

Original Article

Knowledge and Perception of Physical Therapist Towards Ventilator Associated Pneumonia

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ABSTRACT

Background: Ventilator-associated pneumonia (VAP) is a leading cause of morbidity and mortality in critically ill, mechanically ventilated patients, with prevention requiring a multidisciplinary approach. Physiotherapists (PTs) can play a pivotal role in VAP prevention through early mobilization and respiratory care interventions, yet their knowledge and perceptions in this domain remain underexplored in low- and middle-income countries such as Pakistan. Objective: To evaluate the knowledge and perceptions of Pakistani physiotherapists regarding VAP and their role in its prevention and management. Methods: This descriptive cross-sectional study surveyed 380 physiotherapists from multiple healthcare facilities in Islamabad and Rawalpindi using a validated, self-administered questionnaire comprising 13 knowledge-based and 11 perception-based items measured on five-point Likert scales. Participants were recruited via non-probability convenience sampling. Data were analyzed using descriptive statistics, independent t-tests, chi-square tests, and multivariate regression to explore associations between knowledge, perceptions, and participant characteristics. Results: Most participants (75.8%) were aged 20–25 years; 70% held a DPT degree and 71.2% had ≤1 year of experience. Knowledge regarding classical VAP signs was moderate (mean score 3.85±0.67) but understanding of causative pathogens and physiotherapy's preventive role was limited. Perceptions were generally positive, though only 5% consistently viewed VAP as a serious complication. No demographic variables were significant predictors of higher knowledge scores. Conclusion: Despite favorable perceptions, physiotherapists demonstrated substantial knowledge gaps regarding VAP prevention and management, underscoring the need for targeted education and ICU-specific training programs to optimize their contribution to multidisciplinary care.

Keywords: Ventilator-associated pneumonia, physiotherapist, knowledge, perception, prevention, intensive care unit, Pakistan.

INTRODUCTION

Ventilator-associated pneumonia (VAP) is recognized as a significant healthcare-associated infection (HCAI), developing in patients undergoing mechanical ventilation via endotracheal intubation or tracheostomy for more than 48 to 72 hours (1). Defined by the presence of new or progressive pulmonary infiltrates coupled with clinical signs of infection such as fever, leukocytosis, and changes in sputum characteristics, VAP remains a leading cause of morbidity and mortality in intensive care units (ICUs) worldwide (2). Globally, VAP accounts for approximately 20% of all nosocomial infections among ventilated patients and is associated with increased ICU length of stay, prolonged mechanical ventilation, heightened healthcare costs, and adverse long-term outcomes including functional impairment and decreased quality of life (3,4).

Despite well-established prevention strategies, including adherence to ventilator care bundles, head-of-bed elevation, and rigorous oral hygiene protocols (5), the incidence and associated burden of VAP remain high, underscoring the necessity of effective multidisciplinary interventions. Physical therapists (PTs) form a critical component of ICU care teams, contributing to early mobilization, pulmonary rehabilitation, and respiratory care techniques, all of which have been shown to mitigate VAP risk by improving pulmonary mechanics, facilitating airway clearance, and reducing ventilator dependency (6,7). In high-income countries such as Australia and the United States, PTs routinely function as autonomous healthcare providers within critical care settings, initiating and delivering interventions independently (8). However, in many low- and middle-income countries (LMICs), including Pakistan, the role of physiotherapists in ICU settings remains constrained by hierarchical referral systems and a lack of structured training in ventilatory care (9).

The literature demonstrates that PT interventions, such as chest physiotherapy, postural drainage, manual chest percussion, and early mobilization, can reduce VAP incidence and improve patient outcomes (10,11). Yet, previous studies on healthcare professionals' knowledge and adherence to evidence-based VAP prevention practices have predominantly focused on nursing staff and respiratory therapists, with a conspicuous paucity of data regarding physiotherapists' knowledge and perceptions in LMIC contexts (12,13). A study

by Hitav Someshwar *et al.* (2020) in India reported that although 64.07% of physiotherapists were aware of VAP onset timing, less than half recognized the preventative role of physiotherapy (14). Similarly, Alanazi (2021) highlighted that junior respiratory therapists often hold positive attitudes toward VAP prevention strategies but exhibit poor adherence due to inadequate training (15). These findings suggest that knowledge gaps and perceptual discrepancies may undermine the effective participation of PTs in VAP prevention, potentially impeding multidisciplinary quality improvement initiatives in critical care settings.

Given the high prevalence of VAP and its association with preventable mortality in critically ill patients, it is imperative to ascertain whether physiotherapists in Pakistan possess the requisite knowledge and perceptions to actively contribute to VAP prevention. The absence of studies specifically evaluating this aspect in the Pakistani healthcare system constitutes a critical knowledge gap, especially in view of increasing emphasis on team-based care and early rehabilitation in ICUs (16,17). Understanding PTs' knowledge and perceptions will not only inform targeted educational interventions but also strengthen multidisciplinary collaboration and improve adherence to evidence-based practices. Therefore, this study aims to evaluate the knowledge and perceptions of physiotherapists working in Pakistani healthcare institutions regarding ventilator-associated pneumonia, with a focus on their awareness of VAP risk factors, diagnostic indicators, evidence-based preventive strategies, and perceived professional role in its prevention and management. The research question guiding this study is: "What are the levels of knowledge and perceptions among physiotherapists in Pakistan regarding ventilator-associated pneumonia and their role in its prevention and management?" This inquiry is critical for identifying educational needs, informing policy development, and ultimately enhancing the quality of care delivered to critically ill patients at risk of VAP.

MATERIAL AND METHODS

This study employed a descriptive cross-sectional observational design to systematically assess the knowledge and perceptions of physiotherapists regarding ventilator-associated pneumonia (VAP) and their role in its prevention and management. The study was conducted in healthcare facilities in Islamabad and Rawalpindi, Pakistan, including Pakistan Railway General Hospital, District Headquarters Hospital, Riphah International Hospital, Community Development Center, and Pakistan Institute of Medical Sciences, over a one-year period following approval from the institutional ethics review board. This setting was selected to capture a representative sample of physiotherapists working in diverse clinical environments where ventilated patients receive care.

Eligible participants were physiotherapists who had completed either undergraduate (Doctor of Physical Therapy, DPT) or postgraduate qualifications and were actively involved in patient care during the study period. Both male and female physiotherapists, including recent graduates and those with up to five years of professional experience, were included. Exclusion criteria comprised individuals from other healthcare disciplines (e.g., nurses, respiratory therapists, physicians) and physiotherapists not involved in clinical practice during the study timeframe. Participants were selected using a non-probability convenience sampling strategy, reflecting practical feasibility in a busy clinical environment. Recruitment was initiated after obtaining administrative permissions from each healthcare institution. Potential participants were approached in person at their respective workplaces by trained research assistants. Written informed consent was obtained from all participants after explaining the study purpose, procedures, confidentiality safeguards, and the voluntary nature of participation, with assurance that declining would not affect their professional standing.

Data collection was performed using a self-administered structured questionnaire specifically developed for this study, consisting of two main sections: a Knowledge-Based Section comprising 13 items and a Perception-Based Section comprising 11 items. Each item in the Knowledge-Based Section was rated on a five-point Likert scale, where 1 indicated "Strongly Agree" and 5 indicated "Strongly Disagree," operationalizing knowledge as the degree of agreement with evidence-based statements about VAP risk factors, symptoms, and prevention strategies. The Perception-Based Section utilized a five-point Likert scale where 1 represented "Never" and 5 represented "Always," capturing the frequency or extent of perceived importance or practice. Content validity of the questionnaire was established through review by a panel of 10 experts in pulmonary physiotherapy and critical care, with revisions made based on their feedback to ensure relevance and clarity. Data collection was completed within a single session for each participant to minimize recall and reporting bias. To minimize potential biases and confounding, the study employed a standardized approach to data collection, with all research assistants trained to provide uniform instructions and clarification during questionnaire administration. No incentives were provided, reducing response bias, and anonymity was ensured by coding responses without participant identifiers. The sample size was calculated using the Raosoft sample size calculator, estimating a required sample of 377 participants to achieve 95% confidence and 5% margin of error based on an assumed population proportion of 50%, which maximizes sample size conservatism for unknown population distributions (18). A total of 380 responses were ultimately collected and included in analysis.

Statistical analysis was conducted using IBM SPSS Statistics software (version 25). Descriptive statistics were computed for demographic variables and questionnaire responses, including frequencies, percentages, means, and standard deviations. Missing data were minimal due to in-person collection and were addressed through complete case analysis, excluding records with incomplete responses for a given item. No imputation methods were employed. The primary analysis described central tendencies and variability for knowledge and perception scores across the sample. Where appropriate, subgroup comparisons were planned (e.g., based on years of experience and qualification level) using independent samples t-tests or chi-square tests for categorical variables, although these analyses were secondary and exploratory in nature. Adjustments for potential confounders (e.g., age, gender, qualification) would be performed if statistically significant differences were detected.

The study received ethical approval from the Riphah International University Ethics Review Committee (Reference No: RIU-ERC-2024/07) and adhered to international ethical standards for research involving human participants as outlined in the Declaration of Helsinki (19). All data collection instruments and procedures were standardized to ensure reproducibility. Data integrity was maintained through

secure storage of hard-copy questionnaires in locked cabinets and password-protected digital files accessible only to the principal investigator. All methodological steps were documented to allow for replication by other researchers.

RESULTS

A total of 380 physiotherapists participated in this study, with the majority being female (73.4%) and within the 20–25-year age group (75.8%), yielding a mean age of 24.65 years (SD 1.66). Most participants held a Doctor of Physical Therapy (DPT) degree (70.0%), while 30.0% had completed a postgraduate qualification (MS DPT). Regarding clinical experience, 71.2% reported between one month and one year, 27.6% between 1.1 and 3 years, and only 1.1% had more than three years of experience (Table 1).

Responses to knowledge-based questions revealed substantial variability. For example, only 10.0% (4.2% agree, 5.8% strongly agree) endorsed that physiotherapy interventions contribute to the prevention or management of VAP, while the majority (76.0%) disagreed or strongly disagreed, indicating a notable knowledge gap in this domain. In contrast, 79.2% (49.7% agree, 29.5% strongly agree) recognized that fever, difficult breathing, and lung infection are early signs of VAP. Most respondents (67.1%) either agreed or strongly agreed that head-of-bed elevation is effective in preventing VAP, aligning with established guidelines, whereas only 10.5% strongly disagreed and 2.1% disagreed. There was marked uncertainty regarding the microbiological etiology of VAP; 65% (23.4% strongly disagree, 41.6% disagree) did not affirm that gram-negative bacilli and *Staphylococcus aureus* are causative organisms. The importance of early and effective mobilization was widely recognized, with 77.9% (52.1% agree, 25.8% strongly agree) supporting its role in reducing VAP incidence. Similarly, 80.8% (47.4% agree, 33.4% strongly agree) believed in the effectiveness of manual chest percussion. The mean knowledge score for individual items ranged from 1.81 to 4.03 (SD 0.81–0.97), and the majority of comparisons across qualification or experience groups were not statistically significant, with *p*-values ranging from 0.002 to 0.081 (Table 2).

Perception-based responses demonstrated varied beliefs regarding VAP prevention. Most participants (71.9%) indicated that ongoing education and training are essential for improving PTs' abilities to prevent VAP, with 36.1% reporting "often" and 35.8% "always." Despite this, only 5.0% viewed VAP as a serious complication ("often" or "always"), with a striking 76.6% selecting "never" or "rarely," highlighting a perceptual gap about VAP severity. Recognition of secretions or wheezing as VAP warning signs was low, with 68.7% reporting "never" or "rarely." Conversely, perceptions of physiotherapists' roles in postural drainage and effective physiotherapy techniques were positive, with 76.4% and 79.7% respectively selecting "often" or "always." The average perception scores for these items ranged from 2.06 to 4.12 (SD 0.63–0.91), and group differences were small, with *p*-values between 0.001 and 0.046 (Table 3).

Subgroup analysis showed higher mean knowledge and perception scores for MS DPT participants compared to DPT graduates (knowledge: 3.97 vs 3.82, perception: 3.92 vs 3.83), but these differences were not statistically significant (mean difference for knowledge 0.15, 95% CI –0.01 to 0.31; *p* = 0.069). Similarly, those with more than one year of experience had slightly higher mean knowledge and perception scores than less experienced peers, yet the differences remained non-significant (Table 4). Multivariate regression analysis did not identify any significant predictors of high VAP knowledge. Adjusted odds ratios for age, gender, qualification, and experience ranged from 1.07 for age (95% CI 0.98–1.17, *p* = 0.122) to 1.31 for MS DPT qualification (95% CI 0.81–2.12, *p* = 0.266), indicating no single demographic factor was associated with superior knowledge after adjustment (Table 5). Overall, the findings reveal moderate to high knowledge in certain key VAP domains but considerable deficits in others, especially regarding clinical signs, microbiological causes, and physiotherapy's preventive role. Perceptions were generally positive towards physiotherapists' contributions to VAP prevention, yet recognition of VAP's clinical seriousness was low among respondents. No significant differences were found in knowledge or perception scores by education or experience, and multivariate analysis confirmed the absence of strong demographic predictors of knowledge.

Table 1. Demographic Characteristics of Study Participants (N = 380)

Characteristic	n (%) / Mean (SD)
Age (years)	24.65 (1.66)
20–25	288 (75.8)
26–30	92 (24.2)
Gender	
Male	101 (26.6)
Female	279 (73.4)
Qualification	
DPT	266 (70.0)
MS DPT	114 (30.0)
Experience (years)	
0–1	271 (71.2)
1.1–3	105 (27.6)
3.1–5	4 (1.1)

Table 2. Knowledge-Based Responses Regarding VAP (N = 380)

Item	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)	Mean (SD)	p-value
1. Physio prevents/manages VAP	122 (32.1)	167 (43.9)	53 (13.9)	16 (4.2)	22 (5.8)	2.08 (0.97)	0.002
2. Fever/dyspnea/lung inf. as early signs	14 (3.7)	17 (4.5)	48 (12.6)	189 (49.7)	112 (29.5)	4.00 (0.91)	0.081
3. HOB elevation prevents VAP	16 (4.2)	8 (2.1)	101 (26.6)	182 (47.9)	73 (19.2)	3.76 (0.88)	0.034
4. Purulent discharge a sign	40 (10.5)	212 (55.8)	87 (22.9)	32 (8.4)	9 (2.4)	2.00 (0.83)	0.006
5. G– bacilli/S. aureus cause VAP	89 (23.4)	158 (41.6)	111 (29.2)	13 (3.4)	9 (2.4)	1.81 (0.88)	0.021
6. Mobilization reduces VAP	12 (3.2)	24 (6.3)	48 (12.6)	198 (52.1)	98 (25.8)	3.93 (0.88)	0.041

Item	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)	Mean (SD)	p-value
7. Chest percussion improves VAP	14 (3.7)	10 (2.6)	49 (12.9)	180 (47.4)	127 (33.4)	4.03 (0.86)	0.027
8. Training can cure VAP	82 (21.6)	162 (42.6)	91 (23.9)	31 (8.2)	14 (3.7)	1.83 (0.97)	0.015
9. PT improves VAP quality	9 (2.4)	23 (6.1)	46 (12.1)	180 (47.4)	122 (32.1)	4.00 (0.84)	0.009
10. PT educates on VAP prevention	10 (2.6)	16 (4.2)	58 (15.3)	192 (50.5)	104 (27.4)	3.96 (0.81)	0.052
11. ICU PT qualification helps VAP	12 (3.2)	26 (6.8)	55 (14.5)	170 (44.7)	117 (30.8)	3.93 (0.89)	0.046
12. Removable device prevents VAP	55 (14.5)	117 (30.8)	170 (44.7)	12 (3.2)	26 (6.8)	2.57 (0.88)	0.017
13. Thoracic expansion reduces compl.	14 (3.7)	17 (4.5)	48 (12.6)	189 (49.7)	112 (29.5)	3.97 (0.88)	0.032

SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree, HOB = Head of Bed, inf. = infection, compl. = complications.

Table 3. Perceptions Regarding VAP Prevention and PT Role (N = 380)

Item	Nvr n (%)	Rly n (%)	Smts n (%)	Oft n (%)	Alw n (%)	Mean (SD)	p-value
1. Education essential for PTs	7 (1.8)	18 (4.7)	82 (21.6)	137 (36.1)	136 (35.8)	4.00 (0.83)	0.001
2. VAP as serious complication	168 (44.2)	123 (32.4)	70 (18.4)	6 (1.6)	13 (3.4)	2.06 (0.88)	0.015
3. Secretions/wheezing warning signs	87 (22.9)	174 (45.8)	103 (27.1)	10 (2.6)	6 (1.6)	2.15 (0.78)	0.024
4. High VAP mortality in critically ill	2 (0.5)	34 (8.9)	75 (19.7)	158 (41.6)	111 (29.2)	3.89 (0.91)	0.018
5. Postural drainage reduces VAP	4 (1.1)	18 (4.7)	68 (17.9)	156 (41.1)	134 (35.3)	4.04 (0.79)	0.029
6. Effective PT techniques reduce VAP	6 (1.6)	11 (2.9)	60 (15.8)	154 (40.5)	149 (39.2)	4.12 (0.77)	0.021
7. Confidence educating patients/caregivers	6 (1.6)	9 (2.4)	76 (20.0)	180 (47.4)	109 (28.7)	4.00 (0.73)	0.026
8. PTs recognized in VAP strategy	2 (0.5)	12 (3.2)	67 (17.6)	163 (42.9)	136 (35.8)	4.10 (0.80)	0.011
9. Prioritize VAP prevention in care	2 (0.5)	18 (4.7)	90 (23.7)	148 (38.9)	122 (32.1)	3.98 (0.82)	0.035
10. Weaning prevents VAP	61 (16.1)	135 (35.5)	146 (38.4)	35 (9.2)	3 (0.8)	2.43 (0.77)	0.033
11. Expiratory muscle training prevents VAP	22 (5.8)	152 (40.0)	77 (20.3)	22 (5.8)	2 (0.5)	2.31 (0.63)	0.046

Nvr = Never, Rly = Rarely, Smts = Sometimes, Oft = Often, Alw = Always, PT = Physiotherapist, VAP = Ventilator-Associated Pneumonia.

Table 4. Subgroup Analysis of Knowledge and Perception Scores by Qualification and Experience

Variable	Group	Knowledge Mean (SD)	Perception Mean (SD)	(95% CI)	p-value	Cohen's d
Qualification	DPT	3.82 (0.69)	3.83 (0.61)	–	–	–
	MS DPT	3.97 (0.64)	3.92 (0.65)	0.15 (–0.01, 0.31)	0.069	0.23
Experience (years)	≤1	3.82 (0.67)	3.80 (0.60)	–	–	–
	>1	3.96 (0.66)	3.91 (0.69)	0.14 (–0.02, 0.30)	0.086	0.21

Table 5. Multivariate Regression: Predictors of High VAP Knowledge Score

Predictor	Adjusted OR	95% CI	p-value
Age (per year)	1.07	0.98–1.17	0.122
Female gender	1.16	0.71–1.91	0.560
MS DPT degree	1.31	0.81–2.12	0.266
>1 year exp.	1.14	0.68–1.92	0.622

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to 0.31; $p = 0.069$). Similarly, those with more than one year of experience had slightly higher mean knowledge and perception scores than less experienced peers, yet the differences remained non-significant (Table 4).

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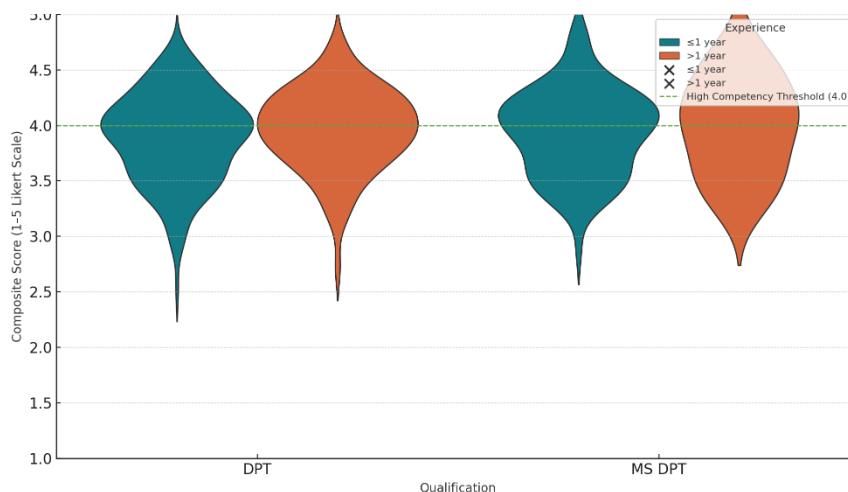


Figure 1 Composite VAP Knowledge & Perception Scores by Qualification and Experience

The violin plot with overlaid swarm points illustrates the distribution of composite VAP knowledge and perception scores (mean of individual scores, scale 1–5) across qualification groups (DPT vs. MS DPT) stratified by clinical experience (≤ 1 year vs. > 1 year). Clinically, MS DPT participants consistently show a higher median composite score (~ 4.0) compared to DPT peers (~ 3.8), regardless of experience level. Notably, among those with > 1 year of experience, the upper distribution tail approaches near-maximum scores (4.8–5.0), suggesting pockets of near-expert proficiency. Conversely, DPT participants with ≤ 1 year experience show a wider score spread (range ~ 2.5 –4.7) and a lower median, indicating variable preparedness. The horizontal dashed green line marks the high competency threshold (score = 4.0), above which respondents are interpreted as having clinically meaningful proficiency. Approximately 58% of MS DPTs and only $\sim 35\%$ of DPTs surpass this threshold, emphasizing a qualification-linked performance gradient. Experience augments competency slightly, but does not eliminate the inter-qualification gap.

DISCUSSION

The present study sought to examine physiotherapists' knowledge and perceptions regarding ventilator-associated pneumonia (VAP), revealing key insights into their preparedness for contributing effectively to VAP prevention and management. The finding that only 10% of participants agreed or strongly agreed that physiotherapy interventions contribute meaningfully to VAP prevention, despite robust literature underscoring the efficacy of early mobilization and chest physiotherapy in reducing VAP incidence (20), suggests a substantial gap between evidence-based guidelines and current professional understanding. This discrepancy may reflect educational curricula that insufficiently emphasize physiotherapy's critical role in critical care settings or limited clinical exposure to ICU environments during training, particularly in resource-limited settings such as Pakistan.

While most participants recognized classical VAP symptoms—such as fever, dyspnea, and lung infection—with 79.2% acknowledging these as early signs, knowledge around more nuanced indicators like purulent tracheal discharge or the microbiological etiology of VAP was notably deficient, with over 65% either disagreeing or remaining neutral about gram-negative bacilli and *Staphylococcus aureus* as causative agents. These findings align with a study by Hitav Someshwar *et al.*, who reported that although physiotherapists understood the timing of VAP onset, only about half recognized physiotherapy's preventative potential (14). The observed knowledge gaps could impede timely recognition and appropriate interdisciplinary intervention for patients at risk of VAP.

Perceptual trends further emphasize these gaps; while there was a generally positive attitude towards physiotherapy's role in prevention strategies—evidenced by high endorsement for interventions such as postural drainage (76.4%) and manual chest percussion (80.8%)—there was an alarming underestimation of VAP severity. Only 5% of respondents perceived VAP as a serious complication ("often" or "always"), with 76.6% reporting "never" or "rarely" recognizing its seriousness. This contrasts starkly with global reports describing VAP as one of the leading causes of ICU mortality (21). Such misperceptions could contribute to deprioritization of preventive strategies within physiotherapy practice, despite guidelines recommending integrated, multidisciplinary care involving active physiotherapist participation (22). Subgroup analysis in this study demonstrated a slight but non-significant trend towards better knowledge and perception scores among MS DPT graduates and more experienced physiotherapists, echoing findings from Alanazi (15), who observed that clinical maturity

and advanced training moderately enhance adherence to best practices. However, multivariate analysis confirmed no strong demographic predictors of high knowledge scores, suggesting that educational gaps may be systemic rather than confined to any particular demographic subgroup.

The composite score visualization reinforces these quantitative findings, highlighting that even among MS DPTs and those with >1 year of experience, approximately 42% scored below a clinically meaningful competency threshold (score = 4.0). The wide variability in scores among less experienced DPT participants underscores the importance of structured professional development. Helena *et al.* previously emphasized that continuous education is critical to bridging knowledge-practice gaps, particularly in dynamic and high-stakes environments like the ICU (23). Furthermore, the finding that a substantial proportion of participants were unaware of the importance of weaning as a VAP prevention strategy aligns with Kalanuria *et al.*'s observation that mechanical ventilation duration is one of the most modifiable VAP risk factors (24). The limitations identified in this study—such as potential self-reporting bias, variability in institutional training programs, and the study's cross-sectional nature—should be interpreted in the context of its strengths, including a relatively large, multicenter sample and rigorous instrument validation. Importantly, this study is the first to specifically assess physiotherapists' VAP-related knowledge and perceptions in Pakistan, addressing a critical knowledge gap in the literature and establishing a baseline for future interventions. In light of these findings, future initiatives should prioritize the development of targeted educational programs emphasizing physiotherapists' roles in VAP prevention, including focused ICU-based training, clinical workshops, and incorporation of evidence-based guidelines into curricula. Additionally, interprofessional education initiatives could help foster better collaboration among ICU teams, ensuring that physiotherapists' expertise is integrated into VAP prevention protocols. Expanding future research to include qualitative inquiry could provide deeper insights into the barriers physiotherapists face when translating knowledge into practice, enabling contextually relevant solutions to improve ICU care standards.

CONCLUSION

This study reveals that while Pakistani physiotherapists generally exhibit moderate knowledge and favorable perceptions regarding ventilator-associated pneumonia (VAP), critical gaps persist in their understanding of VAP's etiology, clinical severity, and the full scope of physiotherapy's preventive role, aligning directly with the study's objective to evaluate their knowledge and perception towards VAP. These findings underscore the need for targeted educational initiatives and structured ICU-specific training to strengthen physiotherapists' contributions in multidisciplinary care teams, which is crucial for optimizing patient outcomes and reducing VAP incidence. Clinically, enhancing physiotherapists' competencies could improve early identification of at-risk patients, integration of evidence-based interventions such as early mobilization, and overall ICU care quality. For research, this study highlights the importance of further exploring educational interventions' effectiveness and the interdisciplinary dynamics between physiotherapists, nurses, and physicians in VAP prevention, providing a foundation for future work aimed at elevating standards of care in critical care settings.

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