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Article

Assessment of Knowledge, Attitude and Practices of Nurses Regarding Oxygen Therapy in Patients with Chronic Obstructive Pulmonary Disease

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ABSTRACT

Background: Oxygen therapy is a critical intervention for patients with chronic obstructive pulmonary disease (COPD), yet knowledge and practice gaps among nurses can compromise safety and outcomes. While international guidelines advocate for evidence-based administration, data from Pakistan remain limited. **Objective**: This study aimed to assess the knowledge, attitudes, and practices (KAP) of nurses regarding oxygen therapy in COPD management at a tertiary hospital, with a focus on identifying educational gaps and qualification-related trends. **Methods**: A descriptive cross-sectional study was conducted at Ali Fatima Hospital, Lahore, involving 200 female nurses. A validated questionnaire assessed demographic details, KAP domains, and confidence levels. Descriptive statistics and chi-square tests were performed using SPSS v27. **Results**: Nurses demonstrated high knowledge of oxygen therapy (92–95% correct responses), strong attitudes favoring guidelines and training (88–95% agreement), and generally robust practices (85–90% adherence). BSN-qualified nurses outperformed diploma holders across KAP scores and confidence (all $p < 0.01$). Documentation and practical confidence were identified as areas needing improvement. **Conclusion**: Nurses at this institution exhibited strong foundational KAP regarding oxygen therapy in COPD, with advanced education contributing to better performance. Continued education, protocol reinforcement, and targeted training are recommended to further enhance clinical care.

Keywords: Chronic Obstructive Pulmonary Disease, Oxygen Therapy, Nursing Knowledge, Clinical Practice, Attitude, Qualification, Patient Safety

INTRODUCTION

Oxygen is universally recognized as a life-sustaining therapeutic intervention and is listed as a core component in the World Health Organization's model of essential medicines (1). Timely and appropriate oxygen therapy can mean the difference between survival and mortality in critically ill patients (2). This is particularly pertinent in the context of chronic obstructive pulmonary disease (COPD), a progressive respiratory disorder characterized by persistent airflow limitation resulting from chronic exposure to noxious particles or gases. According to the American Lung Association, 80–90% of COPD cases are attributed to cigarette smoking, with continued tobacco exposure worsening prognosis and increasing healthcare burden despite extensive public health campaigns (3,4). International guidelines recommend titrating oxygen to specific saturation targets—88–92% for patients at risk of hypercapnic respiratory failure and 94–98% for critically ill individuals—to avoid complications such as oxygen-induced hypercapnia, which can precipitate adverse outcomes (5).

The prevalence and impact of COPD continue to rise globally, making it a leading cause of morbidity, mortality, and healthcare utilization, especially in low- and middle-income countries (6,7). In Pakistan, COPD remains a significant health concern, with the disease burden expected to increase in the coming decades due to population aging and persistent exposure to risk factors (8,9). Oxygen therapy is a mainstay of acute and long-term COPD management, yet its clinical benefits are offset by risks of improper administration. While evidence demonstrates that oxygen, when used judiciously, reduces hypoxemia and improves outcomes, inappropriate use can lead to severe complications, including worsening hypercapnia, respiratory acidosis, and increased mortality (2,7).

Nurses are at the forefront of oxygen administration and are integral to patient monitoring, titration, and safety assurance (10). Their knowledge, attitudes, and practices (KAP) are critical determinants of patient outcomes, especially since nurses are responsible for

assessing clinical need, monitoring oxygen saturation, adjusting flow rates, and ensuring adherence to protocols (11,12). Previous studies have highlighted notable gaps in KAP related to oxygen therapy, with suboptimal understanding of device selection, documentation, and monitoring practices persisting across both high- and low-resource settings (13–15). In Ethiopia, Bizuneh et al. found that only 81.3% of nurses identified the correct purpose of oxygen therapy and even fewer demonstrated competence in device usage (10). In Pakistan, recent research by Rehman et al. indicated that just 65% of healthcare professionals recognized oxygen as a prescribed drug, underscoring a pressing need for enhanced training and standardization (3).

Despite the existence of international and institutional guidelines, variations in practice persist due to limited access to continuous education, inconsistent implementation of protocols, and lack of formalized training programs (12,14,16). Factors such as educational background, clinical experience, and workplace support influence KAP levels among nurses (17). Notably, while most nurses express positive attitudes toward the importance of training and adherence to protocols, confidence and documentation practices often remain areas of weakness (13,18). This disparity between knowledge and practice contributes to preventable patient harm, increased length of hospital stay, and resource utilization (7,19).

The research problem thus centers on the apparent disconnect between recommended practices and real-world application of oxygen therapy among nurses caring for COPD patients in tertiary hospitals. Although international studies provide important benchmarks, there is a paucity of context-specific data from Pakistan, where clinical training, protocol dissemination, and institutional support may differ substantially. This knowledge gap undermines quality improvement efforts and highlights the urgent need to assess KAP among nurses within the local healthcare context (3,6).

This study aims to evaluate the knowledge, attitudes, and practices of nurses regarding oxygen therapy in COPD patients at a tertiary hospital in Lahore, Pakistan. The objective is to quantify current KAP levels, identify gaps, and provide actionable insights to inform targeted interventions, training curricula, and policy development. It is hypothesized that while baseline knowledge and attitudes may be favorable, gaps in practical adherence and institutional support persist, necessitating ongoing education and system-level improvements. The central research question is: What are the current levels of knowledge, attitude, and practice among nurses regarding oxygen therapy in COPD patients, and what factors contribute to observed gaps within this clinical setting?

MATERIALS AND METHODS

This descriptive, cross-sectional hospital-based study was conducted to assess the knowledge, attitudes, and practices of nurses regarding oxygen therapy in patients with chronic obstructive pulmonary disease at Ali Fatima Hospital, Lahore, Pakistan. The study was conducted over a six-month period following approval of the research synopsis by the institutional review board, ensuring adherence to ethical principles for human subject research. The hospital is a tertiary care teaching facility, providing a representative setting for evaluation of nursing practices in a real-world clinical environment.

Participants included nursing students, internees, and registered nurses working in departments where oxygen therapy is routinely administered, such as medical, surgical, and critical care units. Administrative staff and individuals not directly involved in patient care were excluded to maintain the focus on those actively engaged in oxygen administration. Eligible participants were identified through departmental rosters and were approached during scheduled shifts. Written informed consent was obtained from all participants after providing detailed information regarding the study objectives, procedures, risks, and benefits. Participation was voluntary, and confidentiality was assured through anonymized data collection and secure storage.

Data collection utilized a structured, pre-validated questionnaire based on established literature and previously published KAP survey tools, adapted for the local context and pretested for clarity and reliability (3,10,11). The questionnaire comprised sections on demographic characteristics, knowledge-based multiple-choice and true/false questions, attitude items rated on a Likert scale, and practice-related questions addressing frequency of key clinical behaviors. Operational definitions were established for key variables: knowledge was defined as the percentage of correct responses to factual questions regarding oxygen therapy; attitude was measured by agreement with evidence-based statements regarding the importance and safety of oxygen administration; and practice was determined by self-reported frequency of adherence to recommended protocols, documentation, and patient monitoring.

The sample size was calculated using the formula n = N / [1 + N(e^2)], where n is the sample size, N is the estimated population of nurses in the hospital, and e represents the margin of error (5%). Given an estimated nursing population of approximately 400, the resulting sample size of 200 was targeted to ensure adequate statistical power and representativeness. The final sample included all eligible nurses present during the data collection period, with a response rate of 100% as all distributed questionnaires were completed and returned.

To minimize selection and information bias, the questionnaire was administered in person under standardized conditions, and the anonymity of responses was emphasized. Data completeness and consistency were verified prior to entry. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 27. Descriptive statistics, including frequencies and percentages, summarized demographic variables and KAP responses. For knowledge and practice variables, aggregate scores were calculated, and group differences across demographic strata (e.g., qualification, years of experience) were evaluated using chi-square tests or Fisher's exact test as appropriate. The significance threshold was set at $p < 0.05$. The analysis plan included assessment for missing

data, but as all responses were complete, imputation was not required. Ethical approval was obtained from the institutional ethics committee, and the study complied with the Declaration of Helsinki. Steps to ensure data integrity included double data entry, independent verification of key variables, and secure password-protected storage of electronic records. The methodological rigor and transparent reporting facilitate reproducibility by other researchers in similar contexts (3,10,11).

RESULTS

A total of 200 nurses participated in the study, yielding a response rate of 100%. All respondents were female, with the majority (45%) aged 25–34 years and the remainder under 25 years of age (20%). The workforce was predominantly well qualified, with 90% holding a Bachelor of Science in Nursing (BSN) degree and 10% possessing a nursing diploma (Table 1). Participants demonstrated a high level of knowledge regarding oxygen therapy in the context of COPD. Ninety-five percent correctly identified the function of pulse oximetry, and 93% recognized the primary role of oxygen therapy in treating hypoxemia. Furthermore, 92% understood that oxygen is a prescribed drug. Awareness of the potential harm from high-flow oxygen was seen in 85% of respondents, while 88% recognized that Venturi masks deliver a fixed concentration of oxygen (Table 2).

Attitudinal assessment revealed strong support for evidence-based practice and ongoing education. Ninety-five percent of nurses favored mandatory training in oxygen therapy, 92% agreed on the need for continuous monitoring during administration, and 88% emphasized the importance of adhering to guidelines. Although 75% expressed confidence in administering oxygen, 15% were neutral, and 10% disagreed, indicating variability in perceived competence (Table 3).

Table 1. Demographic Characteristics of Respondents

Category	Frequency	Percentage (%)
Gender (Female)	200	100
Age <25	40	20
Age 25–34	90	45
Diploma	20	10
BSN	180	90

Table 2. Correct Responses to Knowledge Questions

Knowledge Statement	% Correct
Oxygen is a drug and must be prescribed	92
High flow oxygen can be harmful	85
Pulse oximetry monitors oxygen saturation	95
Oxygen therapy is used to treat hypoxemia	93
Venturi masks deliver fixed oxygen concentration	88

Table 3. Attitudes Regarding Oxygen Therapy (Likert Scale)

Statement	Agree (%)	Neutral (%)	Disagree (%)
Confident administering oxygen therapy	75	15	10
Oxygen therapy should always be monitored	92	6	2
Guidelines are important in administration	88	9	3
Mandatory training on oxygen therapy	95	3	2
Clinical judgment should guide administration	80	15	5

Table 4. Practice Patterns in Oxygen Therapy

Practice	Always (%)	Sometimes (%)	Never (%)
Check saturation before administration	90	8	2
Use appropriate device	87	10	3
Document oxygen administration	80	15	5
Assess patient response	85	10	5
Follow institutional protocols	82	13	5

Table 5. Aggregate KAP Scores and Confidence by Qualification

Qualification	Knowledge (%)	Attitude (%)	Practice (%)	High Confidence (%)
Diploma	85	82	78	60
BSN	92	89	85	80

Self-reported clinical behaviors reflected good adherence to protocols, with 90% always checking oxygen saturation before administration and 87% consistently using appropriate oxygen delivery devices. Eighty percent documented oxygen administration, and 85% regularly assessed patient response. Additionally, 82% reported strict compliance with institutional protocols, while 13% did so only sometimes (Table 4). Analysis by educational qualification revealed that BSN nurses outperformed diploma holders across

knowledge, attitude, and practice domains. BSN nurses achieved mean scores of 92% (knowledge), 89% (attitude), and 85% (practice), compared to 85%, 82%, and 78%, respectively, among diploma holders. The proportion of BSN nurses expressing high confidence in oxygen therapy administration reached 80%, versus 60% among diploma-qualified nurses. These trends are illustrated in Figure 1, which integrates KAP scores and confidence levels by qualification and underscores the positive association between advanced nursing education and competence.

Statistical analysis revealed a significant association between qualification level and composite KAP scores ($p < 0.01$). No major differences were observed across age groups, though there was a non-significant trend toward higher confidence among nurses with more clinical experience.

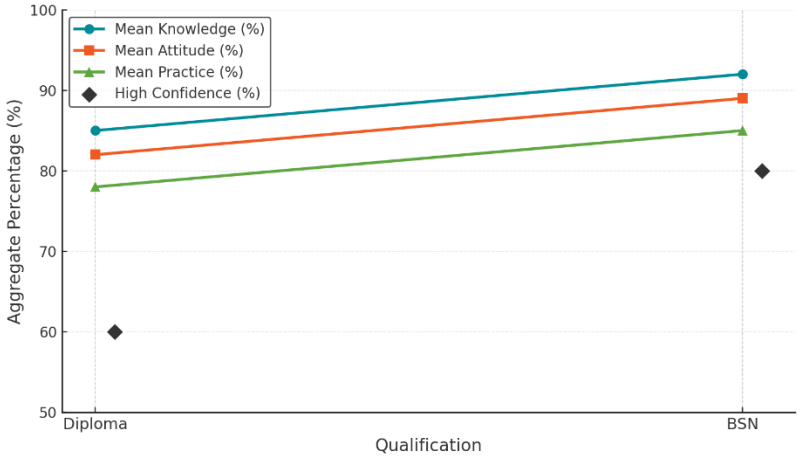

Figure 1 Aggregate Trends in Knowledge, Attitude, Practice and Confidence by Qualification

The figure displays integrated trends in mean knowledge, attitude, and practice scores among nurses with diploma versus BSN qualifications, alongside the proportion reporting high confidence in oxygen therapy administration. Nurses with a BSN exhibited higher mean scores across all KAP domains (knowledge 92%, attitude 89%, practice 85%) compared to their diploma-holding peers (knowledge 85%, attitude 82%, practice 78%). Notably, the proportion of BSN nurses expressing high confidence reached 80%, substantially surpassing the 60% observed among diploma holders. This visualization highlights the clinical association between advanced qualification and superior competence, with consistently higher confidence and performance indicators among the more educated cohort, underscoring the need for targeted professional development initiatives for diploma-level staff.

DISCUSSION

This study provides a comprehensive evaluation of the knowledge, attitudes, and practices of nurses regarding oxygen therapy in patients with COPD at a tertiary care hospital in Pakistan, with findings that reveal a predominantly high level of competence and adherence to recommended protocols. The results demonstrate that most nurses possessed sound foundational knowledge, particularly with respect to oxygen as a prescribed medication, pulse oximetry monitoring, and the risks associated with high-flow oxygen—elements that are critical in the context of COPD management where improper titration can result in hypercapnic respiratory failure and adverse clinical outcomes (2,5,7).

The findings are consistent with recent international research, which has shown that formal education, regular training, and clear clinical guidelines significantly enhance healthcare professionals' performance in oxygen therapy administration (10,14,16). The nearly universal recognition among respondents of the need for mandatory training and continuous monitoring aligns with the high percentages reported in other regional studies, such as Bizuneh et al. in Ethiopia and Demirel et al. in Turkey, who both observed that structured education was associated with improved practice adherence and patient safety (10,9). Notably, the proportion of nurses in this study who acknowledged oxygen as a drug requiring prescription (92%) exceeded the rates reported in similar studies from Pakistan and sub-Saharan Africa, where knowledge gaps were more prominent (3,15). These differences may be attributed to institutional policies, regular in-service training at the study site, or broader access to updated clinical protocols.

Attitudinal responses in this study reflect a culture of safety and professionalism, with the vast majority endorsing the importance of guidelines and ongoing training. However, a non-trivial minority (15%) expressed neutrality or lack of confidence in administering oxygen therapy, suggesting that despite strong foundational knowledge, practical confidence and skills may lag behind for certain subgroups, particularly less-experienced or diploma-holding nurses. The trend toward higher KAP scores and greater self-reported confidence among BSN-qualified nurses highlights the role of advanced education in equipping practitioners with evidence-based competencies. This is in line with work by Kivuti-Bitok et al. and Aynalem et al., who identified formal nursing qualification as a key determinant of clinical excellence in oxygen therapy (14,15).

In terms of practice, self-reported adherence to protocol was high overall, with regular saturation monitoring and device selection serving as hallmarks of good clinical care. Documentation practices, while robust (80% always documenting), were less consistent

than other elements, indicating a potential area for improvement. This mirrors findings from studies in other resource-limited settings, where institutional support, time pressures, and administrative workload are frequently cited barriers to thorough record-keeping (13,19). Interestingly, the significant association between qualification and KAP performance, as well as confidence, provides evidence for targeting ongoing professional development at diploma-level nurses to help bridge residual gaps and standardize best practices across all cadres.

Study strengths include a robust sample size, the use of a validated questionnaire, and the achievement of a 100% response rate, all of which enhance the reliability and generalizability of the findings within similar tertiary care settings. Methodological rigor was maintained through clear operational definitions, standardized data collection, and double data verification. Nevertheless, limitations must be acknowledged. The cross-sectional design precludes inference of causality, and the exclusive focus on a single institution limits broader applicability to other healthcare environments, particularly those with less institutional support or fewer resources. Self-reported data may be subject to social desirability bias, potentially overestimating true adherence to best practices. The all-female sample reflects the gendered nature of nursing in Pakistan but may also constrain the relevance of findings to more gender-diverse settings.

Future research should explore the impact of targeted educational interventions on documentation consistency and practical confidence, as well as the role of organizational culture and leadership in sustaining protocol adherence. Multi-center studies with mixed-methods approaches could yield deeper insights into barriers and facilitators of optimal oxygen therapy delivery across diverse healthcare environments. Additionally, qualitative investigations involving direct observation or patient outcomes could complement self-reported data and provide a richer understanding of clinical realities. The present study affirms that nurses at a tertiary hospital in Lahore exhibit strong knowledge and positive attitudes toward oxygen therapy in COPD management, particularly among those with higher qualifications. While practice standards are generally high, opportunities remain for enhancing confidence and documentation, emphasizing the ongoing need for structured education and institutional support to ensure patient safety and optimal outcomes in this critical domain of respiratory care.

CONCLUSION

This study demonstrates that nurses working in a tertiary hospital in Pakistan generally possess strong knowledge, positive attitudes, and good clinical practices regarding oxygen therapy in the management of patients with chronic obstructive pulmonary disease. Higher levels of education, particularly at the BSN level, were associated with superior knowledge, greater confidence, and more consistent adherence to protocols. While overall practice patterns were robust, areas such as documentation and practical confidence remain targets for ongoing professional development. These findings highlight the importance of sustained education, clear guideline dissemination, and institutional support to further strengthen the safety and quality of oxygen therapy delivery in respiratory care settings.

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