

ORIGINAL ARTICLE

Sleep-enhancing nursing interventions in hospital wards: A systematic review

Sílvia Caldeira Mendonça Degree in Nursing^{1,2}  | Diogo Máximo Sabino Martins Master's Degree in Nursing¹  |
Cândida Durão Master's Degree in Nursing¹  |
Joana Moreira Ferreira Teixeira Master's Degree in Nursing¹  |
Helga Marília da Silva Rafael Henriques PhD in Nursing¹ 

¹Lisbon Center for Research, Innovation, and Development in Nursing (CIDNUR-ESEL), Lisboa, Portugal

²Barreiro Montijo Hospitalar Center, R. Machado dos Santos 54, Montijo, Portugal

Correspondence

Sílvia Caldeira Mendonça, Lisbon Center for Research, Innovation, and Development in Nursing (CIDNUR-ESEL). Av. Prof. Egas Moniz, 1600-096 Lisboa, Portugal.
Email: silvia.mendonca@campus.esel.pt

Abstract

Aim: To identify sleep-promoting nursing interventions in hospitalized adults and older people.

Background: Sleep is necessary for maintaining good physical and mental health, as well as a high quality of life. Hospitalization can significantly disrupt sleep patterns, which is an often-overlooked issue. Nurses are the main participants in promoting sleep in hospitalized patients.

Methods: Systematic literature review based on the question: "What interventions can nurses implement to promote sleep in hospitalized adults and older people?". The research was conducted on April 4, 2023, in CINAHL Complete, MEDLINE, Cochrane, Scopus, and Web of Science, filtering the articles published in the last 10 years. For a study to be included, it must feature adult or older participants, an intervention that aims to enhance sleep, and the research should have been conducted within a hospital setting. We followed the PRISMA flow diagram and analyzed the quality of the articles according to the Joanna Briggs Institute criteria for quality assessment. The results were subjected to a narrative synthesis.

Results or findings: Of the 712 articles found, 13 were selected. The sample encompasses 1975 participants. These selected articles emphasize educational and communicative interventions, dietary and sensory interventions, symptomatic and environmental control, daily activity planning, sleep assessment and documentation, and individualized nursing care.

Discussion: There is a need for a systematic approach incorporating physical, psychosocial, and relational dimensions within the care context.

Conclusion: It is necessary to raise the nurses' awareness of the factors that affect sleep experience and empower them to promote sleep in partnership with hospitalized patients.

Implications for nursing and health policy: Sleep interventions can be promoted by implementing hospital policies, including environmental modifications in the design and refurbishment of facilities and restricting nighttime patient transfers to reduce noise and disturbances. Encouraging research studies that explore the effectiveness of these interventions will further support the development of evidence-based policies aimed at improving sleep quality in hospitalized patients.

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KEYWORDS

Adult, aged, hospitalization, nursing care, patients, sleep promotion, ward

INTRODUCTION

Sleep arises as a phenomenon of interest due to its strong influence on the recovery of hospitalized patients and its underappreciation and lack of understanding among healthcare professionals (Khater et al., 2019; Távora et al., 2022). Sleep health is understood as: “a multidimensional pattern of sleep-wakefulness, adapted to individual, social, and environmental demands, that promotes physical and mental well-being. Good sleep health is characterized by subjective satisfaction, appropriate timing, adequate duration, high efficiency, and sustained alertness during waking hours” (Buysse, 2014, p. 12).

Good quality sleep is necessary to maintain good physical and psychological health and a good quality of life (Clement-Carbonell et al., 2021). However, it is observed that insufficient sleep is a widespread and prominent issue in modern society (Chattu et al., 2018) and is considered a potential public health problem (Zomers et al., 2017). Some studies show that the prevalence of sleep problems in the general population can range from 17% (Zomers et al., 2017) to 32% (Kerkhof, 2017), potentially affecting around 60% of hospitalized individuals (Jolfaei et al., 2014). Organizations such as the American Academy of Sleep Medicine (AASM), the European Sleep Research Society, and the World Sleep Society share the common purpose of advancing knowledge in various aspects of sleep through research and information dissemination, thereby contributing to improving healthcare delivery.

In a hospital setting, hospitalized individuals often experience poor sleep quality (Burger et al., 2022; Jolfaei et al., 2014), associated with a wide range of adverse health effects (Gao et al., 2022). According to Reis et al. (2018), low-quality sleep is strongly associated with people with chronic diseases. It is thus crucial to understand the determinants associated with sleep quality in hospitalized individuals, including client factors, sociocultural aspects, and environmental influences (Burger et al., 2022). Subsequently, interventions can be planned to optimize sleep quality and facilitate recovery (Burger et al., 2022; Távora et al., 2022). However, as mentioned by Khater et al. (2019), nurses often lack a comprehensive understanding of sleep physiology, assessment, and necessary interventions to promote good quality sleep, and patients themselves often downplay and do not report changes in their sleep patterns.

It is also evident that programs developed focusing on sleep health have been scarce, necessitating broad support to promote sleep education, enhance the identification of sleep disorders, optimize sleep conditions for hospitalized patients, and expand research on sleep health (Ramar et al., 2021). Some areas identified for investigation include interventions promoting sleep quality in older people (Martins da Silva et al., 2020) and the impact of hospitalization on sleep and circadian rhythms (Ritkala-Castren et al., 2022).

Bellon et al. (2021) exclusively examine sleep-promoting interventions in acute and semiacute settings, while Bellon et al. (2023) investigate such interventions primarily within ICU settings. However, limited attention is directed toward interventions outside of this acute and critical care environment.

The studies by Garside et al. (2018), Miller et al. (2019), and Tamrat et al. (2013) were the only ones included in the Bellon et al. (2023) review that tailored interventions in medical, psychiatric, and geriatric care settings, emphasizing nuanced environmental factors affecting sleep quality. These findings underscore the need to explore these factors across diverse healthcare settings. By integrating patient-centered care principles, we intend to contribute to the development of comprehensive sleep-promoting strategies catering to the unique requirements of patients across various care settings.

The article aims to identify and discuss nursing interventions that promote better sleep among adults who are hospitalized. By exploring and discussing these interventions, the article seeks to contribute to the body of knowledge on sleep promotion within the hospital context and offer practical insights for nurses to improve patients' overall well-being and recovery by enhancing their sleep experiences. In addition to the articles mentioned above, we intend to develop the topic of sleep promotion in hospital wards, focusing on adult and older patients.

METHODS

A systematic literature review was conducted per the PRISMA 2020 statement: An updated guideline for reporting systematic reviews. The PROSPERO website registered the review (CRD42023461308), underscoring the commitment to transparency and methodological rigor. The decision to conduct a systematic review was driven by its capacity to provide a comprehensive insight into current approaches and practices related to the subject matter. This facilitates a more profound understanding of effective interventions to promote sleep and enhances the quality of nursing practices (Straus et al., 2018).

Eligibility criteria

Studies included participants aged 18 years or older who were non-critically ill inpatients. This criterion aimed to ensure a focus on interventions applicable to a broad adult population within hospital settings.

Eligible studies needed to feature interventions specifically designed to promote sleep among hospitalized patients. This criterion emphasized the targeted objective of improving sleep quality within hospital environments.

TABLE 1 Characteristics of reviewed studies.

Titles	ID study author, year	Research country	Study design	Grade quality of evidence	Aim	Study period	Participants	Interventions
Effectiveness of a multimodal nursing intervention on quality of sleep, fatigue, and level of depression among Indonesian patients with gynecological cancer	Erfina et al. (2022)	Indonesia	Quasi-experimental	7/9 Moderate evidence	Examine the effect of a multimodal nursing intervention (MNI) on sleep quality, fatigue, and level of depression among Indonesian women with gynecological cancer (GC).	From August to December 2018	50 women with GC. The participants were divided into two groups. Control Group (CG) ($n = 25$): received routine hospital care Intervention Group (IG) ($n = 25$): received MNI including progressive muscle relaxation and a counseling session.	The MNI program included 2 combination therapies: 1. Progressive muscle relaxation is a nursing intervention from the NIC defined as facilitating tensing and releasing of successive muscle groups and impacting different responses. 2. Psychological counseling is a nursing intervention including therapeutic communication through counseling.
Application of rational emotive behavior therapy in patients with colorectal cancer undergoing adjuvant chemotherapy	Liu et al. (2022)	China	Quasi-experimental	8/9 High evidence	Explore the effects of our rational emotive behavior therapy (REBT) program on symptoms, anxiety, depression, and sleep state in patients with colorectal cancer (CRC) undergoing chemotherapy.	From October 2020 to May 2021	56 patients with CRC in a hospital were included in this study randomly divided. Control Group ($n = 28$): received routine nursing care. Intervention Group ($n = 28$): completed a 6-week REBT program based on routine nursing care.	The REBT program includes four courses: 1. Establish a relationship and formulate health files. 2. Group communications and study symptom management. 3. Continuously provide health knowledge and strengthen healthy behavior. 4. Review the treatment and summary outcomes.

(Continues)

TABLE 1 (Continued)

Titles	ID study author, year	Research country	Study design	Grade quality of evidence	Aim	Study period	Participants	Interventions
Sleep improvement intervention and its effect on patients' sleep on the ward	Ritkala-Castren et al. (2022)	Finland	Cohort study	9/11 High evidence	Investigate how the sleep improvement interventions developed for the wards were associated with patients' sleep. The objective was to promote patients' sleep.	From March to August 2017 and spring of 2018	Control Group (n = 105): received standard care. Intervention Group (n = 104): received a sleep promotion intervention.	1. Anticipate the care of symptoms. 2. Relieve pain effectively. 3. Work as quietly as possible at night. 4. Relieve discomfort caused by being without nourishment. 5. Answer patient call quietly. 6. Admit new patients quietly. 7. Plan patients' placing to support sleep. 8. Darken the sleep environment. 9. Provide a safe and peaceful environment. 10. Encourage patients to discuss the matters that trouble them. 11. Regulate the brightness of the room according to the circadian rhythm. 12. Provide activities for the patients in the daytime. The aromatherapy intervention involved aromatherapy smearing and aromatic inhalation. The intervention include aromatherapy smearing for 30 minutes, three times a week, and one hour of aromatic inhalation every day.
Effects of aromatherapy on fatigue, quality of sleep and quality of life in patients with inflammatory bowel disease: A feasibility study	You et al. (2022)	China	Randomized controlled trial	11/13 High evidence	Evaluate feasibility and effect of aromatherapy on fatigue, poor sleep quality and poor quality of life (QoL) in patients with inflammatory bowel disease.	From November 2018 to December 2019	Control Group (CG) (n = 39): received routine nursing care. Intervention Group (IG) (n = 39): received aromatherapy through the skin and by inhalation.	The aromatherapy intervention involved aromatherapy smearing and aromatic inhalation. The intervention include aromatherapy smearing for 30 minutes, three times a week, and one hour of aromatic inhalation every day.

(Continues)

TABLE 1 (Continued)

Titles	ID study author, year	Research country	Study design	Grade quality of evidence	Aim	Study period	Participants	Interventions
Nursing intervention based on smart medical care on the sleep quality of cardiology patients	Gao and Su (2021)	China	Randomized controlled trial	9/13 Low evidence	Observation of the effect of smart medical nursing intervention on the sleep quality of cardiology patients.	The study period is not mentioned.	Randomly select 80 cardiology patients from the electronic medical record system of the hospital, and the patients were randomly divided into two groups. Control group ($n = 40$): group of patients who did not receive the smart medical services. Research group ($n = 40$): group of patients who received the smart medical services.	1. The nurse is especially responsible for the psychological problems of the patients. 2. The ward environment is adjusted according to the needs of the patients. 3. Nursing staff should actively observe the patient's condition. 4. Communicate with patients on a regular basis in accordance with the systemic nursing intervention plan.
Conductive environments reduce sleep disturbances and improve sleep quality: a quality improvement project	Ho et al. (2021).	Singapore	Cohort study	9/11 Moderate evidence	Improve patients' sleep quality in a hospital by implementing targeted interventions to reduce sleep disturbances.	From July 2018 to March 31, 2019.	The team recruited 83 patients from the two units (the orthopedic and geriatric units) totaling 166 (100%) responses.	1. Reviewing patients' vital signs monitoring frequency. 2. Serving medications before 1 a.m. and after 4 a.m. 3. Bundling of nursing care activities at the same time when attending to patient's needs. 4. Scheduling of non-urgent investigations to daytime. 5. Resolving issues of medical devices within five alarms. 6. Providing patients with information leaflets on noise disturbances upon admission. 7. Placing a noise awareness poster on a trolley. 8. Switching off main lights and switching on dim lights along the corridors.

(Continues)

TABLE 1 (Continued)

Titles	ID study author, year	Research country	Study design	Grade quality of evidence	Aim	Study period	Participants	Interventions
Study on influencing factors and nursing intervention effect of sleep disorders in esophageal cancer patients after radiotherapy	Xu et al. (2021)	China	Randomized controlled trial	8/13 Low evidence	Study the influencing factors and nursing intervention effect of sleep disorders in esophageal cancer patients after radiotherapy.	From July 2017 to July 2019	Sleep Disorder Group (SDG) ($n = 100$) Non-sleep disorder group ($n = 97$)	1. Active care and understanding from nursing staff. 2. Creating a clean and comfortable ward environment. 3. Formulating individualized work and rest plans. 4. Using analgesics and sedatives for patients with severe sleep disorders. 5. Instructing family members to care for patients and massage their head and limbs before sleep. 6. Encouraging patients to get along with each other. 7. Conducting psychological evaluation and counseling by medical staff. 8. Encouraging patients to use attention transfer methods, such as listening to music, to vent negative emotions. 9. Informing patients of disease-related knowledge by medical staff. 10. Evaluating the physical pain of patients every day, and administered drugs according to the three-level analgesic mode by medical staff. 11. Formulating personalized dietary plan.
Effects of predictive nursing intervention among patients with acute stroke	Gong et al. (2020)	China	Randomized controlled trial	9/13 Low evidence	Explore the effects of predictive nursing intervention among patients with acute stroke.	From January to August 2019.	160 eligible patients with acute stroke in acute stage were selected. Control group ($n = 80$): received general nursing for patients in neurology department. Intervention group ($n = 80$): received predictive nursing on top of the routine nursing program.	Predictive nursing of pulmonary infection, of dysphagia, of pressure sore, of urinary system infection and of predictive nursing of sleep disturbance: 1. Active communication with patients and their families with a warm, friendly service attitude to alleviate the patient's bad mood. 2. Raising questions with serious and patient explanation. 3. Playing soothing music to guide the patient to meditate and relax. 4. Giving typical successful cases to the patient for encouragement, so that the patient could build up the confidence to overcome the disease.

(Continues)

TABLE 1 (Continued)

Titles	ID study author, year	Research country	Study design	Grade quality of evidence	Aim	Study period	Participants	Interventions
Effects of psychological nursing on mood, psychology, sleep and QoL of patients with cervical cancer after neoadjuvant chemotherapy	Li et al. (2020)	China	Quasi-experimental	8/9 Moderate evidence	Explore the effects of psychological nursing on the QoL and negative emotions of patients with cervical cancer (CC) after neoadjuvant chemotherapy (NACT).	From October 2012 to October 2017	154 patients with CC diagnosed in a hospital were included in this study and equally divided. Control Group (CG) (n = 77): received routine nursing care. Observational Group (OG) (n = 77): received psychological nursing intervention.	Psychological nursing is a type of nursing intervention that involves the use of various techniques: 1. Communication and education to change the patients' cognition of the disease, providing a deeper understanding of the disease and its treatment. 2. Additionally, psychological evaluation was carried out to develop individualized nursing plans. 3. Emotional support of family members and relatives was maximized to meet the psychological needs of patients. 4. Psychological resolution and counseling were performed once a week for about 15 minutes each time. In terms of sleep guidance: patients were instructed to master the regular sleep time, keep calm before going to bed, avoid strenuous exercise, and eat as little as possible before going to bed. During the course of chemotherapy, soothing music was applied to relax the patients' mood and divert their attention from the pain sensation. 5. Experience exchange: The department held regular exchange meetings for patients with the same disease.
The effect of psychological nursing on medication adherence, unhealthy emotion and sleep disorders in patients with endometrial cancer	Li and Zhang (2020)	China	Randomized controlled trial	5/13 Low evidence	Investigate the effect of psychological nursing on treatment adherence, unhealthy emotion, and sleep disorders in patients with endometrial cancer.	From August 2014 To August 2016.	The samples were randomly divided into intervention and control groups with 150 items in each. Control Group (n = 150): the general routine nursing model. Intervention Group (n = 150): the comprehensive psychological nursing intervention was performed.	The psychological nursing model is a set of reasonable and specific nursing interventions designed to address the psychological needs of patients and includes: 1. Health education. 2. Cognitive psychological nursing. 3. Deep psychological nursing. 4. Guiding psychological nursing.

(Continues)

TABLE 1 (Continued)

Titles	ID study author, year	Research country	Study design	Grade quality of evidence	Aim	Study period	Participants	Interventions
Specific nursing effectively improves dyspnea and sleep quality of patients with lung cancer undergoing chemotherapy	Liu et al. (2020)	China	Randomized controlled trial	7/13 Low evidence	Explore the effect of specific nursing on dyspnea and sleep quality of patients with lung cancer undergoing chemotherapy.	The study period is not mentioned.	Control Group (CG): 120 patients with routine nursing. Research Group (RG): 123 patients with specific nursing mode.	1. The nursing staff used music, crosstalk, and encouraged the patients to keep a regular daily schedule. 2. Under the guidance of nutritionists, patients were advised to consume foods rich in vitamins, fiber, protein, and calcium, while reducing the intake of foods high in sugar and fat. 3. Before chemotherapy, the medical staff communicated with the patients and provided information and support. 4. After chemotherapy, it was provided targeted nursing interventions based on the specific complications experienced by the patients. 5. Staff ensured a quiet and comfortable environment for the patients.
Sleep assessment and interventions for patients living with cancer from the patients' and nurses' perspective	Khater et al. (2019)	Jordan	Cross-sectional study	8/8 High evidence	Assess the prevalence of sleep disturbances among patients living with cancer and assess the adequacy of sleep assessment and intervention for patients from both nurses' and patients' perspectives.	The study period is not mentioned.	129 patients with cancer participated in the study. 113 nurses who were working with patients with cancer and had at least one year of experience participated in the study.	1. Assess patients' sleep pattern. 2. Document quality and quantity of patients' sleep. 3. Control noise. 4. Talk softly. 5. Decrease patient interruptions and prioritize care by arranging nursing procedures and patients' medication when patients are not resting. 6. Staff make an effort to move quietly during times of patient rest. 7. Make sure patients are in a comfortable position. 8. Demonstrate reassurance/empathy/compassion and therapeutic communication. 9. Relieve patients' pain using pharmacological and non-pharmacological intervention. 10. Consider and understand patients' therapeutic needs. 11. Offer visiting hours to help patients to sleep outside of visiting hours. 12. Maintain a comfortable environment: appropriate lighting, room temperature, ventilation. 13. Demonstrate deep breathing exercises, muscle relaxation, guided imagery for reducing anxiety, improving sleep and promoting relaxation. 14. Listening to music, Quran, or praying to reduce anxiety. 15. Back massages and/or warm showers before sleep. 16. Allow patients to use eye masks and ear plugs. 17. Give prescribed medication to promote sleep. 18. Use behavioral modification programs, including a coordinated routine and reducing disturbances when patients are sleeping. 19. Offer hot drinks to promote sleep.

(Continues)

TABLE 1 (Continued)

Titles	ID study author, year	Research country	Grade quality of evidence		Aim	Study period	Participants	Interventions
			Study design	Grade				
Lavender aromatherapy	Shady et al. (2019)	EUA	Qualitative research	8/10 Moderate evidence	Determine the feasibility of wearable overnight lavender aromatherapy skin patches as a patient-directed nursing intervention for inpatient hematology-oncology unit.	The study period is not mentioned.	40 patients on an inpatient hematology-oncology unit.	Each patient in the intervention received a 55 mL lavender-infused inhalation patch.

We included studies that were required to be conducted within hospital settings, excluding specialized units dedicated to the treatment of critically ill inpatients such as intensive care units, emergency departments, and operating rooms. This specification aimed to maintain focus on interventions relevant to general hospital wards.

Primary studies conducted in the past 10 years were considered for inclusion. This timeframe ensured the incorporation of recent research findings and contemporary practices in sleep promotion within hospital settings. Studies were required to be published in Portuguese, Spanish, or English language. This criterion facilitated accessibility and comprehension for a wider audience, reflecting the linguistic diversity prevalent in healthcare literature.

Search strategy

The development of the search strategy was carried out independently by two reviewers. We formulated a PICO question: "What interventions can nurses implement to promote sleep in hospitalized adults and older people?". In the initial phase, we selected the indexing terms in the MEDLINE and CINAHL databases on the EBSCO search platform. We also identified terms in natural language. The terms utilized in the search strategy encompassed: [Patients OR Aged OR Adult OR "Middle Aged," OR "Frail Elderly" OR "Young Adult" OR "Aged, 80 and over" OR "Older Adult Care" OR "Patient Care"] AND [(Sleep OR "Sleep Hygiene" OR "Sleep Quality" OR "Sleep Duration" OR "Sleep Deprivation" OR "Sleep Disorders" OR "Sleep Disorders, Circadian Rhythm" OR "Sleep, REM" OR "Sleep Deprivation" OR "Sleep Pattern Control" OR "Sleep Pattern Disturbance" OR "Sleep and Rest Patterns" OR "Insomnia" OR "Sleep promotion" OR "Sleep evaluation" OR "Sleep-Wake Transition Disorders" OR "Sleep Disorders, Intrinsic" OR "Sleep-Wake Disorders") AND ("nursing care" OR "nursing intervention*" OR "nursing care plans" OR "gerontologic nursing")] AND [Hospitals OR "Hospitals, Public" OR "Hospitals, Private" OR "Hospital Units" OR Institutionalization OR Hospitalization OR "Hospitalization of Older Persons" OR Ward].

After defining the research strategy, articles were selected from the following databases: CINAHL, MEDLINE, Scopus, Web of Science, and Cochrane. The search strategy was consistently applied across all databases on April 4, 2023.

Selection process

Two reviewers independently executed the identification and screening process and supported it using Rayyan, a commonly employed tool for systematic literature reviews. Duplicates were removed, eligibility criteria were applied through title and abstract screening, and out of the remaining articles, full-text reading was conducted, and a final sample was obtained.

Data extraction

Data from the articles that were included were extracted independently by two reviewers. The following data were removed in a tabular format: title, authors, publication year, country, study design, grade quality of evidence, research objectives, study period, participants, interventions, statistical analysis, outcomes, and conclusions. This is clearly shown in Tables 1 and 2.

Data synthesis

Due to the inherent methodological and clinical diversity across the various studies under consideration, a meticulous examination was conducted on each study, employing a descriptive analysis following the “Synthesis Without Meta-analysis” (SWiM) reporting guideline (Campbell et al., 2020).

A narrative approach was subsequently employed to delineate the evidence, elucidating interventions within every domain of interest using a conceptual map.

Quality appraisal

The assessment of the study risk of bias was ensured independently by two reviewers. Joanna Briggs Institute critical appraisal tools were employed to assess the quality of evidence, with checklists tailored to the specific study design. These checklists assess various criteria of the study, and we assign ratings of “Yes,” “No,” “Unclear,” or “Not Applicable” for each. Subsequently, we provide a qualitative assessment of the study’s overall quality, such as “low,” “moderate,” or “high” risk of bias. Reviewer discussions were conducted to maintain consistency and accuracy in assessments, recognizing the subjective nature of this process.

RESULTS

Study selection

Articles were selected from the following databases: CINAHL ($n = 150$), MEDLINE ($n = 152$), Scopus ($n = 212$), Web of science ($n = 198$), and Cochrane ($n = 0$). From a total of 712 articles, 376 duplicates were removed. Out of the remaining 336 articles, eligibility criteria were applied through title and abstract screening, excluding 306 articles. Out of the remaining 30 articles, full-text reading was conducted, and 17 were excluded due to unavailability of full text ($n = 2$), being in a foreign language ($n = 1$), wrong contexts ($n = 4$), and wrong outcomes ($n = 10$). Wrong outcomes refer to results that do not effectively answer the specific research question in hand. Consequently, a final sample of 13 articles was obtained, as shown in Figure 1.

Characteristics of the studies

From the 13 articles, the following distribution of study designs was observed: 6 randomized controlled trials, 3 quasi-experimental studies, 2 cohort studies, 1 qualitative study, and 1 cross-sectional study. These studies were published between 2019 and 2022 and originated from various countries, including China, the United States, Singapore, Jordan, Finland, and Indonesia.

The sample encompasses 1975 participants, distributed among different groups: 761 participants in control groups, 766 participants in intervention groups, and 448 participants in observational and qualitative studies. The participants are mostly adults and aged individuals with complex chronic conditions, including inflammatory bowel disease, stroke, heart disease, and various types of cancer, such as cervical, colorectal, gynecological, lung, endometrial, and esophageal cancer.

According to Joanna Briggs Institute criteria for critical appraisal, all eight articles were assessed as having a low risk of bias, while five articles were found to have a high risk of bias, as evidenced in Table 3. Among the eight articles, the only cross-sectional study (Khater et al., 2019) and one of the quasi-experimental studies (Ritmala-Castren et al., 2022) met all Joanna Briggs Institute criteria.

In three of the quasi-experimental studies (Erfina et al., 2022; Li et al., 2020; Liu et al., 2022), there is uncertainty regarding whether differences in follow-up were adequately described and analyzed. Additionally, in Erfina et al. (2022), there is a lack of clarity regarding the specific types of routine hospital care provided to the control group.

In the qualitative research study (Shady et al., 2019), there is an absence of a statement that contextualizes the researcher culturally or theoretically, and there is no explicit mention of ethical approval obtained from an appropriate body.

In the cohort study (Ho et al., 2021), no information was provided about the utilization of strategies to address incomplete follow-up, and strategies to deal with confounding factors were not stated.

In the case of randomized controlled trials (RCTs) conducted by You et al. (2022), Gao and Su (2021), Xu et al. (2021), Gong et al. (2020), Li and Zhang (2020), and Liu et al. (2020), several critical issues arise. First, participants were not blinded to the interventions, and there is no mention of whether those administering the treatments were also blinded to the treatment assignments. Among these RCTs, five studies, by Gao and Su (2021), Xu et al. (2021), Gong et al. (2020), Li and Zhang (2020), and Liu et al. (2020), stand out due to a high risk of bias. These trials exhibit deficiencies in critical areas such as allocating participants to treatment groups and the blinding of outcome assessors to treatment assignment. The study conducted by Xu et al. (2021) lacks clarity on whether the treatment groups received identical treatment aside from the intervention of interest. In the case of Li and Zhang (2020), the risk of bias is even more pronounced. Alongside the previously

TABLE 2 Characteristics of reviewed studies.

Article	ID study author, year	Statistical analysis	Outcomes	Conclusions
Effectiveness of a multimodal nursing intervention on quality of sleep, fatigue, and level of depression among Indonesian patients with gynecological cancer	Erfina et al. (2022)	The sociodemographic data were analyzed using frequencies for categorical variables and means and SDs for interval-level variables. The outcomes of this study were analyzed using an independent <i>t</i> test, chi-square, Mann–Whitney <i>U</i> test, Wilcoxon, marginal homogeneity, Kolmogorov–Smirnov, and a regression analysis, along with power and effect size. A value of $p < 0.05$ was considered statistically significant. All analyses were performed using SPSS 20.0 for Windows. The responses to the open-ended questions of the Piper Fatigue Scale (PFS) instrument were analyzed by first grouping the same or highly similar words of the participants' responses, categorizing the responses, and then coding the contents of each category and quantifying the codes with frequencies.	Sleep quality, fatigue, and level of depression: the Pittsburgh Sleep Quality Index (PSQI), Beck Depression Inventory-II and PFS changed significantly in intervention group. The PSQI and PFS in the control group changed significantly. The PSQI and PFS scores differed significantly between the two groups before and after the intervention. Effect size of the MNI: the effect size of the MNI for difference scores before and after the intervention was medium effect size.	The role of nonpharmacological modalities in managing symptoms experienced by patients with cancer is increasingly important to providing holistic care.
Application of REBT in patients with colorectal cancer undergoing adjuvant chemotherapy	Liu et al. (2022)	Participants recruited were required to provide medical and sociodemographic data before the intervention. The following questionnaires were completed at different times: at the baseline before the intervention, patients' symptoms, anxiety and depression, and sleep state were evaluated using the Simplified Chinese version of the Memorial Symptom Assessment Scale Short Form (MSASeFeSC), the Hospital Anxiety and Depression Scale (HADS), and the PSQI scale; at the 4th and 6th weeks of the intervention, patients' symptoms, anxiety and depression were evaluated using the MSASeFeSC and the HADS; and at the 6th week of intervention, patients' sleep state was assessed by the PSQI. The researcher, with unified guidance, distributed the questionnaire. The researcher would help them to complete the written questionnaires one by one according to patients' oral answers for those who could not be completed by themselves. All questionnaires were collected and checked immediately after completion, and the deficiencies and omissions were promptly checked.	The intervention group was significantly improved in symptoms, anxiety, depression, and sleep state, compared with the control group.	The 6-week REBT program can effectively improve the symptom, anxiety, depression, and sleep state of patients with CRC undergoing chemotherapy, which could act as a care plan for patients with CRC who are repeatedly admitted to the hospital for chemotherapy.

(Continues)

TABLE 2 (Continued)

Article	ID study author, year	Statistical analysis	Outcomes	Conclusions
Sleep improvement intervention and its effect on patients' sleep on the ward	Ritmala-Castren et al. (2022)	The data were analyzed statistically. Frequencies and percentages were used to describe the background data. Sleep index was calculated as a mean of the five items of the RCSQ (Richards et al., 2000). The quality of sleep was described with median (MD), interquartile range (IQR), minimum and maximum of each domain and the sleep index of both group measurements. The normality of study variables was tested using the Kolmogorov-Smirnov test. The differences in the background characteristics between the standard care and the intervention group were explored using the chi-square test. The differences between the standard care and the intervention group measurements of sleep and pain evaluations were tested with the nonparametric Mann-Whitney <i>U</i> test because of the skewness of the results. Correlations of pain and sleep evaluations were tested with Spearman's rho. Differences between male and female participants' sleep evaluations in the standard care and the intervention group were tested with Mann-Whitney <i>U</i> test. A significance level of < 0.05 was used to determine statistical significance. Data analysis was performed using the IBM SPSS Statistics version 25.0 (IBM Corp.).	From the participants' perspective, sleep was better in the intervention group, even though statistically significant only among men. The pain intensity correlated with sleep quality. The number of patients in the room had no effect on their sleep evaluations.	Interventions targeted at supporting and promoting the sleep quality of hospital inpatients may be effective. They should be developed in collaboration with patients and nurses. Several nursing interventions can be proposed to promote better sleep among patients; however, more research is needed to confirm the results. Sleep promotion should include both standardized protocols and individualized sleep support.
Effects of aromatherapy on fatigue, quality of sleep and QoL in patients with inflammatory bowel disease: A feasibility study	You et al. (2022)	IBM SPSS Statistics 22.0 was used for statistical analysis. Continuous data are expressed as the means and standard deviations (normal distribution) or medians and interquartile ranges (nonnormal distribution). Independent samples <i>t</i> tests and Mann-Whitney <i>U</i> test were used for statistical analysis. Categorical variables were described with frequencies and percentages and were analyzed by the chi-square test. In all the analyses, $p < 0.05$ was considered statistically significant. This study has been registered with the Chinese Clinical Trial Registry, and the clinical trial registration number is ChiCTR2100045889.	Fatigue and sleep quality: Postintervention fatigue and sleep problems were relieved in the intervention group compared with the CG ($p < 0.05$). QoL: QoL scores improved significantly in the IG ($p < 0.05$).	These results suggested that aromatherapy may be an effective complementary treatment method to relieve fatigue and sleep problems and improve QoL in IBD patients.

(Continues)

TABLE 2 (Continued)

Article	ID study author, year	Statistical analysis	Outcomes	Conclusions
Nursing intervention based on smart medical care on the sleep quality of cardiology patients	Gao and Su (2021)	We use <i>t</i> test and analysis of variance to analyze whether there are differences in the effects of different characteristics of patients, such as education level, work nature, medication status, and living habits, on weakness and sleep quality. The influential indicators are screened for multifactor analysis. Both of them were first subjected to single-factor analysis, and factors with $p < 0.1$ were included in the multivariate analysis. Kaplan–Meier curve was used to analyze the relationship between sleep quality and cardiology patients' readmission. $p < 0.05$ is statistically significant.	Cronbach's coefficient α is 0.811, suggesting that the internal consistency is better, and the calculation reliability and validity are 86.1% and 83.4%, respectively, suggesting that the table can be used for sleep in hospitalized patients. Biological indicators: There were changes in various biological indicators, such as blood pressure and heart rate, as well as changes in medication use. Total sleep time: The results of subjective assessment and objective assessment of total sleep time in the control group were basically the same.	The results show that the application of smart medical services has a certain effect on the patient's sleep quality.
Conducive environments reduce sleep disturbances and improve sleep quality: a quality improvement project	Ho et al. (2021)	Patient sleep experience and noise disturbance survey, environment noise levels, and direct observation of noise-generating activities data were analyzed using IBM SPSS Statistics for Windows, version 25.0 (IBM Corp., Armonk, New York, USA) as descriptive statistics. Survey data on overall sleep experiences in the hospital were analyzed for their significance in affecting patients' overall sleep quality at night. Patients' sleep experiences at home and overall sleep experiences in the hospital were tested using the chi-square test for their significance. Noise levels were presented in run charts and mean differences were generated to analyze the effects of the interventions. Continuous data (noise decibel) were presented as mean SD of dB at every 5 min. Nursing and clinical activities and environmental factors that generated noise were analyzed using descriptive and univariate analyses. Statistical significance was set at p less than 0.05.	Sleep quality: The overall quality of sleep reported by patients improved by 17%. Noise disturbances: Patients' survey reported reduced noise disturbances from direct care activities, environmental noise and medical equipment alarms. Noise level in the orthopedics unit: The mean noise level in the orthopedics unit reduced significantly with a corresponding decrease in noise generating activities by 60%. Noise level in the geriatric unit: In the geriatric unit, the mean noise level increased but is within the National Environmental Agency's permissible noise level even though the noise generating activities reduced significantly by 92.2%.	The "Silent Night" project has successfully reduced noise disturbances generated by environment and nursing care activities and improved patients' sleep quality in the hospital. Sharing sessions regarding sources of noise and the "Silent Night" poster promoted the awareness of noise disturbances in healthcare professionals, visitors, and patients.

(Continues)

TABLE 2 (Continued)

Article	ID study author, year	Statistical analysis	Outcomes	Conclusions
Study on influencing factors and nursing intervention effect of sleep disorders in esophageal cancer patients after radiotherapy	Xu et al. (2021)	The experimental data were statistically analyzed and processed by SPSS21.0 software. GraphPad Prism 6 (GraphPad Software, San Diego, USA) was used to draw pictures of the data. The count data were tested by χ^2 , expressed by $ln(\%)$, and the measurement data were measured by t test, expressed by $(\bar{x} \pm s)$. Logistic regression was used to analyze the influencing factors of sleep disorders in esophageal cancer patients after radiotherapy. The difference was statistically significant when $p < 0.05$.	There were differences in payment methods, tumor staging, beliefs, pain, and anxiety between the two groups of patients ($p < 0.05$). Influencing factors for sleep disorders: multivariate retrospective analysis showed that tumor staging, pain, and anxiety were the main influencing factors for sleep disorders in esophageal cancer patients after radiotherapy. VAS score, PSQI score, and HAMA score of patients in SDG after intervention were significantly lower than those before intervention ($p < 0.001$). The somatic role, social function, activity, emotional role, and total score of patients in SDG after intervention were significantly higher than before ($p < 0.001$).	Tumor staging, pain, and anxiety are the main factors affecting sleep disorders in esophageal cancer patients after radiotherapy. Therefore, effective nursing intervention should be implemented according to patients' condition to improve their sleep quality, alleviate anxiety, and improve life quality, with significant effect, which is worthy of promotion and application.
Effects of predictive nursing intervention among patients with acute stroke	Gong et al. (2020)	SPSS24.0 software package (Chicago, IL, USA) was used for statistical analysis. The mean $\pm$ standard deviation ($\bar{x} \pm s$) was used for the statistical description of each observation indicator. t test of 2 independent samples was used to compare the difference of each observation indicator between the intervention group and the control group before and 2 weeks after the intervention when the normal distribution was followed. The median and quartile spacing were used for statistical description, and a nonparametric test was used to compare the differences in observed indicators between the intervention group and the control group before intervention and 2 weeks after intervention when the normal distribution was not followed. All tests were bilateral; $p < 0.05$ was considered statistically significant.	Scores before intervention: There was no significant difference in the scores of the National Institutes of Health Stroke Scale (NIHSS), Fugl-Meyer scale, Barthel indicator, and PSQI before intervention. Scores after intervention: The scores of NIHSS and PSQI were significantly lower in the intervention group than those in the control group, and the scores of the Fugl-Meyer scale and Barthel indicator were significantly higher in the intervention group than those in the control group ($p < 0.05$).	Predictive nursing intervention could help improve neurologic function, movement function, and daily life ability, as well as sleep quality among patients with acute stroke.

(Continues)

TABLE 2 (Continued)

Article	ID study author, year	Statistical analysis	Outcomes	Conclusions
Effects of psychological nursing on mood, psychology, sleep and QoL of patients with cervical cancer after neoadjuvant chemotherapy	Li et al. (2020)	SPSS 17.0 statistical software was adopted for data analysis, and the continuous variables were expressed as mean $\pm$ standard deviation ($\bar{x} \pm SD$). Intergroup comparisons of continuous variables were performed using an independent sample <i>t</i> test, and multigroup comparisons were realized using paired <i>t</i> tests, expressed as <i>t</i> . The rank-sum test was employed to compare the pathologic grading variables between groups, represented by H. Paired rank-sum test was applied for intragroup comparison, represented by chi-square χ^2 . <i>p</i> < 0.05 indicates that the difference was statistically significant.	Effective rate: The total effective rate after NACT did not show a significant difference between the two groups (<i>p</i> > 0.05). QoL, anxiety and depression, mental health, and sleep quality: the scores of the two groups were significantly improved compared with those before nursing intervention (<i>p</i> < 0.05). The improvement degree in the OG was superior to the CG (<i>p</i> < 0.05), especially in the fields of role emotional (<i>p</i> < 0.001) and bodily pain (<i>p</i> = 0.012).	Psychological nursing intervention can improve QoL, negative emotions represented by anxiety and depression, mental health, and sleep quality, which is worthy of clinical application.
The effect of psychological nursing on medication adherence, unhealthy emotions and sleep disorders in patients with endometrial cancer	Li and Zhang (2020)	SPSS 21.0 statistical software was adopted for the data process; ($\bar{x} \pm s$) was applied for representing measurement data, (<i>n</i> , %) for enumeration data and <i>t</i> test, paired <i>t</i> test and chi-square test for intergroup comparison. When <i>p</i> < 0.05, it was considered statistically significant.	Comparisons on medication adherence, anxiety and depression scores: The research group was better than the control group. Sleep quality: The sleeping process in the research group was significantly better than that in the control group (<i>p</i> < 0.05). Hospital stays and complication rates in the research group were less than those in the control group (<i>p</i> < 0.05). Nursing satisfaction was measured by a questionnaire that manifested that overall satisfaction in the research group was higher than that in the control group (<i>p</i> < 0.05).	To favorably enhance unhealthy emotions and sleep quality in patients with endometrial carcinoma, active psychological nursing intervention to achieve ideal effects and general nursing satisfaction, revealing a great application value.

(Continues)

TABLE 2 (Continued)

Article	ID study author, year	Statistical analysis	Outcomes	Conclusions
Specific nursing effectively improves dyspnea and sleep quality of patients with lung cancer undergoing chemotherapy	Liu et al. (2020)	SPSS 20.0 (IBM Corp, Armonk, NY, USA) was used for statistical analysis of all data in this study. All graphical results were plotted by using GraphPad Prism 7 (San Diego GraphPad Software, Inc.). The count data were represented by n (%). The chi-square test was used for intergroup comparison. The measured data were expressed by $(\bar{x} \pm s)$. The two groups were compared by t test. The difference was statistically significant with $p < 0.05$.	Sleep quality: After the nursing intervention, the PSQI scores of patients decreased significantly in the two groups ($p < 0.05$), while the PSQI scores of the patients in the RG were significantly lower than those in the CG ($p < 0.05$). Depression and anxiety: The Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS) scores of the RG were significantly lower than those of the CG ($p < 0.05$). Dyspnea symptoms: The VAS and mMRC scores of patients decreased significantly in the two groups ($p < 0.05$), and the VAS and mMRC scores of the RG were significantly lower than those of CG ($p < 0.05$). Quality of life: The quality-of-life scores of patients increased in the two groups ($p < 0.05$), and the quality-of-life scores of the patients in the RG were significantly higher than those in the CG ($p < 0.05$). Nursing error rate and complaint rate: The nursing error rate and complaint rate in the RG were significantly lower than in the CG ($P < 0.05$). Adverse reactions: The adverse reactions in the RG were significantly lower than those in the CG ($P < 0.05$). Satisfaction: The satisfaction of the RG was significantly higher than that of the CG ($P < 0.05$).	Specific nursing can effectively improve dyspnea symptoms and sleep quality and improve the quality of life of patients with lung cancer undergoing chemotherapy.

(Continues)

TABLE 2 (Continued)

Article	ID study author, year	Statistical analysis	Outcomes	Conclusions
Sleep assessment and interventions for patients living with cancer from the patients' and nurses' perspective	Khater et al. (2019)	A structured questionnaire consisting of demographic and situational characteristics, the Arabic version of the PSQI, and six open-ended questions developed by the researcher were used to collect data from patients living with cancer.	Sleep quality: The majority of patients with cancer reported having poor sleep quality (69.8%). Nurses' perspectives: About 86.7% ($n = 98$) of nurses reported that they had never screened patients with cancer for any sleep problems. Patients' perspectives: 76.7% ($n = 99$) of the patients reported that they had never been assessed for sleep problems by the nursing staff during hospitalization. Only 8% of patients with cancer who reported having problems sleeping to a nurse received interventions to promote better sleep.	Assessment of sleep disturbances in patients with cancer should be unified using a comprehensive, reliable, valid instrument, as well as providing evidence-based interventions according to the patient's needs. A written policy should be introduced to encourage sleep documentation and to make sleep care for patients part of routine nursing care.
Lavender aromatherapy	Shady et al. (2019)	Data were collected via two survey instruments. Two open-ended questions were used to collect qualitative data and gain insight into patient acceptance and satisfaction with the intervention. In response to a Likert-type question asking how satisfied patients were with wearing the lavender patch overnight, patients were asked why they felt the way they did. Patients were also asked if there was another scent that they preferred. The institutional review board of the Christiana Care Health System approved the study.	Anxiety symptom severity: Self-reported GAD-7 anxiety symptom severity scores among patients ranged from mild to severe. The mean score was 5.95, indicating mild anxiety symptom severity. Patient satisfaction: Most patients ($n = 28$) reported that they were satisfied wearing the lavender inhalation patch and would use it again, describing the scent as pleasant and relaxing. Some patients indicated would prefer alternative scents, such as vanilla or citrus. In addition, patients reported that using the lavender patch resulted in longer and more restful sleep.	Lavender aromatherapy patches can be a feasible intervention in the hematology-oncology setting. Participants perceived better sleep quality and reported mild anxiety symptom scores after administering wearable overnight lavender aromatherapy skin patches.

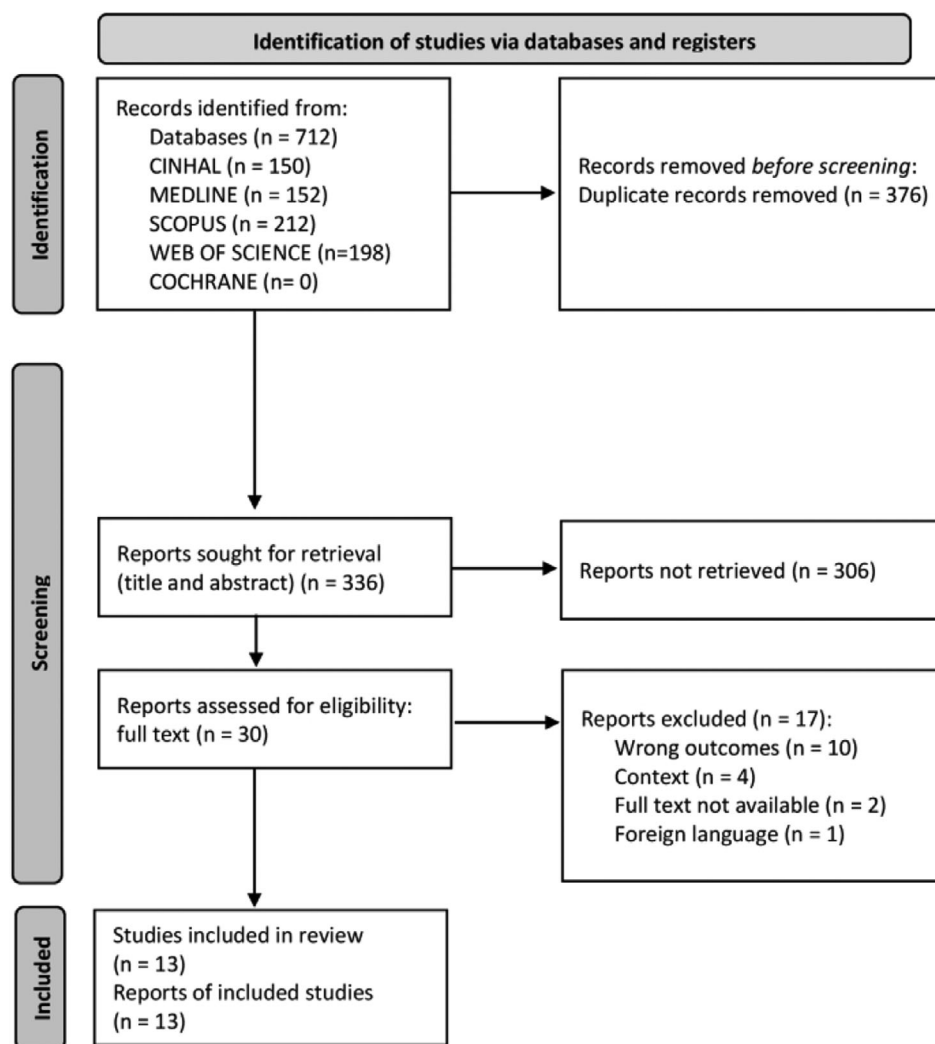


FIGURE 1 Article selection process.

mentioned issues, there is uncertainty regarding the reliability of outcome measurements, inadequate description, and analysis of differences between groups in terms of follow-up, lack of clarity on whether participants were analyzed within the groups to which they were randomized, and uncertainty about the appropriateness of the trial design or if whether any deviations from the standard RCT design were accounted. In Liu et al. (2020), there is a lack of consideration for potential deviations from the standard RCT design, and it remains unclear whether true randomization was employed in the assignment of participants to treatment groups.

The intervention involves the promotion of sleep by the nursing team within the context of hospitalization. The nursing interventions to enhance sleep primarily fall into eight categories: communicational and educational interventions, sensory interventions, daily activity planning, environmental control, dietary interventions, sleep assessment, symptoms control, and individualized care, as evidenced in Figures 2 and 3.

Communicational and educational interventions

The interventions in this category include communication techniques such as the use of empathy (Khater et al., 2019), encouraging the client to share their lived experience of illness with the nurse, family, and people with the same illness (Li et al., 2020; Liu et al., 2022; Ritmala-Castren et al., 2022), actively communicating with patients and their families (Gong et al., 2020; Li et al., 2020), providing clarity about their health situation (Gong et al., 2020; Liu et al., 2020; Xu et al., 2021), offering health education (Li & Zhang, 2020; Li et al., 2020; Liu et al., 2022), psychological assessment and counseling (Erfina et al., 2022; Gao & Su, 2021; Li & Zhang, 2020; Li et al., 2020; Xu et al., 2021), and emotional support (Li et al., 2020). These interventions are mostly integrated into models or programs such as multimodal nursing intervention (Erfina et al., 2022), rational emotive behavioral therapy program (Liu et al., 2022), predictive nursing (Gong et al.,

Categories and subcategories

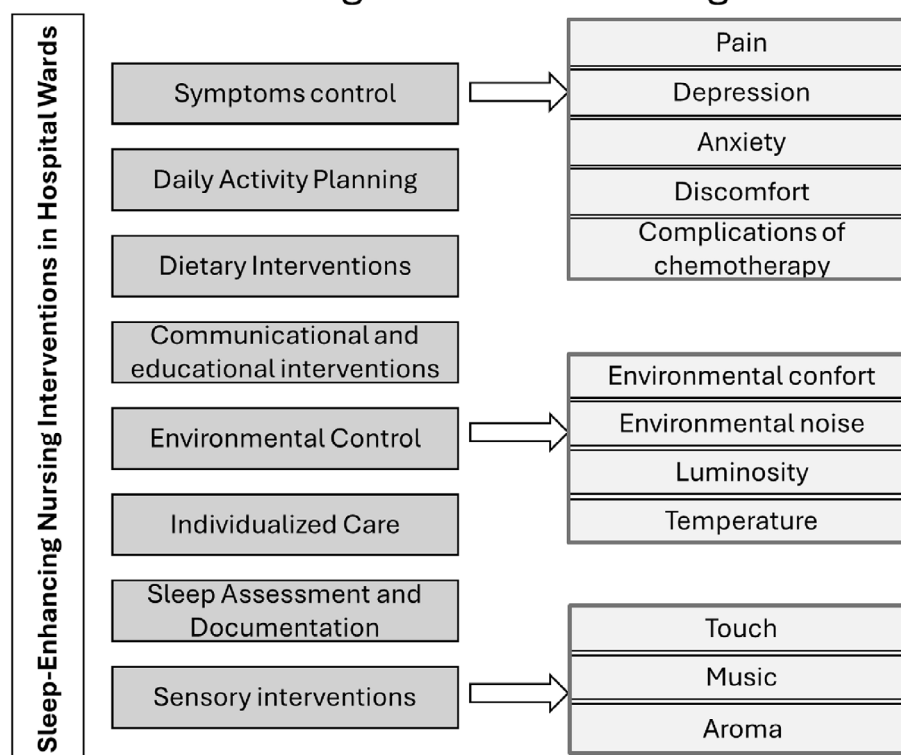


FIGURE 2 Categories and subcategories of sleep-enhancing nursing interventions in hospital wards.

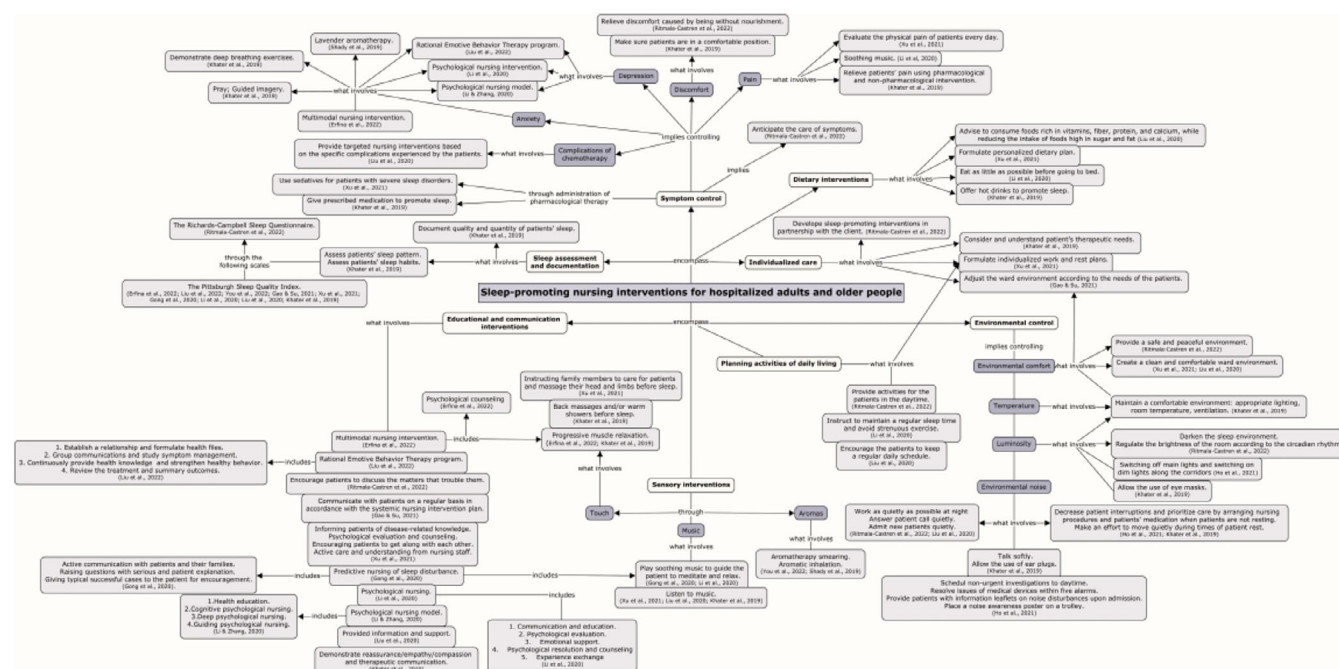


FIGURE 3 Sleep-promoting nursing interventions for hospitalized adults and older people: A conceptual map.

TABLE 3 Methodological quality assessment table.

Randomized controlled trial													
Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13
You et al. (2022)	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y
Gao and Su (2021)	Y	N	Y	N	U	Y	U	Y	Y	Y	Y	Y	Y
Xu et al. (2021)	Y	U	Y	U	U	U	U	Y	Y	Y	Y	Y	Y
Gong et al. (2020)	Y	U	Y	U	N	Y	U	Y	Y	Y	Y	Y	Y
Li and Zhang (2020)	Y	U	Y	U	N	Y	N	Y	U	N	U	Y	U
Liu et al. (2020)	U	N	Y	U	N	Y	U	Y	Y	Y	Y	Y	N
%	83	17	100	0	0	83	17	100	83	83	83	100	67
Cohort study													
Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11		
Ho et al. (2021)	Y	Y	Y	Y	N	Y	Y	Y	Y	U	Y		
%	100	100	100	100	0	100	100	100	100	0	100		
Qualitative research													
Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10			
Shady et al. (2019)	Y	Y	Y	Y	Y	N	Y	Y	N	Y			
%	100	100	100	100	100	0	100	100	0	100			
Quasi-experimental													
Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9				
Erfina et al. (2022)	Y	Y	N	Y	Y	U	Y	Y	Y				
Liu et al. (2022)	Y	Y	Y	Y	Y	U	Y	Y	Y				
Ritmala-Castren et al. (2022)	Y	Y	Y	Y	Y	Y	Y	Y	Y				
Li et al. (2020)	Y	Y	Y	Y	Y	U	Y	Y	Y				
%	100	100	75	100	100	25	100	100	100				
Cross-sectional study													
Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8					
Khater et al. (2019)	Y	Y	Y	Y	Y	Y	Y	Y					
%	100	100	100	100	100	100	100	100					

Y, Yes; N, No; U, Unclear.

2020), psychological nursing model (Li & Zhang, 2020), and psychological nursing intervention (Li et al., 2020).

Sensory interventions

Sensory interventions can be divided into aroma, music, and touch. The use of music constitutes a nursing intervention (Khater et al., 2019; Liu et al., 2020; Xu et al., 2021) that can be employed for meditation and relaxation purposes (Gong et al., 2020; Li et al., 2020). Aromatherapy, on the other hand, is described as a complementary treatment intervention that alleviates sleep problems, enhances quality of life, and can be administered through inhalation and topical application (Shady et al., 2019; You et al., 2022). Lastly, touch involves the application of techniques such as progressive muscle relaxation (Erfina et al., 2022; Khater et al., 2019), inte-

grated into multimodal nursing intervention (Erfina et al., 2022), back massage, and warm baths before bedtime (Khater et al., 2019), in addition to instructing patients' family members to massage the head and the upper and lower limbs (Xu et al., 2021).

Daily activity planning

Daily activity planning involves providing activities to the client throughout the day (Ritmala-Castren et al., 2022), encouraging a daily routine (Liu et al., 2020), creating individualized plans for activity and rest (Xu et al., 2021), instructing to maintain a regular sleep schedule and avoid intense exercise before bedtime (Li et al., 2020), and offering visiting hours to help patients sleep outside of those hours (Khater et al., 2019).

Environmental control

Environmental control entails managing the comfort of the environment, which includes controlling temperature, lighting, and noise. In terms of environmental comfort, it is crucial to provide a safe, calm environment (Ritmala-Castren et al., 2022), one that is clean and comfortable (Liu et al., 2020; Xu et al., 2021), which involves ensuring appropriate lighting, temperature, and ventilation (Khater et al., 2019). Lighting control involves dimming the sleeping environment, adjusting room lighting according to the circadian rhythm (Ritmala-Castren et al., 2022), turning off main lights, using softer lights in ward corridors (Ho et al., 2021), and allowing the use of eye masks (Khater et al., 2019). Noise control encompasses a range of interventions, such as working as quietly as possible during the night, answering client calls in a low tone, and admitting new patients quietly (Khater et al., 2019; Liu et al., 2020; Ritmala-Castren et al., 2022), reducing disruptions for patients, prioritizing care and organizing nursing procedures when they are not resting (Ho et al., 2021; Khater et al., 2019), speaking softly, and allowing the use of earplugs (Khater et al., 2019), scheduling non-urgent investigations to daytime, addressing medical device issues within five alarms, providing patients with informational leaflets about noise disturbances upon admission, and displaying a noise awareness poster on a trolley (Ho et al., 2021). The interventions described by Ho et al. (2021) are integrated into the developed project called “Silent Night.” The successful implementation of this project led to the reduction of noise disturbances from the environment and nursing activities, raising awareness about noise disturbances among healthcare professionals, patients, and visitors, thereby enhancing the quality of sleep for hospitalized individuals (Ho et al., 2021).

Dietary interventions

Among dietary interventions, developing an individualized meal plan is particularly noteworthy (Xu et al., 2021). Recommendations include consuming foods rich in vitamins, fiber, proteins, and calcium while reducing the intake of foods high in sugar and fat (Liu et al., 2020). It is advised to eat as little as possible before going to bed (Li et al., 2020) and offer warm beverages to promote sleep (Khater et al., 2019).

Sleep assessment and documentation

Sleep assessment involves evaluating patients’ sleep patterns and habits (Khater et al., 2019). These assessments should be conducted using the following tools: Pittsburgh Sleep Quality Index (Erfina et al., 2022; Gao & Su, 2021; Gong et al., 2020; Khater et al., 2019; Li et al., 2020; Liu et al., 2020, 2022; Xu et al., 2021; You et al., 2022) and Richards-Campbell Sleep Questionnaire (Ritmala-Castren et al., 2022). Finally, documenting

sleep quality and quantity is essential (Khater et al., 2019). The same author emphasizes that assessing sleep disturbances should be standardized using a comprehensive, reliable, and valid tool. Additionally, there is a need to implement a written policy to encourage sleep documentation and integrate client sleep care into routine nursing practices.

Symptoms control

According to Ritmala-Castren et al. (2022), a proactive approach should be taken in anticipating the control of symptoms. Symptoms may include pain, discomfort, anxiety, depression, and chemotherapy-related complications. Xu et al. (2021) consider pain and anxiety among the main factors affecting sleep in individuals with esophageal cancer. Pain control involves daily assessment of physical pain (Xu et al., 2021), pain relief through pharmacological and non-pharmacological interventions (Khater et al., 2019), and the use of soothing music as a non-pharmacological measure (Li et al., 2020). Discomfort control implies ensuring patients are in a comfortable position (Khater et al., 2019) and adequately nourished (Ritmala-Castren et al., 2022). Anxiety control may involve demonstrating deep breathing exercises (Khater et al., 2019), engaging in prayer and guided imagery (Khater et al., 2019), and employing lavender aromatherapy (Shady et al., 2019). The previously mentioned multimodal nursing intervention (Erfina et al., 2022), rational emotive behavior therapy program (Liu et al., 2022), psychological nursing model (Li & Zhang, 2020), and psychological nursing intervention (Li et al., 2020) have demonstrated effectiveness in both anxiety and depression control. Lastly, Liu et al. (2020) emphasize the importance of considering the specific needs and difficulties experienced by patients with cancer, such as chemotherapy side effects, patient satisfaction, emotional distress, and sleep quality, when managing chemotherapy-related complications. According to Erfina et al. (2022), the role of non-pharmacological interventions in controlling symptoms experienced by patients with cancer is becoming increasingly important for holistic care. As for pharmacological interventions, the use of sedatives for patients with severe sleep disorders is highlighted (Xu et al., 2021), along with the administration of prescribed medication to promote sleep (Khater et al., 2019).

Individualized care

The nursing sleep promotion intervention as individualized care involves adapting the ward environment according to the client’s needs (Gao & Su, 2021), creating individualized plans for activity and rest (Xu et al., 2021), considering and understanding the client’s therapeutic needs (Khater et al., 2019), and developing sleep-promoting interventions in partnership with the client (Ritmala-Castren et al., 2022). However, Ritmala-Castren et al. (2022) conclude that sleep

promotion and individualized care should include standardized protocols.

DISCUSSION

This study constitutes the only known systematic review that scrutinizes sleep-enhancing nursing interventions within hospital wards. Nevertheless, the methodological and clinical heterogeneity intrinsic to this literature impedes the feasibility of executing a comprehensive meta-analysis.

Faced with an adult and aging population with multiple morbidities, it is essential to adopt integrated care approaches that consider the various chronic diseases of the client rather than treating each one in isolation. This approach acknowledges that patients with multimorbidity have complex needs and emphasizes patient involvement and comprehensive care, which are essential preconditions for person-centered care (Rijken et al., 2018).

Allison Kitson's Fundamentals of Care framework is also closely related to the principles of person-centered care. This framework emphasizes fundamental care needs, such as sleep and rest, and values the care relationship between healthcare professionals and patients, recognizing the need for a systematic approach incorporating physical, psychosocial, and relational dimensions within the care context. The nurse–patient relationship is the foundation upon which high-quality fundamental care is built and is essential for nurses to recognize and manage complex needs (Kitson, 2018).

The study results underscore the importance of nurse–patient communication. Communication is, therefore, crucial in addressing patients' fundamental care needs (Kitson, 2018); according to Kalisch (2006), essential psychosocial care, such as engaging with patients, providing patient education, and offering emotional support, is often overlooked and falls under the category of missed care. Missed nursing “refers to any aspect of required patient care that is omitted (either in part or in whole) or delayed” (Kalisch et al., 2009, p. 1509). However, effective communication can mitigate the severe consequences of missed nursing care (Avallin et al., 2020).

Our results suggest that the control of symptoms associated with sleep disorders, such as anxiety, depression, and pain, plays a significant role in promoting sleep. Sleep problems and psychiatric disorders such as anxiety and depression share a bidirectional relationship that leads to impaired quality of life and increased disability (Abad & Guilleminault, 2005). The same happens between chronic pain and sleep disorders that often coexist (Husak & Bair, 2020). Approaches like massage, acupuncture, hypnosis, and music therapy have been recognized as potential treatments for pain. For patients with anxiety and depression, mind–body therapies and massage can also benefit (Deng, 2019). In patients with depression, cognitive-behavioral therapy deserves attention, and more studies that point to its effectiveness need to be developed (Neto et al., 2023).

Among these interventions, music intervention stands out because it is inexpensive, safe, and has no side effects (Gogoularadja & Bakshi, 2020). Using music as a sleep aid offers several potential benefits, including relaxation, distraction, synchronization, sound masking, and enjoyment (Dickson & Schubert, 2019). Although music can be used as a form of auditory stimulation for sleep enhancement, it is distinctively categorized apart from other auditory stimuli like colored noises and autonomous sensory meridian response sounds (Yoon & Baek, 2022). White noise is also recommended as a method for masking environmental noises, sleep induction, improving sleep, and maintaining sleep (Afshar et al., 2016).

Environmental factors can affect patient outcomes in hospitals. Several environmental factors have been identified, including unit layout, floor material, room features, medical equipment visibility, nature, lighting, and music. Among these factors, manifestations of nature, such as viewing natural landscapes from a window, utilizing images of nature, and integrating indoor plants into environments, stand out as solid evidence in effectively managing pain, anxiety, and depression. This emphasizes the importance of evidence-based design in hospital environments and the potential benefits of incorporating environmental factors into the design process (Jamshidi et al., 2020).

Recent research has shown that individuals who sleep fewer hours tend to follow a lower-quality diet. On the other hand, adherence to a varied and balanced diet has been associated with better sleep quality. It is highly recommended to opt for a diet of superior quality, marked by increased food diversity, and elevated consumption of fruits and fish, while simultaneously minimizing the consumption of processed and sugar-rich foods (Godos et al., 2021). In addition to diet, other lifestyle habits also affect sleep, such as alcohol intake, smoking, a sedentary lifestyle, and the use of caffeine and stimulants (Wang & B  r  , 2021). Regarding alcohol, sleep disturbances can occur during withdrawal (Reid-Varley et al., 2020). The incidence of alcohol withdrawal syndrome has increased during the COVID-19 pandemic among hospitalized patients (Sharma et al., 2021). It has been observed to cause alterations in sleep macroarchitecture and microarchitecture of both REM and NREM sleep, with a return to baseline sleep patterns occurring after 4 weeks of alcohol abstinence (Jones et al., 2022). Therefore, effectively managing alcohol withdrawal syndrome may lead to an improvement in sleep patterns.

Healthcare providers' knowledge of sleep includes understanding the implementation of effective sleep evaluation techniques (Meaklim et al., 2020). Various tools are available for assessing sleep disorders, and the appropriate selection of these instruments is pivotal in evaluating sleep disruptions for researchers and clinicians (Luyster et al., 2015). Regarding nurses' documentation, Ritmala-Castren et al. (2017) suggest that “the use of the whole nursing process, i.e., needs assessment, interventions used, the effects of the interventions, and the evaluation of sleep on documentation could be more

systematic, and thus improve the quality of patients' sleep documentation" (p. 8).

Equal interventions identified throughout the article were highlighted by Bellon et al. (2021, 2023) to promote sleep in acute and critical care units, including the use of music, aromatherapy, eye masks, ear plugs, acupressure, and educational programs. However, it is crucial to consider that the factors influencing sleep in both contexts may differ (Hellström & Willman, 2011). Therefore, it is important for nurses to receive training tailored to promoting patients' sleep in diverse healthcare environments.

This review has certain limitations due to the methodological fragility observed in some of the included studies, potentially introducing biases and affecting the overall robustness of the findings. The uncontrolled impact of confounding variables necessitates meticulous consideration of their potential effects on interventions aimed at improving sleep quality during hospitalization. Additionally, the review encompassed studies conducted in diverse countries and among varied patient populations, each with distinct cultural backgrounds, which means that the findings might not universally apply to all hospital settings or patient groups. Variations in cultural practices, healthcare systems, and patient demographics across different regions could significantly impact the effectiveness of implementing sleep-promoting interventions in clinical practice. Therefore, while the review offers valuable insights, its generalizability should be approached cautiously, taking into account the contextual differences across healthcare settings and populations.

IMPLICATIONS FOR NURSING AND HEALTH POLICY

The promotion of sleep interventions can be achieved through the establishment of hospital policies and protocols that acknowledge the importance of sleep promotion, provide clear guidelines for nurses, and allocate adequate resources. These policies should outline best practices for enhancing sleep quality, including recommendations for environmental modifications and restrictions on nighttime activities. Specifically, hospitals should consider incorporating sleep-promoting features into facility design and refurbishment, such as adjustable lighting, soundproofing, and climate control systems to create a restful environment. Policies should also restrict routine patient transfers and non-urgent procedures between 10 PM and 6 AM to minimize unnecessary nighttime disturbances. Additionally, adequate resources must be allocated to support these policies effectively. This includes investing in infrastructure that enhances sleep quality and ensuring that staff have the necessary training and tools to implement sleep promotion strategies. Continuous professional development opportunities should be provided to keep nursing staff updated on the latest research and best practices in sleep promotion. Regular audits should be conducted to ensure adherence to best practices in sleep promotion. Additionally, educational programs for nurses should be developed

to address the intricacies of sleep promotion in hospitalized patients.

From a research perspective, it is crucial to promote studies that investigate the effectiveness of different sleep promotion interventions in hospitalized patients and assess the long-term outcomes of sleep promotion interventions in improving the health and quality of life. Long-term studies are crucial as they reveal the enduring benefits of sleep interventions and guide the creation of evidence-based policies. By integrating research findings into policy development, hospitals can ensure that their sleep promotion strategies are grounded in solid evidence, leading to improved patient care and recovery.

CONCLUSION

Hospitalized patients often experience sleep disturbances that can be related to various factors, including individual, socio-cultural, and environmental influences. Chronic illness is a significant aspect as it is strongly associated with poor sleep quality. Within the context of hospitalization, several nursing interventions can enhance sleep quality of adult and older people with multimorbidity. These include conducting sleep assessments that consider factors impacting sleep, engaging in collaborative efforts with patients to create individualized care plans, promoting effective communication, provide patient education and sensory interventions. Managing environmental factors and alleviating symptomatic issues, scheduling daily activities, offering dietary guidance, and meticulously documenting sleep-related data are equally vital. Therefore, is essential to raise the nurses' awareness of the factors that affect sleep experience and empower them to promote sleep in partnership with hospitalized patients.

AUTHOR CONTRIBUTIONS

Study design: Sílvia Mendonça and Helga Rafael. *Data collection:* Sílvia Mendonça, Helga Rafael, Diogo Martins, Cândida Durão, and Joana Teixeira. *Data analysis:* Sílvia Mendonça, Helga Rafael, Diogo Martins, Cândida Durão, and Joana Teixeira. *Study supervision:* Sílvia Mendonça and Helga Rafael. *Manuscript writing:* Sílvia Mendonça and Helga Rafael. *Critical revisions for important intellectual content:* Sílvia Mendonça, Helga Rafael, Diogo Martins, Cândida Durão, and Joana Teixeira.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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Not applicable.

ORCID

Sílvia Caldeira Mendonça Degree in Nursing  <https://orcid.org/0009-0006-1509-0952>

Cândida Durão Master's Degree in Nursing  <https://orcid.org/0000-0002-9465-5280>

Joana Moreira Ferreira Teixeira Master's Degree in Nursing  <https://orcid.org/0000-0001-9237-8120>

Helga Marília da Silva Rafael Henriques PhD in Nursing  <https://orcid.org/0000-0003-2946-4485>

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