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Review Article

Research Progress of Perioperative Sleep Disorders in Patients Undergoing Surgery

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Abstract

Perioperative sleep disturbances in surgical patients represent a significant yet often overlooked clinical issue that can profoundly impact postoperative recovery and overall outcomes. Perioperative sleep disorders are common complications in surgical patients, with an incidence rate of up to 50%, significantly impacting postoperative recovery and overall health. These disorders manifest as reduced sleep duration, sleep fragmentation, circadian rhythm disturbances, and pain, peaking in severity on the first postoperative day and persisting in some patients for up to 15 days. Sleep disorders not only increase the risk of postoperative cognitive dysfunction (POCD) but are also closely associated with postoperative fatigue, pain, and dysfunction in the cardiovascular and gastrointestinal systems. The mechanisms involve both physiological and psychological factors, such as surgical stress, inflammatory responses, anxiety, and pain. Assessment tools include the Pittsburgh Sleep Quality Index (PSQI) and polysomnography (PSG). Influencing factors encompass patient age, gender, psychological state, environmental noise and lighting, type of surgery, and anesthetic agents. Prevention and management strategies include psychological interventions, environmental optimization, postoperative analgesia, and pharmacological treatments (e.g., dexmedetomidine, propofol). This comprehensive review delves into the prevalence, underlying mechanisms, risk factors, and potential interventions for sleep disorders during the perioperative period. By synthesizing current evidence, this review underscores the need for heightened awareness and proactive management of perioperative sleep disturbances to enhance patient recovery and surgical outcomes. Future research directions are also discussed, aiming to reducing the risk of POCD and promoting rapid recovery in patients.

Keywords

Perioperative, Sleep Disorders, Research Progress

1. Introduction

Studies have shown that perioperative sleep disorders remain a significant challenge for hospitalized patients, with an incidence rate of approximately 50% [1]. Sleep is a naturally occurring reversible state of reduced wakefulness, during which the body restores energy and physical strength, playing a crucial role in maintaining normal physiological activities. Sleep Disorders (SD) refer to a decline in sleep quality or abnormal sleep patterns caused by disruptions in the sleep-wake cycle. Perioperative SD are common complications in surgical patients, manifesting as reduced sleep duration, sleep fragmentation, circadian rhythm disturbances, and pain, with the most severe symptoms typically occurring on the first postoperative day. Approximately one-quarter of patients may experience these disturbances for up to 15 days

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post-surgery, significantly impacting recovery and overall health. Perioperative SD is an essential component of perioperative rehabilitation, and the Enhanced Recovery After Surgery (ERAS) protocol recommends perioperative sleep management for surgical patients.

2. Epidemiology of Perioperative Sleep Disorders

Sleep is one of the fundamental physiological needs of humans. A healthy adult is recommended to sleep 7-8 hours per day. Consistently sleeping less than 5 hours per night can lead to impairments in cognition, memory, mood, and metabolism. Human sleep architecture is divided into Rapid Eye Movement (REM) sleep and Non-Rapid Eye Movement (NREM) sleep, which alternate throughout the night [2]. Each cycle lasts 90-120 minutes, with 4-6 cycles occurring during a full night's sleep. REM sleep accounts for about 20% of the cycle and is primarily responsible for physical recovery and hormone regulation, while NREM sleep, accounting for 80%, is crucial for restoring higher brain functions such as memory and cognition [3].

As surgical patients recover, their sleep architecture typically returns to preoperative levels within a week. However, some patients may experience prolonged postoperative sleep disturbances. Halle et al. used a general sleep disorder scale to track the sleep trajectories of lung cancer patients for 12 months post-surgery. They found that preoperative sleep disorders were present in 60.9% of patients, increasing to 68.5% one-month post-surgery, and gradually declining thereafter. Nevertheless, 49.7% of patients still experienced sleep disorders 12 months post-surgery [4]. The primary manifestations of sleep disorders in these patients included insufficient sleep duration, frequent awakenings, and reduced sleep quality. This highlights the importance of screening and addressing sleep disorders in clinical practice, particularly in lung cancer patients who often present with preoperative sleep disturbances.

3. Mechanisms of Perioperative SD

3.1. Physiological Mechanisms

Perioperative stress responses activate the hypothalamic-pituitary-adrenal axis, leading to elevated cortisol levels that disrupt the sleep-wake cycle. Additionally, systemic inflammatory responses triggered by surgical trauma can interfere with sleep regulation. Factors such as anesthesia, postoperative pain, and environmental changes may also disrupt the patient's circadian rhythm, leading to sleep-wake cycle disturbances [5].

3.2. Psychological Mechanisms

Preoperative anxiety, postoperative pain, and concerns about recovery can induce psychological stress, resulting in difficulty falling asleep or reduced sleep quality. Some patients may experience postoperative cognitive decline, further impairing their ability to regulate sleep [6].

4. Assessment Methods for Sleep Disorders

4.1. Pittsburgh Sleep Quality Index (PSQI)

The PSQI is the most widely used tool for assessing sleep quality and is considered the gold standard [7]. It evaluates seven components: sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medications, and daytime dysfunction. The total score ranges up to 21, with scores above 7 indicating the presence of SD. Higher scores reflect more severe sleep disturbances.

4.2. Polysomnography (PSG)

Polysomnography is the gold standard for diagnosing SD, effectively assessing delayed sleep onset, reduced sleep duration, and overall sleep efficiency [8].

5. Factors Influencing Perioperative Sleep Disorders

5.1. Patient-Related Factors

5.1.1. Age

Older adults are more prone to SD, likely due to age-related declines in melatonin levels [9]. Aging reduces sleep quality and leads to sleep fragmentation, characterized by difficulty falling asleep, shorter sleep duration, and increased nighttime awakenings [10].

5.1.2. Gender

Socioeconomic, physiological, and psychological factors contribute to gender differences in perioperative SD. A meta-analysis of 29 studies involving 1.265 million patients (718,000 women and 546,000 men) found that women had a 1.41 times higher risk of SD compared to men (95% CI: 1.28-1.55), with this trend being more pronounced in elderly patients [11]. Additionally, studies have shown that men and women respond differently to surgical information, with women more likely to seek help before and after surgery [12]. Preoperative anxiety and fear can exacerbate perioperative sleep disturbances.

5.1.3. Psychological State

In the absence of surgical or anesthetic stimuli, psychological stress from negative emotions is a primary factor contributing to perioperative sleep disorders. The psychological burden of illness and changes in the hospital environment can induce anxiety and other negative emotions, enhancing neural conduction in the limbic system (e.g., locus coeruleus, amygdala, hippocampus) and altering neurotransmitter levels, leading to SD. Timely psychological counseling can effectively reduce the incidence of SD.

5.2. Environmental Factors

Noise and lighting are common environmental factors contributing to SD. A study of 205 hospitalized patients without a history of insomnia found that 36% (75 patients) developed new-onset insomnia by days 3-5 of hospitalization. SD was primarily caused by blood draws and vital sign checks (68%), disease-related factors (64%), and noise/lighting (23%) [13]. The World Health Organization recommends that noise levels in hospital wards should not exceed 40 dB [14]. However, studies show that ward noise levels often exceed 50 dB, primarily due to staff conversations, medical monitor alarms, and interactions among patients and their families [15].

Lighting also affects sleep quality. Prolonged exposure to inappropriate lighting can lead to reduced sleep quality and circadian rhythm disruptions. For example, nighttime light exposure negatively impacts sleep, prolonging sleep latency and reducing deep sleep duration [16]. Even 5 Lux of light can reduce sleep quality, and the nighttime lighting in most ICUs is sufficient to suppress melatonin secretion and disrupt sleep rhythms. Some elderly patients who have previously been in the ICU explicitly refuse to return for subsequent surgeries [17].

5.3. Surgical Factors

5.3.1. Type of Surgery

Different types of surgery have varying impacts on sleep quality. Surgeries with greater trauma, longer duration, and hemodynamic instability tend to cause more severe and prolonged sleep disturbances. For example, lumbar spine surgery has a more significant impact on sleep compared to other orthopedic procedures [18] A study comparing sleep quality in 76 laparoscopic surgery patients and 44 open abdominal surgery patients found that all patients experienced sleep disturbances, with major abdominal surgeries having a more pronounced effect [19].

5.3.2. Postoperative Pain

Pain and SD can influence each other. Studies have shown that postoperative pain in orthopedic and general surgery patients leads to difficulty falling asleep, reduced sleep duration, and decreased sleep quality. Conversely, SD could exacerbate pain perception, leading to fear and anxiety, which further disrupt sleep [20].

5.4. Anesthetic Factors

The American Society of Anesthesiologists defines general anesthesia as a drug-induced reversible loss of consciousness, during which patients cannot be awakened even by painful stimuli. General anesthesia and sleep share similarities, such as temporary loss of consciousness and reduced responsiveness to external stimuli. However, studies show that the brainwave patterns and neural circuits during anesthesia differ from those during physiological sleep [21].

Most studies suggest that intraoperative use of dexmedetomidine significantly improves sleep quality on the first postoperative day and reduces the incidence of perioperative SD in elderly patients [22]. However, general anesthesia combined with surgery primarily has negative effects on sleep. General anesthetics can alter sleep architecture, disrupt circadian rhythms, and affect sleep-wake regulation [23].

5.4.1. Sevoflurane

A study at Shengjing Hospital randomized 74 patients undergoing laparoscopic surgery under general anesthesia into propofol and sevoflurane groups. Sleep quality was assessed using a sleep monitor the night before surgery, the first night after surgery, and the third night after surgery [24]. Compared to preoperative levels, all patients had lower sleep efficiency and reduced stable and unstable sleep on the first and third postoperative nights. The sevoflurane group showed an increased proportion of REM sleep and a higher incidence of dreaming compared to the propofol group.

5.4.2. Propofol

A study involving 15 non-obese subjects (4 controls and 11 OSA patients) underwent polysomnography twice daily (with and without propofol) [25]. Propofol significantly altered sleep architecture, increasing NREM-N3 sleep and eliminating REM sleep during sedation. The effects of propofol on sleep may be related to its impact on the locus coeruleus-norepinephrine system.

5.4.3. Penehyclidine Hydrochloride

This is a commonly used preoperative medication for general anesthesia. A study of patients aged 65-80 undergoing total knee replacement under total intravenous anesthesia randomized them into a penehyclidine group (P group) and a control group (C group), with 30 patients in each group. The P group received 1 mg of penehyclidine intramuscularly 30 minutes before surgery, while the C group received 1 ml of saline. Sleep quality on the first postoperative night was assessed using BIS monitoring [26].

6. Consequences of Perioperative Sleep Disorders

6.1. Impact on Cognitive Function

6.1.1. Perioperative SD Could Lead to Postoperative Cognitive Dysfunction (POCD)

POCD is closely related to perioperative SD and is characterized by declines in language ability, memory, attention, and learning. Studies show that 36% of elderly cardiac surgery patients develop POCD six weeks post-surgery, with 24% still affected at six months. Among elderly non-cardiac surgery patients, 26% develop POCD seven days post-surgery, with 10% still affected at three months [27].

6.1.2. Perioperative SD Could Increase Postoperative Fatigue

Postoperative fatigue is a subjective sensation that can persist for up to one week, with some patients experiencing significant fatigue even one-year post-surgery. SD activates multiple inflammatory pathways, exacerbating neuroinflammation and neuronal damage through TNF-α and IL-6, impairing cognitive function. Additionally, sleep and cognitive function share overlapping regulatory pathways. For example, the suprachiasmatic nucleus regulates sleep through the cholinergic, serotonin, and GABA systems, which also influence behavior and cognition. Sleep disorders increase serotonin levels in the limbic system, affecting memory and learning, and induce hippocampal neuroinflammation, leading to impaired neural circuits, abnormal protein and gene expression, and cognitive decline [28]. Sleep is essential for alleviating fatigue [29].

6.1.3. The Brain's Metabolic Waste Clearance Relies on the Glymphatic System, Which Is Composed of Astrocytes

SD could impair the glymphatic system's function, leading to the accumulation of toxic metabolites such as amyloid beta (Aβ), which is associated with Alzheimer's Disease (AD).

6.1.4. Alzheimer's Disease (AD)

Early subclinical manifestations of AD include shortened sleep duration and reduced REM sleep. Sleep disorders are positively correlated with the progression of dementia. Studies using polysomnography and cerebrospinal fluid (CSF) analysis have shown that sleep deprivation prevents the normal decline in Aβ42 levels during sleep. Normally, Aβ42 levels decrease by 6% during sleep, but sleep deprivation eliminates this decline [30]. The difference in Aβ42 levels between normal sleep and sleep-deprived groups was 75.8 pg/mL. Aβ levels rise during wakefulness and decline during sleep, with sleep facilitating its clearance. Sleep disorders impair Aβ clearance, leading to increased Aβ deposition in the brain, progressive declines in learning and memory, and ultimately the development of clinical AD. Sleep disorders are a precursor or early clinical manifestation of AD, exacerbating cognitive dysfunction and accelerating disease progression [30].

6.2. Impact on Postoperative Pain

SD and pain interact bidirectionally. Pain prolongs sleep latency, reduces total sleep time, and causes sleep deprivation, while sleep disorders lower pain thresholds, leading to hyperalgesia [31]. This can exacerbate pain and contribute to the transition from acute to chronic pain. Chronic pain activates microglia, releasing inflammatory factors that induce hippocampal neuron apoptosis, resulting in memory decline and depression. Therefore, it is essential to use appropriate analgesic medications, manage pain effectively, and address psychological factors to ensure adequate perioperative sleep.

6.3. Impact on Other Systems

6.3.1. Brain-Gut Axis

SD prolongs the time to first flatus, bowel sounds, and defecation in abdominal surgery patients. Sleep disturbances induce stress responses, increasing plasma levels of motilin and somatostatin, which impair gastrointestinal motility and digestive secretion. Conversely, gastrointestinal dysfunction can exacerbate anxiety and depression, creating a vicious cycle of sleep disturbances.

6.3.2. Cardiovascular System

SD could elevate blood pressure and accelerate atherosclerosis. Sleep disturbances reduce melatonin secretion and increase cortisol and catecholamine levels, leading to hypertension and systemic inflammation. This inflammatory response accelerates atherosclerosis, increasing the risk of myocardial infarction and sudden cardiac death.

7. Prevention and Management of Perioperative Sleep Disorders

7.1. Psychological Interventions and Environmental Modifications

Providing preoperative education, psychological counseling, postoperative rehabilitation guidance, and health education can reduce the incidence of perioperative sleep disorders [32]. A study on cardiac surgery patients explored the effects of music therapy on early postoperative pain, anxiety, and sleep quality in patients undergoing mechanical mitral valve replacement [33]. Music therapy can alleviate anxiety and stress.

7.2. Optimizing Ward Environment

Reducing noise and light exposure in hospital wards can improve sleep quality. The use of earplugs and eye masks can minimize nighttime disturbances and enhance sleep [34].

7.3. Postoperative Pain Management

Pain is a primary cause of postoperative sleep disturbances. Individualized pain management is crucial for ensuring postoperative sleep quality. While opioids are widely used for postoperative analgesia, their side effects necessitate minimizing their use. Nonsteroidal anti-inflammatory drugs (NSAIDs) are increasingly recognized for their efficacy in pain management with fewer side effects [35]. For patients with severe pain, repeated dosing may interrupt sleep, highlighting the importance of multimodal analgesia. For example, continuous lumbar plexus blocks are recommended for elderly patients undergoing hip replacement [36].

7.4. Pharmacological Interventions

7.4.1. Propofol

Propofol can improve autonomic imbalance caused by sleep disorders. It reduces GABA release, producing sedative, hypnotic, and anesthetic effects, and inhibits excitatory glutamate receptor-mediated neurotransmission, alleviating sleep debt in insomnia patients [37].

7.4.2. Dexmedetomidine

Dexmedetomidine prolongs sleep duration, improves sleep quality, and reduces the incidence of postoperative cognitive dysfunction. A study of 76 elderly non-cardiac surgery patients in the ICU found that dexmedetomidine infusion (0.1 μg/kg/h for 15 hours) increased N2 sleep from 15.8% to 43.5%, prolonged total sleep time, and reduced N1 sleep [38].

7.4.3. Isoflurane

Studies in rats have shown that isoflurane, combined with dexmedetomidine, enhances glymphatic transport efficiency, which is crucial for clearing metabolic waste from the brain [39].

7.4.4. Other Treatments

Stellate ganglion block (SGB) inhibits sympathetic activity and has been shown to improve postoperative sleep disorders [40].

8. Conclusion and Future Directions

Perioperative sleep disorders are prevalent among surgical patients and increase the risk of POCD, particularly in elderly patients. The neuropathological changes associated with perioperative SD reduced brain-derived neurotrophic factor, highlight the importance of early screening and intervention. Understanding the mechanisms and influencing factors of perioperative sleep disorders is essential for developing individualized treatment strategies, reducing perioperative SD, and minimizing the risk of postoperative cognitive dysfunction, ultimately promoting faster recovery.

Abbreviations

SD	Sleep Disorders
ERAS	The Enhanced Recovery After Surgery
REM	Rapid Eye Movement
NREM	Non-Rapid Eye Movement
PSQI	Pittsburgh Sleep Quality Index
PSG	Polysomnography
CSF	Cerebrospinal Fluid
POCD	Postoperative Cognitive Dysfunction
Aβ	Amyloid Beta
AD	Alzheimer's Disease
NSAIDs	Nonsteroidal Anti-inflammatory Drugs

Author Contributions

Chulei Ji: Conceptualization, Writing – original draft, Writing – review & editing

Na Liu: Formal Analysis, Resources

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Siegel J M. Clues to the functions of mammalian sleep [J]. *Nature*, 2005, 437(7063): 1264-1271.

[2] Ukita Y, Okumura M, Chihara T. Ubiquitin Proteasome System in Circadian Rhythm, and Sleep Homeostasis: Lessons from Drosophila [J]. *Genes to Cells: Devoted to Molecular & Cellular Mechanisms*, 2022, 27(6): 381-391.

[3] Davidson P, Jönsson P, Carlsson I, et al. Does Sleep Selectively Strengthen Certain Memories Over Others Based on Emotion and Perceived Future Relevance? [J]. *Nature and Science of Sleep*, 2021, 13: 1257-1306.

[4] Halle I H, Westgard T K, Wahba A, et al. Trajectory of Sleep Disturbances in Patients Undergoing Lung Cancer Surgery: A Prospective Study [J]. *Interactive Cardiovascular and Thoracic Surgery*, 2017, 25(2): 285-291.

[5] Xie Z, Chen F, Li W A, et al. A review of sleep disorders and Melatonin [J]. *Neurological Research*, 2017, 39(6): 559-565.

[6] Besedovsky L, Lange T, Haack M. The Sleep-Immune Crosstalk in Health and Disease [J]. *Physiological Reviews*, 2019, 99(3): 1325-1380.

[7] Fabbri M, Beracci A, Martoni M, et al. Measuring Subjective Sleep Quality: A Review [J]. *International Journal of Environmental Research and Public Health*, 2021, 18(3): 1082.

[8] Bassetti C L A, Adamantidis A, Burdakov D, et al. Narcolepsy — clinical spectrum, aetiopathophysiology, diagnosis and Treatment [J]. *Nature Reviews Neurology*, 2019, 15(9): 519-539.

[9] Reiter RJ, Sharma RN, Manucha W, et al. Dysfunctional mitochondria in age-related neurodegeneration: Utility of melatonin as an antioxidant treatment. *Ageing Res Rev*. 2024; 101: 102480. https://doi.org/10.1016/j.arr.2024.102480

[10] Paulose J K, Wang C, O'Hara B F, et al. The Effects of Aging on Sleep Parameters in a Healthy, Melatonin-Competent Mouse Model [J]. *Nature and Science of Sleep*, 2019, 11: 113-121.

[11] Zhang B, Wing Y-K. Sex Differences in Insomnia: A Meta-Analysis [J]. *Sleep*, 2006, 29(1): 85-93.

[12] Deng S, Chen Y, Fu L, et al. Preoperative Psychological Changes and Needs of Patients of Different Genders Undergoing Elective Surgery [J]. *Chinese Journal of Primary Medicine and Pharmacy*, 2017, 24(24): 3829-3832.

[13] Ho A, Raja B, Waldhorn R, et al. New Onset of Insomnia in Hospitalized Patients in General Medical Wards: Incidence, Causes, and Resolution Rate [J]. *Journal of Community Hospital Internal Medicine Perspectives*, 2017, 7(5): 309-313.

[14] Chai Y, Wang Y, Wang D, et al. Current Status and Countermeasures of Alarm Fatigue Among Nurses in Neurosurgical Intensive Care Units [J]. *Chinese Journal of Clinical Neurosurgery*, 2019, 24(1): 59-61.

[15] Gao Y, Zhang G, Chen L. Investigation, and Intervention Strategies for Noise Levels in Hospital Wards [J]. *China Health Standard Management*, 2021, 12(12): 26-28.

[16] He M, Ru T, Li L, et al. Optimization Effects and Mechanisms of Daytime Light Exposure on Sleep [J]. *Advances in Psychological Science*, 2023, 31(9): 1698-1713.

[17] Stebelova K, Roska J, Zeman M. Impact of Dim Light at Night on Urinary 6-Sulphatoxymelatonin Concentrations and Sleep in Healthy Humans [J]. *International Journal of Molecular Sciences*, 2020, 21(20): 7736.

[18] Zhang Y, Shen N. Effects of Forced Posture After Lumbar Surgery on Sleep and Nursing Research Progress [J]. *Journal of Nurses Training*, 2020, 35(14): 1298-1300.

[19] Gögenur I, Bisgaard T, Burgdorf S, et al. Disturbances in the Circadian Pattern of Activity and Sleep after Laparoscopic versus Open Abdominal Surgery [J]. *Surgical Endoscopy*, 2009, 23(5): 1026-1031.

[20] Haack M, Simpson N, Sethna N, et al. Sleep deficiency and chronic pain: Potential underlying mechanisms and clinical Implications [J]. *Neuropsychopharmacology*, 2020, 45(1): 205-216.

[21] Long-Range Amplitude Coupling Is Optimized for Brain Networks That Function at Criticality - PubMed [2023-11-03]. https://pubmed.ncbi.nlm.nih.gov/35082120/

[22] Cai J, Chen Y, Hao X, et al. Effect of Intraoperative Dexmedetomidine Dose on Postoperative First Night Sleep Quality in Elderly Surgery Patients: A Retrospective Study with Propensity Score-Matched Analysis [J]. *Frontiers in Medicine*, 2020, 7: 528.

[23] Jiang-Xie L-F, Yin L, Zhao S, et al. A Common Neuroendocrine Substrate for Diverse General Anesthetics and Sleep [J]. *Neuron*, 2019, 102(5): 1053-1065. e4.

[24] Li S, Song B, Li Y, et al. Effects of Intravenous Anesthetics vs Inhaled Anesthetics on Early Postoperative Sleep Quality and Complications of Patients After Laparoscopic Surgery Under General Anesthesia [J]. *Nature and Science of Sleep*, 2021, Volume 13: 375-382.

[25] Rebello F A W, Braga A, Küpper D S, et al. Propofol-Induced Sleep: Polysomnographic Evaluation of Patients with Obstructive Sleep Apnea and Controls [J]. *Otolaryngology--Head and Neck Surgery: Official Journal of American Academy of Otolaryngology-Head and Neck Surgery*, 2010, 142(2): 218-224.

[26] Ma W, Deng L, Ma J, et al. Effects of Penehyclidine Hydrochloride on Early Postoperative Sleep in Elderly Patients Undergoing Total Knee Arthroplasty Under General Anesthesia [J]. *Journal of Clinical Anesthesiology*, 2019, 35(3): 260-265.

[27] Li J, Xie X, Zhang J, et al. Novel Bedside Dynamic Nomograms to Predict the Probability of Postoperative Cognitive Dysfunction in Elderly Patients Undergoing Noncardiac Surgery: A Retrospective Study [J]. *Clinical Interventions in Aging*, 2022, 17: 1331-1342.

[28] Wankhede NL, Kale MB, Kyada A, et al. Sleep deprivation-induced shifts in gut microbiota: Implications for neurological disorders [J]. *Neuroscience*. 2025; 565: 99-116. https://doi.org/10.1016/j.neuroscience.2024.11.070

[29] Fox R S, Ancoli-Israel S, Rosch S C, et al. Sleep disturbance and Cancer-related fatigue symptom cluster in breast cancer patients undergoing Chemotherapy [J]. *Supportive Care in Cancer*, 2020, 28(2): 845-855.

[30] Hendriks S, Ranson J M, Peetoom K, et al. Risk Factors for Young-Onset Dementia in the UK Biobank [J]. *JAMA Neurology*, 2024, 81(2): 134.

[31] Moldofsky H, Scarisbrick P, England R, et al. Musculosketal Symptoms and Non-REM Sleep Disturbance in Patients with «Fibrositis Syndrome» and Healthy Subjects [J]. *Psychosomatic Medicine*, 1975, 37(4): 341-351.

[32] Scarpa M, Pinto E, Saraceni E, et al. Randomized Clinical Trial of Psychological Support and Sleep Adjuvant Measures for Postoperative Sleep Disturbance in Patients Undergoing Oesophagectomy [J]. *The British Journal of Surgery*, 2017, 104(10): 1307-1314.

[33] Zhang Q-L, Xu N, Huang S-T, et al. Music Therapy for Early Postoperative Pain, Anxiety, and Sleep in Patients after Mitral Valve Replacement [J]. *The Thoracic and Cardiovascular Surgeon*, 2020, 68(6): 498-502.

[34] Salzmann-Erikson M, Lagerqvist L, Pousette S. Keep Calm and Have a Good Night: Nurses' Strategies to Promote Inpatients' Sleep in the Hospital Environment [J]. *Scandinavian Journal of Caring Sciences*, 2016, 30(2): 356-364.

[35] Wick E C, Grant M C, Wu C L. Postoperative Multimodal Analgesia Pain Management with Nonopioid Analgesics and Techniques: A Review [J]. *JAMA Surgery*, 2017, 152(7): 691-697.

[36] Li J, Dong B, Cai W, et al. Continuous Lumbar Plexus Block Reduces Early Postoperative Cognitive Dysfunction in Elderly Patients Undergoing Hip Replacement [J]. *Journal of Central South University (Medical Science)*, 2018, 43(8): 858-863.

[37] Tung A, Lynch J P, Mendelson W B. Prolonged Sedation with Propofol in the Rat Does Not Result in Sleep Deprivation [J]. *Anesthesia & Analgesia*, 2001, 92(5): 1232-1236.

[38] Wu X-H, Cui F, Zhang C, et al. Low-Dose Dexmedetomidine Improves Sleep Quality Pattern in Elderly Patients after Noncardiac Surgery in the Intensive Care Unit: A Pilot Randomized Controlled Trial [J]. *Anesthesiology*, 2016, 125(5): 979-991.

[39] Benveniste H, Lee H, Ding F, et al. Anesthesia with Dexmedetomidine and Low-dose Isoflurane Increases Solute Transport *via* the Glymphatic Pathway in Rat Brain When Compared with High-dose Isoflurane [J]. *Anesthesiology*, 2017, 127(6): 976-988.

[40] Zhang X, Huang X, Yang J. Efficacy of stellate ganglion block on postoperative sleep disorder: A systematic Review [J]. *Asian Journal of Surgery*, 2024: S1015958424021171.