**Arab American University**

**Faculty of Graduate Studies**

**Department of Health Sciences**

**Master Program in Intensive Care Nursing**

# Anxiety, Depression and Other Influencing Factors Affecting Sleep Quality Among Open-heart Patients in the Intensive Care Unit

**Laith Nizar Mikiemir Yaghi**

**202216334**

**Supervision Committee:**

**Dr. Abeer Hussein**

**Dr. Basma Salameh**

**Dr. Rebhi Bsharat**

**This Thesis Was Submitted in Partial Fulfilment of the Requirements for the Master Degree in Intensive Care Nursing**

**Palestine, Feb/2025**

**Arab American University**

**Faculty of Graduate Studies**

**Department of Health Sciences**

**Master Program in Intensive Care Nursing**

## Thesis Approval

# Anxiety, Depression and Other Influencing Factors Affecting Sleep Quality Among open-heart Patients in the Intensive Care Unit

Laith Nizar Mikiemir Yaghi

202216334

This thesis was defended successfully on 22/2/2025 and approved by:

Thesis Committee Members:

| Name | Title | Signature |
|---|---|---|
| 1. Dr. Abeer Hussein | Main Supervisor | |
| 2. Dr. Basma Salameh | Member of Supervision Committee | |
| 3. Dr. Rebhi Bsharat | Member of Supervision Committee | |

Palestine, 2/2025

## Declaration

I declare that, except where explicit reference is made to the contribution of others, this thesis is substantially my own work and has not been submitted for any other degree at the Arab American University or any other institution.

Student Name: Laith Nizar Mikiemir Yaghi

Student ID: 202216334

Signature: 

Date of Submitting the Final Version of the Thesis: 8.7.2025

## Acknowledgements

This journey has been one of the most challenging yet rewarding experiences of my life, and I am incredibly grateful to those who have stood by me, supported me, and believed in me every step of the way.

First and foremost, I am profoundly grateful to Allah, whose guidance and blessings have been my constant source of strength throughout this journey. I will never cease thanking and praising Him.

I would like to express my deepest gratitude to my supervisors for her unwavering support, insightful guidance, and patience throughout this research.

To my father, you have been my pillar of strength, my guide, and my source of wisdom. Your unwavering belief in me, even when I doubted myself, has been my greatest motivation. Through your sacrifices, patience, and endless support, you have shown me what resilience and determination truly mean.

To my mother, my heart, my safe haven—your love has been the warmth that carried me through the toughest nights and longest days. Your prayers, your gentle encouragement, and your unshakable faith in me have given me the courage to keep going, no matter how difficult the road became. You are the reason I stand strong today, and for that, I am forever grateful.

To my grandparents, who are no longer here but have left an everlasting mark on my heart—your love and wisdom continue to guide me every day. I wish you were here to witness this moment, but I know you are watching over me, proud of what I have accomplished. This achievement is as much yours as it is mine. I carry your lessons, your strength, and your love with me always.

To my friends, you have been my rock, my escape, and my biggest cheerleaders. Whether it was a pep talk, a much-needed laugh, or simply sitting with me in silence when I was overwhelmed, your presence has meant everything to me.

And to you the quiet light in my life, the person who made even the hardest days feel a little softer. Your kindness, patience, and unwavering belief in me have been my greatest comfort. In moments of exhaustion, when I thought I had nothing left to give, you reminded me of why I started, why I should keep going. Your love, in its most gentle and unspoken ways, has been a source of strength I never knew I needed. Thank you for being my peace in the storm.

From the bottom of my heart thank you all

**Anxiety, Depression and Other Influencing Factors Affecting Sleep Quality Among Open-heart Patients in the Intensive Care Unit.**

**Laith Nizar Mikiemir Yaghi**

**Supervision committee: Dr. Abeer Hussein**

**Dr. Basma Salameh**

**Dr. Rebhi Bsharat**

## Abstract

Background: Environmental, patient-related, and medical intervention-related elements affect the quality of sleep and anxiety experienced by Intensive care unit patients. Purpose: To investigate the factors influencing anxiety and sleep quality in open-heart patients in the ICU. Methods: A cross-sectional study was conducted using a convenient sample of 150 post-operative open-heart adult patients from hospitals in Hebron, Ramallah, and Nablus (West Bank). Data were collected via self-report questionnaires between June and December 2024, including demographics, the Hospital Anxiety and Depression Scale, Richards–Campbell Sleep Scale, and ICU Sleep Scale. Analysis included descriptive statistics, inferential tests, and correlation analysis. results A total of 82% of patients reported poor sleep quality overall, and 48.7% experienced poor sleep in the ICU. Sleep quality was significantly lower among divorced or widowed patients ($p = 0.007$). Anxiety was common, with 60% classified as abnormal, and was negatively correlated with suctioning ($r = -0.235$, $p = 0.004$). Depression affected 35% of patients and was positively associated with the use of depression medication ($r = 0.164$, $p = 0.045$). Ventilator use was also linked to poorer sleep ($r = 0.177$, $p = 0.032$). Environmental factors significantly impacted sleep quality ($p < 0.05$). Overall, poor sleep, anxiety, and depression were closely connected and influenced by both clinical and environmental factors. Conclusion: Despite the well- documented association between anxiety and sleep disturbances, this study found that ICU-specific factors such as environmental disruptions, pain, and medical interventions had a more pronounced impact on sleep quality. The findings underscore the critical need for targeted interventions to address environmental disruptions, improve pain management, and provide psychosocial support, particularly for vulnerable groups such as divorced or widowed patients.

Keywords: Anxiety, Sleep Quality, Open-Heart Patients, depression.

## Table of Contents

## List of Tables

## List of Figures

## List of Appendices

## List of Definitions of Abbreviations

| Abbreviations | Title |
|---|---|
| AAUP | Arab American University Palestine |
| ANOVA | Analysis of Variance |
| ASSQ | Anxiety Sensitivity Scale Questionnaire |
| BDI | Beck Depression Inventory |
| Df | Degrees of Freedom |
| et al | And Others |
| HADS | Hospital Anxiety and Depression Scale |
| ICU | Intensive Care Unit |
| IRB | Institutional Review Board |
| M | Mean |
| MOH | Ministry of Health |
| N | Frequency |
| NPRS | Numerical Pain Rating Scale |
| p-Value | Probability Value |
| PAS | Perioperative Anxiety Scale |

| Abbreviation | Title |
|---|---|
| PITI | Pre-operative Intrusive Thoughts Inventory |
| PSQI | Pittsburgh Sleep Quality Index |
| QOL | Quality of Life |
| R | Correlation |
| RCSQ | Richards–Campbell Sleep Questionnaire |
| SAS | Self-Rating Anxiety Scale |
| SD | Standard Deviation |
| Sig. | Significance |
| SICUQ | The Sleep in The Intensive Care Unit Questionnaire |
| SPSS | Statistical Package for the Social Sciences |
| STAI | State-Trait Anxiety Inventory |

# Chapter One: Introduction

## 1.1. Background

Cardiothoracic surgery, also known as open heart surgery, involves the surgical treatment of organs inside the thoracic cavity, predominantly diseases of the heart muscle and the great vessels (Yaftian et al., 2021). Over the past few decades, there have been advances in both surgical techniques and technologies that have led to the incorporation of minimally invasive approaches to mitral valve surgery in addition to traditional sternotomy approaches (Wilbring, 2025). Open heart surgery allows direct access to the heart for interventions including valve replacements, septal defects, and congenital abnormalities (Brito & de Oliveira, 2024). As a result, outcomes for patients are better, recovery time is shorter, and a broader array of heart conditions are treatable (Jiang et al., 2024).

Heart disease remains a major public health concern in Palestine, with ischemic heart disease being the leading cause of death, accounting for 22.2% of all deaths nationwide. The prevalence is particularly high in the West Bank (25.3%) compared to Gaza (17.8%) (Palestinian Ministry of, 2022). These statistics highlight the increasing burden of cardiovascular diseases in the region, underscoring the critical role of open-heart surgery in managing and treating these conditions.

The healthcare system in Palestine operates under a complex structure, comprising public, private, and non-governmental organizations (NGOs) that provide medical services across the West Bank and Gaza Strip. The Palestinian Ministry of Health (PMoH) is the primary healthcare provider, managing government hospitals and clinics; however, United Nations agencies, NGOs, and private facilities also play a critical role in healthcare delivery (Daraghma et al., 2025). Despite advancements, the healthcare system faces several challenges, including limited financial resources, restrictions on medical supply access, and inadequate infrastructure, particularly in specialized care services such as interventional radiology and advanced cardiac surgery. Only 13.5% of hospitals in Palestine offer specialized interventional services, highlighting gaps in healthcare accessibility (Daraghma et al., 2025). Additionally, geopolitical constraints and

movement restrictions often delay patient referrals for specialized treatments, further straining healthcare capacity. Addressing these challenges requires policy reforms international support, and investment in healthcare infrastructure to enhance service delivery and patient outcomes.

Open heart surgery can be lifesaving but can also be complicated, patients undergo precarious recovery, and atrial fibrillation is one of the most frequent and intractable complications that arises after surgery. Atrial fibrillation following open-heart surgery is associated with inflammation, oxidative stress and electrolyte distribution, and it needs meticulous postoperative care and individualized interventions (Jiang et al., 2024; Schmidt, 2024). Additionally, Lung-related complications, including prolonged ventilation, pneumonia, embolism, or effusion, continue to be of particular importance for patients undergoing open-heart surgery. Recent investigations highlight pathways to minimizing these pulmonary complications with thorough advanced perioperative management and rehabilitation (Gnanaraj & Princy, 2024).

Furthermore, some individuals may encounter infectious complications like catheter-related bloodstream infection (Lesens et al., 2024), surgical site infections (Jayakumar et al., 2020). During this procedure, Patients are given a wide range of medications, that can lessen the ventilatory response to physiological alterations such as hypoxia and hypercapnia (Dau et al., 2024). This may increase the result of post-operative complications, consequently patients are admitted to the intensive care unit. Leading them to remain in an unfamiliar and unfriendly environments (Bakytzhanuly et al., 2024), ensuring a restful night's sleep is imperative for both productivity and wellbeing (Tagler, 2024).

For ICU patients, inadequate sleep has been linked to slower cognitive recovery and increased mortality (Almondes et al., 2021), being sleep deprived can have a negative effect on immunity and mental health (Bahashwan & Alhalafi, 2024), impaired cognitive function (Cart & Pauling, 2024), increase in mortality (Thomas & Gallicchio, 2024) and cardiac and endocrine function (Lee, 2024).

Patients sleeping in the ICU expressed lower satisfactions of sleep quality when compared to their home environment (Louis et al., 2020). Building on the understanding of that Sleep is defined behaviorally as a reversible state of perceptual disengagement and unresponsiveness to the environment (Avidan et al., 2022). It becomes imperative to recognize its heightened significance in the realm of critically ill patients.

Research consistently emphasizes that more than 50%-60% of individuals admitted

to the intensive care unit encounter difficulties in attaining an uninterrupted and peaceful

sleep experience (Sun et al., 2022); (Tolba et al., 2021). Factors contributing to this noteworthy concern can be split into two categories; environmental factors such as noise (Lin et al., 2022), lighting, frequent patient care activities and conversations were also associated with poor sleep quality (Czempik et al., 2020); while the other category focus on patient related factor such as psychological stress (Andrews et al., 2020), while pain being a prevalent issue for many ICU patients and has been recognized as a significant factor contributing to sleep disruption (Chudow et al., 2021).

Additionally, patients attributed poor sleep as a significant contributor to anxiety and stress associated with their ICU experience (LI et al., 2024). Various alterations in psychological factors that include anxiety may be also experienced during the treatment process, due to this a prevalence of 35%-72% of anxiety was reported by patients in the ICU (Egger et al., 2024; Rech et al., 2024). anxiety is one of many unfavorable emotions that these patients experience, it is an uncomfortable feeling that patients in intensive care unit encounter (Lin & Liu, 2024). While anxiety may serve as an adaptive response to stressors, its persistence and severity can lead to the development of mood disturbances, thereby adversely impacting the quality of life (Gu et al., 2023). According to a study that stated, preoperative worry significantly influences the quality of sleep for patients undergoing cardiac surgery (Karahan et al., 2024).

Overall, a variety of environmental, patient, and medical intervention factors affect the quality of sleep and anxiety experienced by intensive care unit patients. Improving sleep quality and encouraging improved outcomes for intensive care unit patients require an understanding of and attention to these aspects.

## 1.2. Problem Statement

In the intensive care unit (ICU), patients recovered from open heart surgery experience unique challenges with anxiety and sleep. Despite technological advancements, medical procedures, constant monitoring, and the unfamiliar intensive care unit all contribute to elevated stress levels (Karawan Sayed Sallam et al., 2022). This issue is especially concerning in Palestine, where ischemic heart disease is the leading cause of death (22.2%), and access to specialized post-operative care remains limited (Palestinian Ministry of, 2022).

From firsthand observations in Palestinian healthcare settings, patients in ICUs

often report poor sleep quality, heightened anxiety, and prolonged hospital stays due to psychological distress. Despite the prevalence of these issues, the specific factors influencing sleep quality and anxiety among ICU patients in Palestine remain inadequately explored. Studies confirm. Poor sleep and anxiety have severe effects. Sleep disturbances lead to weariness, irritability, and cognitive impairment (Duru, 2021). Additionally, anxiety disrupts the body's natural healing processes. These issues are linked to longer healing times, increased risks of infection, and mental health issues, which have an adverse effect on overall health beyond the short term (Wu et al., 2021),

However, the specific factors influencing sleep quality in this patient population remain inadequately explored. Addressing this gap is crucial for improving post-operative recovery and overall well-being. Investigating the variables and potential roadblocks that might affect the quality of sleep for patients recovering from open heart surgery in the intensive care unit is very important. By understanding these factors, tailored therapies to increase sleep quality may be developed, improving patient outcomes and quality of life during the critical post-operative recovery period.

## 1.3. Significance of Study

Improving patient care and outcomes requires an understanding of the factors affecting anxiety and sleep quality in patients in the open-heart intensive care unit. This study intends to offer important insights into the psychological and physiological health of open-heart patients throughout their stay in the critical care unit by examining the connection between anxiety and sleep disruptions in this particular patient population.

This study will serve as a valuable database for future researchers investigating postoperative patient care, ICU psychological health, and sleep disturbances. The findings can contribute to comparative studies, systematic reviews, and future research focused on improving critical care and cardiac surgery recovery.

In order to assist patients recover and have a better overall care experience, medical personnel may use the research results to better understand the variables that lead to anxiety and poor sleep quality in these patients. Additionally, by addressing these issues, medical professionals may be able to lower anxiety, encourage healthy sleeping habits, and increase patient comfort—all of which might lead to better patient outcomes and higher standards of intensive care unit treatment, implementing patient-centered care guidelines that address anxiety and sleep disturbances in ICU patients can significantly

enhance recovery outcomes.

Policies should promote health professional training to recognize and manage these issues, allocate resources for ICU noise reduction, psychological support, and structured patient education, and integrate mental health support into postoperative care. By prioritizing these factors, healthcare systems can improve patient comfort, reduce ICU-related distress, and elevate the standard of critical care.

## 1.4. Aim of the Study

To investigate the factors influencing anxiety, depression and sleep quality in open-heart patients in the intensive care unit.

### 1.4.1. Specific Objectives

1. To assess the level of sleep quality, anxiety and depression among open heart patients in the ICU.
2. To determine factors influencing sleep, anxiety and depression among ICU patients.
3. To assess the differences between demographic data and sleep quality, anxiety and depression among ICU patients.
4. To assess the relationships between environmental factors and quality of sleep, anxiety and depression among open heart patients in the ICU.

### 1.4.5. Research Questions

1. What is the level of Anxiety, sleep quality and depression among open heart patients in the ICU?
2. What are the factors influencing sleep, anxiety and depression among ICU patients?
3. Are there significant differences in anxiety, depression and quality of sleep among ICU patients based on demographic variables?
4. Is there a significant relationship between influencing factors and the quality of sleep, anxiety, and depression scores among ICU patients?

### 1.4.5. Research Hypotheses

The following are the null hypotheses of the study:

1. There are no significant differences in the quality of sleep among ICU patients based on demographic variables.
2. There are no significant differences in anxiety and depression scores among ICpatients based on demographic variables.
3. There is no significant relationship between environmental factors and the quality of sleep, anxiety, and depression scores among ICU patients.

## 1.5. Conceptual Framework

### 1.5.1. Sleep Quality

Sleep quality is a multidimensional concept, that includes several crucial characteristics which are necessary for comprehending the whole sleep experience, it is characterized by four fundamental dimensions: sleep efficiency, sleep latency, sleep duration, and wake after sleep onset (Nelson et al., 2021). This perspective is consistent with what (Morrissey et al., 2020), who went into additional detail about sleep quality by taking into account both subjective and objectively assessed factors, such as the architecture of sleep cycles and satisfaction and perceived challenges with sleep.

Poor sleep quality is common among the older adults, it is often worsened by multiple factors that include frailty, multiple medications use, emphasizing its effects on overall health outcomes (Kumar et al., 2019). There are subjective and objective methods for assessing sleep quality, using the Pittsburgh Sleep Quality Index (PSQI) that is commonly used for evaluating sleep quality based on sleep latency, duration, efficiency, disturbances, and daytime dysfunction (Zhang et al., 2016), while objective measures can be assessed by using methods such as polysomnography and actigraphy this is done to grasp broad image of sleep architecture and patterns (Yan et al., 2021).

### 1.5.5. Anxiety

Anxiety was defined by the American Psychiatric Association as the expectation of impending threats or dangers, frequently accompanied by physical signs of stress (al-yasari & Al-Juboori, 2022). This description focused on both the physiological and cognitive components of anxiety.

Anxiety can manifest itself in various ways, such as eco-anxiety which is related to the environment (Pihkala, 2020), sleep bruxism in adults (Polmann et al., 2019), factors such as age, gender and intellectual potential can be considered as a contributing factors to anxiety (Kermarrec et al., 2020).

### 1.5.3. Depression

Depression is a complex mental health condition that significantly impacts sleep quality and anxiety, creating a reinforcing cycle that can worsen recovery outcomes in ICU patients (An et al., 2024). Studies suggest that poor sleep efficiency, prolonged sleep latency, and frequent nocturnal awakenings are strongly linked to higher depression scores, with anxiety further exacerbating these disruptions (HUANG & Chair, 2024)

### 1.5.4. Environmental factors

Environmental factors play a crucial role in affecting sleep quality and anxiety levels in ICU patients, particularly those recovering from open-heart surgery. Studies have shown that excessive noise, lighting, frequent patient care interventions, and unfamiliar ICU environments significantly contribute to sleep disturbances and increased stress (Pelin & Sert, 2025). The intensive care unit environment, characterized by constant monitoring, alarms, staff movements, and interruptions, can lead to fragmented sleep and an exacerbation of anxiety symptoms (Nurhayati et al., 2024).

### 1.5.5. Intensive Care Unit

The intensive care unit (ICU) is a highly specialized medical facility, it provides treatment and monitoring for critically ill patients (Mellhammar et al., 2022). Patients who are admitted to the ICU experience a wide range of diseases ranging from respiratory, cardiovascular to trauma and other complications (Mercier et al., 2020), and due to the severity of their condition they require mechanical ventilation, close monitoring and a high level of care (Sjöström et al., 2021).

### 1.5.6. Open Heart Surgery

Open-heart surgery is a complex surgical procedure that involves accessing the heart through a median sternotomy, this is often complemented by the utilization of a cardiopulmonary bypass machine (Batiha et al., 2021). In most cases, this complex

surgery is recommended for the treatment of a variety of cardiac illnesses. These illnesses include coronary artery disease, valve diseases, congenital heart abnormalities, and cardiac transplantation (Bal & Çilingir, 2023).

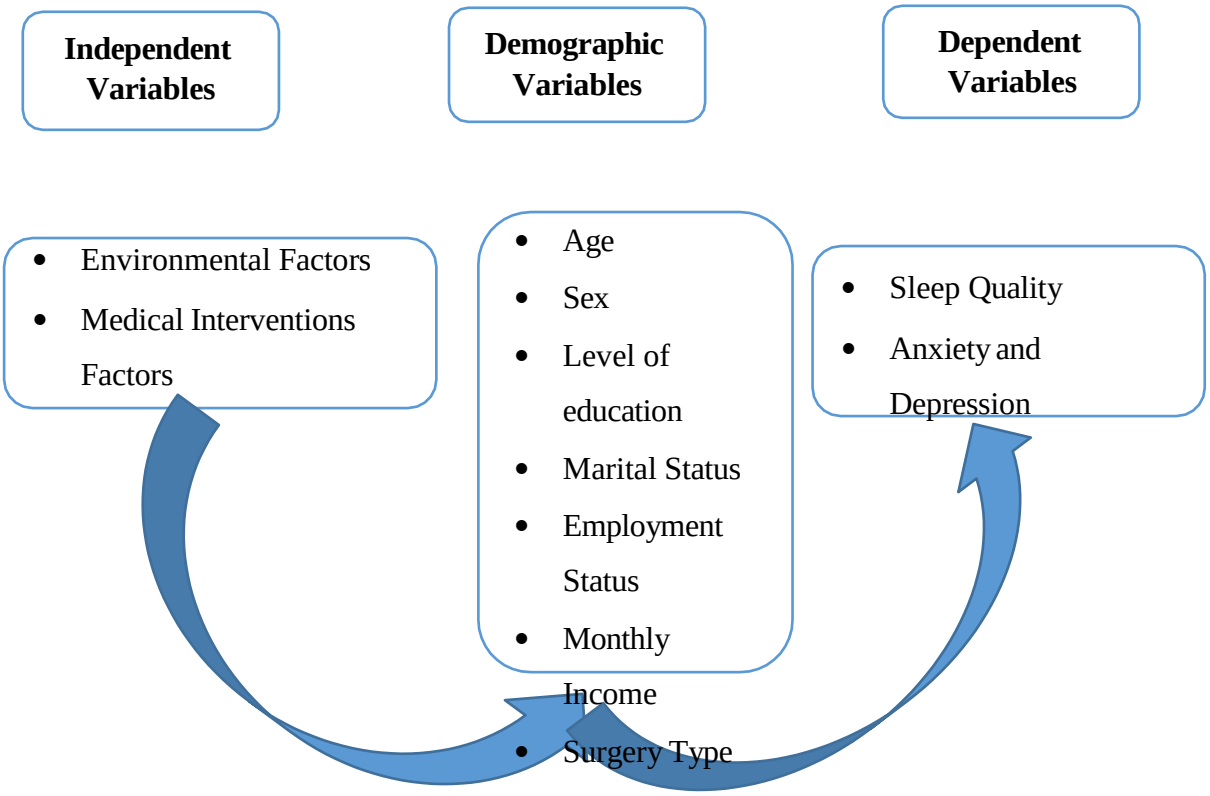



Figure 1.1. The Conceptual Framework

## 1.6. Operational Framework

### 1.6.1. Sleep Quality

Sleep quality was measured by using the Richards-Campbell sleep questionnaire (RCSQ). RCSQ is a validated questionnaire designed to assess sleep quality in critically ill patients. It consists of 5 items related to sleep depth, sleep latency, number of awakenings, and overall sleep quality. Responses were measured on a 100-mm visual analog scale, with higher scores indicating better sleep quality (Richards et al., 2000).

### 1.6.2 Anxiety and Depression

Anxiety was measured using the Hospital Anxiety and Depression Scale (HADS). HADS is a widely used questionnaire to assess anxiety and depression in patients. It consists of 14 items, with 7 items specifically assessing anxiety symptoms. Each item is scored on a scale of 0 to 3, with higher scores indicating higher levels of anxiety (Zigmond & Snaith, 1983).

# Chapter Two: Literature Review

## 2.1. Introduction

Open heart surgery is a complex procedure, where the chest of the patient is opened through a median sternotomy, commonly employing a cardiopulmonary bypass machine (Batiha et al., 2021), where the heart is connected to a machine to create a blood free environment to operate in. this procedure is done to address many heart conditions including, coronary artery disease, congenital heart abnormalities, valvular disease and many others (Harky et al., 2020). Reviewing the literature is essential to comprehending the clinical results, patient care techniques, and procedural improvements related to open heart surgery because of its complexity and the substantial consequences it has for patient outcomes.

The search strategy for this literature review involved selecting key terms such as anxiety, ICU patients, open-heart surgery, sleep quality, depression, environmental factors, and patient-related factors to capture relevant studies. Boolean operators (AND, OR) were used to refine searches by combining terms and expanding search scope. The databases CINAHL Plus, ERIC, MEDLINE Complete, and PubMed were utilized to ensure access to high-quality, peer-reviewed literature. The selection criteria focused on articles published in the last 10 years, prioritizing research on adult ICU patients undergoing open-heart surgery and examining the relationship between anxiety, depression, sleep quality, and environmental influences. Studies outside this scope, such as those focusing on pediatrics or non-cardiac ICU settings, were excluded unless they provided significant theoretical insights. This approach ensured a comprehensive and evidence-based literature review aligned with the study's objectives.

## 2.2. Open Heart and Anxiety

The patients who are going through an open-heart surgery, might have different psychological difficulties due to the significant influence of surgery on their personal lives (Younes et al., 2019a). A study endeavors on investigating the relationship between preoperative anxiety levels with postoperative pain, dyspnea and nausea-vomiting in 77 patients undergoing open-heart surgery in turkey (Lin et al., 2022). The researchers used

the anxiety specific to surgery questionnaire to assess participants' worries and anxiety before surgery, finding that individuals experienced medium-level anxiety, as measured by a mean score of 22.69 on the Anxiety Sensitivity Scale Questionnaire (ASSQ). These findings underscore the need to mitigate preoperative anxiety for the prevention of postoperative complications.

Preoperative anxiety levels were assessed using the State-Trait Anxiety Inventory (STAI scale) among 60 subjects (Prado-Olivares & Chover-Sierra, 2019). Their research conducted in Valencia (Spain) showed that the majority of patients (80%) had high anxiety levels before surgery. These findings validate the high incidence of preoperative anxiety in cardiac surgical patients.

Although preoperative anxiety is common, it is rarely realized or underestimated in clinical practice, so the improvement of sensitivity and strategy regarding this overflow phenomenon is essential to improve patient's outcome and well-being. Motivated by these results, a cross-sectional study was carried out in Serbia by Jovanovic et al. (2022) to examine the association between preoperative anxiety level and postoperative complications in patients undergoing surgery using the demonstrated Serbian version of the Amsterdam Preoperative Anxiety and Information Scale. Of the 385 participants interviewed, 43.4% of patients reported high-level anxiety related to surgery, and female patients were more likely to experience preoperative anxiety related to surgery (OR=2.387, p=0.001). A study also revealed relationships between anxiety levels and postoperative outcomes, and additionally (Kashif et al., 2022) conducted a prospective cohort study in Karachi, Pakistan which aimed to assess the preoperative anxiety levels in all patients who came for cardiac surgery and then evaluated the impact of varying levels of anxiety on postoperative pain scores, 100 open heart patients were enrolled in this study and it demonstrated preoperative anxiety has been linked to increased postoperative pain scores, delayed wound healing and infection, prolonged recovery, and longer hospital stays.

## 2.3. Factors Influencing Anxiety in Open Heart Surgery

There are numerous reasons why patients may experience anxiety (Elgazzar et al., 2022). Using a hospital anxiety and depression scale, a quasi-experimental study was conducted on 60 patients in the Ismailia Governate, Egypt, to examine the effects of the

educational program on the patients' health outcomes following open heart surgeries. The findings indicated that inadequate preoperative education or a lack of knowledge about the surgical procedure, potential complications, and postoperative management can lead to elevated anxiety in patients having open heart surgery.

However, (Zafar et al., 2023) conducted a study in Faisalabad, Pakistan, with 95 patients. The study's goal was to assess the patients' quality of life (QOL), cognitive profile, and psychiatric symptoms before and after open heart surgery. The study used a hospital and depression scale for psychiatric evaluation. The findings suggested that patients with a history of mental disorders like anxiety and depression might exhibit elevated anxiety levels prior to heart surgery, underscoring the importance of mental health considerations in this patient group.

Nevertheless, at Dessie Referral Hospital in Northeast Ethiopia, a study by (Edmealem & Olis., 2020) included 384 patients with a presumptive diagnosis of diabetes, hypertension, and heart failure. The study used the GAD-7 and PHQ-9 to measure anxiety and depression, respectively, and found that patients with lower educational levels were significantly more likely to experience anxiety, with illiterates 7.89 times more likely to experience anxiety than patients with a diploma or higher. In this study, substance use is 2.56 times more likely, and the risk was also linked to alcohol, cigarettes, shisha, and hashish. Comorbid conditions like hypertension also make patients who are having heart surgery feel more anxious.

Although a cross-sectional study conducted by (Ryamukuru et al., 2019) on adult patients in Kigali, Rwanda focused on the assessing of anxiety for the Pre-operative Intrusive Thoughts Inventory (PITI) anxiety scale which reported that significant preoperative anxiety was recorded in young adults (79.2%), and middle-aged adults (72.9%), while was less in older adult (53.8%). This indicates that age is associated with and possibly affects anxiety level in conjunction with demographic characteristics in this population. This is further supported by a multicenter cross-sectional study (Yu et al., 2022) that sought to determine the overall prevalence of preoperative anxiety in Chinese adult patients and to identify the sociodemographic and clinical correlates of preoperative anxiety in China, using the 7-item Perioperative Anxiety Scale (PAS-7) to assess the preoperative anxiety after entering the operating zone, in total 5191 patients were enrolled and 5018 of them were analyzed, the study found that being a female patient, lower age, being non-retired, first-time surgery, high-risk surgery, and poor preoperative sleep were significantly related to a higher degree of preoperative anxiety.

## 2.4. Sleep Quality and Open Heart

In patients undergoing open heart surgery, quality sleep is important for postoperative recovery. Sleep quality, especially post-major surgery such as open-heart surgery, has been well studied and found to be compromised post-surgery (Alipourian et al., 2021).

In one study conducted by (Hu et al., 2021), which aimed to explore sleep characteristics in infective endocarditis patients and to look for predictors for disturbed sleep quality after operation via using Pittsburgh Sleep Quality Index (PSQI) and Epworth Sleepiness Scale to evaluate 139 patients sleep quality, during hospitalization post-operation, 61.9% of patients (n = 86) showed disturbed sleep quality during hospitalization post-operation, which decreased to 33.1% (n = 46) at 6 months post-operation, sleep disturbances can negatively affects patients' recovery, overall well-being and could potentially increase mortality rate.

Recently, a study was conducted to evaluate the risk of postoperative Hyperalgesia in adult patients undergoing open-heart valve surgery; for the study, the researchers assessed preoperative sleep quality and postoperative pain severity using the Pittsburgh sleep quality index (PSQI) and numerical pain rating scale (NPRS), respectively. Among 214 adult patients enrolled in the study, a positive correlation was established between preoperative poor sleep quality and postoperative Hyperalgesia (Zhang et al., 2020).

In another longitudinal study by (Chou et al., 2022) that was conducted in Taiwan, the researchers enrolled a total of 125 patients to observe the course of fatigue and its components over a period after surgery, and the study results revealed a correlation between poor sleep quality and fatigue levels in patients after undergoing heart surgery, implying the major influence sleep quality can have in the postoperative recovery process.

## 2.5. Factors Influencing Sleep Quality in Open Heart Patients

Patients undergoing open-heart surgery seem prone to poor overall sleep quality during the hospital stay period, a cross-sectional study conducted to investigate open-heart patients' sleep quality and how patients' sleep quality is affected in critical care. Consecutive sample of 117 eligible open-heart patients, Chinese version of the hospital

anxiety and depression scale (HADS), the Richards–Campbell sleep questionnaire (RCSQ), the sleep in the intensive care unit questionnaire (SICUQ). Responses from 87 participants indicated that the main factors affecting sleep are wound pain, perceived noise from chest tubes, psychological factors such as anxiety or nervousness, staff and equipment noise and environmental noise. Sleep quality was found to be lower in the ICU than at home (Lin et al., 2022).

Nonetheless, a descriptive pilot study conducted on 30 patients in Korea that aimed to measure sleep quality in the ICU and to identify barriers to sleep, Assess quality of sleep at home using a visual analog scale while quality of sleep in the ICU was assessed using the Korean version of the Richards-Campbell Sleep Questionnaire it identified physical discomfort the most common for influencing sleep quality 43% of patients, followed by being awoken for procedures (43%), and feeling unwell as a result of an underlying medical condition (37%) furthermore the study showed that environmental factors also mean a big portion for sleep quality, in particular, noise and light were identified as key contributors to poorer sleep quality (Ahn et al., 2023).

Moreover, it was performed a prospective, observational study in ICU of Renmin Hospital of Wuhan University, China, which focused on the relationship between APACHE III score with sleep quality in critically ill patients, the study comprised 124 ICU patients and used Pittsburgh Sleep Quality Index (PSQI) pre-ICU admission, Numeric Rating Scales (NRS), noise, illumination, number of nursing interventions, Richards Campbell Sleep Questionnaire (RCSQ) in sleep quality assessment, which demonstrated that Patients with noise exposure above and below the 59 dB of noise level showed significant difference in sleep quality, indicating that high noise level is associated with poor overall sleep quality (Wang et al., 2019).

Likewise, a study conducted to examine the influence of physical activity, perceived angina severity, depression, and fear of dying on sleep quality of survivors of ACS, 147 patients for having attended Outpatient units in Siriraj Hospital and King Chulalongkorn Memorial Hospital by (Susuthi et al., 2020) which used the Pittsburgh sleep quality index [PSQI] (Thai edition), Duke activity status index (Thai edition) and suggested the negative correlation between physical activity and sleep quality. On the other hand, psychological factors like fear of dying and depression are directly related to the quality of sleep. Those with depressive symptoms often report lower sleep quality.

## 2.6. Sleep Quality and Anxiety

It is crucial to explore the relationship between anxiety and sleep quality in open-heart patients. In Wuhan, an observational and cross-sectional study was done to investigate the effects of social support on the sleep quality and functions of medical staff treating patients with COVID-19, the study sample consisted of 180 participants, and with the help of the Self-Rating Anxiety Scale (SAS), The Pittsburgh Sleep Quality Index (PSQI), the authors made an association between anxiety levels and social support during outbreaks, since the levels of anxiety were strongly associated with stress, which in turn had negative effects on both self-efficacy and sleep quality (Xiao et al., 2020).

Subsequently, a study was conducted on a sample of 1083 adults assessed the State-Trait Anxiety Inventory (STAI) and the abridged version of the Beck Depression Inventory (BDI-13) in the Sleep Laboratory of Erasme Hospital in order to define the influence of state and trait anxiety on sleep characteristics. Conclusion that REM sleep stages were found to be diminished & REM latency was found to be increased in trait anxiety study -Same was demonstrated for stage of sleep- An increase in sleep onset latency was correlated with state anxiety (Horváth et al., 2016).

Similarly a study was done on examining the experiences of ICU patients with respect to sleep and rest during the night using a qualitative design based on phenomenology, 23 subjects agreed to participate, a semi- structured designed interview was conducted and they concluded that chronic anxiety is a major factor underpinning the sleep disturbances experienced by patients in the ICU, thereby emphasizing the urgent need for psychological support and individualized care (Lewandowska et al., 2020).

While previous studies have explored anxiety, depression, and sleep quality among ICU patients undergoing open-heart surgery, significant research gaps remain. One major limitation is the lack of integrative studies examining the longitudinal impact of anxiety and poor sleep quality on post-operative depression and recovery outcomes (Gheiasi et al., 2024). Most research focuses either on preoperative anxiety or postoperative depression but rarely investigates their interdependence over time (Soh et al., 2024). Additionally, existing studies primarily emphasize pharmacological interventions, with limited exploration of non-pharmacological strategies such as cognitive-behavioral therapy (CBT), sleep hygiene programs, or psychological counseling tailored for cardiac ICU patients (Ali, 2023). Moreover, gender-specific and cultural variations in anxiety and sleep disturbances among post-surgical ICU patients remain understudied, despite

evidence suggesting that women and younger patients exhibit higher levels of preoperative distress (Ng et al., 2022). Future research should adopt a holistic, multidisciplinary approach, incorporating psychological, physiological, and environmental factors to develop comprehensive patient-centered interventions for improving recovery and quality of life in ICU patients post open-heart surgery (Hummel, 2021).

## 2.7. Summary

This chapter reviews the literature on the factors influencing sleep and anxiety in patients recovering from cardiac surgery in intensive care units. It begins by discussing the physiological and psychological pressures unique to heart surgery patients, including pain, the necessity for assisted respiration, and medication side effects. The impact of environmental factors, such as light, noise, and the frequency of medical procedures in the intensive care unit, on the quality of sleep is examined. The association between elevated anxiety and sleep disturbances is also covered in this chapter, with a focus on how these factors impact patient outcomes and recovery timelines. By integrating the findings of earlier research, the chapter highlights the importance of recognizing and lowering these factors to enhance the overall health and recovery of post-operative cardiac patients in the intensive care unit.

# Chapter Three: Methodology

## 3.1. Introduction

This chapter describes the methodology to assess factors influencing anxiety and sleep quality in open-heart patients within the ICU setting. The study depended on descriptive analysis methodology to answer the research aims and objectives. It describes the study design, study setting, study population, Inclusion and exclusion criteria, study variables data collection tool and process of educational sessions, validity and reliability, data analysis, ethical considerations.

## 3.2. Study Design

This study used a cross-sectional design to investigate factors influencing anxiety and sleep quality in open-heart patients in the ICU. Data was collected using structured questionnaires.

## 3.3. Site and Setting

The study was conducted in four major hospitals across Hebron, Ramallah, and Nablus in the West Bank region of Palestine. These hospitals were specifically selected for their capability to perform open-heart surgeries and their critical role in providing advanced cardiac care. The selection process prioritized hospitals with well-established cardiothoracic surgery departments, ensuring a diverse patient population from different geographical areas.

Hospitals Included in the Study:

- Al-Ahli Hospital (Hebron) – A 198-bed non-governmental hospital, known for its specialized cardiac surgery unit and comprehensive ICU facilities.
- Al-Meezan Specialized Hospital (Hebron) – A 70-bed private hospital providing tertiary care services, including cardiac interventions.
- Palestine Medical Complex (PMC) (Ramallah) – A 312-bed Ministry of Health hospital, functioning as one of the largest referral centers in Palestine, offering open- heart surgery, ICU care, and emergency services.
- An-Najah National University Hospital (Nablus) – A 104-bed university-affiliated

hospital that specializes in cardiac surgery, intensive care, and advanced medical education.

The selected hospitals represent both governmental and private institutions, ensuring that the study covers a broad spectrum of healthcare settings. These facilities vary in size, resources, and patient demographics, providing a comprehensive understanding of the impact of anxiety and sleep quality on open-heart surgery patients in ICU settings.

## 3.4. Population, Sample and Sampling

To reach the target number of post-operative adult patients (18 years of age and older) who had had open heart surgery at the chosen hospitals in Hebron, Ramallah, and Nablus in the West Bank region of Palestine, the study used a nonprobability convenient sampling technique. Because it was feasible and practical to reach the target population within the study's limitations, convenient sampling was used. This approach simplified data collecting, shortened its duration, and cut costs by selecting individuals who were easily accessible in the settings. However, it was crucial to recognize that selection bias and sampling errors may be introduced by convenient sampling. Taking into account the correlation between variables, the total estimated population size was 1,500 patients, the sample size was determined using the G*Power tool with an alpha level of 0.05, effect size of 0.2, and power of 0.80. Through this calculation, the study's statistical power to identify meaningful correlations between relevant variables was guaranteed. The study sought to reduce sampling error and improve the dependability of the results by figuring out the necessary sample size. A sample size of 150 was needed.

### 3.4.1. Inclusion Criteria

- Adult patients aged 18 years and above.
- Patients who had undergone open-heart surgery at the selected hospitals.
- Patients who were willing and able to participate in the study and provide informed consent.

### 3.4.2. Exclusion Criteria

- Patients under the age of 18.

- Patients who were unable to provide informed consent due to cognitive impairment or language barriers.
- Patients with severe medical conditions or complications that preclude their participation in the study.
- 1st day post operation
- People who had previous open-heart surgery

## 3.5. Data Collection

Potential participants were identified based on the study's inclusion criteria and approached at their bedside in the morning, typically on the second or third day after open-heart surgery. This timing was selected as per hospital policies, as patients are generally in a stable condition by this stage. The data collection process was conducted over six months (June 6, 2024 – December 6, 2024).

The researcher personally introduced themselves to the patients and explained the purpose, objectives, procedures, potential risks, and benefits of the study in a clear and comprehensible manner. Patients were given ample time to ask questions before they were asked to provide informed consent. Only those who voluntarily agreed to participate were included in the study.

A self-report questionnaire that asked demographic questions on age, gender, education, marital status, occupation, monthly income, kind of surgery, history of previous intensive care unit stays, and usage of hypnotic drugs was used to collect data. The questionnaire included standardized measures such the Richards-Campbell Sleep Questionnaire (RCSQ) the Arabic version of the questionnaire was used (Al-Sulami et al., 2019), the Hospital Anxiety and Depression Scale (HADS) used the Arabic version (Terkawi et al., 2017), and the Sleep in the Intensive Care Unit Questionnaire (SICUQ) (Freedman et al., 2001). The study questionnaire usually took participants 10 to 15 minutes to complete. ICU patients' subjective sleep quality was assessed using the RCSQ. Five aspects of sleep are measured by this tool: overall quality, awakenings, depth, latency, and percentage of time awake. A 100 mm visual analog scale is used to score each dimension, with 100 denoting the best sleep and 0 denoting the worst, According to research, a mean score of $\geq 63.4$ on the RCSQ indicates good or satisfactory sleep quality, while scores below 63.4, particularly those under 60, suggest poor or unsatisfactory sleep

quality (Ritmala et al., 2022). The average of the five items represents the overall score for sleep quality. This questionnaire works well for evaluating how ICU ambient elements affect the quality of sleep.

Patients' levels of anxiety and depression were measured using HADS (Zigmond & Snaith, 1983). There are 14 questions total, with equal parts on the anxiety and depression subscales. A 4-point Likert's scale (0–3) is used to grade each question, producing subscale scores ranging from 0 to 21. The scores were evaluated as follows: normal for scores 0–7, borderline abnormal for scores 8–10, and abnormal for scores 11–21. The instrument's dependability in evaluating psychological discomfort in clinical contexts is well known.

The Sleep in the Intensive Care Unit Questionnaire (SICUQ) is a comprehensive tool designed to assess sleep quality in critically ill patients and identify factors affecting sleep in the ICU, including environmental stimuli and routine patient care activities. Patients rate their overall sleep quality on a scale from 1 (poor) to 10 (excellent), evaluating their sleep at home, on the first night in the ICU, midway through their ICU stay, and at discharge. Similarly, daytime sleepiness is rated from 1 (unable to stay awake) to 10 (fully alert and awake) at multiple ICU time points. Additionally, SICUQ evaluates sleep disruptions caused by noise, light, nursing interventions, medical tests (e.g., chest X-rays), vital sign monitoring, blood sample collection, and medication administration, using a 1 (no disruption) to 10 (significant disruption) scale. This instrument provides a holistic assessment of ICU-specific sleep disturbances, allowing for a detailed understanding of sleep-related issues in critically ill patients. (Freedman et al., 2001).

Potential volunteers were approached at the patient's bedside in the morning, usually on the second or third day after open heart surgery, this was due to hospitals policies and usually patients on the second and third day are in well condition, as part of the data collection procedure. Following an explanation of the study's goals, methods, possible dangers, and advantages, participants were asked to give their informed consent. After giving their consent, participants filled out the study's questionnaire on their own.

Forward and backward translations of the report were carried out by two committees (each having two translators and bilingual clinicians).

Forward Translation: The original English scales were translated into two Arabic drafts by two separate English-Arabic bilingual translators:

- One bilingual clinician

- One certified translator

The initial consensus review involved comparing the two Arabic drafts with the original English text and an independent bilingual reviewer to identify and resolve ambiguities or discrepancies in meaning.

Back Translation: The finalized Arabic version was then back-translated into English by two independent bilingual translators who were not involved in the forward translation and had no prior exposure to the original English scales:

- One licensed translator
- One bilingual clinician

This method ensured accuracy, conceptual equivalence, and cultural appropriateness, maintaining the integrity of the original content while adapting it for Arabic-speaking participants.

## 3.6. Pilot Study

A pilot study was conducted to confirm the validity and reliability of the study instruments. 10% of the whole population (n=15) was included in the pilot study, it was not included in the final results.

### 3.6.1. Validity and Reliability of Instruments

The process of figuring out whether an instrument accurately measures the theoretical notion it is designed to measure is known as concept validity. Three expert evaluations were used to qualitatively evaluate the content validity. The internal consistency of the items meant to measure the same construct was examined using Cronbach's Alpha. As shown in (Table 3.1). All instruments were reliable evidenced by Cronbach's Alpha were more than 0.7. The Richards Campbell Sleep Scale, consisting of 5 items, demonstrated acceptable reliability with ($\alpha = 0.795$). The Quality of Sleep Scale, comprising 28 items, showed high reliability with ($\alpha = 0.894$). Similarly, the Anxiety and Depression Scale, which includes 14 items, exhibited strong reliability with ($\alpha = 0.812$).

Table 3.1. Reliability of the Scales

| Instruments | Number of items | Cronbach's Alpha |
|---|---|---|
| Richards Campbell Sleep Scale | 5 | 0.795 |
| Quality of Sleep Scale | 28 | 0.894 |
| Anxiety and Depression Scale | 14 | 0.812 |

## 3.7. Ethical Considerations

The IRB at AAUP examined and approved the study (**R-2024/A/59/N)**. The Palestinian MOH and the directors of the hospitals where the study was carried out granted permission. By keeping the participants in this study anonymous, participant confidentiality was preserved. Participants could choose not to respond or to stop participating at any moment without facing any repercussions or having their rights violated.

## 3.8. Data Analysis

The Statistical Package for Social Sciences (SPSS), Version (27), was used to examine the data that was gathered. Descriptive and inferential statistical data analysis was done. The study variables were described using frequency, percentages, mean score, and Standard Deviation (SD) in terms of descriptive statistics. Following the evaluation of the normality of the scores using the Shapiro Will test (p=>0.05) and Kolmogorov Smirnov test, the independent t test and One Way ANOVA were employed to evaluate the differences between variables with respect to inferential statistics. To evaluate the relationships between the variables, correlation analysis was employed.

## 3.9. Summary

The study's demographic, sampling techniques, research design, setting, and data collection methods are all described in the methodology chapter. In the intensive care unit, it explains the quantitative method used to investigate the variables influencing anxiety and sleep in patients recovering from heart surgery. The study's equipment are described in detail, including validated techniques for measuring anxiety and sleep quality. For the study to comply with research ethics, ethical factors including informed consent and confidentiality are stressed. In order to guarantee the authenticity and dependability of the results, the chapter also describes the statistical techniques applied to data analysis. A defined framework for methodically addressing the study objectives is provided by this methodology.

# Chapter Four: Results

## 4.1. Introduction

The study's results are presented in this chapter, with an emphasis on the variables influencing anxiety and sleep in intensive care unit patients recovering from heart surgery. The findings are methodically arranged to answer the research questions and objectives, offering information on the study population's clinical and demographic traits, the frequency of anxiety and sleep disorders, and the correlations between important variables. To efficiently and clearly communicate the facts, descriptive statistics, inferential analysis, and pertinent graphic representations are used. The following discussion and analysis in light of the body of existing literature are based on these findings. Data were normally distributed according to Kolmogorov Smirnov and Shapiro Will test (p=>0.05) (Table 4.1).

Table 4.1. Normality Tests

| | **Kolmogorov-Smirnov** | | | **Shapiro-Wilk** | | |
|---|---|---|---|---|---|---|
| | **Statistic** | **df** | **Sig.** | **Statistic** | **df** | **Sig.** |
| Quality of sleep | .076 | 150 | .34 | .991 | 150 | .469 |
| Anxiety score | .138 | 150 | .344 | .954 | 150 | .432 |
| Depression score | .103 | 150 | .122 | .971 | 150 | .241 |

## 4.2. Demographic Variables of Patients

A wide range of characteristics are represented in the patients' (n=150) demographic analysis. The majority of patients (42.7%) were between the ages of 50 and 59, with those over 59 coming in second (32.7%). Compared to females (45.3%), males made up a somewhat larger percentage (54.7%). In terms of education, a significant minority had no formal education (36.0%), whilst others had earned diplomas (24.0%) and bachelor's degrees (22.7%). Most patients were married (88.7%), and a notable percentage were not employed (41.3%), with a smaller fraction being employees (29.3%). Monthly income was predominantly <1850 NIS (43.3%), with fewer patients earning 1850-3000 NIS (29.3%) or >3000 NIS (27.3%). A majority underwent open heart surgery (86.0%), and

62.0% had no previous ICU admissions. Sleep disorders were reported by nearly half (48.7%), while 44.7% used sleep pills. Additionally, 49.3% of patients had chronic diseases, and the remaining (50.7%) were disease-free as seen in (Table 4.2).

Table 4.2. Frequency and Percentages of Demographic Variables (n=150)

| Item | | n | % |
|---|---|---|---|
| Age group | 20-29 years old | 5 | 3.2% |
| | 30-39 years old | 7 | 4.7% |
| | 40-49 years old | 25 | 16.7% |
| | 50-59 years old | 64 | 42.7% |
| | >59 years old | 49 | 32.7% |
| Sex | Male | 82 | 54.7% |
| | Female | 68 | 45.3% |
| Level of education | Uneducated | 54 | 36.0% |
| | Primary education | 7 | 4.7% |
| | Secondary education | 11 | 7.3% |
| | Diploma | 36 | 24.0% |
| | Bachelor's Degree | 34 | 22.7% |
| | Higher education | 8 | 5.3% |
| Marital Status | Single | 6 | 4.0% |
| | Married | 133 | 88.7% |
| | Other (Divorced or Widowed) | 11 | 7.3% |
| Employment Status | Did not work | 32 | 21.3% |
| | Retired | 12 | 8.1% |
| | Not employee | 62 | 41.3% |
| | Employee | 44 | 29.3% |
| Monthly Income | <1850 NIS | 65 | 43.4% |
| | 1850-3000 NIS | 44 | 29.3% |
| | >3000 NIS | 41 | 27.3% |
| Surgery Type | Open heart surgery | 129 | 86.0% |
| | Valve replacement | 11 | 7.3% |
| | Congenital heart repair | 10 | 6.7% |

| | | | |
|---|---|---|---|
| Previous admitted to ICU? | Yes | 57 | 38.0% |
| | No | 93 | 62.0% |
| Did you take sleep pills? | Yes | 67 | 44.7% |
| | No | 83 | 55.3% |
| Did you have chronic diseases? | Yes | 74 | 49.3% |
| | No | 76 | 50.7% |
| Did you have a previous sleep disorder? | Yes | 73 | 48.7% |
| | No | 77 | 51.3% |

## 4.3. Sleep Quality among Patients

Figure (4.1) demonstrates the distribution of sleep quality among patients. A significant majority (82.0%) reported poor sleep quality, while only a small proportion (18.0%) experienced good sleep quality. This indicates that poor sleep quality is a prevalent issue within the patient population.

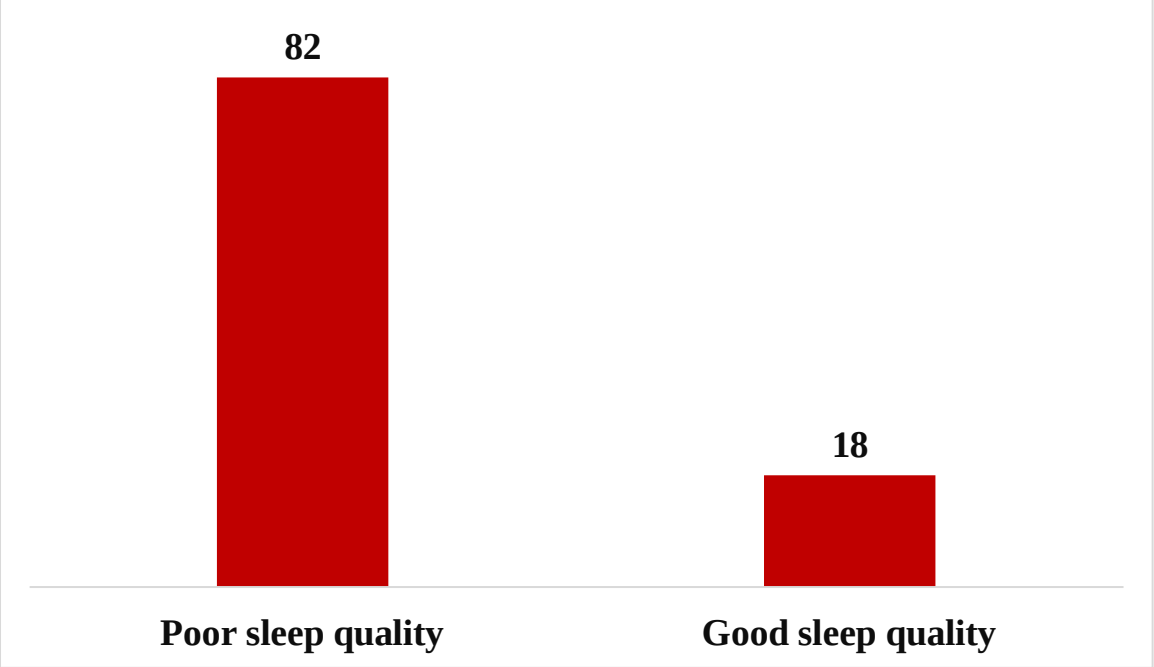



Figure 4.1. Level of Sleep Quality among Patients

The mean scores for each item assessing sleep quality among patients indicated

poor sleep across all domains. The average scores ranged from (48.20) to (53.43), with the highest score being for "Last night, when I woke up or was awakened, I" (53.43 ± 29.61), and the lowest for "Last night I was" (48.20 ± 26.56). The overall mean score for all five items was (50.72 ± 12.58), which also falls within the poor sleep quality category as seen in (Table 4.3).

Table 4.3. Mean Score of Each Item toward Sleep Quality among Patients (N=150)

| Item | Mean | SD | Status |
|---|---|---|---|
| 1. My sleep last night was | 51.61 | 31.20 | Poor |
| 2. Last night, the first time I got to sleep, I | 48.38 | 29.30 | Poor |
| 3. Last night I was | 48.20 | 26.56 | Poor |
| 4. Last night, when I woke up or was awakened, I | 53.43 | 29.61 | Poor |
| 5. I would describe my sleep last night as | 51.99 | 26.80 | Poor |
| **Total Mean Score (5 items)** | **50.72** | **12.58** | **Poor** |

*Higher mean score means higher good quality of sleep (Min=0, Max=100, cut-off point as follow; < 63.4 = poor, ≥ 63.4 = good)*

## 4.4. Sleep in the Intensive Care Unit

The chart illustrates the quality of sleep among patients in the Intensive Care Unit (ICU). A slight majority of patients (51.30%) reported good quality of sleep, while (48.70%) experienced poor sleep quality. This suggests that while more than half of the patients achieved good sleep quality, a significant proportion still struggled with poor sleep as seen in (Figure 4.2).

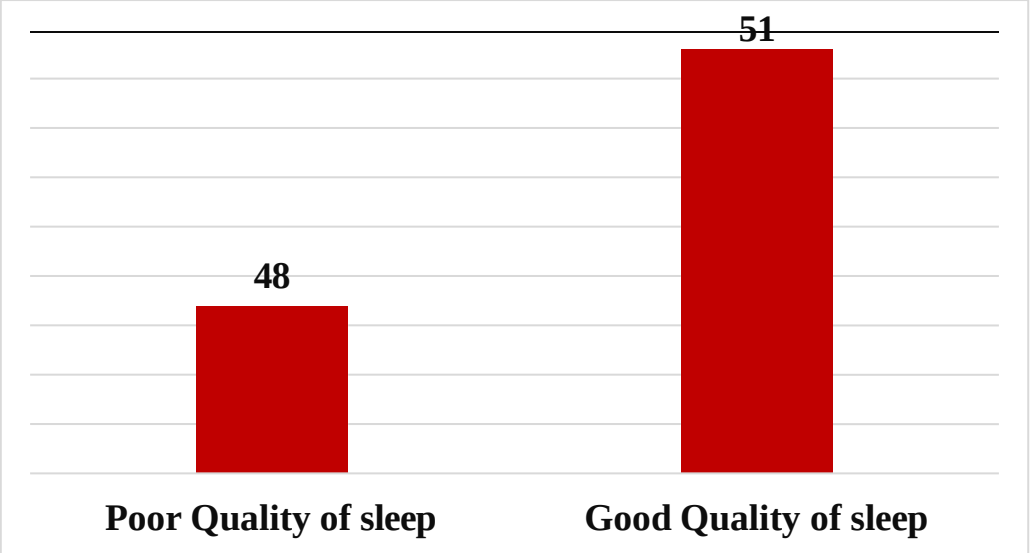


Figure 4.2. Level of Quality of Sleep in the Intensive Care Unit

The assessment of sleep quality among ICU patients revealed varied results across different items. The mean scores ranged from (5.06) to (5.81), with some items classified as "Good" and others as "Poor." Sleep quality during the middle of the ICU stay had the highest mean score (5.81 ± 2.66, Good), while the quality of sleep at home was among the lowest (5.31 ± 2.94, Poor) (Table 4.4).

Table 4.4. Mean Score for Each Item toward Sleep in ICU (N=150)

| Item | Mean | SD | Status |
|---|---|---|---|
| Rate the overall quality of your sleep at home. | 5.31 | 2.94 | Poor |
| Rate the overall quality of your sleep in the ICU. | 5.54 | 2.81 | Good |
| Rate the overall quality of your sleep in the ICU on the first night in the ICU | 5.63 | 291 | Good |
| Rate the overall quality of your sleep in the ICU during the middle of your ICU stay | 5.81 | 266 | Good |
| Rate the overall quality of your sleep in the ICU at the end of your ICU stay | 5.42 | 2.82 | Poor |
| Rate the overall degree of daytime sleepiness during your ICU stay | 5.38 | 2.85 | Poor |
| Rate the overall degree of daytime sleepiness during your ICU stay on the first night in the ICU | 5.42 | 2.81 | Poor |
| Rate the overall degree of daytime sleepiness during your ICU During the middle of your ICU stay | 5.47 | 2.75 | Poor |
| Rate the overall degree of daytime sleepiness during your ICU stay at the end of your ICU stay | 5.37 | 3.09 | Poor |

## 4.5. Factors Influencing Sleep in the ICU

Factors like noise (5.55 ± 2.72, Good) and nursing interventions (5.62 ± 2.99, Good) were less disruptive, while pain (5.27 ± 2.87, Poor) and diagnostic testing (5.43 ± 2.93, Poor) negatively impacted sleep. Additionally, daytime sleepiness during ICU stays consistently fell within the "Poor" range, with scores around (5.37-5.47). The total mean score across all items was (5.49 ± 0.505), indicating an overall "Poor" classification for sleep quality in the ICU setting. These findings emphasize the complexity of sleep experiences and the impact of environmental and procedural factors in the ICU as seen in (Table 4.5).

Table 4.5. Factors Influencing Sleep in the ICU

| **Rate how disruptive the following activities were to your sleep during your ICU stay*** | | | |
|---|---|---|---|
| Pain | 5.27 | 2.87 | Poor |
| Noise | 5.55 | 2.72 | Good |
| Light | 5.33 | 2.75 | Poor |
| Nursing Interventions (e.g., baths) | 5.62 | 2.99 | Good |
| Diagnostic Testing (e.g., chest X-rays) | 5.43 | 2.93 | Poor |
| Vital Signs (blood pressure, pulse, temperature) | 5.61 | 2.87 | Good |
| Blood Samples | 5.43 | 2.97 | Poor |
| Administration of Medications | 5.65 | 2.79 | Good |
| **Rate how disruptive the following noises were to your sleep during your ICU stay*** | | | |
| Heart Monitor | 5.25 | 2.74 | Poor |
| Ventilator Alarm | 5.64 | 2.99 | Good |
| Ventilator | 5.76 | 2.87 | Good |
| Oxygen Finger Probe | 5.70 | 2.88 | Good |
| Talking | 5.63 | 2.98 | Good |
| I.V. Pump Alarm | 5.31 | 3.02 | Poor |
| Suctioning | 5.63 | 2.89 | Good |
| Nebulizer | 5.57 | 3.06 | Good |
| Doctor's Beepers | 5.62 | 2.87 | Good |
| Television | 5.06 | 2.92 | Poor |

| | | | |
|---|---|---|---|
| Telephone | 5.34 | 2.97 | Poor |
| Total Mean Score (28 items) | 5.49 | .505 | Poor |

**Reversed coded*

## 4.6. Prevalence of Anxiety among ICU Patients

The chart shows the prevalence of anxiety among patients, where more than half of individuals (60%) were classified as "Abnormal," and 25% falling into the "Borderline abnormal" and 15% "normal" categories.

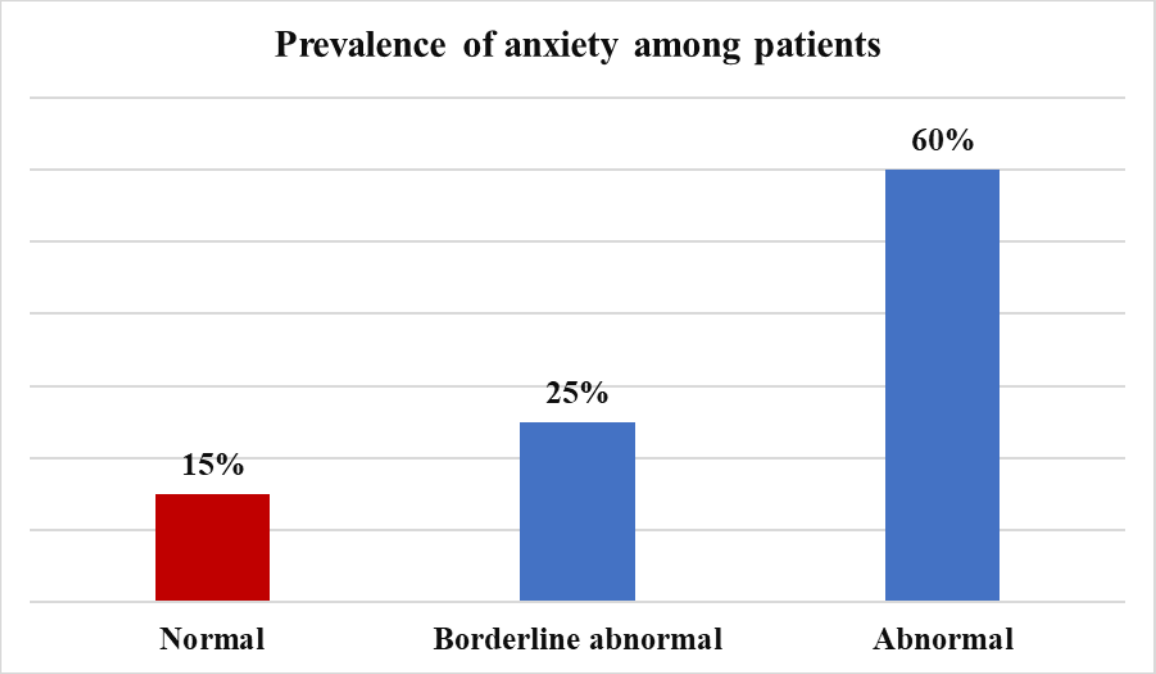



Figure 4.3. Prevalence of Anxiety among ICU Patients (N=150)

## 4.7. Prevalence of Depression among ICU Patients

Figure (4.4) illustrates the prevalence of depression among patients. The majority (50%) were classified as "Borderline abnormal," while (35%) were falling into the "Abnormal" category. However, only 15% were “Normal” cases.

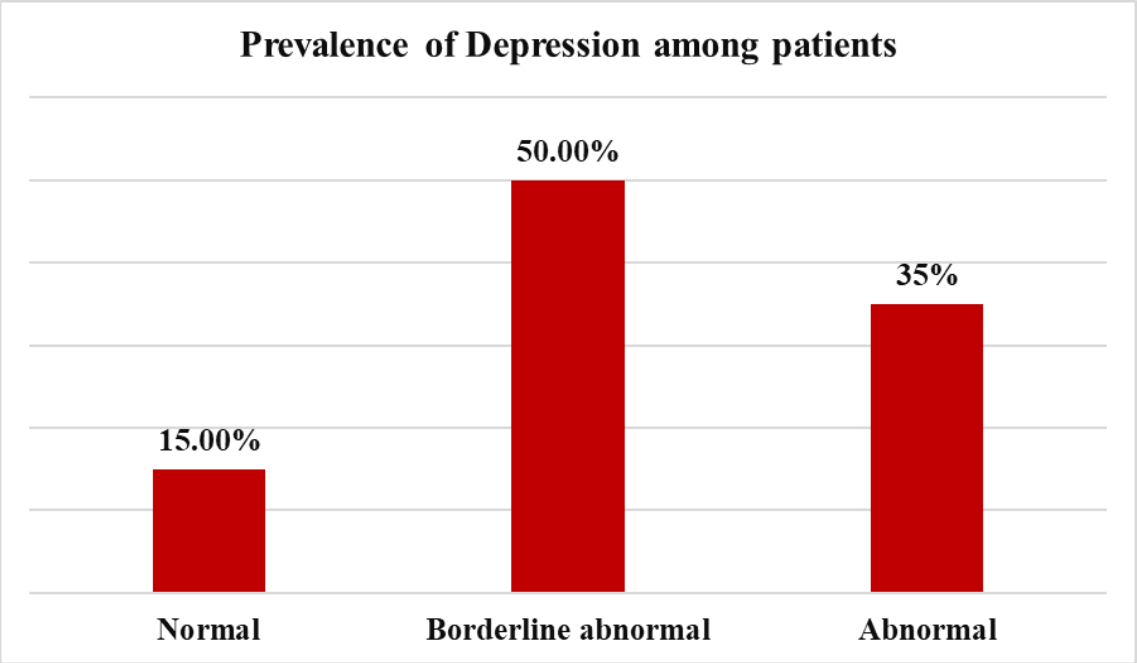



Figure 4.4. Prevalence of Depression among ICU Patients

## 4.8. Differences between Demographic Variables in Terms of Quality of Sleep in the ICU

The analysis of differences in quality of sleep in the ICU across various demographic variables revealed the following significant findings:

A statistically significant difference was observed in the quality of sleep based on marital status ($F = 5.196$, $p = 0.007$). Individuals categorized as "Other" (divorced or widowed) reported a lower mean sleep quality ($5.03 \pm 0.55$) compared to single and married individuals. No statistically significant differences were found in the quality of sleep for other demographic variables, including age group, sex, level of education, employment status, monthly income, type of surgery, prior ICU admission, use of sleep pills, chronic disease status, or previous sleep disorders (all p-values > 0.05) as seen in (Table 4.6).

Table 4.6. Differences between Demographic Variables in Terms of Quality of Sleep in the ICU (n=150)

| | **Item** | **n** | **Mean** | **SD** | **Statistical values** | **P** |
|---|---|---|---|---|---|---|
| Age group | 20-29 years old | 5 | 5.51 | 0.50 | *F* = 0.736 | 0.569 |
| | 30-39 years old | 7 | 5.30 | 0.48 | *df = 4* | |
| | 40-49 years old | 25 | 5.40 | 0.45 | | |
| | 50-59 years old | 64 | 5.56 | 0.49 | | |
| | >59 years old | 49 | 5.47 | 0.56 | | |
| Sex | Male | 82 | 5.53 | 0.54 | *t= 0*.919 | 0.360 |
| | Female | 68 | 5.45 | 0.46 | *df=148* | |
| Level of education | Uneducated | 54 | 5.45 | 0.52 | *F*=1.284 | 0.274 |
| | Primary education | 7 | 5.86 | 0.36 | *df=5* | |
| | Secondary education | 11 | 5.69 | 0.44 | | |
| | Diploma | 36 | 5.47 | 0.57 | | |
| | Bachelor's Degree | 34 | 5.43 | 0.45 | | |
| | Higher education | 8 | 5.51 | 0.44 | | |
| Marital Status | Single | 6 | 5.47 | 0.43 | *F*=5.196 | |
| | Married | 133 | 5.53 | 0.49 | *df=2* | 0.007* |
| | Other (Divorced or Widowed) | 11 | 5.03 | 0.55 | | |
| Employment Status | Did not work | 32 | 5.45 | 0.47 | *F*=.230 | 0.875 |
| | Retired | 12 | 5.47 | 0.67 | *df=3* | |
| | Not employee | 62 | 5.53 | 0.55 | | |
| | Employee | 44 | 5.47 | 0.42 | | |
| Monthly Income | <1850 NIS | 65 | 5.44 | 0.49 | *F*=0.380 | 0.684 |
| | 1850-3000 NIS | 44 | 5.46 | 0.51 | *df=2* | |
| | >3000 NIS | 41 | 5.61 | 0.51 | | |
| Surgery Type | Open heart surgery | 129 | 5.50 | 0.51 | *F*=1.375 | 0.256 |
| | Valve replacement | 11 | 5.33 | 0.41 | *df=2* | |
| | Congenital heart repair | 10 | 5.57 | 0.54 | | |
| Previous admitted to ICU? | Yes | 57 | 5.42 | 0.51 | *t*=-1.349 | 0.179 |
| | No | 93 | 5.53 | 0.50 | *df=148* | |
| Did you take sleep pills? | Yes | 67 | 5.55 | 0.49 | *t*=1.343 | 0.181 |
| | No | 83 | 5.44 | 0.51 | *df=148* | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Did you have chronic diseases? | Yes | 74 | 5.46 | 0.54 | *t*=-.839 | 0.403 |
| | No | 76 | 5.52 | 0.47 | *df=148* | |
| Did you have a previous sleep | Yes | 73 | 5.50 | 0.50 | *t*=.184 | 0.854 |
| disorder? | No | 77 | 5.48 | 0.52 | *df=148* | |

*Significant value at p=<.05

Independent t test and OnWay ANOVA

## 4.9. Differences between Demographic Variables in Terms of Anxiety and Depression Scores

The analysis of differences in anxiety and depression scores across demographic variables in a sample of 150 participants revealed no statistically significant differences for any of the variables analyzed (all p-values > 0.05). This indicate that demographic variables did not affect the anxiety and depression mean scores as seen in (Table 4.7).

Table 4.7. Differences between Demographic Variables in Terms of Anxiety and Depression Scores (n=150)

| **Item** | | **n** | **Mean** | **SD** | **Statistical values** | **P** |
|---|---|---|---|---|---|---|
| Age group | 20-29 years old | 5 | 3.90 | 1.39 | *F=*1.902 | 0.113 |
| | 30-39 years old | 7 | 3.07 | 1.27 | *df=4* | |
| | 40-49 years old | 25 | 3.54 | 1.30 | | |
| | 50-59 years old | 64 | 4.19 | 1.57 | | |
| | >59 years old | 49 | 3.66 | 1.32 | | |
| Sex | Male | 82 | 3.87 | 1.46 | *t=0.*177 | 0.860 |
| | Female | 68 | 3.82 | 1.46 | *df=148* | |
| Level of education | Uneducated | 54 | 3.56 | 1.35 | *F=0.*654 | 0.659 |
| | Primary education | 7 | 4.14 | 2.15 | *df=5* | |
| | Secondary education | 11 | 3.91 | 2.08 | | |
| | Diploma | 36 | 4.03 | 1.34 | | |
| | Bachelor's Degree | 34 | 3.99 | 1.47 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Higher education | 8 | 4.00 | 0.85 | | |
| Marital Status | Single | 6 | 3.92 | 1.24 | *F=0.*656 | |
| | Married | 133 | 3.88 | 1.48 | *df=2* | 0.521 |
| | Other (Divorced or Widowed) | 11 | 3.36 | 1.27 | | |
| Employment Status | Did not work | 32 | 3.94 | 1.47 | *F=*0.228 | 0.877 |
| | Retired | 12 | 3.83 | 1.56 | *df=3* | |
| | Not employee | 62 | 3.73 | 1.60 | | |
| | Employee | 44 | 3.94 | 1.20 | | |
| Monthly Income | <1850 NIS | 65 | 3.93 | 1.51 | *F=*0.380 | 0.684 |
| | 1850-3000 NIS | 44 | 3.72 | 1.57 | *df=2* | |
| | >3000 NIS | 41 | 3.85 | 1.23 | | |
| Surgery Type | Open heart surgery | 129 | 3.76 | 1.43 | *F=*1.375 | 0.256 |
| | Valve replacement | 11 | 4.36 | 1.45 | *df=2* | |
| | Congenital heart repair | 10 | 4.45 | 1.62 | | |
| Previous admitted to ICU? | Yes | 57 | 3.84 | 1.56 | *t=*-0.030 | 0.976 |
| | No | 93 | 3.85 | 1.39 | *df=148* | |
| Did you take sleep pills? | Yes | 67 | 3.87 | 1.38 | *t=*.200 | 0.842 |
| | No | 83 | 3.83 | 1.52 | *df=148* | |
| Did you have chronic diseases? | Yes | 74 | 3.89 | 1.47 | *t=*0.319 | 0.750 |
| | No | 76 | 3.81 | 1.44 | *df=148* | |
| Did you have a previous sleep disorder? | Yes | 73 | 3.69 | 1.44 | *t=*-1.275 | 0.204 |
| | No | 77 | 3.99 | 1.46 | *df=148* | |

*Independent t test and One Way ANOVA*

## 4.10. Relationships between Influencing Factors in Terms of Quality of Sleep, Depression and Anxiety

Table (4.8) highlights significant relationships between various environmental factors and quality of sleep, depression, and anxiety among ICU patients (n = 150).

Several environmental factors were significantly correlated with the quality of sleep. Moderate positive correlations were observed with pain (r = 0.212, p = 0.009), noise (r = 0.212, p = 0.009), and light (r = 0.282, p = 0.001). Additionally, nursing interventions (r = 0.166, p = 0.043), blood sampling (r = 0.226, p = 0.004), medication administration (r = 0.235, p =0.005), ventilator alarm (r = 0.227, p = 0.005), ventilator usage (r = 0.239, p = 0.003), suctioning (r = 0.160, p = 0.049), television (r = 0.234, p = 0.004), and telephone usage (r = 0.227, p = 0.001) were also positively correlated with poor sleep quality.

Regarding depression, significant positive correlations were found between depression levels and medication administration (r = 0.164, p = 0.045) as well as ventilator usage (r = 0.175, p = 0.032). Regarding Anxiety, a significant negative correlation was observed between suctioning and anxiety levels (r = -0.235, p = 0.004). These findings suggest that environmental factors in the ICU significantly influence patients' quality of sleep, depression, and anxiety, with some factors exacerbating discomfort while others potentially alleviating anxiety.

Table 4.8. Relationships between Environmental Factors In Terms of Quality of Sleep, Depression and Anxiety (N=150)

| Variable | Factors | R | P-value |
|---|---|---|---|
| Quality of sleep | Pain | 0.212 | 0.009 |
| | Noise | 0.212 | 0.009 |
| | Light | 0.282 | 0.001 |
| | Nursing Interventions (e.g., baths) | 0.166 | 0.043 |
| | Blood Samples | 0.226 | 0.004 |
| | Administration of Medications | 0.235 | 0.005 |
| | Ventilator Alarm | 0.227 | 0.005 |

| | | | |
|---|---|---|---|
| | Ventilator | 0.239 | 0.003 |
| | Suctioning | 0.160 | 0.049 |
| | Television | 0.234 | 0.004 |
| | Telephone | 0.227 | 0.001 |
| Depression | Administration of Medications | 0.164 | 0.045 |
| | Ventilator | 0.175 | 0.032 |
| Anxiety | Suctioning | -0.235 | 0.004 |

*Pearson Correlation*

## 4.11. Summary of Results

The results revealed that 82.0% of patients reported poor sleep quality with an overall mean score of 50.72 ± 12.58. In the ICU, 48.7% of patients reported having poor sleep. The results show a high prevalence of anxiety and depression, with 60% of patients classified as abnormal for anxiety and 50% as borderline abnormal for depression, highlighting significant psychological distress.

According to demographic analysis, there was a significant difference in the quality of ICU sleep depending on marital status ($F = 5.196$, $p = 0.007$), with those who were divorced or widowed reporting lower quality sleep (mean = 5.03 ± 0.55). There were no significant difference across others demographics ($p>0.05$).

There were significant positive relationships between sleep quality scores and all environmental factors evidenced by p-values were <0.05. The administration of medication for depression ($r = 0.164$, $p = 0.045$) and the use of a ventilator ($r = 0.177$, $p = 0.032$) were found to be significantly positively correlated. Anxiety and suctioning had a significant negative correlation ($r = -0.235$, $p = 0.004$). These results highlight how important procedural and environmental factors are in determining the quality of sleep, anxiety, and depression experienced by intensive care unit patients.

# Chapter Five: Discussion

## 5.1. Introduction

This study investigates factors influencing sleep quality, anxiety and depression in open-heart surgery patients during their ICU stays. A striking finding was the prevalence of poor sleep quality, reported by 82% of patients, alongside anxiety was prevalent, with 60% classified as abnormal, 25% as borderline abnormal, and only 15% as normal. Similarly, 50% of patients were borderline abnormal for depression, while 35% had abnormal levels, and only 15% were within the normal range. This highlights significant psychological distress among patients. While certain demographic factors, such as marital status, influenced sleep quality, clinical factors and other demographic variables had limited impact. These findings raise important questions about the complex interplay between physiological, psychological, and environmental factors in ICU recovery.

## 5.2. Quality of Sleep

The high prevalence of poor sleep quality amongst the patients is consistent with the robust literature demonstrating that the ICU environment is highly sleep disruptive. (Surani et al., 2022) reported similar results, noting ICU noise, procedural interruptions, and patient discomfort as main contributors to poor sleep quality. In this study, a mean total sleep score of 50.72 was found, so there is steady impairment, and it suggests the need for targeted interventions.

Notably, the findings differ slightly from (Ahn et al., 2023) that although a relatively greater proportion of ICU patients achieved "good" sleep quality during their ICU stay. Variations in ICU setting, population, or method of measuring quality of sleep may account for this difference. For instance, whereas this study used self-reported metrics, (Ahn et al., 2023) used objective markers such as actigraphy, which may derive different thresholds for sleep quality classification.

Pain emerged as a significant barrier to sleep quality in this study, mean scores for pain identified it as a major impediment to sleep quality and were below the range for good sleep, beyond pain, several environmental factors such as noise, light, and procedural interventions also demonstrated significant correlations with poor sleep

quality in this study ($p < 0.05$). Consistent with previous literature, these findings reinforce that ICU environmental disturbances play a crucial role in impairing sleep quality (Lin et al., 2022). Light was found to have one of the strongest associations with disrupted sleep ($r = 0.282$, $p = 0.001$), emphasizing the need for environmental modifications such as the use of blackout curtains or dim lighting during nighttime hours (Louis et al., 2020). While noise was moderately disruptive, its impact on sleep appeared less significant compared to physiological discomfort and procedural disturbances, suggesting that pain management and procedural timing should be prioritized when developing sleep-focused interventions in ICU settings (Wang et al., 2019). This aligns with (Susuthi et al., 2020), which also showed a strong inverse relationship between pain and sleep quality in patients with coronary syndromes. (Chudow et al., 2022) also associated poor sleep patterns with greater perceived fatigue levels among post-operative cardiac patients, confirming the negative effect of inadequate pain control on recovery outcomes procedural impacts were also present with diagnostic testing, nursing interventions, and blood sampling leading to sleep disruption, similar to (Chudow et al., 2022). While some of these interruptions are essential to maintaining patient care, it highlights the need for adjustments to ICU protocol to go ahead and consolidate, for example, time sensitive (non-urgent) interventions to help reduce frequency of awakening overnight.

Sleep quality was also highly affected by environmental factors, like noise and light. Noise was generally described as moderately disruptive, but it remained a problem, confirming a study from (Wang et al., 2019) that found that noise above 59 dB was strongly correlated to poor sleep quality. The results of this study propose that the hospital nursing interventions were less disruptive and irritating than noise, which differs from the study of (Louis et al., 2020) showing that nursing care was a major source of sleep deprivation in intensive care units. This may indicate differences in ICU workflow or perceptions of patients in studies.

## 5.3. Anxiety and Depression

One of the key findings of this study was the high prevalence of anxiety and depression among patients, with 60% classified as abnormal for anxiety and 50% as borderline abnormal for depression. These results align with previous research indicating that psychological distress is common among ICU patients post-open-heart surgery

(Ibrahim Abdelraof et al., 2022). data from (Kashif et al., 2022) showed that anxiety preoperatively correlates with postoperative pain levels as well as postoperative recovery.

Studies have reported anxiety prevalence ranging from 30% to 72% in ICU patients, varying based on preoperative preparation, psychological resilience, and institutional support (Younes et al., 2019b), Similarly, depression has been identified as a significant post-operative issue, with incidence rates between 8% and 47% among open-heart surgery patients (Amiri et al., 2019), the association between depression and cardiovascular diseases is well documented, as patients with preexisting mood disorders are more likely to experience worse surgical outcomes and prolonged hospital stays (Lin et al., 2022).

Several factors contribute to the high levels of anxiety and depression observed in post-open-heart surgery patients. Although psychological distress is widely documented in ICU settings, the findings of this study suggest that environmental and medical factors may exert a stronger influence on patient well-being than pre-existing psychological variables. Notably, depression in this study was significantly correlated with both medication administration ($r = 0.164$, $p = 0.045$) and ventilator usage ($r = 0.175$, $p = 0.032$). This suggests that prolonged ICU treatments and mechanical ventilation may contribute to feelings of helplessness or distress, further exacerbating depressive symptoms (Nouri et al., 2021). These findings reinforce the need for increased psychological support during prolonged ICU stays to mitigate depressive symptoms and promote emotional resilience among patients recovering from cardiac surgery (Lin et al., 2022). (Nouri et al., 2021), emphasized that prolonged ICU stays, postoperative pain, and mechanical ventilation significantly elevate anxiety and depressive symptoms. In their study, patients with longer ICU stays showed a 70% increased risk of developing anxiety-related complications. Similarly, (Lin et al., 2022) found that environmental stressors such as ICU noise, sleep disturbances, and the lack of social interaction exacerbated psychological distress among post-cardiac surgery patients.

In addition to environmental stressors, preoperative psychological state plays a significant role in determining postoperative mental health outcomes. (Kashif et al., 2022) found that patients with higher preoperative anxiety levels had significantly increased postoperative pain scores and longer recovery durations. This suggests that early psychological interventions could help mitigate the negative impact of anxiety on postoperative recovery.

## 5.4. Demographics Differences of Sleep Quality and Anxiety

The only demographic factor that was significantly associated with sleep quality was marital status, in which divorced or widowed patients had poorer sleep. This aligns with (Horváth et al., 2016) who indicated the beneficial effects of social support on stress and sleep quality. Without a spouse or close family member nearby for moral support while in the ICU, a patient may feel isolated and stressed out.

Age, gender, and level of education had no significant relationship with sleep quality or anxiety. This contrasts studies like (Yu et al., 2022), which related younger age and female gender to poorer sleep and anxiety. Sleep disturbances are prevalent in ICU, and the absence of association in this study could be explained when considering ICU specific factors like noise or medical procedures which are probably stronger modifiers of sleep than individual factors. Moreover, community differences, the practice of regulation in ICU care, and the adaptability of patients to the ICU environment might have minimized the impact of demographic variables. These findings indicate that external ICU influences appear to be more important than demographic differences in determining patient outcomes.

There is considerable literature documenting the relationship between anxiety and sleep quality, consistently demonstrating that elevated levels of anxiety can lead to increased sleep disruption (both in terms of duration and quality). (Xiao et al., 2020) found that increased anxiety leads to sleep problems, characterized mostly by prolonged sleep onset latency and disrupted restorative sleep. Anxiety engages hyperarousal and excessive physiological stress responses, including cortisol and adrenaline, that do not allow for restful sleep. However, the results of this study indicate that while anxiety is a commonly cited factor in sleep disruption, ICU patients may experience sleep disturbances that are more directly linked to procedural and environmental factors. Suctioning was found to have a significant negative correlation with anxiety ($r = -0.235$, $p = 0.004$), suggesting that certain medical interventions may provide relief from distress rather than exacerbate it. This contrasts with studies like (Lewandowska et al., 2020), which suggest that chronic anxiety remains a dominant predictor of long-term sleep disturbances in ICU patients. The divergence in findings may be attributed to the timing of anxiety assessments in this study, as anxiety levels were likely mitigated by the successful completion of surgery, effective pain management, and ICU staff interventions aimed at reducing distress (Elgazzar et al., 2023). Further research is needed to explore

whether procedural modifications, such as early mobilization and enhanced communication strategies may further reduce anxiety-related sleep disturbances in ICU settings.

The timing of the measurement of anxiety might be another explanation for the absence of a clear association between anxiety and sleep quality. Furthermore, preoperative anxiety is one of the highest since it is the time where the uncertainty of the surgical results are highest. (Yaman & Aygin, 2022) reported high levels of anxiety in patients undergoing preoperative cardiac systems, which considerably affected their recovery after surgery. This being said, once patients arrive at the ICU, most likely a successful surgical procedure has taken place and with effective analgesia, anxiety levels may drop significantly, and the focus of their recovery becomes more physical and less psychological.

Furthermore, cultural and social factors could play a role in directing anxiety levels. In collectivist cultures, support of families and communities may provide buffers against psychological distress during critical illnesses. (Horváth et al., 2016) highlighted that social support has a significant impact in decreasing anxiety and enhancing patient outcomes. In this study, familial ties and positive care networks may buffer patient anxiety and minimize the negative effects on sleep quality.

## 5.5. Conclusion

This study highlights the significant challenges related to sleep quality, anxiety, and depression among ICU patients recovering from open-heart surgery. The high prevalence of poor sleep quality (82%) underscores the substantial impact of ICU-specific environmental and procedural factors, including pain, noise, light exposure, and frequent medical interventions. These findings reinforce that ICU environmental disturbances play a crucial role in sleep impairment and emphasize the need for structured interventions to enhance sleep hygiene and patient comfort in critical care settings.

Although anxiety was prevalent (60%), its direct impact on sleep quality was less pronounced than expected, which contrasts with prior research. This suggests that physiological discomfort, medical interventions, and ICU environmental stressors may have had a greater influence on sleep disturbances than psychological distress alone. Additionally, marital status emerged as the only demographic factor significantly associated with sleep quality, with widowed and divorced patients experiencing poorer

sleep, highlighting the essential role of social support in post-operative recovery.

Despite the high prevalence of anxiety (60%) and depression (50%), their relationship with sleep disturbances and demographic variables was less pronounced than expected. The study found that depression was significantly correlated with medication administration and ventilator use, indicating that prolonged ICU treatments and complex medical procedures may contribute to emotional distress and hinder recovery.

## 5.6. Recommendations

The findings of this study suggest that targeted interventions are necessary to improve the quality of sleep, reduce anxiety and depression, and enhance post-operative recovery among ICU patients undergoing open-heart surgery. Given the significant impact of environmental and procedural factors on sleep disturbances, specific measures should be implemented within ICU settings to optimize patient outcomes.

One of the primary recommendations for clinical practice is the reduction of noise levels in ICU environments. Since noise was identified as a major disruptor of sleep, hospitals should adopt structured noise control policies, including limiting unnecessary alarms, reducing nighttime staff conversations, and utilizing soundproofing materials. Additionally, adjusting lighting conditions to align with patients' circadian rhythms can significantly improve sleep quality. Dimmable lighting systems, blackout curtains, and restricted exposure to artificial light during nighttime hours should be considered to enhance restfulness among ICU patients.

Another crucial recommendation is the implementation of structured pain management protocols, given the significant correlation between pain and sleep disturbances. Pain relief strategies should include both pharmacological approaches, such as the timely administration of analgesics, and non-pharmacological methods, such as relaxation techniques, warm compresses, or guided physical therapy. Moreover, reorganizing medical procedures to minimize unnecessary patient awakenings is essential. Blood sampling, vital sign assessments, and medication administration should be consolidated where possible to reduce disruptions during sleep hours.

From a health policy perspective, integrating mental health screening into ICU protocols is necessary. National guidelines should mandate preoperative and postoperative screening for anxiety and depression among ICU patients to facilitate early detection and intervention. Additionally, continuous training programs should be

introduced for ICU nurses and physicians to enhance their ability to recognize and manage sleep disturbances, anxiety, and depression in post-open-heart surgery patients. To further improve patient care, hospitals should implement standardized ICU sleep hygiene policies, such as designated "quiet hours" and structured schedules that limit non-urgent medical interventions during nighttime.

At a governmental level, the Ministry of Health should prioritize infrastructure improvements in ICU settings to enhance patient recovery. This includes investing in noise-reduction technologies, patient-controlled lighting systems, and designated rest periods to create a more healing environment. Furthermore, increasing funding for mental health resources in ICUs, such as hiring on-site psychologists or psychiatric support teams, can help manage post-operative anxiety and depression effectively. Establishing longitudinal follow-up programs for discharged patients is also crucial to monitor sleep quality, anxiety, and depression, ensuring that recovery continues beyond hospitalization.

In addition to these measures, public awareness campaigns should be launched to educate patients and their families on the importance of sleep quality and mental health in post-surgical recovery. These campaigns can provide guidance on managing anxiety, improving sleep habits, and recognizing symptoms of psychological distress following surgery.

Lastly, future research is needed to further explore the interplay between anxiety, depression, and sleep quality in ICU patients. Longitudinal studies should be conducted to assess the long-term effects of ICU interventions on patient recovery. Additionally, investigating the cultural and demographic influences on sleep and mental health outcomes can provide further insights into patient needs. Research on non-pharmacological sleep interventions, such as white noise therapy, relaxation techniques, or personalized sleep hygiene programs, could also lead to more effective strategies for managing sleep disturbances in ICU patients.

## 5.7. Limitations of the Study

The study was carried out in a few hospitals, which would have limited how broadly the results can be applied to different populations or environments. Establishing causal links between the indicated determinants and outcomes is impossible due to the cross-sectional methodology. Self-reported measures were used to collect data on psychological states and sleep quality, which could be prone to subjectivity or recall bias. All possible

environmental factors that could affect results, such as particular ICU design or staff behaviors, were not taken into consideration in this study. The study doesn't explain how depression, anxiety, or sleep quality change during the course of recovery.

Additionally, the political situation in Palestine presents a unique challenge that could have impacted patient stress levels, hospital resource availability, and access to specialized care. Restrictions on movement, limited medical supplies, and administrative hurdles may have influenced both the quality of ICU care and patients' psychological well-being. These external factors should be considered when interpreting the findings.

Another challenge was the cooperation of health administration across different hospitals. Variations in hospital policies, administrative support, and resource allocation may have affected data collection and the implementation of standardized ICU care. Differences in hospital management approaches could also contribute to inconsistencies in patient experiences and outcomes.

## References


Ali, N. N. (2023). Assessment of preoperative anxiety, its contributing factors, and impact on immediate postoperative outcomes among cardiac surgery patients−A cross−sectional study.

Almondes, K. M. d., Marín Agudelo, H. A., & Jiménez−Correa, U. (2021). Impact of Sleep Deprivation on Emotional Regulation and the Immune System of Healthcare Workers as a Risk Factor for COVID 19: Practical Recommendations From a Task Force of the Latin American Association of Sleep Psychology [Perspective]. *Frontiers in Psychology*,

Al−Sulami, G. S., Rice, A. M., Kidd, L., O'Neill, A., Richards, K. C., & McPeake, J. (2019). An Arabic Translation, Reliability, Validity, and Feasibility of the Richards−Campbell Sleep Questionnaire for Sleep Quality Assessment in ICU: Prospective−Repeated Assessments. *J Nurs Meas*, *27*(3), E153−e169. https://doi.org/10.1891/1061− 3749.27.3.E153

al−yasari, A. s., & Al−Juboori, A. K. (2022). Quality of Life for Anxiety Patients in Holy Kerbala City. *Journal of Pharmaceutical Negative Results*. https://doi.org/10.47750/pnr.2022.13.s06.178

Amiri, Z. B., Sanagoo, A., Jouybari, L., Bahnampour, N., & Kavosi, A. (2019). The effect of written emotional disclosure on depression, anxiety, and stress of patients after open heart surgery. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, *10*(2), 55−64.

Andrews, J. L., Louzon, P., Torres, X., Pyles, E., Ali, M., Du, Y., & Devlin, J. W. (2020). Impact of a Pharmacist−Led Intensive Care Unit Sleep Improvement Protocol on Sleep Duration and Quality. *Annals of Pharmacotherapy*. https://doi.org/10.1177/1060028020973198

*Annals of Intensive Care*, *14*(1), 175.

*Australian Critical Care*, *35*, S19.

Avidan, A. Y., Meir, H. K., & Richard, B. B. (2022). Normal sleep in humans. *Atlas of Clinical Sleep Medicine. 3rd ed.[e-Book: Expert Consult-Online]. Saint Louis: Elsevier Health Sciences*, 83−116.

Bahashwan, E., & Alhalafi, A. H. (2024). Effect of Stress and Anxiety on Quality of Life among Health Science Students in Early Clinical Years. *Bahrain Medical Bulletin*, *46*(4).

Bakytzhanuly, A., Turubayev, E., Esilbayev, Z., Bagibayev, S., & Nuralinov, O. (2024). Feasibility and effectiveness of left bundle branch area pacing after TAVR: the single center experience. *Europace*, *26*(Supplement_1), euae102. 399.

Bal, D., & Çilingir, D. (2023). Evaluation of Kinesiophobia and Fatigue Levels of Patients Who Have Undergone Open Heart Surgery. *Acibadem Universitesi Saglik Bilimleri Dergisi*. https://doi.org/10.31067/acusaglik.1098447

Batiha, A.−M. M., Al−Zaru, I., Al−Shaarani, M. S., & Alhalaiqa, F. (2021). Pulmonary Complications After Open Heart Surgery: a Retrospective Study. *International Journal of Emerging Trends in Health Sciences*. https://doi.org/10.18844/ijeths.v5i1.5300

Brito, J., & de Oliveira, E. I. (2024). Current and Future Landscape of Structural Heart Interventions. *Lusiadas Scientific Journal*, *5*(3), 72−74. 12. https://doi.org/10.3389/fpsyg.2021.564227

Cart, C., & Pauling, L. (2024). Sleep Deprivation: A Deeper Dive Into Clinical Screenings, Mitochondrial Impact, and Therapeutic Interventions.

Chudow, M., Paradiso, V., Silva, N., & Collette, J. (2021). Evaluation of the Impact of Prior−to− Admission Sleep Aid Prescribing Practices on Sleep and Delirium in the Intensive Care Unit. *Annals of Pharmacotherapy*. https://doi.org/10.1177/10600280211042632

Chudow, M., Paradiso, V., Silva, N., & Collette, J. (2022). Evaluation of the impact of prior−to− admission sleep aid prescribing practices on sleep and delirium in the intensive care unit. *Annals of Pharmacotherapy*, *56*(6), 679−684.

Czempik, P. F., Jarosińska, A., Machlowska, K., & Pluta, M. (2020). Impact of Sound Levels and Patient−Related Factors on Sleep of Patients in the Intensive Care Unit: A Cross−

D. (2020). The Future of Open Heart Surgery in the Era of Robotic and Minimal Surgical Interventions. *Heart Lung and Circulation*. https://doi.org/10.1016/j.hlc.2019.05.170

Daraghma, M., Rjoub, A., Ahmed, O., Sabri, S. S., Chaudry, G., & Raja, J. (2025). Current Landscape, Challenges, and Future Directions for Interventional Radiology in Palestine. *CardioVascular and Interventional Radiology*, 1−3.

Dau, J., Bhayani, S., Tiu, D. R., Sreepathy, P., Ambalavanan, M., Khan, A., Navarro, L., Yu, J., Hattab, A., & Patel, K. (2024). E−9| The Home Field Advantage: The Relationship Between Discharge Disposition and TAVR Outcomes. *Journal of the Society for Cardiovascular Angiography &*

*Interventions*, *3*(5).

Depression in Patients with Chronic Obstructive Pulmonary Disease and Their Influencing Factors: a Multicenter Cross−sectional Study. *Chinese General Practice*, *27*(20), 2437.

Duru, H. (2021). The Continuing Effect of COVID−19 Pandemic on Physical Well−Being and Mental Health of ICU Healthcare Workers in Turkey: A Single−Centre Cross−Sectional Later−Phase Study. *Journal of Intensive Care Medicine*. https://doi.org/10.1177/08850666211070740

E. M., Doais, K. S., Abdulrahman, A., & Altirkawi, K. A. (2017). Development and validation of Arabic version of the Hospital Anxiety and Depression Scale. *Saudi J Anaesth*, *11*(Suppl 1), S11−s18. https://doi.org/10.4103/sja.SJA_43_17

Egger, M., Finsterhölzl, M., Farabegoli, D., Wippenbeck, F., Schlutt, M., Müller, F., Huge, V., Jahn, K., & Bergmann, J. (2024). Comprehensive assessment and progression of health status during neurorehabilitation in survivors of critical illness: a prospective cohort study.

Elgazzar, S. E., Qalawa, S. A. A., & Ali Hassan, A. M. (2023). Impact of educational programme on patient's health outcomes following open heart surgeries. *Nursing Open*, *10*(5), 3028−3041.

Freedman, N. S., Gazendam, J., Levan, L., Pack, A. I., & Schwab, R. J. (2001). Abnormal sleep/wake cycles and the effect of environmental noise on sleep disruption in the intensive care unit. *American journal of respiratory and critical care medicine*, *163*(2), 451−457.

Gheiasi, S. F., Hosseini, E., Sharifi, F., Esmaeili, M., Etesam, F., & Navab, E. (2024). Effect of a Nurse−Led Cognitive−Behavioral Therapy on Sleep Quality in Patients Undergoing Open Heart Surgery: A Prospective Randomized Clinical Trial. *Health Scope*, *13*(1).

Gnanaraj, J. P., & Princy, S. A. (2024). Celebrating motherhood after Fontan operation: a difficult and distant dream? In (Vol. 11, pp. e002911): Archives of Disease in childhood.

Gu, X., Zhang, Y., Wei, W., & Zhu, J. (2023). Effects of preoperative anxiety on postoperative outcomes and sleep quality in patients undergoing laparoscopic gynecological surgery. *Journal of clinical medicine*, *12*(5), 1835.

Harky, A., Chaplin, G., Chan, J. S. K., Eriksen, P., MacCarthy−Ofosu, B., Theologou, T., & Muir, A.

Hummel, A. (2021). *Barriers and Enablers to Nurses' Sleep Promotion Practices in the Cardiac Post-Surgery Population: A Theoretical Domains Framework Based Survey* Université d'Ottawa/University of Ottawa].

Ibrahim Abdelraof, A., Mohamed Abdelfatah Sliman, A., Al−Wehedy Ibrahim, A., & Rabie El− Etreby, R. (2022). Relationship between Psychosocial Care and ICU Trauma among Patients underwent Open−Heart Surgery. *Egyptian Journal of Health Care, 13*(3), 76−85.

Jayakumar, S., Khoynezhad, A., & Jahangiri, M. (2020). Surgical Site Infections in Cardiac Surgery. *Crit Care Clin, 36*(4), 581−592. https://doi.org/10.1016/j.ccc.2020.06.006

Jiang, Q., Huang, K., Zhao, D., Xiao, Y., Ma, X., & Hu, S. (2024). Innovations and Developments in Totally Thoracoscopic Cardiac Procedures. The Heart Surgery Forum,

Karawan Sayed Sallam, G., Fouad Abdalla, K., & Fathi Mahmoud, S. (2022). Relation between compliance of patients post coronary artery bypass surgery towards symptoms management strategies and experienced discomforts. *Egyptian Journal of Health Care, 13*(3), 887−901.

Kashif, M., Hamid, M., & Raza, A. (2022). Influence of Preoperative Anxiety Level on Postoperative Pain After Cardiac Surgery. *Cureus*. https://doi.org/10.7759/cureus.22170

Kermarrec, S., Attinger, L., Guignard, J. H., & Tordjman, S. (2020). Anxiety Disorders in Children With High Intellectual Potential. *Bjpsych Open*. https://doi.org/10.1192/bjo.2019.104

Kumar, S., Wong, P. S., Hasan, S. S., & Kairuz, T. (2019). The Relationship Between Sleep Quality, Inappropriate Medication Use and Frailty Among Older Adults in Aged Care Homes in Malaysia. *PLoS One*. https://doi.org/10.1371/journal.pone.0224122

Lee, E. B. (2024). What is the disease burden from childhood and adolescent obesity?: a narrative review. *Journal of Yeungnam Medical Science, 41*(3), 150−157.

Lesens, O., Forestier, E., Botelho−Nevers, E., Pavese, P., David, G., Nougarede, B., Corbin, V., Pereira, B., Aumeran, C., Sauvat, L. J. E. J. o. C. M., & Diseases, I. (2024). Comparing ethanol lock therapy versus vancomycin lock in a salvation strategy for totally implantable vascular access device infections due to

coagulase−negative staphylococci (the ETHALOCK study): a prospective double−blind randomized clinical trial. *43*(2), 223− 232.

Lewandowska, K., Mędrzycka−Dąbrowska, W., Pilch, D., Wach, K., Fortunato, A., Krupa, S., & Ozga, D. (2020). Sleep Deprivation from the Perspective of a Patient Hospitalized in the Intensive Care Unit—Qualitative Study. *Healthcare*, *8*(3), 351. https://www.mdpi.com/2227−9032/8/3/351

LI, X., SUN, W., YIN, M., DOU, T., LYU, Y., XU, W., & ZHA, Z. (2024). Sleep Quality and Anxiety and

Lin, F., & Liu, L. (2024). Effects of strengthening prospective nursing practice on sleep quality, anxiety, and depression of awake patients in intensive care unit. *World Journal of Psychiatry*, *14*(5), 735.

Lin, T.−R., Cheng, C.−H., Wei, J., & Wang, T. J. (2022). Factors Influencing Sleep Quality in Open− Heart Patients in the Postoperative Intensive Care Unit. *Healthcare*. https://doi.org/10.3390/healthcare10112311

Louis, M., Treger, K., Ashby, T., Smotherman, C., Gautum, S., Seeram, V., Cury, J., & Jones, L. J. P.

Mellhammar, L., Elén, S., Ehrhard, S., Bouma, H. R., Ninck, L., Muntjewerff, E., Wünsch, D., Bloos, F., Malmström, E., & Linder, A. (2022). New, Useful Criteria for Assessing the Evidence of Infection in Sepsis Research. *Critical Care Explorations*. https://doi.org/10.1097/cce.0000000000000697

Mercier, T., Dunbar, A., Veldhuizen, V., Holtappels, M., Schauwvlieghe, A., Maertens, J., Rijnders, B. J. A., & Wauters, J. (2020). Point of Care Aspergillus Testing in Intensive Care Patients. *Critical Care*. https://doi.org/10.1186/s13054−020−03367−7

Morrissey, B., Taveras, E. M., Allender, S., & Strugnell, C. (2020). Sleep and Obesity Among Children: A Systematic Review of Multiple Sleep Dimensions. *Pediatric Obesity*. https://doi.org/10.1111/ijpo.12619

Nelson, K. L., Davis, J. E., & Corbett, C. F. (2021). Sleep Quality: An Evolutionary Concept Analysis. *Nursing Forum*. https://doi.org/10.1111/nuf.12659

Ng, S. X., Wang, W., Shen, Q., Toh, Z. A., & He, H. G. (2022). The effectiveness of preoperative education interventions on improving perioperative outcomes of adult patients undergoing cardiac surgery: a systematic review and meta−analysis. *European Journal of Cardiovascular Nursing*, *21*(6), 521−536.

Nouri, J. M., Safaeipour, L., Vafadar, Z., & Moradian, S. T. (2021). The effect of

the family presence on anxiety and agitation of patients under mechanical ventilation after open heart surgery: a randomized clinical trial. *Perioperative Medicine*, *10*, 1−9.

Nurhayati, N., Waluyo, A., Kariasa, I. M., & Asih, S. R. (2024). The Effect of Combined Foot Massage and Nature Music on the Sleep Quality of Critically Ill Patients. *Jurnal Keperawatan Komprehensif (Comprehensive Nursing Journal)*, *10*(5), 594−601.

o. (2020). Patient−related factors may influence nursing perception of sleep in the Intensive Care Unit. *15*(1), e0226323.

Palestinian Ministry of, H. (2022). Annual Health Report, Palestine 2022. http://www.moh.ps Pelin, M., & Sert, H. (2025). The effect of nursing care provided to coronary intensive care

patients according to their circadian rhythms on sleep quality, pain, anxiety, and delirium: a randomised controlled trial. *BMC nursing*, *24*(1), 1−14.

Pihkala, P. P. (2020). Anxiety and the Ecological Crisis: An Analysis of Eco−Anxiety and Climate Anxiety. *Sustainability*. https://doi.org/10.3390/su12197836

Polmann, H., Domingos, F. L., Melo, G., Stuginski−Barbosa, J., Guerra, E. N. S., Porporatti, A. L., Dick, B., Flores−Mir, C., & Canto, G. D. L. (2019). Association Between Sleep Bruxism and Anxiety Symptoms in Adults: A Systematic Review. *Journal of Oral Rehabilitation*. https://doi.org/10.1111/joor.12785

Rech, J., Santin, A., Lionnet, F., Mattioni, S., Guerif, E. D., Steichen, O., & Boelle, P. (2024). Patterns of emergency department utilization in adults with sickle cell disease. *La Revue de Médecine Interne*, *45*, A389−A390.

Richards, K. C., O'Sullivan, P. S., & Phillips, R. L. (2000). Measurement of sleep in critically ill patients. *J Nurs Meas*, *8*(2), 131−144.

Ritmala, M., Elliott, R., Vahlberg, T., Richards, K., & Axelin, A. (2022). Richards Campbell sleep questionnaire cut−off scores for good quality sleep in non−ventilated ICU patients.

Schmidt, M. R. (2024). The Expanding Future of Transcatheter Pulmonary Valves. In (Vol. 17, pp. 2298−2300): American College of Cardiology Foundation Washington DC.

Sectional Cohort Study. *Scientific Reports*. https://doi.org/10.1038/s41598−020−76314− 9

Sjöström, B., Månsson, E., Kamienny, J. V., & Östberg, E. (2021). Characteristics and Definitive Outcomes of <scp>COVID</Scp>−19 Patients Admitted to a Secondary Hospital Intensive Care Unit in Sweden. *Health Science Reports*. https://doi.org/10.1002/hsr2.446

Soh, P. Q. P., Wong, W. H. T., Roy, T., & Tam, W. W. S. (2024). Effectiveness of non− pharmacological interventions in improving sleep quality after cardiac surgery: A systematic review and meta−analysis. *Journal of clinical nursing*, *33*(6), 2084−2098.

Sun, Y., Zhu, S.−N., Zhang, C., Li, S.−L., & Wang, D. X. (2022). Effect of Low−Dose Dexmedetomidine on Sleep Quality in Postoperative Patients With Mechanical Ventilation in the Intensive Care Unit: A Pilot Randomized Trial. *Frontiers in Medicine*. https://doi.org/10.3389/fmed.2022.931084

Susuthi, P., Wattanakitkrileart, D., Pongthavornkamol, K., & Dumavibhat, C. (2020). Factors affecting sleep quality in acute coronary syndrome survivors (P. 283). *Chulalongkorn Medical Journal*, *64*(3), 283−290.

Tagler, M. J. (2024). Allowing time for 8+ hours of sleep: identification and validation of important beliefs using the reasoned action approach. *Frontiers in Psychology*, *15*, 1402322.

Terkawi, A. S., Tsang, S., AlKahtani, G. J., Al−Mousa, S. H., Al Musaed, S., AlZoraigi, U. S., Alasfar,

Thomas, A., & Gallicchio, V. (2024). Stem Cell Res. *Stem Cell Research Associated with Obesity*, *5*(1), 1−11.

Tolba, A. A., Mehany, M. M., & Mohammed, M. (2021). Association Between Sleep Disturbance and Physiological Parameters of Critically Ill Patients. *Egyptian Journal of Health Care*. https://doi.org/10.21608/ejhc.2021.183802

Wang, C.−y., Shang, M., Feng, L.−z., Zhou, C.−l., Zhou, Q.−s., & Hu, K. (2019). Correlation between APACHE III score and sleep quality in ICU patients. *Journal of International Medical Research*, *47*(8), 3670−3680. https://doi.org/10.1177/0300060519856745

Wilbring, M. (2025). Advancing Minimally Invasive Cardiac Surgery—Let's Take a Look into the Future. *Journal of clinical medicine*, *14*(3), 904. https://www.mdpi.com/2077− 0383/14/3/904

Wu, T., Jia, X., Shi, H., Niu, J., Yin, X., Xie, J., & Wang, X. (2021). Prevalence of Mental Health Problems During the COVID−19 Pandemic: A Systematic Review and Meta−Analysis. *Journal of Affective Disorders*.

https://doi.org/10.1016/j.jad.2020.11.117

Yaftian, N., Dunne, B., Ferrari, I., & Antippa, P. (2021). Cardiothoracic surgery. *Oxford Handbook of Clinical Surgery*. https://doi.org/10.1093/med/9780198799481.003.0018

Yaman, Ö., & Aygin, D. (2022). Relationship Between Patients' Anxiety Levels Before Open Heart Surgery With Postoperative Symptoms. *Sakarya Üniversitesi Holistik Sağlık Dergisi*. https://doi.org/10.54803/sauhsd.1103950

Yan, D., Huang, Y., Chen, X., Wang, M., Li, J., & Luo, D. (2021). Application of the Chinese Version of the Pittsburgh Sleep Quality Index in People Living With HIV: Preliminary Reliability and Validity. *Frontiers in Psychiatry*. https://doi.org/10.3389/fpsyt.2021.676022

Younes, O., Amer, R., Fawzy, H., & Shama, G. (2019a). Psychiatric disturbances in patients undergoing open−heart surgery. *Middle East Current Psychiatry, 26*(1), 4. https://doi.org/10.1186/s43045−019−0004−9

Younes, O., Amer, R., Fawzy, H., & Shama, G. (2019b). Psychiatric disturbances in patients undergoing open−heart surgery. *Middle East Current Psychiatry, 26*, 1−7.

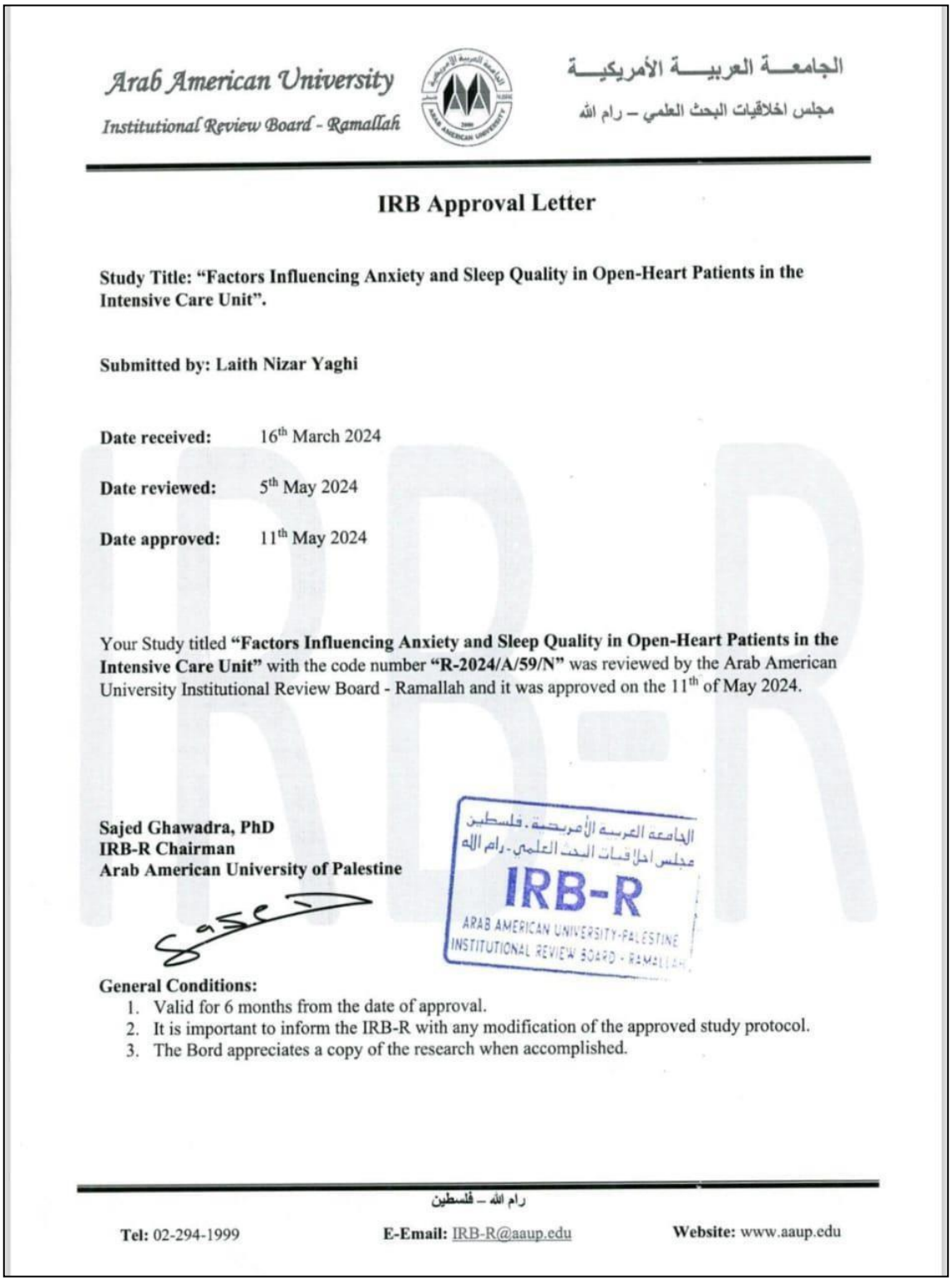
Zhang, P., Lou, P., Chang, G., Chen, P., Zhang, L., Li, T., & Qiao, C. (2016). Combined Effects of Sleep Quality and Depression on Quality of Life in Patients With Type 2 Diabetes. *BMC Family Practice*. https://doi.org/10.1186/s12875−016−0435−x

Zhang, Z., Wang, H., Wang, Y., Luo, Q., Yuan, S., & Yan, F. (2020). Risk of postoperative hyperalgesia in adult patients with preoperative poor sleep quality undergoing open− heart valve surgery. *Journal of Pain Research*, 2553−2560.

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatr Scand, 67*(6), 361−370. https://doi.org/10.1111/j.1600−0447.1983.tb09716.x

# Appendices

Appendix 1. IRB Approval



Arab American University
Institutional Review Board - Ramallah

الجامعـــة العربيـــة الأمريكيـــة
مجلس اخلاقيات البحث العلمي – رام الله

**IRB Approval Letter**

**Study Title: "Factors Influencing Anxiety and Sleep Quality in Open-Heart Patients in the Intensive Care Unit".**

**Submitted by: Laith Nizar Yaghi**

**Date received:** 16th March 2024

**Date reviewed:** 5th May 2024

**Date approved:** 11th May 2024

Your Study titled **"Factors Influencing Anxiety and Sleep Quality in Open-Heart Patients in the Intensive Care Unit"** with the code number **"R-2024/A/59/N"** was reviewed by the Arab American University Institutional Review Board - Ramallah and it was approved on the 11th of May 2024.

**Sajed Ghawadra, PhD**
**IRB-R Chairman**
**Arab American University of Palestine**

الجامعة العربية الأمريكية - فلسطين
مجلس اخلاقيات البحث العلمي - رام الله
IRB-R
ARAB AMERICAN UNIVERSITY-PALESTINE
INSTITUTIONAL REVIEW BOARD - RAMALLAH

**General Conditions:**

1. Valid for 6 months from the date of approval.
2. It is important to inform the IRB-R with any modification of the approved study protocol.
3. The Bord appreciates a copy of the research when accomplished.

رام الله – فلسطين

**Tel:** 02-294-1999 **E-Email:** IRB-R@aaup.edu **Website:** www.aaup.edu

Appendix 2. Facilitating Research Letter

Arab American University
Faculty of Graduate Studies

الجامعة العربية الأمريكية
كلية الدراسات العليا

2024/6/6

الى من يهمه الامر

**تسهيل مهمة بحثية**

تحية طيبة وبعد،

تُهديكم كلية الدراسات العليا في الجامعة العربية الأمريكية أطيب التحيات، وبالإشارة الى الموضوع أعلاه، تشهد كلية الدراسات العليا في الجامعة أن الطالب ليث نزار مخيمر باغي والذي يحمل الرقم الجامعي 202216334 هو طالب ماجستير في برنامج تمريض العناية المكثفة ويعمل على رسالة الماجستير الخاصة به بعنوان:

"Factors Influencing Anxiety and Sleep Quality in Open-Heart Patients in the Intensive Care Unit"

تحت إشراف الدكتورة عبير حسين، نأمل من حضرتكم الإيعاز لمن يلزم لمساعدته للحصول على المعلومات اللازمة للدراسة، علماً أن المعلومات ستستخدم لغاية البحث فقط وسيتم التعامل معها بغاية السرية، وقد أُعطي هذه الرسالة بناءً على طلبه.

وتفضلوا بقبول فائق الاحترام

ق.أ. عميد كلية الدراسات العليا

د. حسين الأحمد

كلية الدراسات العليا
FACULTY OF GRADUATE STUDIES



Jenin Tel: +970-4-2418888 Ext.:1471,1472 Fax: +970-4-2510810 P.O. Box:240
Ramallah Tel: +970-2-2941999 Fax: +970-2-2941979 Abu Qash - Near Alrehan
E-mail: FGS@aaup.edu ; PGS@aaup.edu Website: www.aaup.edu

Appendix 3. Consent Form

## نموذج الموافقة

**AAUP-IRB-R Code No.:** .....

**AAUP-IRB-R Date:** .....

أنا ..... (اسم المشارك /

اختياري) أوافق بموجبه على المشاركة في البحث السريري (دراسة الاستبانة) المحددة أدناه:

**العوامل التي تؤثر على القلق وجودة النوم لدى مرضى القلب المفتوح في وحدة العناية المركزة**

**لتحقيق درجة: الماجستير**

**في برنامج: تمريض العناية المكثفة في: الجامعة العربية الامريكية.**

تم شرح وتفسير طبيعة الدراسة وهدفها عن طريق الباحث: ليث نزار مخيمر ياغي

لقد تم إخباري عن طبيعة البحث من حيث المنهجية والآثار السلبية المحتملة والمضاعفات (حسب ورقة معلومات المشارك).

بعد معرفة وفهم جميع المزايا والعيوب المحتملة لهذا البحث، أوافق طواعية بمحض إرادتي على المشاركة في البحث السريري المحدد أعلاه.

أفهم أنه يمكنني الانسحاب من هذا البحث في أي وقت دون إبداء أي سبب على الإطلاق.

التاريخ: ..... إمضاء المشارك: .....

**في حضور:-**

اسم: .....

التسمية / اللقب: . ..... إمضاء:

.....

(شاهد على توقيع

المشارك)

أؤكد أنني أوضحت للمشارك طبيعة وهدف البحث المذكور أعلاه.

تاريخ: ..... إمضاء: .....

(الباحث)

Appendix 4. Hospital Anxiety and Depression Scale

**Hospital Anxiety and Depression Scale (HADS)**

**Tick the box beside the reply that is closest to how you have been feeling in the past week.**
**Don't take too long over you replies: your immediate is best.**

| D | A | | D | A | |
|---|---|---|---|---|---|
| | | **I feel tense or 'wound up':** | | | **I feel as if I am slowed down:** |
| | 3 | Most of the time | 3 | | Nearly all the time |
| | 2 | A lot of the time | 2 | | Very often |
| | 1 | From time to time, occasionally | 1 | | Sometimes |
| | 0 | Not at all | 0 | | Not at all |
| | | | | | |
| | | **I still enjoy the things I used to enjoy:** | | | **I get a sort of frightened feeling like 'butterflies' in the stomach:** |
| 0 | | Definitely as much | | 0 | Not at all |
| 1 | | Not quite so much | | 1 | Occasionally |
| 2 | | Only a little | | 2 | Quite Often |
| 3 | | Hardly at all | | 3 | Very Often |
| | | | | | |
| | | **I get a sort of frightened feeling as if something awful is about to happen:** | | | **I have lost interest in my appearance:** |
| | 3 | Very definitely and quite badly | 3 | | Definitely |
| | 2 | Yes, but not too badly | 2 | | I don't take as much care as I should |
| | 1 | A little, but it doesn't worry me | 1 | | I may not take quite as much care |
| | 0 | Not at all | 0 | | I take just as much care as ever |
| | | | | | |
| | | **I can laugh and see the funny side of things:** | | | **I feel restless as I have to be on the move:** |
| 0 | | As much as I always could | | 3 | Very much indeed |
| 1 | | Not quite so much now | | 2 | Quite a lot |
| 2 | | Definitely not so much now | | 1 | Not very much |
| 3 | | Not at all | | 0 | Not at all |
| | | **Worrying thoughts go through my mind:** | | | **I look forward with enjoyment to things:** |
| | 3 | A great deal of the time | 0 | | As much as I ever did |
| | 2 | A lot of the time | 1 | | Rather less than I used to |
| | 1 | From time to time, but not too often | 2 | | Definitely less than I used to |
| | 0 | Only occasionally | 3 | | Hardly at all |
| | | | | | |
| | | **I feel cheerful:** | | | **I get sudden feelings of panic:** |
| 3 | | Not at all | | 3 | Very often indeed |
| 2 | | Not often | | 2 | Quite often |
| 1 | | Sometimes | | 1 | Not very often |
| 0 | | Most of the time | | 0 | Not at all |
| | | | | | |
| | | **I can sit at ease and feel relaxed:** | | | **I can enjoy a good book or radio or TV program:** |
| | 0 | Definitely | 0 | | Often |
| | 1 | Usually | 1 | | Sometimes |
| | 2 | Not Often | 2 | | Not often |
| | 3 | Not at all | 3 | | Very seldom |

Please check you have answered all the questions

Scoring:
Total score: Depression (D) _____ Anxiety (A) _____
0-7 = Normal
8-10 = Borderline abnormal (borderline case)
11-21 = Abnormal (case)

Appendix 5. Sleep in the ICU Questionnaire

**Sleep in the Intensive Care Unit Questionnaire (SICUQ)**

| Question | Scale | Responses |
|---|---|---|
| Rate the overall quality of your sleep at home. | 1 = Poor; 10 = Excellent | |
| Rate the overall quality of your sleep in the ICU. | 1 = Poor; 10 = Excellent | |
| Rate the overall quality of your sleep in the ICU on the following days: | 1 = No Sleep; 10 = Excellent | - On the first night in the ICU<br>- During the middle of your ICU stay<br>- At the end of your ICU stay |
| Rate the overall degree of daytime sleepiness during your ICU stay. | 1 = Unable to stay awake; 10 = Fully alert | |
| Rate the overall degree of daytime sleepiness during your ICU stay on the following days: | 1 = Unable to stay awake; 10 = Fully alert | - On the first night in the ICU<br>- During the middle of your ICU stay<br>- At the end of your ICU stay |
| Rate how disruptive the following activities were to your sleep during your ICU stay: | 1 = No Disruption; 10 = Significant Disruption | - Pain<br>- Noise<br>- Light<br>- Nursing Interventions (e.g., baths)<br>- Diagnostic Testing (e.g., chest X-rays)<br>- Vital Signs (blood pressure, pulse, temperature)<br>- Blood Samples<br>- Administration of Medications |
| Rate how disruptive the following noises were to your sleep during your ICU stay: | 1 = No Disruption; 10 = Significant Disruption | - Heart Monitor Alarm<br>- Ventilator Alarm<br>- Ventilator<br>- Oxygen Finger Probe<br>- Talking<br>- I.V. Pump Alarm<br>- Suctioning<br>- Nebulizer<br>- Doctor's Beepers<br>- Television<br>- Telephone |

Appendix 6. RCSQ

# Richards Campbell Sleep Questionnaire (RCSQ)

Code Number_____ Date_____

Each of these questions is answered by placing an "X" on the answer line. Place your "X" ***anywhere*** on the line that you feel ***best*** describes your sleep last night. The following are examples of the type of questions you are to answer.

**EXAMPLE A**
Right now I feel:

***Very Sleepy*** X _____ ***Not sleepy at all***

If you were very sleepy, you would place an "X" as is shown at the beginning of the line next to the words ***"Very Sleepy."***

**EXAMPLE B**
Right now I feel:

***Very Sleepy*** _____ X _____ ***Not sleepy at all***

If you were somewhat sleepy, you would place an "X" near the center of the line. Mark the answer line near the center to indicate the answer ***"Somewhat Sleepy."***

**EXAMPLE C**
Right now I feel:

***Very Sleepy*** _____ X ***Not sleepy at all***

If you were not sleepy at all, you would place an "X" at the end of the line next to the words ***"Not Sleepy At All."***

**Please turn to next page**

***Very Sleepy*** _____ **X** _____ ***Not sleepy at all***

If you were somewhat sleepy, you would place an "X" near the center of the line. Mark the answer line near the center to indicate the answer ***"Somewhat Sleepy."***

**EXAMPLE C**
Right now I feel:

***Very Sleepy*** _____ **X** ***Not sleepy at all***

If you were not sleepy at all, you would place an "X" at the end of the line next to the words ***"Not Sleepy At All."***

**Please turn to next page**



You are now ready to begin to answer the questions. Place your "X" ***anywhere*** on the answer line that you feel ***best*** describes your sleep last night.

1. My sleep last night was:

***Deep Sleep*** _____ ***Light Sleep***

2. Last night, the first time I got to sleep, I:

***Fell Asleep Almost Immediately*** _____ ***Just Never Could Fall Asleep***

3. Last night I was:

***Awake Very Little*** _____ ***Awake All Night Long***

4. Last night, when I woke up or was awakened, I:

***Got Back To Sleep Immediately*** _____ ***Couldn't Get Back To Sleep***

5. I would describe my sleep last night as:

***A Good Night's Sleep*** _____ ***A Bad Night's Sleep***

**Optional Noise Item:**

6. I would describe the noise level last night as:

***Very Quiet*** _____ ***Very Noisy***

**القلق والاكتئاب والعوامل الأخرى المؤثرة على جودة النوم لدى مرضى جراحة القلب المفتوح في وحدة العناية المركزة**

**ليث نزار مخيمر ياغي**

**لجنة الإشراف: د. عبير حسين**

**د. بسمة سلامة**

**د. ربحي بشيرات**

## ملخص

المقدمة

تتأثر جودة النوم، والقلق، والاكتئاب لدى مرضى العناية المركزة بعد الخضوع لجراحة القلب المفتوح بعدة عوامل متداخلة، تشمل التدخلات الطبية، والعوامل البيئية، والعوامل النفسية المرتبطة بالحالة المرضية. إن فهم هذه العوامل يُعد أمرًا بالغ الأهمية لتحسين نتائج المرضى وتعزيز استراتيجيات الرعاية الصحية في بيئة العناية المركزة.

هدف الدراسة

هدفت هذه الدراسة إلى تحليل العوامل المؤثرة في جودة النوم، والقلق، والاكتئاب لدى المرضى الذين خضعوا لجراحة القلب المفتوح أثناء إقامتهم في وحدة العناية المركزة، بالإضافة إلى تقييم أثر العوامل البيئية على النتائج النفسية والفسيولوجية لهؤلاء المرضى.

المنهجية

أُجريت دراسة مقطعية على عينة ملائمة مكونة من 150 مريضًا بالغًا خضعوا لجراحة القلب المفتوح في مستشفيات الهلال الأحمر، والخليل، ورفيديا. تم جمع البيانات باستخدام استبيانات ذاتية شملت:

- المتغيرات الديموغرافية
- مقياس القلق والاكتئاب في المستشفى(HADS)
- مقياس ريتشموند لجودة النوم(RCSQ)
- مقياس النوم في وحدة العناية المركزة(SICUQ)

تم تحليل البيانات باستخدام الإحصاء الوصفي، التحليل الاستنتاجي، وتحليل الارتباطات المتبادلة.

النتائج:

- أظهر 82% من المرضى انخفاضًا في جودة النوم، بمتوسط إجمالي 50.72 ± 12.58.
- أفاد 48.7% من المرضى بأن جودة النوم كانت أسوأ في وحدة العناية المركزة مقارنة ببيئة المنزل.
- 60%من المرضى صُنّفوا ضمن مستويات غير طبيعية من القلق، بينما أظهرت 50% أعراض اكتئاب

غير طبيعية.

- أظهر التحليل الديموغرافي فروقًا ذات دلالة إحصائية في جودة النوم بحسب الحالة الاجتماعية، حيث كانت الجودة الأقل لدى المطلقين والأرامل($F = 5.196, p = 0.007$) ، دون دلالة إحصائية مع باقي المتغيرات.($p > 0.05$)
- وُجد ارتباط سلبي بين جودة النوم والعوامل البيئية مثل الضوضاء، الإضاءة، والإجراءات الطبية المتكررة ($p < 0.05$).
- ارتبط الاكتئاب بشكل إيجابي باستخدام الأدوية ($r = 0.164, p = 0.045$) وجهاز التنفس الصناعي (r $= 0.177, p = 0.032$)، مما يشير إلى أثر العلاجات الطبية الطويلة في زيادة المشاعر السلبية.
- وُجد ارتباط سلبي دال إحصائيًا بين القلق وإجراء الشفط(suctioning) ($r = -0.235, p = 0.004$) ، مما يدل على تأثير مهدئ محتمل لهذا الإجراء.

الكلمات المفتاحية: القلق؛ جودة النوم؛ مرضى جراحة القلب المفتوح؛ الاكتئاب