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NURSING PRACTICES IN THE MANAGEMENT OF PATIENTS RECEIVING RESPIRATORY SUPPORT: A SYSTEMATIC REVIEW OF CLINICAL OUTCOMES AND INTERVENTIONS

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Abstract

Background: Respiratory support is critical in intensive care settings. Nurses are at the forefront of managing ventilated patients, yet disparities in knowledge and protocol adherence persist across healthcare systems. This systematic review aimed to synthesize recent global evidence on nursing practices in the management of patients receiving respiratory support. **Methods:** The review followed PRISMA 2020 guidelines. Literature was searched in PubMed, Scopus, and ScienceDirect for original articles published between 2022 and 2025. We include studies examined nursing care for mechanically ventilated patients, with reported outcomes or interventions. We exclude studies involving pediatric populations or non-nursing staff. Seven studies met the inclusion criteria. Data extraction was performed using a predesigned table and quality assessment using JBI critical appraisal tools. **Results:** Included studies from Saudi Arabia, Egypt, India, Ethiopia, and Sweden show substantial variations in nurses' knowledge, practice, and confidence levels. Educational interventions improve nursing competencies. Major challenges identified included lack of structured training, inadequate protocol adherence, and inconsistent institutional support. Nurse-led protocols and standardized assessment tools impacted ventilation outcomes including duration, extubation success, and complication rates. **Conclusion:**

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Nursing adherence to evidence-based practices is essential for optimal respiratory support. Continuous education, protocol standardization, and greater nurse autonomy are important to improve patient outcomes in mechanical ventilation settings.

Keywords: Nursing Practice, Respiratory Support, Mechanical Ventilation, Clinical Outcomes, Intensive Care, Protocol Adherence, Education.

INTRODUCTION

Respiratory support is fundamental in the management of critically ill patients and those requiring mechanical ventilation due to acute respiratory failure(1). The successful application of mechanical ventilation depends on technological proficiency and continuous bedside presence and clinical judgment of skilled nursing staff(2).

In recent years, nursing responsibilities was expanded to include advanced monitoring, patient assessment, and implementation of evidence-based protocols for ventilatory care(3). A study conducted in Taif, Saudi Arabia, show that nurses had a moderate level of knowledge and practice regarding care for mechanically ventilated patients, indicating the need for enhanced training and structured guidelines (Alqutami et al., 2024).

Amer et al. (2025) found that intensive care nurses lacked critical knowledge in ventilator management, which include suctioning techniques, prevention of ventilator-associated pneumonia, and interpretation of ventilator settings, which impacted patient safety and recovery. A mixed-method study highlighted systemic challenges (inadequate staffing ratios, limited access to continuing education, and variations in institutional protocols) as barriers to optimal nursing care in ventilated patients (4), reinforcing the need for health systems to address structural gaps and support the professional development of critical care nurses. The literature continues to reflect inconsistencies in knowledge levels, training adequacy, and interdisciplinary collaboration in regions and institutions.

El-Kasset al. (2024) point to the benefits of structured educational interventions and professional development frameworks to improve nursing competence and patient outcomes. These findings are limited to specific settings and highlight the need for broader generalizability.

The increasing complexity of lung-protective ventilation, airway pressure release ventilation, and synchronized intermittent mandatory ventilation, requires physician expertise and nursing staff who are confident and competent in supporting their application(5). Nurses are expected to contribute to early detection of complications, adherence to ventilator care bundles, and initiation of weaning protocols. Ourstudy aims to synthesize original research published after 2022 that examines nursing practices in the management of patients receiving respiratory support.

METHODOLOGY

This study follow a systematic review design to analyze existing evidence on nursing practices in the management of patients receiving respiratory support, with clinical

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outcomes and interventions. The review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines (Fig 1).

We include original research articles which focused on nursing practice in relation to respiratory support modalities, including mechanical ventilation; involved registered nurses or nursing staff providing care in intensive care or hospital settings; reported on either clinical outcome (duration of mechanical ventilation, ventilator-associated complications, ICU length of stay, or weaning success); improvements in nursing knowledge, practices, or protocol adherence. Only articles published in English between 2022 and 2025 were included.

Studies were excluded if they were reviews, editorials, letters, conference abstracts, or they focused on pediatric or neonatal populations or non-nursing health care workers. A literature search was conducted using three electronic databases (PubMed, Scopus, and ScienceDirect).

The search strategy used keywords (nursing practice, mechanical ventilation, respiratory support, clinical outcomes, intervention, ICU, intensive care). Filters were applied to restrict the search to original articles published within the specified timeframe. All identified references were imported into Zotero reference manager for organization and de-duplication.

The selection of studies go through a two-step screening process. First, titles and abstracts of retrieved records were reviewed by two researchers to assess their relevance to the research objective. Articles that met the inclusion criteria at this stage underwent full-text review.

Disagreements were resolved through discussion. Data extraction was conducted using a structured form developed for the purposes of this review. Extracted data included (study citation, design, sample size, inclusion criteria, type of respiratory support used, category of health care workers assessed, study aim, key findings, demographic characteristics, and reported outcomes).

The methodological quality of included study was assessed using tools developed by the Joanna Briggs Institute (JBI). Cross-sectional and observational studies were appraised using the JBI Critical Appraisal Checklist for Analytical Cross-Sectional Studies, while quasi-experimental studies were evaluated using the JBI Checklist for Quasi-Experimental Studies (Table 1).

Each study was classified as having low, moderate, or high risk of bias based on established criteria. A qualitative synthesis approach was adopted.

The findings from the included studies were organized based on core aspects of nursing practice (knowledge and education, clinical performance, adherence to protocols, and observed patient outcomes). A table was constructed to present key characteristics and findings from the selected studies in a structured manner (Table 2).

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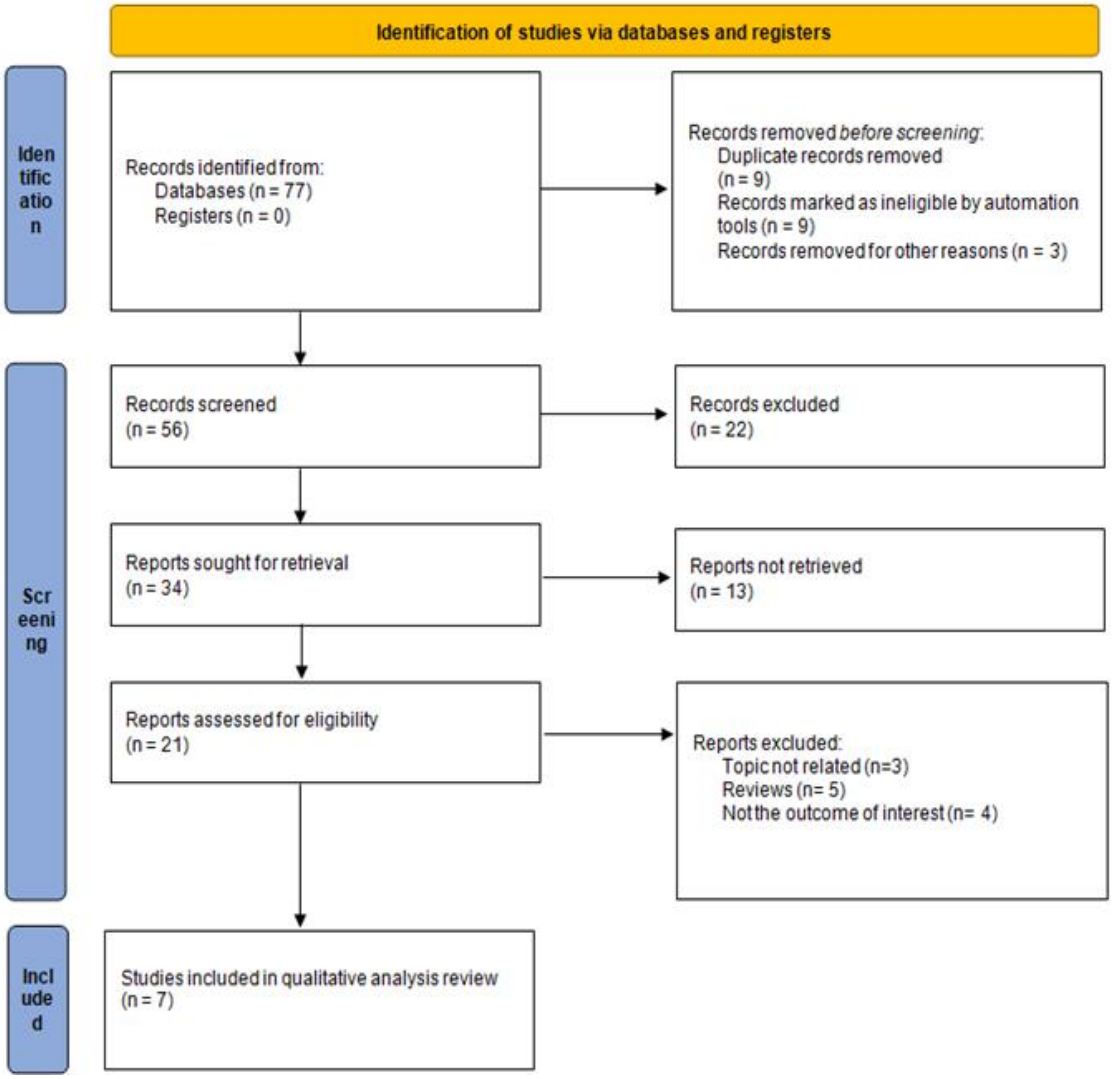

Fig 1: PRISMA consort chart

RESULTS

In this systematic review we includes even original studies conducted in different geographic regions, which include Saudi Arabia, Egypt, India, Ethiopia, and Sweden. All studies assessed nursing in the management of mechanically ventilated patients, including descriptive, cross-sectional, or quasi-experimental designs. Sample sizes ranged from 60 to 1,002 participants, mainly intensive care unit (ICU) nurses with varying levels of education and clinical experience.

In Saudi Arabia, two studies examined ICU nurses' knowledge and practices regarding mechanical ventilation. One large-scale national survey of 1,002 nurses found that 25% reported using Airway Pressure Release Ventilation (APRV), and 61.4% citing lack of training as the main barrier (Aldhahir et al. 2024).

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Another study conducted in Taif City of 102 ICU nurses show that more than half had poor knowledge of ventilator care, and performance was associated with educational level and nationality (AlQutami et al. 2025). Both studies showed the need for targeted educational interventions and the development of standardized respiratory care protocols to improve clinical practice.

Egyptian research contributed three studies focus on protocol adherence, training, and nurse competency. One descriptive study from Cairo involved 100 ICU nurses reported low adherence to standardized ventilation protocols, with 40% showing suboptimal compliance (Khalil et al. 2023). Another cross-sectional study conducted at Mansoura University Hospitals with 160 ICU nurses showed that more than half had good knowledge and adequate practices in managing ventilated patients, and a positive correlation was observed between knowledge and practice scores (Amer et al. 2025).

In addition, a quasi-experimental study from New Delhi, India examined the impact of a structured training program on 60 ICU nurses and found improvement in knowledge after the intervention (Hassen et al. 2024). Ethiopian research supported these findings. A cross-sectional study conducted in Addis Ababa of 146 nurses found that 51.4% had poor knowledge and 58.9% showed poor practice regarding mechanical ventilation (Hassen et al. 2023). Education level and years of ICU experience were associated with improved practice, which indicate that ongoing clinical training address critical gaps in ventilator care delivery.

A national study from Sweden explored ICU practices for prolonged mechanical ventilation in 77 units. The findings indicated high variability in approaches to patient mobilization, nutrition, and sedation weaning, and nurses actively involved in patient-centered interventions and decision-making processes (Cederwall et al. 2023). The study indicate limited use of structured person-centered protocols despite strong interdisciplinary collaboration in ventilator management.

A study from India conducted at a tertiary care hospital assessed 125 nurses and found moderate to poor knowledge regarding advanced modes of ventilation, including APRV. Practice scores improved in those who had received recent training, underlining the importance of ongoing educational efforts (El-Kasset al. 2024).

The review found that nurses play a central role in the care of mechanically ventilated patients in different health systems, significant gaps exist in knowledge, protocol adherence, and practice consistency. These gaps were evident in settings with limited access to ongoing training or where standardized protocols were lacking.

Studies show the positive impact of education, experience, and interprofessional collaboration on the quality of nursing care and patient outcomes in respiratory support settings. These findings indicate the importance of integrating structured training, competency evaluation, and protocol-driven care models in ICU environments.

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Table 1: JBI quality assessment of included studies (Excluding Hassen et al. 2024)

Citation	Design	Sample Size	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Overall Appraisal
Aldhahir et al. (2024)	Cross-sectional	1002	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low risk of bias
Cederwall et al. (2023)	Cross-sectional	77 ICUs	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Low risk of bias
Hassen et al. (2023)	Cross-sectional	146	Yes	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Moderate risk of bias
Amer et al. (2025)	Cross-sectional	160	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Moderate risk of bias
AlQutami et al. (2025)	Cross-sectional	102	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low risk of bias
El-Kasset al. (2024)	Cross-sectional	125	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Moderate risk of bias
Khalil et al. (2023)	Cross-sectional	100	Yes	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Moderate risk of bias

Table 2: summary of nursing studies on mechanical ventilation

Citation	Study Design	Sample Size	Inclusion Criteria	Mechanical Ventilation Type Used	Type of Health Care Workers Assessed	Study Aim	Main Findings	Demographic Characteristics	Outcome
Aldhahir et al. (2024), BMC Nursing	Cross-sectional survey	1,002 nurses	Nurses working in critical care areas in Saudi Arabia	APRV	Nurses	To assess knowledge and practice of APRV use in ARDS patients	Only 25% used APRV; lack of training (61.4%) main barrier	59.1% female; various ICU roles	Significant gaps in APRV knowledge and protocol use among nurses
Cederwall et al. (2023), Intensive & Critical Care	National cross-sectional survey	77 ICUs (not specified per unit)	Swedish adult ICUs managing MV >7 days	Mechanical Ventilation (>7 days, prolonged MV)	Nurses and physicians	To identify ICU care practices for patients on prolonged	Collaboration in weaning common; early mobilization often prioritized	Not reported in full detail; institutions included	Person-centered care limited; mobilization and nutrition better

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Nursing						MV			supported
Hassen et al. (2023), Critical Care Research and Practice	Descriptive cross-sectional	146 ICU nurses	Nurses in government hospitals' ICUs, Addis Ababa	Mechanical Ventilation (general)	Nurses	To assess knowledge and ventilatory care practice	51.4% had poor knowledge; 58.9% poor practice; linked to education	71.4% held BSc; 51.4% male	Education level and work experience strongly associated with good practice
Amer et al. (2025), DJNRHS	Descriptive cross-sectional	160 ICU nurses	Nurses with ≥1 year ICU experience, Mansoura University Hospitals	Mechanical Ventilation (general)	Nurses	To assess knowledge and practice regarding MV patient care	More than half had good knowledge and adequate practice; positive knowledge–practice link (p=0.002)	Demographics and ICU types listed (SICU, MICU, LTICU)	Knowledge and practice improved with training; recommends continuous education
AlQutami et al. (2025), MAR Nursing and Patient Care	Cross-sectional descriptive	102 ICU nurses	Nurses with ≥1 year ICU experience in Taif City	Mechanical Ventilation (general)	Nurses	To assess nursing care quality for MV patients in Taif	51% had poor knowledge; recommends targeted training to improve care	75.5% aged 25–35, 64.7% held bachelor's degrees, 69.6% non-Saudi	Nursing knowledge and practice gaps identified; correlated with demographics
El-Kasset al. (2024), International Journal of Critical Care Medicine	Cross-sectional descriptive study	125 nurses	Nurses working in ICUs at a tertiary care hospital	Mechanical Ventilation (conventional and advanced modes)	Nurses	To assess nurses' knowledge and practice regarding MV care	Moderate to poor knowledge in advanced MV; practice scores correlated with training	Majority female, aged 25–40, most held BSc Nursing	Training improved outcomes; recommendation for protocol-based refresher sessions
Khalil et al. (2023), SAGE Open Medical Case Reports	Descriptive study with structured questionnaire	100 ICU nurses	Nurses working in MV units in Cairo hospitals	Mechanical Ventilation	Nurses	To assess nurse preparedness and protocol adherence in MV	Low protocol adherence in40%; knowledge gaps identified	Mixed demographic (gender/experience) noted	Suggests need for standardized MV protocols in Egyptian ICUs

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DISCUSSION

This systematic review aimed to evaluate the current nursing practices involved in the management of patients receiving respiratory support, and those on mechanical ventilation, and to identify their impact on patient outcomes. The findings indicate that the knowledge and attitudes of nurses have influence on patient care and ventilator management. One study show that nurses with higher educational qualifications and longer work experience were more competent in managing ventilator settings, identifying complications early, and adhere to established protocols (8). This indiacte the need for hospitals to prioritize ongoing education and structured orientation programs tailored to mechanical ventilation care.

Another study indicate that many nurses lacked adequate understanding of mechanical ventilation concepts regarding ventilator-associated complications and preventive measures (9). Thismake risks to patient safety and there is a need for standardized, evidence based educational interventions. Nurses are the primary caregivers responsible for bedside implementation of VAP bundles(10).

Structured training provide a good results in improving nurse performance. A quasi-experimental study showed that targeted educational sessions improved nurses' ability to assess ventilated patients, perform suctioning, and monitor ventilator settings (11). These findings suggest that regular workshops, simulation-based training, and bedside coaching are effective to enhancethe competency of ICU nurses managing mechanically ventilated patients.

A large cross-sectional study found inconsistencies in the application of weaning protocols in ICUs, mainly due to the lack of institutional support and clearly defined nursing roles (6). Nurses show uncertainty in modifying ventilator settings without physician input, even when protocols existed(12). This reinforces the importance of providing nurses with clear guidelines, interdisciplinary collaboration, and clinical decision-making authority where appropriate.

The role of nurses also include risk perception and the implementation of preventive strategies(13). One of our included studies found that nurses who were aware of the complications associated with prolonged mechanical ventilation, mainly VAP, were likely to adopt head-of-bed elevation, oral care with chlorhexidine, and hand hygiene (Amer et al. 2025). The study showed the importance of creating a culture of safety through educational reinforcement and performance auditing.

Cultural and institutional contexts play a critical role in shaping nursing practices(15). A study conducted in Saudi Arabia show that nurses were familiar with basic mechanical ventilation procedures, they lacked confidence in more advanced aspects of care (pressure support ventilation adjustment and ABG interpretation)(AlQutami et al. 2024). These findings indicate that loscalized protocols, mentorship programs, and organizational investment in nurse training are essential, mainly in regions with rapidly developing healthcare systems. Our study also found that the use of nurse led structured assessment tools improve patient outcomes. Several studies reported that

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the implementation of standard care bundles led by nursing staff decrease the duration of mechanical ventilation, decreased ICU length of stay, and improved extubation success rates(17,18).

CONCLUSION

Our review indicate the role of nurses in managing patients on respiratory support, mainly mechanical ventilation. The included studies show that nursing knowledge, adherence to evidence-based protocols, and institutional support affect patient outcomes, including ventilation duration, complication rates, and weaning success. Nurse-led interventions and continuous education were linked to improved clinical outcomes. To optimize care, healthcare institutions should prioritize standardized protocols, professional development, and improve nurse autonomy.

Abbreviations

ICU, Intensive Care Unit; MV, Mechanical Ventilation; VAP, Ventilator-Associated Pneumonia; APRV, Airway Pressure Release Ventilation; SIMV, Synchronized Intermittent Mandatory Ventilation; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; JBI, Joanna Briggs Institute; HCP, Health Care Provider; RN, Registered Nurse; EBP, Evidence-Based Practice; LOS, Length of Stay; RCT, Randomized Controlled Trial; SPSS, Statistical Package for the Social Sciences.

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