs, particularly in intensive care units (ICUs). Ventilator-associated pneumonia (VAP) represents a prevalent and serious healthcare-associated infection among mechanically ventilated ICU patients. While evidence-based preventive measures can substantially reduce VAP incidence, their effectiveness depends on healthcare providers' (HCPs) knowledge and compliance.

Healthcare providers involved in direct patient care play a crucial role in preventing VAP. Among these professionals, respiratory therapists (RTs) have specialized training in ventilator management and infection control measures. Their ability to apply evidence based interventions is essential for minimizing complications and enhancing patient recovery. Nonetheless, the success of these preventive strategies relies not only on theoretical knowledge but also on the consistent and accurate execution of clinical practices. Respiratory therapists are vital members of the multidisciplinary ICU team, managing critical components of mechanical ventilation, airway maintenance, and the implementation of ventilator bundles specifically aimed at reducing VAP risk. Their duties include a variety of impactful interventions, such as endotracheal suctioning, maintaining head-of-bed elevation, managing humidification systems, and calibrating sedation protocols—all of which directly affect the risk of developing VAP.

Nursing staff and physicians are also essential elements of the multidisciplinary ICU team, with their combined expertise and commitment to best practices being critical in reducing VAP risk in mechanically ventilated patients. Nurses conduct continuous patient evaluations to identify early infection signs, provide routine oral hygiene to lower bacterial colonization, and ensure head-of-bed elevation to avoid aspiration incidents. Furthermore, they play a significant educational role, guiding patients and their families on VAP prevention tactics and advocating for stringent protocol adherence among the entire healthcare team. On the other hand, physicians are tasked with creating and executing evidence-based guidelines for VAP prevention,

making vital decisions regarding sedation management, ensuring appropriate antibiotic use to minimize resistance, leading multidisciplinary rounds to improve interdisciplinary communication, and engaging in quality improvement efforts aimed at decreasing VAP rates. The collaborative effort among respiratory therapists, nurses, physicians, and other healthcare professionals is essential for developing a thorough, standardized strategy for VAP prevention, ultimately enhancing patient outcomes in the ICU environment.

Despite the broad availability of established guidelines from reputable organizations, such as the Centers for Disease Control and Prevention (CDC) and the European Respiratory Society, adherence to these protocols remains inconsistent across healthcare facilities.(1, 2). Studies indicate that the gap between healthcare providers' knowledge and their actual clinical behaviors may stem from a combination of factors, including high workload demands, inadequate training options, limited resources, and differences in institutional cultures. For example, a study by Wami et al.(3) in public hospitals in Addis Ababa indicated that while ICU nurses had a strong theoretical grasp of VAP prevention concepts, their practical implementation of these strategies was often inconsistent. For instance, a study conducted by Wami et al. within public hospitals in Addis Ababa revealed that although ICU nurses demonstrated a robust theoretical understanding of VAP prevention principles, their practical application of these measures was frequently inconsistent. Similarly, Mohammed et al. (4) observed that neonatal ICU nurses, despite possessing adequate knowledge of recommended protocols, exhibited irregular adherence in clinical practice. These findings collectively suggest that knowledge acquisition alone is insufficient to ensure protocol compliance; bridging the persistent gap between awareness and practical implementation remains a formidable challenge in critical care settings.

Numerous studies have examined the relationship between healthcare providers' knowledge of VAP prevention strategies and their adherence to established clinical guidelines. While awareness of best practices constitutes a fundamental prerequisite, it does not invariably translate into uniform or sustained implementation. This disparity, commonly termed the "knowledge-practice gap," represents a significant barrier to effective VAP prevention within ICUs. Blot et al. conducted an evaluation of ICU nurses' knowledge and practices on VAP prevention and identified substantial discrepancies.(5) Although participants acknowledged the importance of

interventions such as oral hygiene, optimal patient positioning, and hand hygiene, their actual compliance with these measures was frequently suboptimal. Similarly, Klompas noted that misconceptions surrounding ventilator-associated events (VAEs) could produce uncertainty regarding the most efficacious preventive strategies, further undermining adherence rates.(6)

Qualitative research by Madhuvu et al. clarified several systemic barriers to guideline implementation, including time constraints, high patient-to-staff ratios, limited access to updated protocols, and insufficient institutional support structures. These insights underscore the necessity of evaluating not only healthcare providers' knowledge but also the practical challenges they encounter within high-pressure ICU environments. Respiratory therapists, nurses, and physicians despite their specialized training are not immune to these obstacles.(7) The dynamic and evolving nature of evidence-based guidelines necessitates ongoing professional development and regular competency assessments to ensure alignment with current best practices. Furthermore, development strong interdisciplinary collaboration among nurses, physicians, and RTs is paramount for achieving uniformity in the application of VAP prevention measures.

The majority of existing research on VAP prevention has been conducted within high-income healthcare systems, with a lack of data available from lower-middle-income countries such as Pakistan. Public-sector tertiary care hospitals in regions like Peshawar, Khyber Pakhtunkhwa, face distinct challenges, including resource constraints, irregular training programs, and understaffed ICUs. These systemic deficiencies may exacerbate the existing knowledge-practice gap, ultimately compromising patient safety and clinical outcomes. There exists an urgent need to investigate this issue within the local context, with particular emphasis on frontline healthcare providers such as RTs, nurses, and physicians. By concurrently assessing knowledge levels and real-world adherence patterns, this study seeks to identify the underlying factors contributing to suboptimal implementation of VAP prevention strategies within public-sector ICUs. The focus on respiratory therapy is especially relevant, given the profession's central role in ventilator management and infection control.

This research will contribute to the limited body of literature on ICU infection prevention in Peshawar, Khyber Pakhtunkhwa, Pakistan, while providing actionable insights for hospital administrators, educators, and policymakers. By identifying

gaps between knowledge and practice, this study will offer evidence-based recommendations for improving educational initiatives, clinical protocols, and infection control measures. The ultimate goal is to enhance the capacity of healthcare professionals to implement best practices in VAP prevention, thereby improving patient care and reducing the incidence of healthcare-associated infections on a broader scale. Ventilator-associated pneumonia remains a preventable yet prevalent complication among mechanically ventilated patients in ICUs, with serious consequences for patient health and healthcare costs. Respiratory therapists, as key stakeholders in ventilator management, are vital to VAP prevention efforts. However, a significant gap persists between healthcare providers' awareness of prevention protocols and their actual clinical practices. This study aims to explore the association between knowledge and adherence to VAP prevention guidelines, with a specific focus on respiratory therapy in public-sector hospitals in Peshawar, Khyber Pakhtunkhwa.

OBJECTIVES

- To assess healthcare professionals' knowledge of VAP prevention guidelines.
- To evaluate adherence to these guidelines in clinical settings.
- To identify gaps between knowledge and practices.

Chapter 2

LITERATURE REVIEW

Ventilator-associated pneumonia (VAP) is a significant healthcare-associated infection (HAI) that occurs in patients receiving mechanical ventilation for more than 48 hours. Ventilator-associated pneumonia (VAP) significantly contributes to increased morbidity, mortality, prolonged hospital stays, and higher healthcare costs, particularly in intensive care units (ICUs).(7). Ventilator-associated pneumonia (VAP) represents a prevalent and serious healthcare-associated infection among mechanically ventilated ICU patients. While evidence-based preventive measures can substantially reduce VAP incidence, their effectiveness depends on healthcare providers' (HCPs) knowledge and compliance.(8).

Despite strong evidence supporting these strategies, significant discrepancies remain between the established guidelines and the actual clinical practices in ICUs around the world. Research by Rahimi et al. examining the knowledge of critical care staff regarding preventive strategies indicated that, although healthcare workers showed a solid theoretical understanding of essential measures including hand hygiene, sedation protocols, and timely extubation their real-life application was inconsistent(9). Similarly, a study by Blot et al. involving direct observations in European ICUs revealed that while nursing staff universally recognized the importance of maintaining correct head positioning, objective evaluations showed that adherence was suboptimal in over 40% of instances. These results highlight a significant hurdle in preventing VAP: possessing knowledge does not guarantee consistent clinical adherence, indicating a need for a comprehensive approach to tackle systemic and behavioral obstacles to compliance.(5).

Respiratory therapists (RTs) play a vital and distinctive role in the prevention of VAP due to their specialized knowledge in the management of mechanical ventilation. Their clinical roles include adjusting ventilator settings to reduce ventilator-induced lung injury, executing sterile endotracheal suctioning procedures, and engaging in sedation protocols to promote early extubation. Research conducted by Torres et al. showed that ICUs utilizing RT-led ventilator bundle initiatives experienced significantly lower rates of VAP than those following standard care

models(1). However, studies by Blot et al. uncovered ongoing challenges, such as high workloads, inconsistent training, and insufficient supervision, which impede the consistent application of preventive strategies, especially in resource-constrained environments. Multiple systemic and behavioral barriers complicate the consistent implementation of VAP prevention strategies in clinical practice. These obstacles can be categorized into three primary domains:

Structural Limitations – Equipment shortages, understaffing, and inadequate access to antiseptic solutions.

Procedural Challenges – Complex protocols, excessive documentation burdens, and lack of standardized workflows.

Cognitive-Behavioral Factors – Clinician complacency, risk perception biases, and competing clinical priorities.(10)

Madhuvu et al. conducted qualitative research revealing that clinicians often prioritize acute interventions over preventive measures during critical situations.(7). Similarly, Wami et al. identified significant knowledge gaps among ICU nurses regarding current guidelines, with only 31% correctly specifying the appropriate frequency of chlorhexidine oral care in an Ethiopian study(3). Mohammed et al. further demonstrated discrepancies between self-reported and observed practices, where nurses overestimated their adherence to oral hygiene and sedation protocols in surveys but exhibited less than 50% compliance during unannounced audits(4).

Effective strategies to improve adherence require multifaceted, context-specific approaches. Blot et al. advocate for simulation-based interdisciplinary training involving RTs, nurses, and physicians, combined with real-time performance feedback through electronic checklists and enhanced communication during structured rounds. Simulation training has demonstrated particular efficacy, with one Kenyan study reporting a 62% improvement in bundle compliance following scenario-based drills.(5). However, as Klompas notes, educational interventions alone yield only transient benefits unless supported by systemic enablers, including adequate staffing, reliable supply chains, and engaged leadership to sustain long-term improvements(6).

Comparative studies across different healthcare systems reveal distinct patterns in guideline adherence. Ereta et al. found that public-sector ICUs in low- and middle-income countries, grappling with challenges such as staff shortages and supply chain disruptions, averaged only 44% compliance with core prevention measures,

compared to 71% in better-resourced private facilities. These disparities highlight the urgent need for tailored interventions that account for local resource constraints while maintaining fidelity to evidence-based practices.(11).

VAP remains a formidable challenge in critical care, necessitating a comprehensive approach that bridges the gap between knowledge and practice. Strengthening interdisciplinary collaboration, optimizing resource allocation, and implementing continuous training and feedback mechanisms are essential to improving adherence to preventive strategies. Future research should focus on context-specific interventions in resource-limited settings, where the burden of VAP is disproportionately high. By addressing systemic barriers and reinforcing best practices, healthcare systems can mitigate the clinical and economic impact of VAP, ultimately enhancing patient outcomes in ICUs worldwide. Wami et al. quantified how staffing ratios directly impact adherence, with each 10% increase in nurse-patient ratios correlating with a 6.5% decline in compliance.(3).

Discipline-specific training gaps further complicate implementation efforts. Respiratory therapists, despite their central role in ventilator management, are often excluded from hospital-wide infection control initiatives, limiting opportunities for coordinated prevention strategies. Current research demonstrates that incorporating respiratory therapists (RTs) into comprehensive multidisciplinary education initiatives yields superior clinical outcomes. Intensive care units that have adopted this collaborative training model demonstrate a 19% improvement in protocol compliance rates compared to facilities relying exclusively on nursing-centered educational programs. This finding underscores the value of interdisciplinary teamwork in enhancing adherence to evidence-based preventive measures.

Despite established preventive strategies, ventilator-associated pneumonia persists as a prevalent and clinically significant complication of mechanical ventilation. While healthcare provider knowledge serves as the fundamental prerequisite for prevention, numerous operational barriers, including staffing shortages, resource limitations, and institutional cultural factors, frequently hinder consistent implementation. This analysis reveals three critical areas requiring attention:

1. The underutilized potential of respiratory therapists in prevention initiatives
2. The distinct challenges faced by resource-constrained healthcare environments
3. The demonstrated efficacy of interdisciplinary training models

The current investigation of knowledge and practice patterns in Peshawar's public hospital ICUs seeks to generate practical, actionable insights with broad applicability to similar healthcare environments. The findings hold significant potential to inform:

- Policy development for infection prevention
- Targeted educational program design
- Clinical workflow optimization strategies

By addressing both individual knowledge deficits and systemic barriers, healthcare systems can achieve measurable progress in reducing the substantial clinical and economic burden of ventilator-associated pneumonia across global critical care settings. This dual-focused approach targeting both healthcare provider competencies and organizational support structures represents the most promising pathway to sustainable improvement in patient outcomes.

Chapter 3

METHODOLOGY

3.1. Research Design

The descriptive cross-sectional research focused on evaluating the knowledge of healthcare professionals, particularly respiratory therapists, physicians, and nurses, regarding their adherence to evidence-based guidelines for the prevention of ventilator-associated pneumonia. This cross-sectional study is pertinent to my research as it encompasses the prevalence and relationships among variables within a defined timeframe.

3.2 Clinical Settings

The study was conducted in public sector tertiary care hospitals of Peshawar, Khyber Pakhtunkhwa, including Lady Reading Hospital (LRH), Khyber Teaching Hospital (KTH), and Hayatabad Medical Complex (HMC).

3.3 Sample Size

Using Using Single population proportion formula:

Sample size n = $Z^2 * p * (1 - p)/d^2$ = $1.96^2 * 0.899 * 0.101/0.05^2$ = 139.5 = 140

Confidence level = 95% (Z = 1.96)

Predominance of the practice of VAP prevention of 89.9% from the past Study.

Confidence limits as % of 100 (d): 5% (0.05)

3.4 Sampling Technique

A non-probability convenience sampling technique was used to recruit participants who met the inclusion criteria and were available during the study period.

3.5 Duration of Study

This study was piloted from October 2024 to July 2025. In this period, I first select the topic, then search for relevant literature, and then write the synopsis. The synopsis was approved by the university's ethics committee. After approval then started data collection, analysis of the data, and lastly, the report writing started.

3.6 Selection Criteria

3.6.1 Inclusion Criteria

- Registered healthcare professionals including doctors, nurses, and respiratory therapists working in the ICU.
- Actively and directly involved in the care of mechanically ventilated patients, including airway management, suctioning, ventilator monitoring, and implementation of VAP prevention protocols.
- Having a minimum of one month of continuous working experience in the ICU, ensuring basic familiarity with ICU practices and ventilator care.
- Currently working in the ICU during the data collection period.
- Willing to participate and providing informed consent.

3.6.2 Exclusion Criteria

- Healthcare professionals who are on extended leave (e.g., maternity leave, medical leave, or study leave) during the data collection period.
- Staff not directly involved in ventilated patient care, such as administrative personnel or those working in non-critical care units.
- Newly hired staff with less than one month of ICU experience, as they may lack adequate exposure to VAP prevention practices.
- Participants who decline to give informed consent.
- Individuals with potential conflicts of interest that may influence responses (e.g., involvement in study design or data analysis).

3.7 Ethical Consideration

Approval was obtained from the Institutional Review Board (IRB) before data collection. Written informed consent was obtained from all participants. Participants were assured of the confidentiality and anonymity of their responses. Data were used solely for academic and research purposes. Participation was voluntary, with the right to withdraw at any time without any hesitation.

3.8 Data Collection Procedure

A structured self-administered questionnaire was used, consisting of three sections: Demographic Information (age, gender, profession, experience, and training), Knowledge Assessment: Based on evidence-based VAP prevention guidelines, and Adherence Assessment: Practices related to VAP prevention such as hand hygiene, head-of-bed elevation, oral care, etc. The questionnaire was developed based on previously validated tools and adapted to the local context. The researcher visited each ICU and explained the purpose of the study to the eligible. After obtaining informed consent, questionnaires were distributed to be filled out anonymously. Completed forms collected on the same day.

3.9 Data Analysis

Data were entered and analyzed using the Statistical Package for the Social Sciences SPSS. Descriptive statistics are used to summarize demographic data and responses. One-way ANOVA testing and the Chi-square test are used to assess the association between knowledge and adherence. A p-value of <0.05 will be considered statistically significant.

Chapter 4

RESULTS

This chapter describes the findings of the study, which were derived from descriptive statistics, chi-square tests, and one-way ANOVA analyses. Each variable is examined in detail, presenting frequencies and percentages, followed by the inferential results that provide deeper insights into the data.

4.1 Demographic Characteristics of Participants

A total of 140 healthcare professionals participated in this study, providing a diverse representation of the healthcare workforce. The gender distribution was notably skewed towards males, with 84 participants (60%) identifying as male and 56 (40%) as female.

In terms of professional roles, respiratory therapists constituted the largest group, comprising 65 participants (46.4%). Nurses closely followed with 61 participants (43.6%), while physicians represented the smallest cohort with 14 participants (10%).

When considering experience in critical care, a significant majority of participants (111; 79.3%) reported having between 1 month and 5 years of experience. A smaller group of 23 participants (16.4%) had 6 to 10 years of experience, and only 6 participants (4.3%) had more than 10 years of experience in this specialized field.

Among the total participants, 103 (73.6%) indicated that they had received formal training in the prevention of Ventilator-Associated Pneumonia (VAP), while 37 participants (26.4%) reported lacking such training.

Table 4.1: Demographic information

Demographic Characteristic	**Category**	**Frequency (N)**	**Percentage (%)**
Gender	Male	84	60.0
	Female	56	40.0
Profession	Respiratory Therapist	65	46.4
	Physician	14	10.0

	Nurse	61	43.6
Years of Critical Care Experience	1 month to 5 years	111	79.3
	6 to 10 years	23	16.4
	More than 10 years	6	4.3
Received VAP Prevention Training	Yes	103	73.6
	No	37	26.4

4.2 Descriptive Statistics: Knowledge and Practice Variables

4.2.1 Head-of-Bed Elevation (Knowledge)

Participants were queried about the recommended head-of-bed elevation to mitigate the risk of VAP. An overwhelming majority (130; 92.9%) accurately identified the optimal elevation range as 30–45 degrees. However, a small number provided incorrect responses: 15–30 degrees (3; 2.1%), 45–60 degrees (2; 1.4%), and "no specific angle" (5; 3.6%).

Table 4.2: What is the recommended head-of-bed elevation to reduce VAP risk? (knowledge)

What is the recommended head-of-bed elevation to reduce VAP risk?		
	N	%
15-30 degrees	3	2.1%
30-45 degree	130	92.9%
45-60 degree	2	1.4%
No specific angle	5	3.6%

4.2.2 Head-of-Bed Elevation (Practice)

When asked if they consistently elevate the head of the bed to the recommended 30–45 degrees for ventilated patients, 110 participants (78.57%) responded "Always," 21 (15%) indicated "Often," and 9 (6.43%) replied "Sometimes."

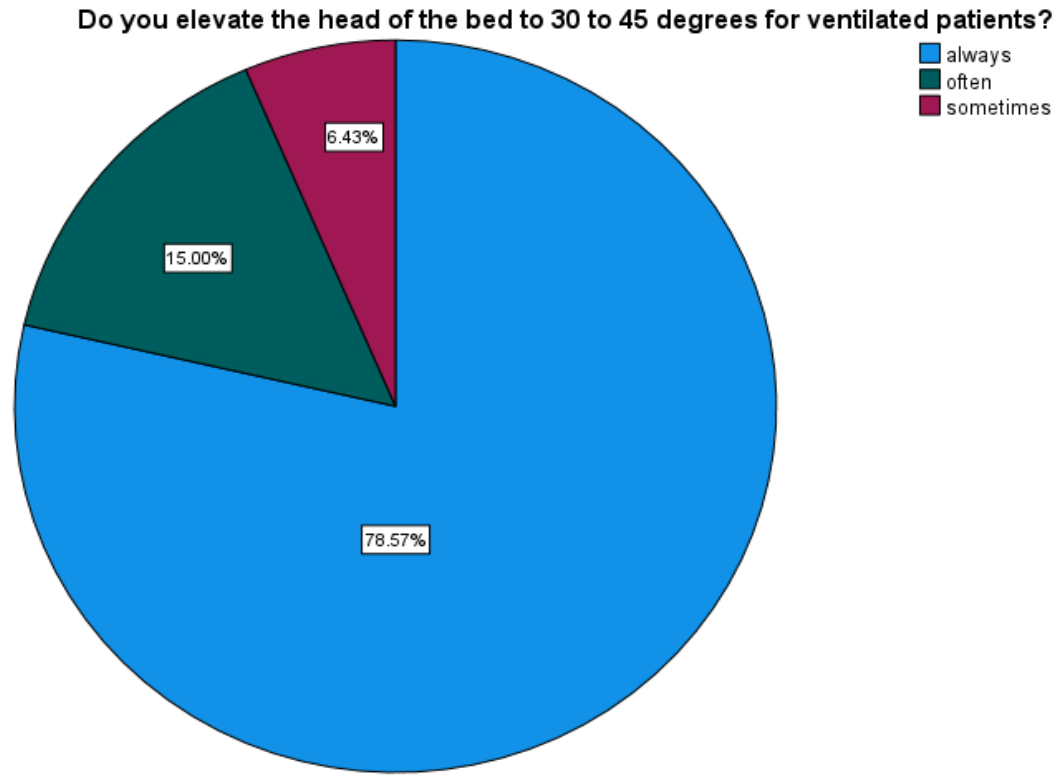

Figure 4.1: Head of bed elevation (Practice)

4.2.3 Oral Care Frequency (Knowledge)

A total of 99 participants (70.7%) correctly identified "every shift" as the ideal frequency for providing oral care to ventilated patients. Other responses included "twice a day" (16; 11.4%), "once a day" (12; 8.6%), and "as needed" (13; 9.3%).

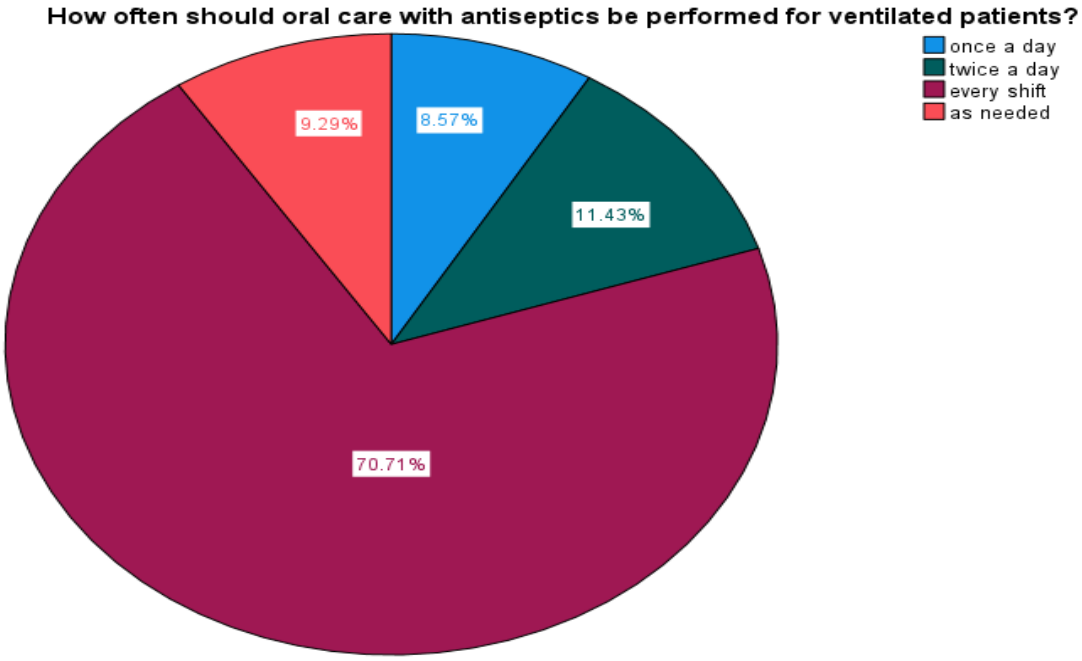

Figure 4.2: Oral care frequency (knowledge)

4.2.4 Oral Hygiene Practice

In terms of actual practice, 80 participants (57.1%) reported performing oral hygiene twice daily, while 19 (13.6%) did it once daily, 39 (27.9%) as needed, and 2 (1.4%) indicated they did not perform it routinely.

Table 4.3: Oral Hygiene

How often do you perform oral hygiene for ventilated patients?		
	N	%
Twice daily	80	57.1%
Once daily	19	13.6%
As needed	39	27.9%
Not routinely	2	1.4%

4.2.5 Antiseptic for Oral Care

A significant majority of participants (105; 75%) correctly identified chlorhexidine gluconate as the preferred antiseptic for oral care. The remaining participants selected alternatives such as normal saline (24; 17.1%), betadine (6; 4.3%), and hydrogen peroxide (5; 3.6%).

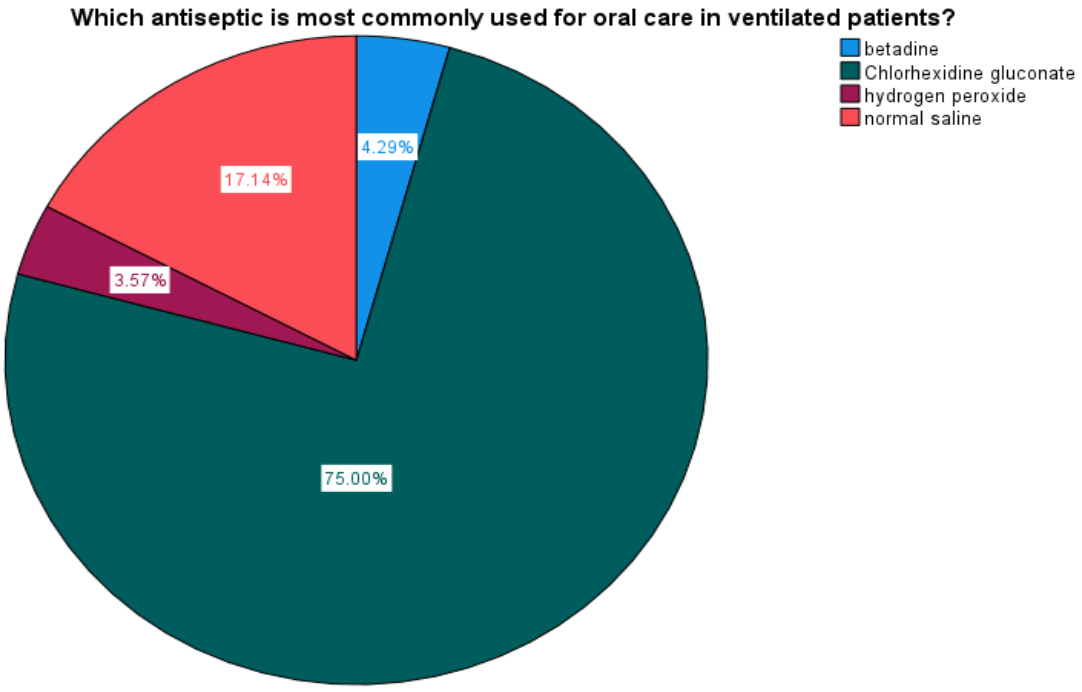

Figure 4.3: Antiseptic for oral care

4.2.6 Sedation Interruption (Knowledge)

Regarding the rationale behind daily sedation interruption, 75 participants (53.6%) recognized its purpose as "to assess readiness for extubation." Other responses included "to prevent VAP" (46; 32.9%), "to improve patient comfort" (14; 10%), and "to reduce aspiration risk" (5; 3.6%).

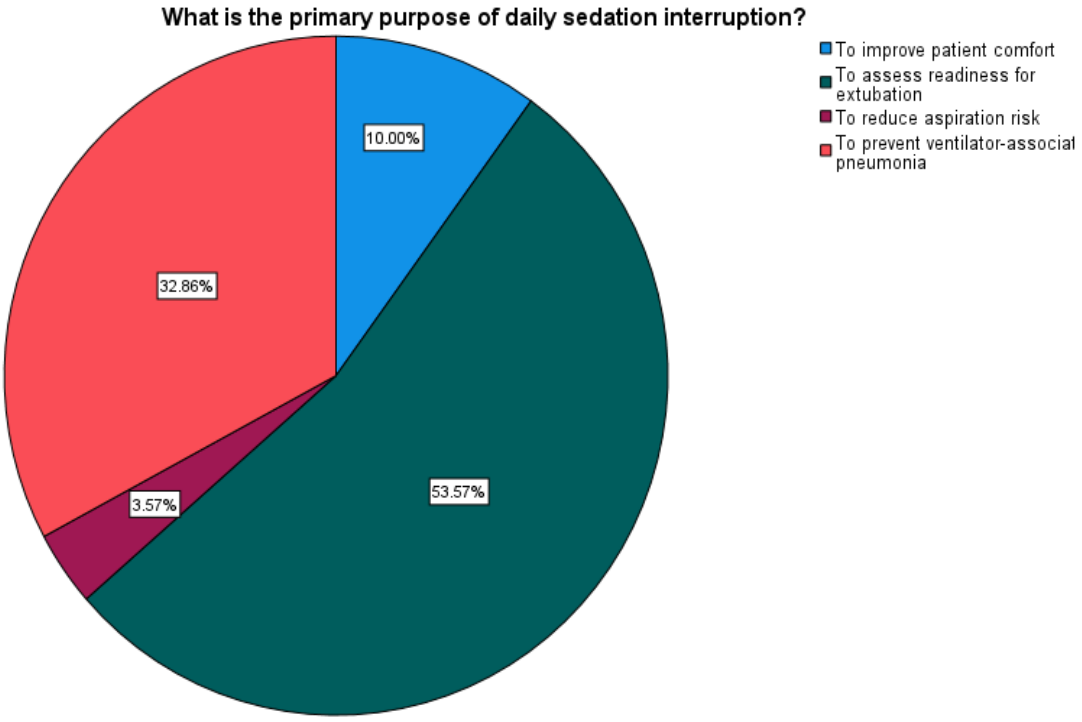

Figure 4.4: Sedation interruption (knowledge)

4.2.7 Sedation Interruption (Practice)

In terms of practice, 102 participants (72.9%) reported that they always implement daily sedation interruption, while 36 (25.7%) indicated they do so occasionally, and 2 (1.4%) stated they do not practice it at all.

Table 4.4: Sedation interruption (practice)

Do you conduct daily assessments for sedation interruption and readiness for extubation?		
	N	%
Yes, always	102	72.9%
Yes, occasionally	36	25.7%
No	2	1.4%

4.2.8 Ventilator Circuit Replacement

Participants were asked about their practices regarding the replacement of ventilator

circuits. The most common response was "when visibly soiled" (59; 42.14%), followed by "weekly" (23; 16.43%), "every 48 hours" (31; 22.14%), and "every 24 hours" (27; 19.29%).

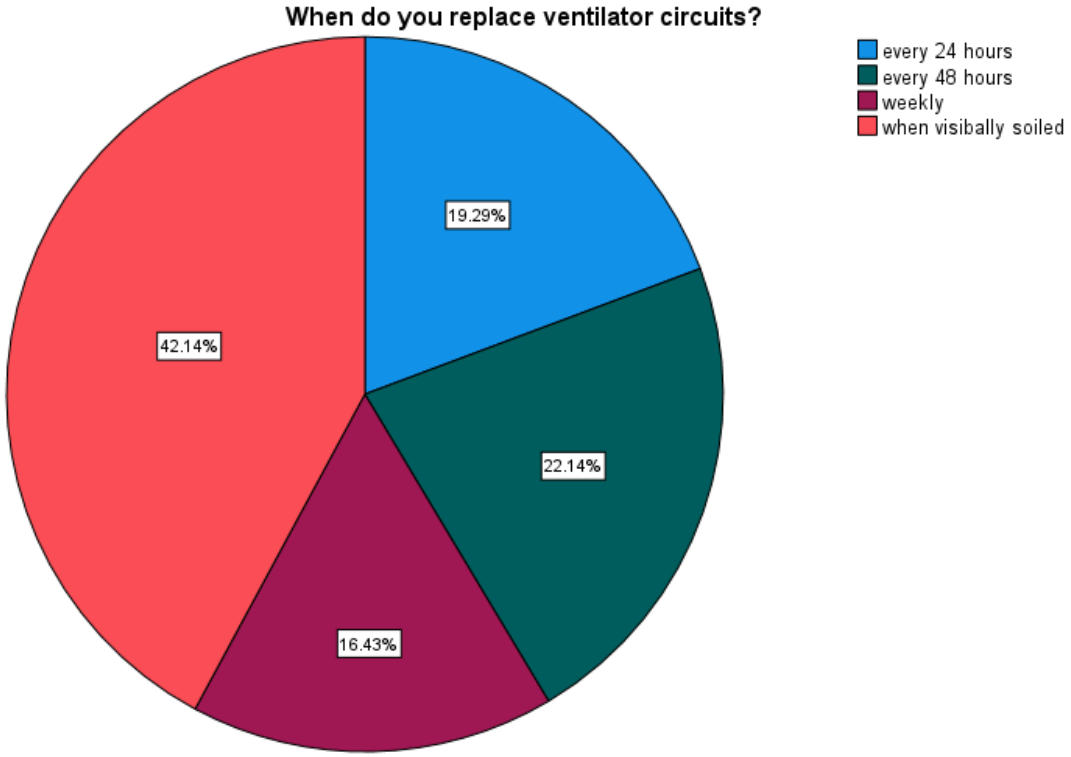

Figure 4.5: Replacement of ventilator circuit

4.2.9 Condensate Management

A majority of participants (83; 59.3%) reported that they check and empty condensate from ventilator tubing as needed. Additionally, 27 participants (19.3%) performed this task once or twice daily, while 3 (2.1%) did not do it routinely.

Table 4.5: Condensate management

How often do you check and empty condensate from ventilator tubing?		
	N	%
Once a day	27	19.3%
Twice a day	27	19.3%
Ts needed	83	59.3%
Not routinely	3	2.1%

4.2.10 Prevention of Secretion Pooling

When asked about strategies to prevent secretion pooling, 76 participants (54.3%) selected subglottic suctioning via specialized endotracheal tubes as the preferred method. Other options included frequent suctioning (50; 35.7%), routine saline instillation (8; 5.7%), and daily changing of ventilator circuits (6; 4.3%).

Table 4.6: Prevent Secretion Pooling

Which of the following is a key measure to prevent secretion pooling in ventilated patients?		
	N	%
Frequent suctioning	50	35.7%
Subglottic suctioning via specialized endotracheal tubes	76	54.3%
Routine saline instillation	8	5.7%
Changing ventilator circuits daily	6	4.3%

4.2.11 Subglottic Suctioning Practice

In terms of practice, 74 participants (52.86%) reported "Always" ensuring subglottic suctioning in eligible patients, while 23 (16.43%) indicated "Often," 33 (23.57%) said "Sometimes," and 10 (7.14%) responded "Rarely."

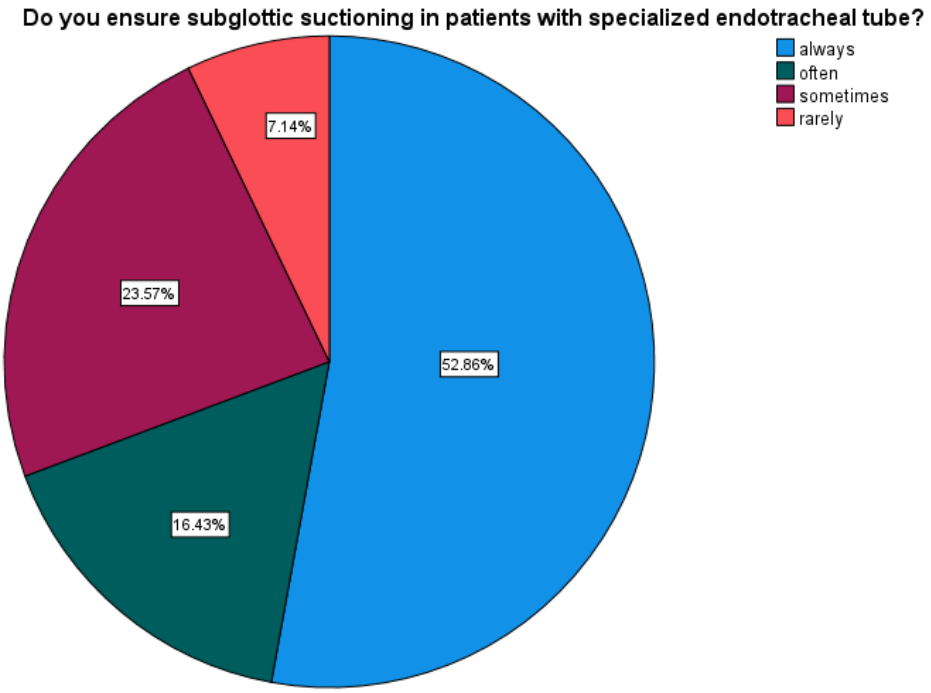

Figure 4.6: Subglottic suction

4.2.12 Subglottic Suctioning Purpose

73.57% of respondents correctly identified that the main purpose of subglottic suctioning is “To prevent secretion pooling above the endotracheal tube cuff”. This is the evidence-based purpose aimed at preventing ventilator-associated pneumonia (VAP).

13.57% believed the purpose is “To improve oxygenation”, which is not the main goal, although it might be a secondary benefit in some cases.

7.14% responded “To reduce patient discomfort”, which may reflect a misconception or misunderstanding of the intervention’s primary role.

5.71% chose “To remove sputum from the lungs”, which is incorrect since subglottic suctioning targets secretions above the cuff, not deep pulmonary secretions.

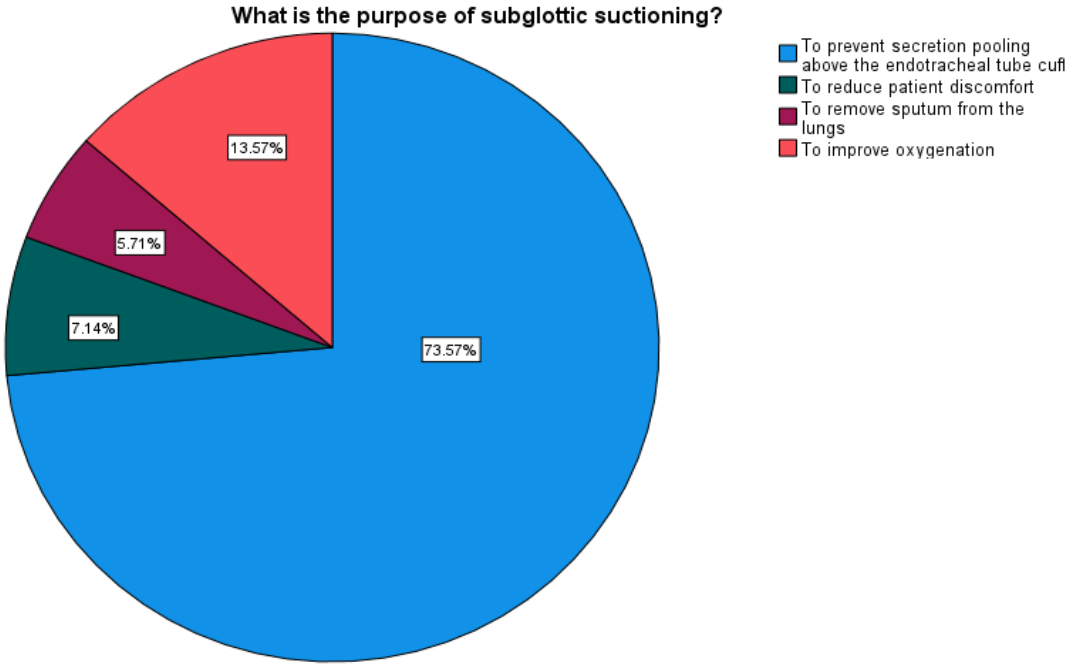

Figure 4.7: Subglottic suction Purpose

4.2.13 Saline Instillation During Suctioning

When questioned about the routine use of saline instillation during suctioning, 108 participants (77.1%) answered "Yes," while 32 (22.9%) responded "No."

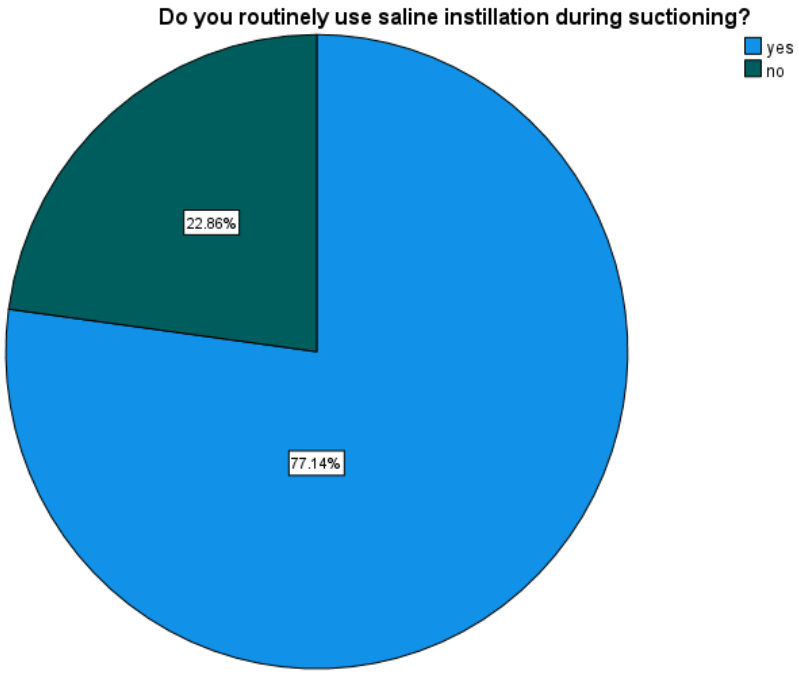

Figure 4.8 Saline instillation

4.2.14 Hand Hygiene Protocol

A total of 100 participants (71.4%) correctly identified that handwashing or the use of alcohol-based hand rub is essential for infection control. However, misconceptions were evident, as 32 (22.9%) believed that handwashing is optional when wearing gloves, 7 (5%) chose "wear gloves without handwashing," and 1 (0.7%) stated "only wash hands if visibly soiled."

Table 4.7: Hand hygiene protocol

What is the recommended protocol for hand hygiene before patient contact?		
	N	%
Wash hands or use alcohol-based hand rub	100	71.4%
Wear gloves without handwashing	7	5.0%
Only wash hands if visibly soiled	1	0.7%
Handwashing is optional with gloves	32	22.9%

4.2.15 Ventilator Bundle Focus

A significant majority (116; 82.9%) recognized the primary goal of the ventilator bundle as preventing VAP. Other beliefs included improving mobility (11; 7.9%), reducing hospital stays (10; 7.1%), or ensuring ventilator maintenance (3; 2.1%).

Table 4.8: Ventilator Bundles

What is the primary focus of the ventilator bundle?		
	N	%
Improving patient mobility	11	7.9%
Reducing hospital stay duration	10	7.1%
Preventing ventilator-associated pneumonia	116	82.9%
Ensuring ventilator maintenance	3	2.1%

4.2.16 Early Mobility Purpose

Most participants (72; 51.4%) identified "to reduce the duration of mechanical ventilation" as the primary purpose of early mobility initiatives. Other responses included prevention of pressure ulcers (52; 37.1%), enhancing physical fitness (14; 10%), and facilitating feeding (2; 1.4%).

Table 4.9: Early mobility

What is the purpose of early mobility programs in ventilated patients?		
	N	%
To prevent pressure ulcers	52	37.1%
To reduce the duration of mechanical ventilation	72	51.4%
To enhance physical fitness	14	10.0%
To facilitate feeding	2	1.4%

Chi-Square Test Results

Profession vs. Head-of-Bed Elevation: No statistically significant association was identified ($\chi 2 = 7.312$, df = 6, p = 0.293).

Profession vs. Oral Care Frequency: A significant association was observed between

profession and oral care frequency ($\chi 2 = 13.172$, df = 6, p = 0.040; Spearman ρ = 0.281, p = 0.001), indicating that professional background influences oral care practices.

Profession vs. Antiseptic Used: Marginal significance was noted ($\chi 2 = 12.239$, p = 0.057), but the likelihood ratio (p = 0.041) and Spearman correlation ($\rho = 0.217$, p = 0.010) suggest a mild relationship between profession and the choice of antiseptic.

Profession vs. Purpose of Sedation Interruption: No significant association was found ($\chi 2 = 7.740$, df = 6, p = 0.258).

Table 4.10: Profession Vs Head-of-bed elevation

Crosstab						
Count						
		What is the recommended head-of-bed elevation to reduce VAP risk?				
		15-30 degrees	30-45 degree	45-60 degree	no specific angle	Total
What is your profession?	Respiratory therapist	0	63	1	1	65
	Physician	0	14	0	0	14
	Nurse	3	53	1	4	61
Total		3	130	2	5	140

Table 4.11: Profession Vs Oral care

Crosstab						
Count						
		How often should oral care with antiseptics be performed for ventilated patients?				
		once a day	twice a day	every shift	as needed	Total
What is your profession?	respiratory therapist	9	11	41	4	65
	Physician	1	2	11	0	14

	Nurse	2	3	47	9	61
Total		12	16	99	13	140

Table 4.12: Profession Vs Antiseptic

Crosstab						
Count						
		Which antiseptic is most commonly used for oral care in ventilated patients?				
		betadine	Chlorhexidine gluconate	hydrogen peroxide	normal saline	Total
What is your profession?	Respiratory therapist	4	52	4	5	65
	Physician	1	11	0	2	14
	Nurse	1	42	1	17	61
Total		6	105	5	24	140

Table 4.13: Profession Vs Daily Sedation Interruption

Crosstab						
Count						
		What is the primary purpose of daily sedation interruption?				
		To Improve patient comfort	To assess Readiness for extubation	To reduce aspiration risk	To prevent ventilator-associated pneumonia	Total
What is your profession?	Respiratory therapist	6	40	1	18	65

	Physician	0	8	0	6	14
	Nurse	8	27	4	22	61
Total		14	75	5	46	140

One-Way ANOVA Results

Purpose of Early Mobility Programs: A statistically significant difference was identified across professions (F = 3.702, p = 0.027), indicating varying perceptions of early mobility's purpose among different healthcare roles.

Primary Focus of Ventilator Bundle: No significant difference was observed (F = 0.087, p = 0.917), suggesting a consensus on the ventilator bundle's focus across professions.

Hand Hygiene Protocol: No significant difference was noted across professions (F = 0.699, p = 0.499), indicating uniformity in understanding hand hygiene protocols.

These comprehensive findings affirm a strong overall knowledge of VAP prevention among healthcare providers. However, the identified practice gaps and inter-professional variations underscore the necessity for targeted training and reinforcement strategies to enhance adherence to best practices in VAP prevention."

Table 4.14: One-way ANOVA between groups (early mobility, focus of ventilator bundle, and hand hygiene)

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
What is the purpose of early mobility programs in ventilated patients?	Between Groups	3.371	2	1.686	3.702	.027
	Within Groups	62.372	137	.455		
	Total	65.743	139			
What is the primary focus of the ventilator bundle?	Between Groups	.064	2	.032	.087	.917
	Within Groups	50.928	137	.372		
	Total	50.993	139			

What is the recommended protocol for hand hygiene before patient contact?	Between Groups	2.224	2	1.112	.699	.499
	Within Groups	218.026	137	1.591		
	Total	220.250	139			

Chapter 5

DISCUSSION

This chapter discusses the findings of the present study titled "Association between Healthcare Providers' Knowledge and Adherence to Ventilator-Associated Pneumonia Prevention Guidelines." The results indicate that although most HCPs demonstrated strong theoretical knowledge of VAP prevention guidelines, their practical adherence varied considerably. Knowledge regarding essential preventive measures such as head-of-bed elevation, oral hygiene protocols, and ventilator bundle components was high. However, practices such as subglottic suctioning, sedation interruption, and routine use of chlorhexidine for oral care were inconsistently followed.

A total of 140 participants were included in the study, primarily respiratory therapists (46.4%) and nurses (43.6%). Most participants had between 1 month and 5 years of ICU experience, and 73.6% had received formal training in VAP prevention. This demographic provided a balanced sample from which to draw insights regarding knowledge and adherence patterns.

The study highlighted that while 92.9% of participants correctly identified 30–45 degrees as the recommended head-of-bed elevation (HOB), only 78.6% always implemented this in practice. This discrepancy is consistent with findings by Wami et al. who observed similar gaps between knowledge and practice in Ethiopian ICUs(3). Klompas emphasized that such gaps often emerge due to institutional workflow issues, staffing limitations, or the absence of routine audits (6).

Similarly, 70.7% correctly recognized that oral care should be performed every shift, yet only 57.1% reported practicing it twice daily. Although the guideline suggests more frequent care, the observed behavior reflects inconsistencies and possible logistic challenges, such as workload burden or lack of materials—factors also reported by Madhuvu et al. (7).

Chlorhexidine gluconate was correctly identified by 75% as the preferred antiseptic for oral care. However, its consistent use remains suboptimal, possibly due to cost or supply constraints. Ogdi et al. noted similar findings, citing inconsistent supply and unclear protocols as barriers in nurse-led prevention programs.(13).

A statistically significant association was found between profession and oral care frequency ($\chi 2 = 13.172$, $p = 0.040$), as well as antiseptic choice (likelihood ratio p =

0.041). Nurses were more likely to vary their oral care frequency compared to respiratory therapists. Such inter-professional differences were also noted in studies by Blot et al. and Rahimi et al. both emphasizing the need for profession-specific protocols and training (9, 10).

Subglottic suctioning, an essential practice in VAP prevention, was reported to be "Always" performed by only 52.9% of participants, despite 54.3% identifying it as the key method for secretion management. This again points to a knowledge-practice gap. According to Torres et al. integrating suctioning into bundle protocols with monitoring tools can improve consistency.(1).

Sedation interruption showed better alignment, with 72.9% reporting consistent practice, which may reflect its integration into ICU protocols. However, the remaining 27.1% either practiced it occasionally or not at all. This inconsistency can be mitigated by strengthening ICU rounds and team-based monitoring, as advocated by Labeau et al.(10).

A concerning finding was the use of saline instillation during suctioning, which was reported by 77.1% of participants. This outdated practice is discouraged in contemporary guidelines due to the risk of infection and impaired oxygenation. Mohammed et al. also reported a high prevalence of this practice among neonatal ICU nurses, highlighting a need for re-education on suctioning techniques.(4).

Hand hygiene protocols were well understood, with 71.4% correctly stating that alcohol-based rub or handwashing is mandatory before patient contact. However, 22.9% believed it to be optional if gloves are worn. This misconception poses a serious infection risk, reiterating CDC's guideline emphasis on hand hygiene regardless of glove use.(2).

Inferential analysis revealed statistically significant differences in knowledge and practices by profession. Chi-square tests confirmed that profession influenced oral care frequency and antiseptic selection. One-way ANOVA identified significant variation in knowledge regarding early mobility programs ($F = 3.702$, $p = 0.027$). Nurses often associated mobility with pressure ulcer prevention, while respiratory therapists linked it to reduced ventilation duration. These findings support Klompas' assertion that knowledge translation into practice is mediated by role-specific expectations.(6).

No significant differences were found regarding hand hygiene or knowledge of the ventilator bundle's focus, suggesting consistent baseline awareness across

professions, likely due to institutional training.

Participants who had received formal training (73.6%) showed higher adherence in key areas such as sedation interruption, oral hygiene, and ventilator circuit replacement. These outcomes resonate with Blot et al., who concluded that structured education improves both knowledge and compliance.(10).

Interestingly, most participants had less than 5 years of ICU experience, which may have affected their confidence and consistency in applying guidelines. Mohammed et al. found that while junior staff often possess recent theoretical knowledge, they may lack the clinical autonomy and reinforcement mechanisms needed for consistent application(4).

The study findings highlight the importance of institutionalizing evidence-based bundles that include daily sedation interruption, subglottic suctioning, routine oral care, and HOB elevation. Interdisciplinary rounds, feedback loops, and point-of-care training can enhance implementation.

CDC guidelines Tablan et al. recommend structured documentation and electronic monitoring tools to track compliance.(2). Incorporating these elements into ICU workflows will ensure sustained adherence.

Future studies should focus on longitudinal follow-ups post-training to assess behavior change. Mixed-methods designs could explore the reasons behind persistent knowledge-practice gaps. Expansion to private hospitals and rural ICUs would improve the generalizability of findings. Additionally, the impact of simulation-based training on behavioral adherence could be further investigated, as suggested by Labeau et al.(10).

This study affirms a strong knowledge foundation among HCPs regarding VAP prevention, yet underscores significant discrepancies in practice. These gaps are influenced by profession, training exposure, and institutional barriers. Targeted, role-specific education, coupled with systemic support and monitoring, is crucial to improving adherence to VAP prevention protocols.

CONCLUSIONS

This study assessed the association between healthcare providers' knowledge and their adherence to ventilator-associated pneumonia (VAP) prevention guidelines in the intensive care units of tertiary care hospitals in Peshawar. The findings revealed that while most healthcare professionals demonstrated adequate knowledge of VAP prevention measures—such as appropriate head-of-bed elevation, antiseptic use, and sedation interruption—their actual adherence to these practices varied significantly. Respiratory therapists generally showed higher compliance, while knowledge-practice gaps were more pronounced among nurses and physicians.

Significant associations were found between professional role and practices such as oral care frequency, antiseptic usage, and understanding of VAP bundle components. One-way ANOVA revealed professional variation in knowledge regarding early mobility. Despite high levels of formal training, systemic barriers, inconsistent protocols, and workload pressures appear to hinder consistent practice. The study concludes that targeted interventions, ongoing education, and organizational support are essential to enhance adherence to evidence-based VAP prevention strategies.

Limitation

- The study relied on self-reported data, which may be influenced by recall bias or social desirability bias.
- The use of a convenience sampling technique limits the generalizability of the results.
- The study was confined to public tertiary hospitals in Peshawar and did not include private or rural healthcare settings.
- The cross-sectional design captures data at a single time point, limiting the ability to determine causality or changes over time.

Recommendations

- Continuing Education: Develop regular, role-specific training programs incorporating hands-on VAP prevention simulations for ICU personnel.
- Performance Monitoring: Implement systematic clinical audits with prompt feedback to identify and address practice deviations.
- Inter professional Collaboration: Foster structured teamwork between physicians, nurses, and respiratory therapists during patient care rounds.
- Protocol Standardization: Enhance compliance through visual aids, bedside protocols, and EHR-integrated reminders.
- Future Research Directions: Pursue longitudinal studies to evaluate intervention effectiveness and expand investigations to private/rural healthcare environments

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APPENDICES 1

ENGLISH CONSENT FORM

The study you are about to participate in is a descriptive cross-sectional study titled; **"Association between Healthcare Providers' Knowledge and Adherence to Ventilator Associated Pneumonia Prevention Guidelines"** The study has no potential harm to participants. All data collected from you will be coded in order to protect your identity, and should not be disclosed to anyone. Following the study, there will be no way to connect your name with your data. Your answers to the questions will not affect the quality of education given to you. Any additional information about the study results will be provided to you at its conclusion, upon your request.

You are free to withdraw from the study at any time. You agree to participate, indicating that you have read and understood the nature of the study, and that all your inquiries concerning the activities have been answered to your satisfaction.

NAME: MAHMOOD JAN **SIGNATURE**_____

DATE: 06/07/2025

APPENDICES 2

URDU CONSENT FORM

میں_____ تصدیق کرتا ہوں کہ **محترم MAHMOOD JAN** نے اپنی اس تحقیق

"Association between Healthcare Providers' Knowledge and Adherence to Ventilator Associated Pneumonia Prevention Guidelines"

.زیرنگرانی **Dr. Shehzad Muzammil** کے متعلق بتا دیا ہے۔ مجھے اس تحقیق کی نوعیت، مقاصد، احداف، توقعات، فوائد اور خطرات کے متعلق ، ۔ساری معلومات فراہم کر دی گئی ہیں اس تحقیق کے دوران ساری معلومات صیغۃ راز میں رہیں گی اور مریض کا نام اور دیگر معلومات صرف تحقیق کے لیے استعمال ہوں گی۔مجھے یہ بھی بتا دیا گیا ہے کہ میں اس تحقیق سے متعلقہ ہر قسم کے سوال پوچھنے کا مجاز ہوں اور یہ تحقیق صرف ایک شخص ک مفاد میں نہیں ہے بلکہ بحسثیت مجموعی انسانیت کا مفاد اس سے وابسطہ ہے۔ تمام تفصیلات جاننے کے بعد یس تحقیق میں شامل ہونے یا نہ ہونے پر کسی کا قائل نہیں ہوں۔ اس تحقیق سے کسی بھی وقت علیحدہ ہونے پر مجھ پر کوئی پابندی نہیں ہو گی۔ میں بذاتِ خود بقائمی حوش و حواس

۔اور رضا مندی سے اس تحقیقاتی عمل میں شامل ہوتی/ ہوتا ہوں

---------- دستخط محقق

---------- دستخط شرکت کار

---------- تاریخ

APPENDICES 3

DEMOGRAPHICS FORM & QUESTIONNAIRES

Section 1: Demographic Information

1) Gender

1. Male
2. Female

2) What is your profession?

1. Nurse
2. Respiratory Therapist
3. Physician

3) How many years of experience do you have in critical care?

1. 1 months to 5 years
2. 6–10 years
3. More than 10 years

4) Have you received formal training in VAP prevention?

1. Yes
2. No

Section 2: Knowledge of VAP Prevention Guidelines

5) What is the recommended head-of-bed elevation to reduce VAP risk?

1. 15–30 degrees
2. 30–45 degrees
3. 45–60 degrees
4. No specific angle

6) How often should oral care with antiseptics be performed for ventilated patients?

1. Once a day
2. Twice a day
3. Every shift
4. As needed

7) Which antiseptic is most commonly used for oral care in ventilated patients?

1. Betadine
2. Chlorhexidine gluconate
3. Hydrogen peroxide
4. Normal saline

8) What is the primary purpose of daily sedation interruption?

1. To improve patient comfort
2. To assess readiness for extubation
3. To reduce aspiration risk
4. To prevent ventilator-associated pneumonia

9) Which of the following is a key measure to prevent secretion pooling in ventilated patients?

1. Frequent suctioning
2. Subglottic suctioning via specialized endotracheal tubes
3. Routine saline instillation
4. Changing ventilator circuits daily

10) What is the purpose of subglottic suctioning?

1. To prevent secretion pooling above the endotracheal tube cuff
2. To reduce patient discomfort
3. To remove sputum from the lungs
4. To improve oxygenation

11) What is the recommended protocol for hand hygiene before patient contact?

1. Wash hands or use alcohol-based hand rub
2. Wear gloves without handwashing
3. Only wash hands if visibly soiled
4. Handwashing is optional with gloves

12) What is the primary focus of the ventilator bundle?

1. Improving patient mobility
2. Reducing hospital stay duration
3. Preventing ventilator-associated pneumonia
4. Ensuring ventilator maintenance

13) What is the purpose of early mobility programs in ventilated patients?

1. To prevent pressure ulcers
2. To reduce the duration of mechanical ventilation

3. To enhance physical fitness

4. To facilitate feeding

Section 3: VAP Prevention Practices

14) Do you elevate the head of the bed to 30–45 degrees for ventilated patients?

1. Always

2. Often

3. Sometimes

4. Rarely

15) How often do you perform oral hygiene for ventilated patients?

1. Twice daily

2. Once daily

3. As needed

4. Not routinely

16) Do you conduct daily assessments for sedation interruption and extubation readiness?

1. Yes, always

2. Yes, occasionally

3. No

17) When do you replace ventilator circuits?

1. Every 24 hours

2. Every 48 hours

3. Weekly

4. When visibly soiled

18) How often do you check and empty condensate from ventilator tubing?

1. Once a day

2. Twice a day

3. As needed

4. Not routinely

19) Do you ensure subglottic suctioning in patients with specialized endotracheal tubes?

1. Always

2. Often

3. Sometimes

4. Rarely

20) Do you routinely use saline instillation during suctioning?

1. Yes

2. No

APPENDICES 4

ETHICS COMMITTEE LETTER

SUPERIOR UNIVERSITY

OFFICE OF THE DEAN-FAHS

Ref.: IRB /FAHS/Allied/04/25/MS/AHS-3711

Date: 18th March 2025

Program: MS Allied Health Sciences

Name: Mahmood Jan

Registration: SU91-MSAHW-F23-065

Subject: Ethical Approval Letter

The Research Ethical Committee convened on Dated: **17th March, 2025** to discuss your protocol titled **"Association between Healthcare Providers' Knowledge and Adherence to Ventilator Associated Pneumonia Prevention Guidelines"**

No further corrections and recommendations were suggested. The above-mentioned protocol has been approved after considering various research issues including ethical concerns with condition that the researcher will submit completion report at the end of his/her research.

Prof. Dr. Muhammad Naveed Babur
Dean/Convener REC
Faculty of Allied Health Sciences
Superior University, Lahore

17-KM, Main Raiwind Road, Lahore.
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PLAGIARISM SI CERTIFICATE

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APPENDICES 5
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Jan, M. et al.,

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Association between Healthcare Providers' Knowledge and Adherence to Ventilator-Associated Pneumonia Prevention Guidelines

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ABSTRACT

Ventilator-associated pneumonia (VAP) represents a prevalent and serious healthcare-associated infection among mechanically ventilated ICU patients. While evidence-based preventive measures can substantially reduce VAP incidence, their effectiveness depends on healthcare providers' (HCPs) knowledge and compliance. This study evaluated the relationship between HCPs' knowledge and adherence to VAP prevention guidelines in ICUs of public sector tertiary care hospitals in Peshawar, Pakistan. A cross-sectional study was conducted with 140 healthcare professionals (HCPs), including nurses, respiratory therapists, and physicians, using convenience sampling. Data were collected through a structured questionnaire assessing demographics, knowledge, and self-reported practices, analyzed via SPSS v25 using descriptive and inferential statistics (chi-square, ANOVA). Participants were predominantly male (60%), respiratory therapists (46.4%), with 79.3% having 1 month to 5 years ICU experience. While 73.6% reported formal VAP training, significant knowledge-practice gaps emerged: 92.9% knew the correct head-of-bed elevation (30-45°), but only 78.6% consistently practiced it; 70.7% recognized ideal oral care frequency ("every shift"), yet 57.1% performed it twice daily. Although 75% identified chlorhexidine as the preferred antiseptic, application remained inconsistent. Significant profession-based variations were observed. Chi-square tests revealed associations between professional role and oral care frequency (p=0.040) and antiseptic selection (p=0.041). ANOVA showed differences in early mobility understanding across professions (p=0.027). Despite adequate knowledge, adherence to critical practices (sedation interruption, subglottic suctioning) varied substantially by role. The study demonstrates persistent gaps between VAP prevention knowledge and practice, influenced by professional background, training inconsistencies, and systemic factors. Findings underscore the need for role-specific training, clinical audits, and strengthened institutional protocols to bridge these gaps. A multidisciplinary approach combining education, monitoring, and system-level support is essential to reduce VAP incidence and promote evidence-based critical care.

INTRODUCTION

Ventilator-associated pneumonia (VAP) is a significant healthcare-associated infection (HAI) that occurs in patients receiving mechanical ventilation for more than 48 hours. Ventilator-associated pneumonia (VAP) significantly contributes to increased morbidity, mortality, prolonged hospital stays, and higher healthcare costs, particularly in intensive care units (ICUs). (1–3)The incidence of VAP in ventilator-dependent patients is 10% to 20%, with mortality between 20% and 50%.(4) Evidence-based preventive measures can substantially reduce VAP incidence; their effectiveness depends on healthcare providers' (HCPs) knowledge and compliance.(4) Klompas noted that misconceptions surrounding ventilator-associated events (VAEs) could produce uncertainty regarding the most efficacious preventive strategies, further undermining adherence rates.(2) Qualitative research by Madhuvu et al. clarified several systemic barriers to guideline implementation, including time constraints, high patient-to-staff ratios, limited access to updated protocols, and insufficient institutional support structures. These insights underscore the necessity of evaluating not only healthcare providers' knowledge but also the practical challenges they encounter within high-pressure ICU environments. (5) Respiratory therapists (RTs), nurses, and physicians, despite their specialized training, are not immune to these obstacles. The dynamic and evolving nature of evidence-

APPENDICES 6
PLAGIARISM REPORT

Association between Healthcare Providers' Knowledge and Adherence to Ventilator-associated Pneumonia Prevention Guidelines

ORIGINALITY REPORT

6%	5%	1%	2%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

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1	Submitted to Higher Education Commission Pakistan Student Paper	1%
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