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(RESEARCH ARTICLE)

# Evaluation of sleep quality postoperatively in thoracic surgery patient: Study Protocol

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## Abstract

**Introduction:** While thoracic surgical procedures remain complex and potentially distressing, the introduction of minimally invasive methods such as video-assisted thoracoscopic surgery (VATS) has led to shorter hospitalizations and fewer complications. However, numerous factors, including postoperative pain, anxiety, pharmacological interventions, environmental stressors, and pre-existing conditions such as sleep apnea, significantly influence postoperative sleep quality. Strategies such as optimized nursing care, effective analgesia, and targeted anxiety reduction can improve sleep and support recovery.

**Purpose:** This study aims to evaluate the quality of sleep in patients during the postoperative period after thoracic surgery.

**Material and Methods:** The population to be included in the study will consist of patients who are to undergo thoracic surgery at a University Thoracic Surgery Clinic of a General Hospital in Athens-Greece. The sample of participants will consist of 70 patients.

The tools used in this study include:

- Demographic Questionnaire
- Pittsburgh Sleep Quality Index (PSQI)
- Athens Insomnia Scale (AIS)
- Epworth Sleepiness Scale (ESS)
- STOP-BANG Questionnaire
- Visual Analogue Scale (VAS)
- Verran and Snyder-Halpern Sleep Scale (VSH)

**Expected Outcomes:** It is expected that improved sleep quality following thoracic surgery will be associated with enhanced postoperative recovery outcomes in patients. Furthermore, identifying sleep-related problems arising from the procedure could inform preoperative assessments and guide interventions. Finally, preventing postoperative sleep disturbances may enhance recovery outcomes and overall patient well-being

**Keywords:** Thoracic surgery; Sleep quality; Pain scale; apnea; Postoperative patients

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## 1. Introduction

Advancements in modern surgical practice, including the development of laparoscopic and robotic techniques and novel pain control strategies, have markedly enhanced patient outcomes in the postoperative period [1]. The advent of minimally invasive techniques like video-assisted thoracoscopic surgery (VATS) has decreased the frequency of complications and length of hospital stay for thoracic surgeries, despite the fact that these procedures are naturally high-risk and frequently linked to severe postoperative discomfort [2]. These improvements are correlated with decreased pain levels and better postoperative sleep quality, ultimately facilitating recovery and improving patient quality of life. However, numerous factors influence sleep quality following thoracic procedures, including acute pain, emotional stress, pharmacological interventions, hospital environmental stressors, and pre-existing sleep conditions such as obstructive sleep apnea [3]. Patients, particularly the elderly or those with chronic comorbidities, may experience complications like atelectasis, pneumonia, or respiratory insufficiency [3-4].

Sleep is a fundamental component of postoperative recovery, with substantial evidence supporting its role in wound healing, immune function, and overall physiological and psychological restoration [5]. Nonetheless, disturbances in sleep are frequently reported in hospitalized patients, with many experiencing reduced sleep duration and poor quality, both of which negatively impact healing [6]. Contributing factors often include environmental disruptions such as nocturnal noise, artificial lighting, and frequent care interventions as well as medical comorbidities. Insomnia and obstructive sleep apnoea are the most prevalent conditions and are associated with increased cardiovascular risk, impaired cognitive performance, and heightened pain perception [7]. Promoting sleep quality is thus considered a critical target in enhancing patient outcomes. Interventions such as optimizing pain control, reducing anxiety, and modifying nursing care protocols may significantly improve sleep and accelerate recovery [8-9].

### *Study Objective*

The principal aim of this study is to evaluate postoperative sleep quality in patients undergoing thoracic surgery. The specific research objectives include.

- Investigating the impact of thoracic surgical procedures on sleep quality.
- Identifying variations in sleep patterns before and after surgery.
- Assessing the relationship between sleep quality and postoperative recovery outcomes in thoracic surgery patients.

## 2. Material and methods

This prospective, quantitative, cross-sectional, single center study will be conducted at a University General Hospital in Athens, Greece, specifically within the thoracic surgery department. Data will be collected using both subjective questionnaires and objective sleep monitoring tools. Preoperative assessments will utilize the Pittsburgh Sleep Quality Index (PSQI), Athens Insomnia Scale (AIS), Epworth Sleepiness Scale (ESS), and STOP-BANG questionnaire, alongside sleep recording [11-14]. Postoperative evaluations will be conducted using the same tools, in addition to the Visual Analogue Scale (VAS), Verran and Snyder-Halpern Sleep Scale (VSH), and polysomnography. A follow-up assessment will be completed one-month post-surgery using the PSQI [11-16]. The research is scheduled to begin in December 2024 and is expected to conclude by December 2027.

## 3. Study Population

Participants will be patients scheduled for thoracic surgery at the University Hospital's Thoracic Surgery Department. This study is designed as a single -center investigation with a planned inclusion of approximately 70 patients meeting the study's inclusion criteria without restrictions related to demographic or social parameters. The decision to conduct the study at a single center was made to ensure consistency in surgical techniques and postoperative management. All surgical procedures will be performed by the same surgical team, and postoperative care will be delivered by a uniform nursing staff following a standardized protocol. This approach was chosen to minimize variability and reduce potential biases related to differences in surgical techniques, perioperative care, and institutional practices. Based on preliminary screening, it is estimated that around 70 patients would fulfil the study's inclusion and exclusion criteria and provide informed consent to participate. This projected sample size was deemed sufficient for the observational objectives of the study while maintaining methodological rigor and consistency in patient care.

### 3.1. Inclusion Criteria

- Age ≥18 years
- Voluntary participation
- Hospital admission for upcoming thoracic surgery
- Fluency in Greek
- Literacy sufficient to complete questionnaires

### 3.2. Exclusion Criteria

- Diagnosed psychiatric disorders or depression
- Use of medications or substances affecting sleep (e.g., antiepileptics, alcohol)
- Cognitive impairment or intellectual disability
- Hospitalization for conditions unrelated to thoracic surgery
- Decline to participate

## 4. Measurement Instruments

### 4.1. Demographic Questionnaire

Collects basic participant data such as age, gender, and educational level.

#### *4.1.1. Pittsburgh Sleep Quality Index (PSQI)*

A 19-item instrument evaluating subjective sleep quality over a one-month period. It distinguishes between good and poor sleepers using a threshold score of 5, with strong psychometric properties and widespread usage [11].

#### *4.1.2. Athens Insomnia Scale (AIS)*

An eight-item tool assessing nocturnal sleep difficulty and daytime impairment, validated across diverse populations. A total score of 6 or higher indicates clinical insomnia [12].

#### *4.1.3. Epworth Sleepiness Scale (ESS)*

Calculates the likelihood of falling asleep in typical everyday circumstances. Higher scores indicate excessive daytime sleepiness; scores range from 0 to 24 [13].

### 4.2. STOP-BANG Questionnaire

Screens for obstructive sleep apnea risk, with items addressing snoring, fatigue, apnoea, and hypertension. Scores of 2 or more indicate elevated risk. The extended version improves diagnostic sensitivity through additional biometric and demographic factors [14]. The total score ranges from 0 to 8. Patients can be classified for OSA risk based on their respective scores. The sensitivity of STOP-Bang score ≥ 3 to detect moderate to severe OSA (apnea-hypopnea index [AHI] > 15) and severe OSA (AHI > 30) is 93% and 100%, respectively. Corresponding negative predictive values are 90% and 100%. As the STOP-Bang score increases from 0 to 2 up to 7 to 8, the probability of moderate to severe OSA increases from 18% to 60%, and the probability of severe OSA rises from 4% to 38%. Patients with a STOP-Bang score of 0 to 2 can be classified as low risk for moderate to severe OSA whereas those with a score of 5 to 8 can be classified as high risk for moderate to severe OSA. In patients whose STOP-Bang scores are in the midrange (3 or 4), further criteria are required for classification. For example, a STOP-Bang score of ≥ 2 plus a BMI > 35 kg/m2 would classify that patient as having a high risk for moderate to severe OSA. In this way, patients can be stratified for OSA risk according to their STOP-Bang scores. [17].

#### *4.2.1. Visual Analogue Scale (VAS)*

A 100-mm scale for measuring subjective pain intensity. It is widely validated across various patient populations and health conditions [15].

#### *4.2.2. Verran and Snyder-Halpern Sleep Scale (VSH)*

Evaluates subjective sleep disturbance and effectiveness in hospitalized individuals, incorporating measures of latency, continuity, and perceived restfulness [16].

### 4.3. Ethical Considerations

Participation will be entirely voluntary and free of charge. Informed consent will be obtained after thorough explanation of the study's aims and procedures. Participants may withdraw at any point without repercussions. All data will be pseudonymized using unique codes, stored securely in locked cabinets, and destroyed after 24 months via supervised recycling. Ethical approvals and tool usage permissions (e.g., from Dr. Tsara for ESS and Dr. Steiropoulos for PSQI) have been obtained, while others are pending.

### 4.4. Statistical Analysis

#### *4.4.1. Data Entry and Validation*

Questionnaires will be coded, counted, and entered into SPSS with validation protocols to minimize entry errors.

#### *4.4.2. Data Cleaning*

Errors and inconsistencies will be reviewed and corrected to ensure data integrity.

#### *4.4.3. Descriptive Analysis*

Initial statistical analysis will involve descriptive statistics to summarize key participant characteristics and outcome variables.

### 4.5. Expected Outcomes

It is anticipated that improved sleep quality following thoracic surgery will be associated with enhanced postoperative recovery outcomes in patients. Understanding postoperative sleep disturbances may inform future preoperative risk assessments and intervention planning. Ultimately, proactive management of sleep-related issues could enhance both physiological recovery and patient-reported outcomes.

## 5. Conclusion

Author should provide an appropriate conclusion to the article. Write conclusion as single para. Conclusion should be concise, informative and can be started with summarizing outcome of the study in 1-2 sentence and ended with one line stating: how this study will benefit to the society and way forward. This study highlights the critical role of sleep in recovery following thoracic surgery. By systematically assessing sleep quality using validated tools and identifying key predictors of poor sleep, healthcare professionals can implement targeted interventions to improve patient outcomes. Findings from this study may inform broader efforts to integrate sleep management into standard perioperative care, ultimately benefiting postoperative recovery and quality of life.

## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of ethical approval*

If studies involve use of animal/human subject, authors must give appropriate statement of ethical approval. If not applicable then mention 'The present research work does not contain any studies performed on animals/humans subjects by any of the authors' Approval has been received from the Scientific Council of Attikon University Hospital (Protocol #887, 03 December 2024).

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study Written informed consent has been obtained from all study participants.

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