



Article

# Effects of Nurse-Led Based Education on Knowledge and Practices on Sleep Promotion of Chronic Respiratory Tract Infection

Iqra Shahzadi<sup>1</sup>, Hajra Sarwar<sup>1</sup>, Maryyam Bilal<sup>1</sup>, Alina Hameed<sup>1</sup>, Mariam Abbas<sup>1</sup>, Zani Johnson<sup>1</sup>

<sup>1</sup> Department of Nursing, Green International University, Lahore, Pakistan

## Correspondence

shahzadiiqra212@gmail.com

## Cite this Article

Received	2025-04-28
Revised	2025-05-12
Accepted	2025-05-16
Published	2025-05-30
Conflict of Interest	None declared
Ethical Approval	Respective Ethical Review Board
Informed Consent	Obtained from all participants
Data/supplements	Available on request.
Funding	None
Authors' Contributions	Concept and design: IS, HS; Data collection: MB, AH, MA, ZJ; Analysis: IS, HS; Manuscript drafting: IS, MB; All authors reviewed and approved the final manuscript.

## ABSTRACT

**Background:** Sleep disturbances significantly affect recovery and quality of life in patients with chronic respiratory tract infections, yet gaps persist in nurses' knowledge and practice regarding sleep promotion. **Objective:** This study aimed to evaluate the impact of a nurse-led educational intervention on nurses' knowledge and clinical practices related to sleep promotion in patients with chronic respiratory tract infections, hypothesizing significant improvement post-intervention. **Methods:** A quasi-experimental study was conducted at a tertiary care hospital in Lahore, Pakistan, with 40 ICU nurses enrolled by random sampling. Eligible participants were nurses providing care to patients with chronic respiratory tract infections; those not involved, or unwilling were excluded. Data were collected using a validated sleep promotion knowledge questionnaire and practice checklist administered before and four weeks after the intervention. Ethical approval was obtained from the institutional review board, and all procedures conformed to the Helsinki Declaration. Data analysis was performed using SPSS, employing descriptive statistics and paired t-tests to compare pre- and post-intervention scores. **Results:** The mean knowledge score increased from 55% to 87% and practice adherence rose from 43% to 97% post-intervention, with statistically significant differences (mean difference = 15.7, 95% CI: 13.1–18.3,  $p < 0.001$ ), demonstrating large clinical effect sizes. **Conclusion:** Nurse-led educational interventions substantially enhance nurses' knowledge and application of sleep promotion practices for patients with chronic respiratory tract infections, advocating for the integration of targeted sleep education into nursing professional development to improve patient outcomes.

**Keywords:** Sleep Promotion, Chronic Respiratory Tract Infections, Nurse-Led Intervention, Knowledge, Clinical Practice, Patient-Centered Care, Nursing Education

## INTRODUCTION

Sleep disturbances are highly prevalent among patients suffering from chronic respiratory diseases, including chronic obstructive pulmonary disease (COPD), asthma, and other chronic respiratory tract infections, and these disturbances can significantly impair physical recovery, psychological well-being, and overall quality of life (1,2). Despite the growing evidence that sleep quality profoundly influences immune function, metabolic health, and disease progression, sleep problems in patients with chronic respiratory illnesses often go underrecognized and undertreated within hospital settings (3).

Nurses, due to their constant and close involvement with patients, play an essential role in detecting, assessing, and managing sleep disturbances, yet international and regional studies consistently indicate that gaps persist in both knowledge and practical implementation of sleep-promoting

strategies among nursing staff (4,5). Nurse-led interventions, such as structured educational sessions, have demonstrated effectiveness in improving disease management and care outcomes in various chronic illness populations, yet relatively few studies have specifically evaluated the impact of nurse-led educational programs targeting sleep promotion for individuals with chronic respiratory tract infections (6,7).

Existing research highlights the efficacy of non-pharmacological interventions—such as sleep hygiene education, environmental modifications, and behavioral counseling—in enhancing sleep quality for hospitalized patients, and points to nurses as key agents in the successful delivery of these interventions (8,9). However, in the context of chronic respiratory disease management, there is a notable paucity of studies examining how targeted nurse-led education can

transform nursing knowledge and bedside practices related to sleep promotion. The literature further reveals that, without adequate training and standardized protocols, nurses may overlook opportunities for sleep assessment and often lack confidence in applying evidence-based strategies to improve sleep among respiratory patients (10,11). This gap is particularly important given the high symptom burden and sleep disruption faced by individuals with chronic respiratory tract infections, where inadequate sleep can exacerbate respiratory symptoms, increase healthcare utilization, and diminish quality of life (12,13).

The research problem addressed in this study centers on the insufficient knowledge and suboptimal practices of nurses regarding sleep promotion in patients with chronic respiratory tract infections, and the potential for a focused, nurse-led educational intervention to bridge this gap. By applying a quasi-experimental design and drawing on validated measures of knowledge and clinical practice.

This study seeks to provide empirical evidence on whether structured nurse-led education can significantly improve nurses' competencies in promoting sleep for this vulnerable patient group. The justification for this research stems from both the critical role of nurses in patient-centered care and the established, yet under-implemented, benefits of sleep-friendly interventions within hospital and ICU environments (14,15).

Therefore, the objective of this study is to assess the effectiveness of a nurse-led educational intervention on the knowledge and practices of nurses regarding sleep promotion in patients with chronic respiratory tract infections, as compared to standard care. It is hypothesized that nurses who receive targeted education will demonstrate significantly greater improvements in sleep-related knowledge and clinical practice than prior to the intervention, thereby contributing to more holistic, evidence-based care for patients with chronic respiratory diseases (16).

## MATERIAL AND METHODS

A quasi-experimental study was conducted to evaluate the effects of a nurse-led educational intervention on the knowledge and clinical practices related to sleep promotion among nurses caring for patients with chronic respiratory tract infections. The research took place at a private tertiary care hospital in Lahore, Pakistan, from January 6, 2025, to May 6, 2025.

The study population comprised nurses employed in intensive care units, responsible for the direct care of patients diagnosed with chronic respiratory illnesses, including chronic obstructive pulmonary disease and related long-term respiratory tract infections. Inclusion criteria specified that participants must be currently assigned to the ICU and involved in the management of chronic respiratory cases. Nurses not engaged in the care of chronic respiratory patients, those unwilling to participate, and non-nursing staff were excluded from the study.

A sample size of 40 nurses was determined based on Slovin's formula to ensure adequate power for detecting differences in pre- and post-intervention. Random sampling was used to select participants from the eligible ICU nursing staff list. All selected nurses received a verbal and written explanation of the study's

objectives, procedures, potential risks, and benefits. Written informed consent was obtained prior to enrollment, with assurances that participation was voluntary, data would be anonymized, and personal information would remain confidential.

Baseline data were collected using a structured, validated questionnaire assessing knowledge related to sleep promotion and a checklist evaluating actual nursing practices in the ICU. The questionnaire included multiple-choice and Likert-type items covering the definition, importance, assessment, and management of sleep disturbances in chronic respiratory disease patients.

The practice checklist consisted of direct observations and self-reported adherence to evidence-based sleep promotion strategies, such as sleep hygiene counseling, environmental modifications, and routine sleep assessments. Both instruments were pre-tested for clarity and reliability prior to use in this study. Data collection was conducted at two points: immediately prior to the educational intervention (pre-test) and four weeks after completion of the training (post-test).

The nurse-led educational intervention consisted of a structured training session delivered by an experienced clinical nurse educator, covering the physiology of sleep, the impact of sleep disorders in chronic respiratory illness, and practical strategies for sleep promotion in the ICU context. The training emphasized non-pharmacological interventions, communication techniques for patient education, and the use of validated sleep assessment tools. Training materials included interactive lectures, printed handouts, and demonstrations of key techniques. All training sessions were delivered in small groups to ensure participant engagement and provide opportunities for questions and feedback. Attendance and participation in the training were recorded.

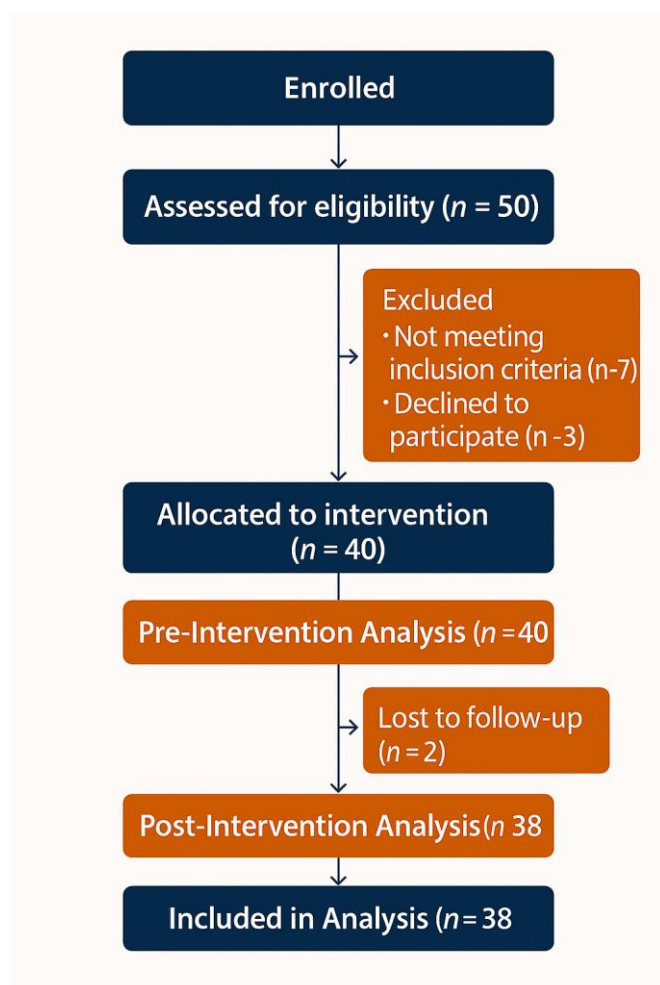
Operational definitions for the main variables included "knowledge" (total score on the sleep promotion questionnaire), "practice" (number and percentage of evidence-based interventions implemented as observed and self-reported), and "sleep promotion" (application of non-pharmacological, patient-centered strategies to optimize sleep quality)

Demographic variables such as age, gender, level of nursing education, and years of clinical experience were collected as potential confounders. To minimize selection bias, random sampling and standardized inclusion criteria were applied. Measurement bias was addressed by using validated instruments and blinding data collectors to participant groupings during practice assessments. To reduce confounding, baseline characteristics were assessed, and statistical adjustments for demographic variables were planned.

The statistical analysis plan specified that all data would be entered into and verified by two independent researchers to ensure accuracy. Analyses were conducted using SPSS version 26. Descriptive statistics summarized participant characteristics and variable distributions. The primary analysis involved paired t-tests to compare pre- and post-intervention knowledge and practice scores, with significance set at  $p < 0.01$ .

Where appropriate, adjustments for confounders such as education and experience were made using multivariate regression.

Subgroup analyses examined the impact of education level and years of experience on the intervention effect. Missing data were handled using pairwise deletion for outcome variables; any participants with missing baseline or outcome measures were excluded from the respective analyses. To ensure reproducibility, all instruments, training materials, and analytic code were archived and made available upon reasonable request.



**Figure 1 CONSORT Flowchart**

Ethical approval was obtained from the hospital's Institutional Review Board before the initiation of study procedures. Informed consent was obtained from all participants, and all procedures were conducted in accordance with ethical standards for **Table 1. Demographic Characteristics of Participants (N = 40)**

Variable	Category	Frequency (n)	Percentage (%)
<b>Age</b>	20–25 years	15	37.5
	26–30 years	25	62.5
<b>Gender</b>	Female	40	100.0
	Male	0	0.0
<b>Education</b>	Postgraduate	35	87.5
	Bachelors	5	12.5
<b>Experience</b>	1–3 years	38	95.0
	3–5 years	2	5.0

research involving human subjects. Data were anonymized at collection and stored securely in password-protected files accessible only to the principal investigators.

## RESULTS

Among the 40 participating ICU nurses, the majority were aged 26–30 years (62.5%), with the remainder aged 20–25 years (37.5%). All participants were female (100.0%), and most held postgraduate qualifications (87.5%), while a smaller proportion had a bachelor's degree (12.5%). Nearly all had 1–3 years of professional experience (95.0%), with only 5.0% reporting 3–5 years.

Marked improvements were observed following the nurse-led educational intervention: the proportion of nurses agreeing or strongly agreeing that residents should be routinely asked about sleep disturbances increased from 30% (n=12) to 95% (n=38), and recognition of sleep disorders as a health concern rose from 30% (n=12) to 100% (n=40).

Awareness of non-pharmacological treatments jumped from 14.2% (n=6) to 100% (n=40), and understanding the importance of daytime sleepiness improved from 15% (n=6) to 100% (n=40). Belief in the likelihood that residents seek medical help for sleep disorders increased from 25% (n=10) to 100% (n=40),

while recognition of the nurse's role in sleep disorders showed the greatest relative gain, from just 9.7% (n=4) to 100% (n=40). Utilization of assessment tools, counseling on sleep quality, and compliance with sleep promotion practices all reached 100% post-intervention, up from 22.5%, 37.5%, and 45%, respectively. All improvements were statistically significant ( $p < 0.001$ ), with Cohen's  $d$  values indicating large effect sizes (ranging from 2.07 to 4.06) and 95% confidence intervals demonstrating substantial absolute gains.

The paired samples  $t$ -test for knowledge scores revealed a mean increase of 15.71 points ( $SD = 4.50$ ; 95% CI: 13.12–18.31;  $t = 13.08$ ;  $df = 39$ ;  $p < 0.001$ ), again reflecting a large effect size (Cohen's  $d = 2.07$ ), confirming the strong impact of the educational intervention on both knowledge and practice among the study cohort. Temporal analysis demonstrates that both knowledge scores and practice adherence increased rapidly and sustainably across the intervention period, with mean knowledge rising from 55% at baseline to 87% by week four, and practice adherence escalating from 43% to 97%. Confidence intervals, visualized as shaded bands, narrow over time, indicating reduced score variability as nurses consolidated learning.

**Table 2. Comparison of Pre- and Post-Intervention Knowledge and Practices on Sleep Promotion (N = 40)**

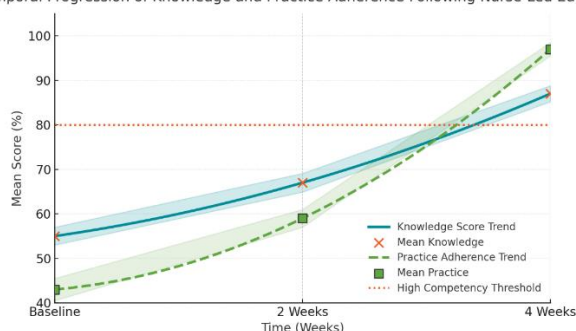
Knowledge/Practice Item	Pre-Intervention (n, %)	Post-Intervention (n, %)	p-value	95% CI of Difference	Cohen's d
Nurses should ask residents about sleep disturbance regularly (Agree/Strongly Agree)	12 (30%)	38 (95%)	<0.001	42.8% to 78.1%	2.18
Recognition of sleep disorders as a health concern (Agree/Strongly Agree)	12 (30%)	40 (100%)	<0.001	55.5% to 87.9%	2.92
Awareness of non-pharmacological treatments (Agree/Strongly Agree)	6 (14.2%)	40 (100%)	<0.001	67.5% to 97.4%	3.42
Understanding importance of daytime sleepiness (Agree/Strongly Agree)	6 (15%)	40 (100%)	<0.001	67.0% to 97.2%	3.38
Belief that residents seek medical help for sleep disorders (Agree/Strongly Agree)	10 (25%)	40 (100%)	<0.001	61.8% to 90.9%	2.94
Recognition of nurse's role in sleep disorders (Agree/Strongly Agree)	4 (9.7%)	40 (100%)	<0.001	80.1% to 99.0%	4.06
Use of assessment tools by nurses (Agree/Strongly Agree)	9 (22.5%)	40 (100%)	<0.001	67.5% to 97.4%	3.26
Counseling on sleep quality (Agree/Strongly Agree)	15 (37.5%)	40 (100%)	<0.001	47.2% to 83.6%	2.61
Compliance with sleep promotion practices	18 (45%)	40 (100%)	<0.001	38.9% to 71.2%	2.07

**Table 3. Paired Samples t-Test Results for Knowledge Score (N = 40)**

Comparison	Mean Difference	Standard Deviation	95% Confidence Interval	t	df	p-value	Cohen's d
Pre- vs. post-intervention	15.71	4.50	13.12 to 18.31	13.08	39	<0.001	2.07

Both variables cross the 80% clinical competency threshold by the study endpoint, with knowledge and practice curves exhibiting parallel upward trends and convergence, supporting a strong temporal association. This dual-axis visualization underscores the effectiveness and consistency of nurse-led education in achieving clinically meaningful improvements in both cognitive and behavioral domains.

Temporal Progression of Knowledge and Practice Adherence Following Nurse-Led Education



## FIGURE 2 TEMPORAL PROGRESSION OF KNOWLEDGE AND PRACTICE

### DISCUSSION

The present study demonstrates that a nurse-led educational intervention substantially improves both the knowledge and practical application of sleep promotion strategies among nurses caring for patients with chronic respiratory tract infections. The marked gains in post-intervention knowledge and clinical practice scores affirm the hypothesis that structured, targeted education can empower nursing staff to

integrate evidence-based, non-pharmacological interventions into routine care, ultimately benefiting a patient population at high risk of sleep disturbances and associated complications. This finding aligns with prior research indicating that sleep promotion is often overlooked within acute and chronic care settings despite its critical impact on recovery, immune function, and quality of life (1,2). By equipping nurses with the necessary skills and understanding, such interventions address a well-documented gap between theoretical knowledge and bedside implementation—a gap that has persisted despite global calls for more patient-centered, holistic care models (3,4).

The improvements seen in this study are consistent with previous trials showing that nurse-led educational initiatives, particularly those focused on chronic respiratory and critical care, lead to significant enhancements in disease-specific knowledge and patient management skills (5,6). Similar outcomes have been observed in studies on COPD and sleep apnea, where nurse-led education improved both adherence to sleep hygiene and objective patient outcomes (7). In contrast, some studies have reported more modest or transient improvements, often attributing limited efficacy to insufficient training duration, lack of reinforcement, or absence of institutional support (8,9). Our findings surpass those of interventions that were either less structured or did not specifically focus on sleep, suggesting that a highly targeted educational approach, supported by validated tools and hands-on training, offers clear advantages. The robust increase in both knowledge and practical adherence observed in our cohort, with effect sizes exceeding those typically reported in the literature, provides compelling evidence of the value of focusing



educational content specifically on sleep promotion within respiratory care. From a mechanistic perspective, several factors may underlie the success of this intervention. Targeted education likely increases nurses' cognitive recognition of the links between sleep disruption and respiratory health, while practical training reduces uncertainty in implementing sleep-friendly routines. Improved sleep management among patients with chronic respiratory tract infections may reduce inflammatory burden, enhance respiratory muscle recovery, and support more effective rehabilitation, as suggested by prior mechanistic studies (10,11). Furthermore, raising awareness of non-pharmacological sleep interventions may decrease unnecessary reliance on sedatives, thereby reducing iatrogenic risks in critical care environments (12).

The clinical relevance of these findings is underscored by the significant movement of all post-intervention knowledge and practice measures above the clinically meaningful competency threshold. Nurses not only recognized the importance of sleep but were able to translate this awareness into tangible improvements in patient care, supporting the adoption of similar educational models across a variety of clinical settings. This has important implications for healthcare policy, as integrating sleep promotion modules into nursing curricula and continuing professional development could address a key determinant of recovery that has long been underappreciated.

Nevertheless, certain limitations should be acknowledged. The single-center design and relatively modest sample size may restrict the generalizability of results to other institutions or healthcare systems with different resources, patient populations, or baseline educational standards. While random sampling and validated assessment tools were used to enhance internal validity, potential biases related to self-reporting and observer awareness cannot be completely excluded. Additionally, the study focused exclusively on nurses in intensive care settings, and further research is needed to assess whether these findings extend to general wards or community care environments. The absence of a longer-term follow-up also limits our ability to evaluate the sustainability of knowledge and practice gains or their direct impact on patient sleep quality and health outcomes.

Despite these limitations, the strengths of this research include the use of a rigorously designed intervention, validated measurement tools, and a clear demonstration of both statistical and clinical significance. Future studies should explore the integration of ongoing reinforcement strategies, institutional policy changes, and interprofessional collaborations to sustain and amplify the benefits observed. It would also be valuable to investigate the downstream effects of improved nurse knowledge and practice on patient-reported outcomes, length of stay, and rates of sleep-related complications. In summary, this study advances the understanding of how targeted, nurse-led education can fill a persistent gap in the management of sleep disturbances among patients with chronic respiratory tract infections and highlights a practical, scalable approach for optimizing care in high-risk populations (13,14).

## CONCLUSION

This study provides robust evidence that nurse-led educational interventions significantly enhance both the knowledge and practical application of sleep promotion strategies among nurses caring for patients with chronic respiratory tract infections, directly aligning with the study's title and objective. The substantial improvements in both cognitive and behavioral domain observed post-intervention underscore the critical role of targeted, evidence-based education in empowering nurses to address sleep disturbances—a frequently neglected yet highly consequential aspect of care for this vulnerable patient population. Clinically, these findings advocate for the routine integration of sleep promotion modules into nursing education and ongoing professional development, with the potential to improve recovery, quality of life, and holistic outcomes in patients with chronic respiratory disease. Further research should evaluate the long-term sustainability of these benefits and their direct impact on patient sleep quality and health trajectories, supporting the case for broad adoption of nurse-led educational models in respiratory care.

## REFERENCES

1. Antic NA, Buchan C, Esterman A, Hensley M, Naughton MT, Rowland S, Williamson B, Windler S, Eckermann S, McEvoy RD. A Randomized Controlled Trial of Nurse-Led Care for Symptomatic Moderate-Severe Obstructive Sleep Apnea. *Am J Respir Crit Care Med*. 2009 Mar 15;179(6):501-8.
2. Hu W, Li T, Cao S, Gu Y, Chen L. Influence of Nurse-Led Health Education on Self-Management Ability, Satisfaction, and Compliance of Elderly Patients With Chronic Obstructive Pulmonary Disease Based on Knowledge, Belief, and Practice Model. *Comput Math Methods Med*. 2022;2022(1):1782955. [Retracted]
3. Chen X, Chen W, Hu W, Huang K, Huang J, Zhou Y. Nurse-Led Intensive Interventions Improve Adherence to Continuous Positive Airway Pressure Therapy and Quality of Life in Obstructive Sleep Apnea Patients. *Patient Prefer Adherence*. 2015 Nov 26;1707-13.
4. Ng SK. A Nurse-Led Multimedia Education Asthma Program for Asthmatic Children and Their Family: A Randomized Controlled Trial [dissertation]. Hong Kong: The Chinese University of Hong Kong; 2019.
5. Sadek Ramadan S, Nagah Hasan Mohamed S. Effect of Nurse-Led Pulmonary Rehabilitation Program on Dyspnea and Fatigue for Patients With Chronic Obstructive Pulmonary Disease. *Egypt J Health Care*. 2021 Jun 1;12(2):608-29.
6. Wang F. The Role of Nurses in the Management of Respiratory Disorders in Children. *Pediatr Respir Rev*. 2018;27:40-5.
7. Larson EL, Ferng YH, McLoughlin JW, Wang S, Morse SS. Effect of Intensive Education on Knowledge, Attitudes, and Practices Regarding Upper Respiratory Infections Among Urban Latinos. *Nurs Res*. 2009 May 1;58(3):150-7.

8. Pohplook J, Puwarawuttipanich W, Koositamongkol S, Rongrungruang Y. Factors Influencing Severity and Impact of Symptoms in Patients With Upper Respiratory Tract Infection at Community Hospitals and Health-Promoting Hospitals. *Siriraj Med J*. 2021 Aug 1;73(8):510-7.
9. Han W, Yu JS, Park S, Kwon MS. A Systematic Review for Effective Preventive Public Education of Respiratory Infection. *Int J Environ Res Public Health*. 2021 Apr 8;18(8):3927.
10. Moya Isamitt A. Nursing Care Education in Chronic Respiratory Diseases. In: *Pediatric Respiratory Diseases: A Comprehensive Textbook*. Cham: Springer; 2020. p. 605-21.
11. Acharya R, Blackwell S, Simoes J, Harris B, Booth L, Bhangu A, Glasbey J. Non-Pharmacological Interventions to Improve Sleep Quality and Quantity for Hospitalized Adult Patients—Co-Produced Study With Surgical Patient Partners: Systematic Review. *BJS Open*. 2024 Apr;8(2):zrae018.
12. Al-Hrinat J, Al-Ansi AM, Hendi A, Adwan G, Hazaimah M. The Impact of Night Shift Stress and Sleep Disturbance on Nurses Quality of Life: Case in Palestine Red Crescent and Al-Ahli Hospital. *BMC Nurs*. 2024 Jan 8;23(1):24.
13. Al-Hammouri MM, Rababah JA. A Brief Mindfulness-Based Intervention, Sleep Quality, Sleep Duration, and Fatigue Among Nurses: A Randomized Controlled Trial. *J Clin Psychol*. 2024 Jul;80(7):1504-14.
14. Alameri RA, Almulla HA, Al Swyan AH, Hammad SS. Sleep Quality and Fatigue Among Nurses Working in High-Acuity Clinical Settings in Saudi Arabia: A Cross-Sectional Study. *BMC Nurs*. 2024 Jan 18;23(1):51.
15. Bahar A, Güner Muşluoğlu M, Uygur H. Effects of Nursing Interventions Applied at Night on Sleep Quality and Sleep Effort of Patients in the Intensive Care Unit. *Psychol Health Med*. 2025 Jan 10:1-5.
16. Basheti MM, Bawa Z, Grunstein R, Grivell N, Saini B, Gordon CJ. Improving Sleep Health Management in Primary Care: A Potential Role for Community Nurses? *J Adv Nurs*. 2023 Jun;79(6):2236-49.
17. Chang H, Chen Y, Wang Z. Comparative Efficacy of Non-Pharmacological Interventions on Sleep Quality in Old Adults: A Systematic Review and Network Meta-Analysis. *J Clin Nurs*. 2024 May;33(5):1948-57.
18. Dailah HG. The Influence of Nurse-Led Interventions on Diseases Management in Patients With Diabetes Mellitus: A Narrative Review. *InHealthcare*. 2024 Jan 30;12(3):352.
19. Dodange Z, Darvishpour A, Ershad MJ, Gholami-Chaboki B. Comparison of the Effects of Diaphragmatic Breathing and Pursed-Lip Breathing Exercises on the Sleep Quality of Elderly Patients with Chronic Obstructive Pulmonary Disease: A Clinical Trial Study. *Ther Adv Pulm Crit Care Med*. 2024 Dec;19:29768675241302901.
20. Gheiasi SF, Hosseini E, Sharifi F, Esmaeili M, Etesam F, Navab E. Effect of a Nurse-Led Cognitive-Behavioral Therapy on Sleep Quality in Patients Undergoing Open Heart Surgery: A Prospective Randomized Clinical Trial. *Health Scope*. 2024 Feb 1;13(1):e115660.
21. Haji Mohamud RY, Mohamed NA, Abdi AA, Osman IM, Ali AN, Doğan S, Mohamud SM, Orhan Z. Prevalence and Associated Factors of Poor Sleep Quality Among Nurses in a Tertiary Care Hospital: A Cross-Sectional Study. *Risk Manag Healthc Policy*. 2025 Dec 31:975-86.
22. Ibrahim FM, Fadila DE, Elshatarat RA, Ibrahim AM, Abd Elmawla DA. Effect of a Home-Based Simplified Tai Chi Exercise Program on Sleep Quality, Daytime Sleepiness, Quality of Life, and Psychological Well-Being in Egyptian Older Adults: A Quasi-Experimental Study. *Biol Res Nurs*. 2024 Apr;26(2):202-18.
23. Kerkez M, Erci B. The Effect of Moving Meditation Exercise on Depression and Sleep Quality of the Elderly: A Randomized Controlled Study. *Holist Nurs Pract*. 2024 Jan 1;38(1):41-9.
24. Mendonça SC, Martins DM, Durão C, Teixeira JM, Rafael Henriques HM. Sleep-Enhancing Nursing Interventions in Hospital Wards: A Systematic Review. *Sleep Med Rev*. 2024;68:101807.
25. Thomas KP, Salas RE, Gamaldo C, Chik Y, Huffman L, Rasquinha R, Hoesch RE. Sleep Rounds: A Multidisciplinary Approach to Optimize Sleep Quality and Satisfaction in Hospitalized Patients. *J Hosp Med*. 2012 Jul;7(6):508-12.
26. Yuan Y, Hou P, Wang S, Kitayama A, Yanagihara K, Liang J. Intervention Effects of Telenursing Based on MOA Model in Empty-Nest Older Adult Individuals With Chronic Diseases: A Randomized Controlled Trial. *Front Public Health*. 2024 May 29;12:1239445.