

Circadian Rhythm and Sleep Disturbances in Hospitalized Patients: Implications for Nursing Care: A Narrative Review

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Abstract

Sleep is a basic physiological need that supports cognition, emotional stability, physical restoration, and recovery from illness. Hospital admission often disrupts sleep–wake patterns through environmental, clinical, psychological, and organizational factors. Noise, artificial light, nighttime procedures, pain, anxiety, unfamiliar surroundings, medication timing, and reduced daytime activity can contribute to fragmented sleep and circadian misalignment. Nurses are well positioned to identify sleep problems and modify avoidable environmental and care-related causes while maintaining patient safety. This narrative review synthesizes current literature on circadian rhythm and sleep disturbance in hospitalized patients, outlines major contributing factors, considers potential consequences, and discusses evidence-informed nursing strategies. Evidence generally supports multicomponent approaches that include sleep assessment, environmental adjustment, symptom control, daytime activity, relaxation strategies, sensory aids, and reduction of unnecessary nighttime interruptions. Evidence for individual interventions remains variable. A practical circadian-sensitive nursing framework is proposed to integrate sleep promotion into routine patient care. Protecting sleep should be considered an important component of holistic, patient-centered nursing care while maintaining individualized monitoring and clinical safety.

Keywords: circadian rhythm, sleep disturbance, hospitalized patients, nursing care, sleep promotion, sleep hygiene, circadian-sensitive nursing, inpatient care

1. Introduction

Sleep is essential for cognitive performance, emotional balance, metabolic regulation, immune function, and physical recovery. The sleep–wake cycle depends on the interaction between homeostatic sleep pressure and the circadian timing system. Circadian rhythms organize physiological and behavioral processes across approximately 24 hours and are mainly synchronized by environmental cues, particularly the light–dark cycle (Meyer et al., 2022; Pandi-Perumal et al., 2022).

Hospitalization can disturb these natural time cues. Patients leave their usual sleep environment and encounter unfamiliar rooms, clinical procedures, monitoring, medication schedules, noise, artificial lighting, pain, anxiety, and changes in daytime activity. Consequently, hospital sleep is often shorter, more fragmented, and perceived as poorer than sleep at home. A systematic review and meta-analysis reported that hospitalized patients slept approximately 1–4 hours less than at home across included studies (Burger et al., 2022).

Recent evidence suggests that this problem remains common. Koshy et al. (2024) reported that 77% of patients in a respiratory ward rated their hospital sleep as worse or much worse than sleep at home. Noise, vital-sign checks, and light were among the commonly reported sources of disturbance.

Sleep disruption is not simply a matter of comfort. It may influence cognition, emotional well-being, pain perception, physical function, and patient experience. However, evidence linking hospital sleep disruption directly with specific clinical outcomes remains mixed, and causal interpretations should therefore be cautious (Elliott et al., 2021).

Nurses play a central role because they provide continuous bedside care and perform many activities that may either disturb or protect sleep. Recent evidence identifies environmental modification, symptom management, activity, sleep assessment, education, and individualized care as important components of nursing-led sleep promotion (Mendonça et al., 2025). Sleep promotion should therefore be incorporated into fundamental nursing care and patient-centered practice.

2. Circadian Rhythm and Hospital-Related Sleep Disruption

Circadian rhythms are internal biological rhythms that follow an approximately 24-hour cycle. They influence sleep and wakefulness, body temperature, hormone release, metabolism, cardiovascular activity, and behavior. The central circadian pacemaker is located in the suprachiasmatic nucleus of the hypothalamus. Light is the most important environmental cue for synchronizing this internal clock with the external environment. The interaction between circadian timing and homeostatic sleep pressure determines when and how well an individual sleeps (Meyer et al., 2022; Pandi-Perumal et al., 2022).

In hospital settings, this system can easily become disrupted. Patients may receive inadequate natural daylight during the day and excessive artificial light at night. Repeated awakenings for nursing care, monitoring, procedures, and other clinical activities can further fragment sleep. Over time, the internal biological clock and the hospital environment may become mismatched.

Common manifestations of disrupted sleep and circadian rhythm include difficulty initiating sleep, frequent nighttime awakening, fragmented sleep, reduced total sleep duration, early morning awakening, daytime sleepiness, excessive daytime napping, altered sleep–wake timing, poor perceived sleep quality, and reduced day–night orientation.

A systematic review of hospitalized adults and children found that both sleep quantity and quality were generally poor during hospitalization, with environmental and patient-related factors contributing to the disturbance (Burger et al., 2022).

3. Factors That Contribute to Poor Sleep in Hospital

3.1 Noise

Noise is one of the most consistent sleep disruptors in hospitals. Common sources include equipment alarms, staff conversations, telephones, doors, cleaning activities, patient movement, other patients, and monitoring devices. In a respiratory ward, noise was reported as the most frequent cause of poor sleep, followed by vital-sign checks and light (Koshy et al., 2024). Reducing unnecessary noise should therefore be considered both a nursing responsibility and an institutional priority.

3.2 Light and Lack of Daylight

Light strongly influences circadian timing. Hospitalized patients may receive inadequate natural daylight during the day and excessive artificial light at night from overhead lighting, monitors, corridors, procedures, and electronic screens. A systematic review of light therapy in hospitalized patients found

potential benefits for sleep duration, sleep quality, circadian alignment, fatigue, and daytime mood, although studies varied considerably (Lindskov et al., 2022). Critical care literature also emphasizes the importance of the timing and quality of light exposure while acknowledging uncertainty regarding optimal lighting parameters (Perry et al., 2024).

A practical nursing principle is therefore to encourage appropriate daytime light exposure while reducing unnecessary light at night.

3.3 Nighttime Nursing Care and Procedures

Some nighttime care is essential and cannot be eliminated. Patient safety must remain the priority. However, repeated non-urgent interruptions can fragment sleep. Examples include vital-sign monitoring, medication administration, blood sampling, intravenous therapy, bedside procedures, repositioning, toileting assistance, routine assessments, and staff communication.

When clinically appropriate, clustering care activities may reduce the number of separate awakenings. Such decisions must always be individualized according to the patient's condition, monitoring requirements, treatment plan, and safety needs.

3.4 Pain and Physical Symptoms

Pain is an important cause of sleep disturbance in hospitalized patients. Other symptoms may include breathlessness, cough, nausea, vomiting, itching, fever, urinary frequency, gastrointestinal discomfort, and muscle soreness. Sleep promotion should therefore begin with assessment of what is preventing the patient from sleeping. Symptom management and sleep promotion should be integrated rather than considered separate aspects of care.

3.5 Anxiety and Psychological Stress

Hospitalization can produce fear, uncertainty, anxiety, and emotional distress. Patients may worry about their diagnosis, procedures, family responsibilities, finances, prognosis, or recovery. Psychological stress can make it difficult to initiate or maintain sleep.

Nursing interventions may include therapeutic communication, orientation and information, reassurance, relaxation techniques, identification of patient concerns, involvement of family when appropriate, and referral to other professionals when required.

3.6 Reduced Daytime Activity

Hospitalization frequently reduces physical activity, particularly among older adults, postoperative patients, and patients with mobility limitations. Prolonged daytime bed rest may increase daytime sleepiness and reduce sleep pressure at night.

When medically appropriate, nurses can encourage sitting out of bed, walking, self-care, physiotherapy, daytime social interaction, and suitable therapeutic activities. The objective is not to eliminate daytime rest but to avoid unnecessary prolonged daytime sleeping that weakens the distinction between day and night.

3.7 Medication and Treatment Schedules

Medications and treatment schedules can influence sleep directly or indirectly. Some medications may cause alertness or sedation, whereas others may contribute to nighttime symptoms or awakenings. Treatment schedules may also require patients to be awakened.

Nurses should not independently alter prescribed medication schedules for the purpose of improving sleep. Instead, recurring medication-related sleep problems should be identified and communicated to the prescribing clinician or multidisciplinary team.

3.8 Unfamiliar Environment and Room Characteristics

Hospital rooms may be unfamiliar and uncomfortable. Shared rooms, unfamiliar beds, room temperature, bedding, frequent room changes, reduced privacy, equipment sounds, and the presence of other patients can interfere with sleep. Koshy et al. (2024) reported that patients in shared rooms were more likely to report disruption related to noise and light.

These findings highlight the importance of considering environmental characteristics as part of sleep-promoting care.

4. Consequences of Sleep and Circadian Disruption

4.1 Cognitive Function

Sleep disruption can affect attention, concentration, memory, and orientation. In critically ill patients, sleep and circadian disruption frequently occur alongside delirium, but the relationship is complex and potentially bidirectional. It remains uncertain whether improving sleep independently prevents delirium. Elliott and Delaney (2023) identified low-quality evidence suggesting that better sleep may reduce delirium but emphasized the difficulty of establishing causality because sleep disturbance and delirium may influence one another.

Nursing literature should therefore avoid claiming that sleep promotion definitively prevents delirium.

4.2 Psychological Well-Being

Poor sleep may contribute to irritability, emotional distress, reduced coping, and daytime fatigue. Hospitalization itself is stressful, and sleep disturbance may add to this psychological burden.

4.3 Pain and Physical Function

Sleep and pain influence one another. Pain can disturb sleep, while inadequate sleep may alter pain perception. A systematic review of hospital-related sleep disruption identified associations with pain intensity and physical strength, although evidence was mixed and methodological limitations were common (Elliott et al., 2021).

4.4 Recovery and Patient Experience

Sleep is biologically important for recovery, but the exact relationship between inpatient sleep and outcomes such as length of stay or postoperative recovery remains incompletely defined. Hillman (2021) highlighted the multiple physiological effects of sleep loss and the numerous barriers to adequate sleep created by hospitalization.

The nursing goal should therefore not be to promise a specific clinical outcome but to reduce avoidable sleep disruption and create conditions that support recovery.

5. Nursing Assessment of Sleep

Sleep assessment should form part of routine nursing assessment rather than being treated as an optional question. A simple structured assessment can include:

Usual sleep pattern: bedtime, wake time, usual sleep duration, and usual sleep quality.

Hospital sleep: time taken to fall asleep, number of awakenings, duration of nighttime sleep, daytime naps, morning fatigue, and the patient's perception of sleep quality.

Potential disruptors: noise, light, pain, anxiety, procedures, vital-sign checks, medication schedules, toileting, temperature, and room environment.

Patient preferences: preferred sleep routine, relaxation methods, environmental conditions, and personal or cultural sleep practices.

Validated sleep assessment tools may be incorporated according to institutional policy and clinical context.

6. Evidence-Informed Nursing Interventions

No single intervention is effective for every hospitalized patient. A multicomponent and individualized approach is therefore appropriate. A 2025 systematic review identified environmental and sensory strategies, symptom management, activity-based interventions, education, sleep assessment, and individualized care as important categories of nursing sleep promotion (Mendonça et al., 2025).

6.1 Promote Daytime Light Exposure

During the day, nurses can open curtains or blinds when appropriate, encourage natural daylight exposure, position patients near windows when feasible, avoid unnecessary prolonged darkness, and combine daylight exposure with daytime activity. Light-based interventions show potential benefits for sleep and circadian outcomes, although evidence remains variable (Lindskov et al., 2022).

6.2 Encourage Appropriate Daytime Activity

Depending on the patient's clinical condition, nurses can encourage walking, sitting out of bed, self-care, physiotherapy, daytime social interaction, and participation in therapeutic activities. Unnecessary prolonged daytime sleeping should be minimized where clinically appropriate.

6.3 Reduce Nighttime Noise

Practical measures include speaking quietly, limiting unnecessary conversations near patients, closing doors gently, reducing avoidable equipment noise, coordinating care activities, and promoting designated quiet periods. Noise reduction should be a shared responsibility among healthcare workers rather than solely a nursing task.

6.4 Reduce Unnecessary Nighttime Light

Nurses can dim lights when safe, avoid unnecessary overhead lighting, use focused bedside lighting during procedures, reduce corridor light entering patient rooms, and minimize unnecessary screen exposure before bedtime. Darkness should never compromise clinical observation or patient safety.

6.5 Cluster Nursing Care

When clinically feasible, nurses can group several activities into a single care episode. Before a planned sleep period, this may include toileting, positioning, comfort measures, symptom assessment, prescribed medication, and environmental adjustment. Essential monitoring must continue according to clinical requirements.

6.6 Manage Pain and Other Symptoms

Before sleep, nurses should identify symptoms that may interfere with rest. Interventions may include pain assessment, prescribed analgesia, repositioning, respiratory comfort measures, temperature adjustment, toileting, management of nausea or other symptoms, and relaxation strategies. The objective is to address modifiable causes of sleep disturbance rather than simply instructing patients to sleep.

6.7 Relaxation Techniques

Non-pharmacological approaches may include deep breathing, progressive muscle relaxation, guided imagery, relaxation audio, quiet music, and therapeutic communication. Systematic evidence indicates potential benefits from several non-pharmacological approaches, although the magnitude and certainty of effects vary (Beswick et al., 2023).

6.8 Eye Masks and Earplugs

Eye masks and earplugs may reduce sensory stimulation for selected patients. Hospital-based evidence suggests potential benefits, but these devices should be used only when clinically appropriate. They may

be unsuitable for patients who require frequent communication, close observation, alarm awareness, or other forms of monitoring.

6.9 Patient and Family Education

Education may include the importance of sleep during illness, maintaining a regular sleep–wake routine, avoiding excessive daytime sleep when possible, relaxation techniques, reporting sleep problems, understanding hospital routines, and appropriate use of sleep aids. Family members can also support a calm nighttime environment.

7. Circadian-Sensitive Nursing Care and a 24-Hour Framework

Circadian-sensitive nursing care extends beyond conventional sleep hygiene by considering the timing of nursing activities and environmental cues. The central principle is to establish a clearer distinction between daytime—characterized by light, activity, orientation, and engagement—and nighttime—characterized by darkness, quiet, comfort, and protected sleep.

This approach does not require sophisticated technology and can be integrated into routine bedside nursing care.

Figure 1. Conceptual Framework of Circadian-Sensitive Nursing Care

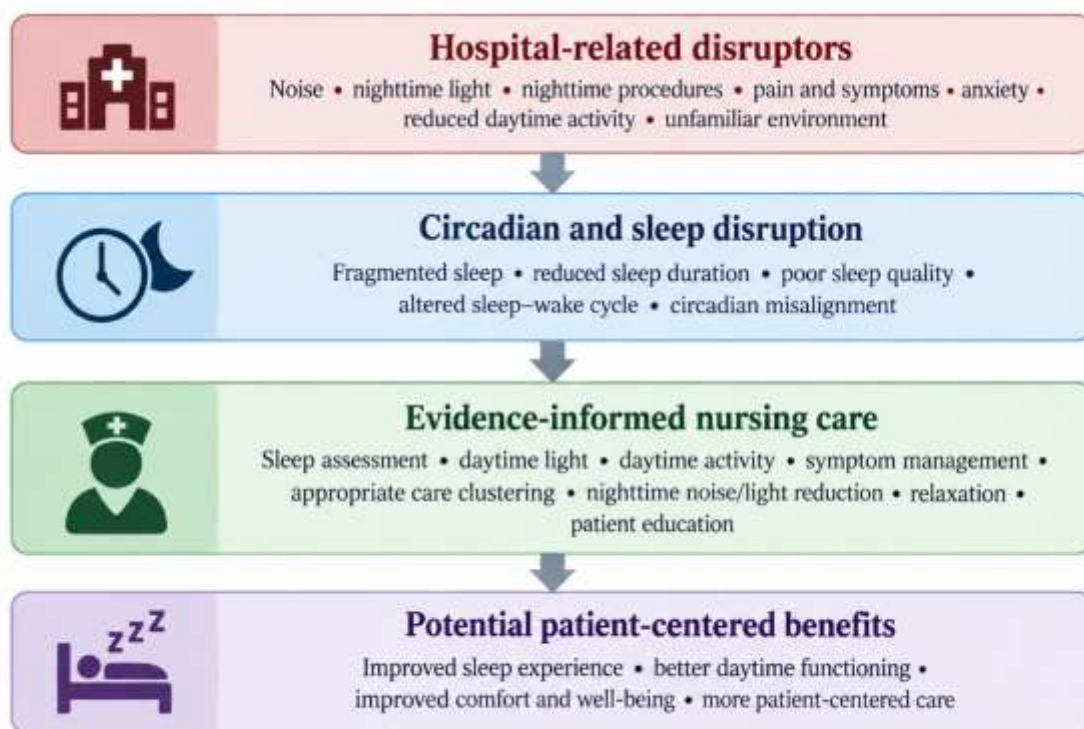


Figure 1. Conceptual framework of circadian rhythm and sleep in hospitalized patients and evidence-informed nursing strategies.

7.1 Morning

- Open curtains or blinds when appropriate.
- Encourage daylight exposure.
- Orient the patient to time and date.
- Encourage personal care and daytime activity.
- Support mobilization as tolerated.

- Avoid unnecessary prolonged daytime sleep.

7.2 Afternoon

- Encourage physical activity according to clinical condition.
- Facilitate social interaction and therapeutic activities.
- Encourage participation in rehabilitation.
- Avoid excessive daytime naps where possible.
- Continue symptom management.
- Reinforce orientation to time.

7.3 Evening

- Reduce environmental stimulation.
- Address pain and discomfort.
- Assist with toileting.
- Provide relaxation strategies.
- Cluster appropriate care.
- Reduce unnecessary lighting.
- Encourage a consistent bedtime routine.

7.4 Night

- Maintain a quiet environment.
- Minimize unnecessary light.
- Cluster care when clinically appropriate.
- Avoid non-urgent interruptions.
- Use eye masks or earplugs when suitable.
- Continue essential monitoring.
- Respond promptly to patient needs.

This framework is a clinical concept rather than a rigid protocol. Individualization according to patient condition, preferences, safety requirements, and treatment needs remains essential.

8. Evidence for Multicomponent Approaches

Evidence increasingly suggests that inpatient sleep may be better addressed through several complementary interventions rather than a single isolated strategy. Bellon et al. (2021) reviewed randomized controlled trials of nursing-delivered sleep interventions and identified environmental, physical, behavioral, and combined approaches. Many studies reported improvements in perceived sleep quality, although methodological quality varied.

Mendonça et al. (2025) similarly identified multiple categories of nursing interventions and emphasized integration of sleep promotion into routine nursing care.

A 2025 randomized clinical trial, the WEsleep study, evaluated a multicomponent intervention in medical hospital wards incorporating strategies such as delayed care, sleep hygiene, earplugs, and eye masks. The intervention was associated with improved patient-reported sleep quality, although not all sleep or clinical outcomes differed significantly (de Gans et al., 2025). These findings support the practical value of combining several low-risk strategies rather than relying on a single intervention.

Burger et al. (2023) also reported promising effects for interventions including eye masks and earplugs, headphones or white noise, aromatherapy, massage, muscle relaxation, breathing exercises, and advanced nursing strategies. However, certainty of evidence varied from moderate to very low. Nursing practice

should therefore emphasize individualized, low-risk, evidence-informed strategies rather than assuming that one intervention will work for all patients.

9. Role of Nurses in Sleep-Promoting Care

Nurses can support sleep through assessment, planning, implementation, evaluation, and communication. **Assessment** involves identifying sleep disturbance and contributing factors early.

Planning involves incorporating sleep-related interventions into the individualized care plan.

Implementation includes environmental modification, symptom management, daytime activity, relaxation, patient education, and appropriate organization of nighttime care.

Evaluation involves assessing the patient's response the following morning. Nurses can ask whether the patient slept better, what disturbed sleep, whether pain was controlled, whether unnecessary interruptions occurred, whether the environment was appropriate, and which interventions were helpful.

Communication involves sharing sleep-related concerns during handover and multidisciplinary discussions when appropriate.

Sleep should therefore be considered a nursing outcome that can be assessed and addressed alongside other fundamental aspects of patient care.

10. Barriers to Sleep-Promoting Nursing Practice

Even relatively simple interventions may be difficult to implement. Common barriers include high patient acuity, staffing limitations, frequent monitoring requirements, emergency procedures, lack of standardized sleep assessment, limited staff awareness, absence of institutional sleep policies, environmental noise, inappropriate lighting design, and patient-specific treatment requirements.

An integrative review of nurses' knowledge, attitudes, and practices found that although nurses generally recognize the importance of sleep, implementation may be affected by inadequate training, limited assessment tools, patient acuity, coworker attitudes, and lack of organizational sleep policies (Mohedat & Somayaji, 2023).

Recent evidence also highlights institutional barriers such as frequent staff interruptions, environmental noise, limited staff training, and absence of formal sleep-promoting policies (Goldstein Betancourt & Schulman, 2026).

Improving inpatient sleep therefore requires organizational support rather than relying solely on individual nurses.

11. Education, Administration, and Hospital Design

Nursing Education

Circadian health and sleep promotion can be incorporated into undergraduate and postgraduate nursing education. Students should learn to assess sleep, identify environmental disruptors, understand the relationship between light and circadian rhythm, promote daytime activity, reduce nighttime disturbances, use relaxation techniques, develop individualized sleep plans, and evaluate outcomes.

Clinical teaching can integrate sleep promotion into medical-surgical nursing, critical care, geriatric nursing, perioperative nursing, and fundamental nursing. Simulation or OSCE stations could require students to assess a hospitalized patient's sleep disturbance and develop an individualized nursing care plan.

Nursing Administration

Nurse leaders can support sleep promotion through quiet-hour policies, nighttime noise-reduction measures, review of nighttime monitoring practices, clustering of care where appropriate, improved daytime light exposure, daytime mobility, staff education, sleep assessment documentation, patient education materials, and monitoring of patient feedback.

Sleep promotion should therefore be treated as a quality-of-care issue rather than solely as an individual patient responsibility.

Hospital Design

Hospital design should consider natural daylight, nighttime lighting control, noise reduction, room layout, acoustics, privacy, temperature control, bedside lighting, and alarm management.

Research on hospital lighting suggests that dynamic lighting systems may influence sleep timing and circadian alignment, although additional evidence is required before broad recommendations can be made (Perry et al., 2024). Hospital design should complement nursing interventions rather than replace them.

12. Circadian-Sensitive Nursing Strategies Across the 24-Hour Hospital Cycle

Time	Primary goal	Key nursing strategies
Morning	Strengthen daytime cues	Daylight exposure, orientation, personal care, mobilization, reduce unnecessary prolonged sleep
Afternoon	Maintain activity and daytime alertness	Activity as tolerated, therapy, social interaction, symptom management, avoid excessive naps
Evening	Prepare for sleep	Reduce stimulation, address pain/symptoms, toileting, relaxation, appropriate care clustering, reduce unnecessary light
Night	Protect sleep while maintaining safety	Quiet environment, minimal unnecessary light, appropriate care clustering, avoid non-urgent interruptions, essential monitoring
Morning review	Evaluate effectiveness	Ask about sleep quality, interruptions, symptoms, environmental factors, and helpful interventions

13. Special Considerations

13.1 Older Adults

Older adults may be particularly vulnerable to sleep–wake disruption because of age-related changes in sleep, chronic illness, sensory impairment, reduced mobility, and increased delirium risk.

Nursing care should emphasize daytime orientation, natural daylight, appropriate activity, avoidance of unnecessary prolonged naps, familiar routines, reduction of nighttime disturbances, pain and symptom management, and regular communication and reassurance. The nursing systematic review by Mendonça et al. (2025) emphasized individualized interventions for hospitalized adults and older people.

13.2 Critical Care

Sleep and circadian disruption can be particularly severe in intensive care because of critical illness, mechanical ventilation, continuous monitoring, medications, procedures, alarms, and loss of a normal day–night environment.

A 2024 review emphasized light exposure, ICU design, and circadian-supportive interventions while noting uncertainty regarding optimal timing and intensity of light (Perry et al., 2024). A systematic review

of sound and darkness interventions in critically ill patients identified potential benefits from eye masks, earplugs, music, and combined interventions, although effects and study quality varied (Fang et al., 2024). Critical care nurses must therefore balance sleep promotion with the need for continuous monitoring and immediate clinical intervention.

14. Future Directions and Limitations

Future nursing research should address several areas:

1. Standardized sleep assessment using consistent and validated measures.
2. Objective assessment of circadian rhythm using actigraphy, light exposure measurements, or melatonin-related measures where feasible.
3. Multicomponent nursing interventions combining daytime light, activity, environmental modification, symptom management, appropriate care clustering, relaxation, and education.
4. Implementation research examining how sleep-promoting practices can be integrated into routine nursing workflows.
5. Patient-centered outcomes such as sleep quality, comfort, fatigue, anxiety, satisfaction, and functional recovery.
6. Hospital policy research examining whether institution-wide sleep policies produce sustained improvements.

The current evidence has several limitations. Studies use different definitions and measures of sleep quality. Intervention studies vary in population, setting, components, timing, and duration. Many studies have small samples or methodological limitations. Hospital sleep is also influenced by multiple interacting variables that are difficult to isolate.

Burger et al. (2023) reported that although several interventions show promise, certainty of evidence ranges from moderate to very low. Elliott et al. (2021) similarly concluded that the relationship between hospital-related sleep disruption and short-term physical health outcomes remains incompletely defined because of heterogeneity and methodological limitations.

These limitations should be considered when translating evidence into routine nursing practice.

15. Conclusion

Sleep and circadian rhythm are important components of recovery and can be substantially disrupted during hospitalization. Noise, artificial light, nighttime care, pain, anxiety, reduced daytime activity, medication schedules, and unfamiliar surroundings may contribute to fragmented sleep and altered day–night rhythms.

Current evidence supports the value of sleep-promoting nursing care, although the strength of evidence varies across individual interventions. Recent evidence supports environmental modification, physical sleep aids, relaxation, light-based strategies, symptom management, and multicomponent nursing approaches (Bellon et al., 2021; Beswick et al., 2023; Burger et al., 2023; de Gans et al., 2025; Mendonça et al., 2025).

The nurse's role extends beyond responding to complaints of poor sleep. Nurses can actively shape conditions that support the patient's biological day–night cycle through assessment, environmental modification, symptom management, daytime activity, education, and thoughtful organization of nighttime care.

A circadian-sensitive nursing approach provides a practical way to integrate these actions into routine care. The objective is not to eliminate necessary clinical care but to distinguish essential nighttime care from avoidable disruption. Protecting sleep should therefore be recognized as an important component of holistic, patient-centered nursing care.

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