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RESEARCH ARTICLE (ORIGINAL)

Anxiety in surgical patients and its implications on sleep quality

Ansiedade no doente cirúrgico e suas implicações na qualidade de sono

Ansiedad en el paciente quirúrgico y sus implicaciones en la calidad del sueño

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Abstract

Background: Hospitalization and subsequent surgery can generate increased levels of anxiety that lead to disturbances in the patient's sleep, interfering with the improvement of their health status and recovery.

Objective: To evaluate the anxiety levels of surgical patients and their impact on sleep quality.

Methodology: Observational study, carried out with 150 patients admitted for a surgical procedure, in a Portuguese hospital center. A questionnaire was applied for sociodemographic and clinical characterization, as well as the Beck Anxiety and the Pittsburgh Sleep Quality Index.

Results: Upon admission, 38,0% of participants had mild anxiety, 47,3% moderate anxiety and 8,7% severe anxiety, which continued during hospitalization. When sleep quality was analyzed, 89,3% of participants had poor sleep quality during hospitalization. Sleep quality decreases significantly as anxiety levels increase.

Conclusion: It is essential to implement structured nursing interventions adapted to the needs of each patient.

Keywords: anxiety; sleep; pacients; hospitalization; general surgery

Resumo

Enquadramento: A hospitalização e subsequente cirurgia podem gerar níveis acrescidos de ansiedade que levam a perturbações no sono do doente, interferindo na melhoria do seu estado de saúde e recuperação.

Objetivo: Avaliar os níveis de ansiedade do doente cirúrgico e o seu impacto na qualidade de sono.

Metodologia: Estudo observacional, realizado com 150 doentes internados para procedimento cirúrgico, num centro hospitalar português. Foi aplicado um questionário para caracterização sociodemográfica e clínica, bem como o Inventário de Ansiedade de Beck e o Índice de Qualidade do Sono de Pittsburgh.

Resultados: Na admissão, 38,0% dos participantes apresentavam níveis de ansiedade leve, 47,3% ansiedade moderada e 8,7% ansiedade severa, que se perpetuaram durante o internamento. Quando analisada a qualidade de sono, 89,3% dos participantes apresentou má qualidade de sono, durante o internamento. A qualidade do sono diminui de forma significativa à medida que aumentam os níveis de ansiedade.

Conclusão: É fundamental a implementação de intervenções de enfermagem estruturadas adaptadas às necessidades de cada doente.

Palavras-chave: ansiedade; sono; pacientes; hospitalização; cirurgia geral

Resumen

Marco contextual: La hospitalización y posterior intervención quirúrgica pueden generar mayores niveles de ansiedad, que conllevan alteraciones en el sueño del paciente e interfieren en la mejora de su estado de salud y recuperación.

Objetivo: Evaluar los niveles de ansiedad de los pacientes quirúrgicos y su repercusión en la calidad del sueño.

Metodología: Estudio observacional de 150 pacientes ingresados en un centro hospitalario portugués para una intervención quirúrgica. Se utilizó un cuestionario para tipificar las características sociodemográficas y clínicas, así como el Inventario de Ansiedad de Beck y el Índice de Calidad del Sueño de Pittsburgh.

Resultados: Al ingreso, el 38,0% de los participantes presentaba niveles de ansiedad leve, el 47,3% ansiedad moderada y el 8,7% ansiedad grave, que continuó durante la hospitalización. Cuando se analizó la calidad del sueño, el 89,3% de los participantes presentó una mala calidad del sueño durante la hospitalización. La calidad del sueño disminuyó significativamente a medida que aumentaban los niveles de ansiedad.

Conclusión: Es esencial aplicar intervenciones de enfermería estructuradas y adaptadas a las necesidades de cada paciente.

Palabras clave: ansiedad; sueño; pacientes; hospitalización; cirugía general

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Introduction

Sleep is a basic human need, as it consists of a physiological mechanism of homeostatic regulation, with the function of maintaining and repairing the body, providing the person with physical and cognitive health (Silva et al., 2021).
Sleep deprivation during hospitalization has serious consequences for the patient, with a negative impact on the healing process. Changes in the sleep-wake cycle, in addition to poor sleep quality and feeling tired the next day, cause changes in the body's circadian biorhythms, interrupting the activity of normal physiological processes and hindering the patient's recovery (Lima et al., 2022).
Hospitalization often leads to inadequate sleep of insufficient duration, time, and quality, which is associated with physical and psychological disturbances that negatively affect the patient's recovery process (Hillman, 2021).
Hospitalization and surgery are factors that result in emotional and psychosocial imbalances. The need for surgery is one of the standard procedures that can increase anxiety, which should be considered a health problem (Fernandes et al., 2024).
Although there have been many studies evaluating preoperative anxiety, few have tried to establish a relationship with sleep. This research aims to assess surgical patients' anxiety levels and determine their impact on sleep quality.

Background

Surgery is a complex event that generates stress and anxiety, which can have repercussions on a person's well-being, health, and behavior (Dias et al., 2022).
According to the International Council of Nurses (ICN), anxiety is defined as "feelings of threat, danger or distress" (ICN, 2019). It is an unpleasant and transient emotional reaction characterized by feelings of tension, apprehension, nervousness, and worry. These feelings translate into physiological (such as changes in heart rate and blood pressure, urinary urgency, gastrointestinal upset, increased sweating), psychological (negative feelings such as fear, tension, worry, difficulty falling asleep, and lack of concentration), and behavioral manifestations such as isolation and restlessness (Fernandes, 2022; Melchior et al., 2018).
The main causes of anxiety in patients are the waiting time for surgery, the unknown environment, fear of anesthesia, loss of control, separation from loved ones, dependence on strangers, fear of death, and uncertainty about postoperative recovery (Dias et al., 2022; Fernandes, 2022; Fernandes et al., 2024).
Anxiety is an emotional response occurring in the preoperative period which, if persistent, can be a complicating factor in the entire process. This can be reduced by nursing interventions such as health education and psychological support (Lucena et al., 2020).
Due to the specific needs of perioperative patients, they require the attention of specialized nurses, who use a range of skills, including promoting understanding of the surgical/anesthetic process, providing nursing care, preventing complications, training for self-care, and family and social reintegration of the surgical patient (Regulamento n. º 429/2018 da Ordem dos Enfermeiros, 2018).
Studies show that the information given to surgical patients is a crucial element in preparing for surgery (Breda & Cerejo, 2021; Lemos et al., 2019; Fernandes, 2022; Fernandes et al., 2024). However, patients feel poorly informed in the preoperative period about the care they will undergo (Gonçalves et al., 2017).
Lemos et al. (2019) observed a reduction in anxiety levels and hemodynamic values in patients who received preoperative information.
Sleep is a physiological process that is essential for a person's physical, psychological, and emotional balance and well-being. Inadequate sleep is frequently observed in surgical patients and is associated with worse clinical outcomes, increased morbidity and mortality rates, longer hospital stays, higher healthcare costs, and poor quality of life. Sleep deprivation leads to increased levels of anxiety and depressive symptoms, showing a bidirectional relationship (Hillman, 2021; Tegegne & Alemnew, 2022).
Studies involving surgical patients show that those with high levels of anxiety have poorer sleep quality (Barbosa et al, 2018; Tegegne & Alemnew, 2022). Despite the relevance of the topic, there are few studies in Portugal.

Research question

What is the relationship between anxiety levels and sleep quality in surgical patients?

Methodology

An observational, descriptive, correlational, and cross-sectional study was conducted on a non-probabilistic convenience sample of 150 patients admitted for elective surgery to the general surgery department of a hospital center in central Portugal between December 2022 and March 2023. The study was approved by the Health Ethics Committee of this hospital (Ref. 05/18/11/2022). Inclusion criteria for the study were: age over 18 years, admission for elective surgery, and cognitive ability to understand what was being done to them. Exclusion criteria were illnesses that affected the mental and intellectual capacity of the participants (dementia, mental disability).
Data was collected using a sociodemographic and clinical questionnaire, the Pittsburgh Sleep Quality Index - Portuguese version (PSQI-PT), and the Beck Anxiety Inventory - Portuguese version (BAI-PT). Information was collected at two moments: at admission when the participants' anxiety was assessed before the surgery, and at discharge when the surgical patient's anxiety and self-reported sleep quality were assessed during hospitalization.
The PSQI is a self-report method for assessing sleep quali-

ty, developed by Buysse et al. (1989) and validated for the Portuguese population by João et al. (2017). The PSQI aims to assess sleep quality and its disturbances in the last month. The questionnaire consists of 19 questions divided into seven components: 1) subjective sleep quality, 2) sleep latency, 3) sleep duration, 4) habitual sleep efficiency, 5) sleep disturbances, 6) use of sleep medication, and 7) daytime dysfunction. Each component is scored from 0 to 3. The sum of these components gives a global score, ranging from 0 to 21, where the higher the score, the poorer the quality of sleep. A score between 0 and 5 (PSQI ≤ 5) indicates that the person has a good quality of sleep and a score above 5 (PSQI > 5) indicates a poor quality of sleep (Buysse et al., 1989; João et al., 2017).

The BAI is a self-report measure for anxiety developed by Beck et al. (1988) and validated for the Portuguese population by Quintão et al. (2013). The questionnaire consists of 21 items scored on a 4-point Likert scale (from 0 to 3). The score obtained defines the level of anxiety: 0 to 7 - "Minimum level of anxiety"; 8 to 15 - "Mild anxiety"; 16 to 25 - "Moderate anxiety"; 26 to 63 - "Severe anxiety" (Beck & Steer, 1993).

Data were analyzed at a 5% significance level ($p < 0.05$) using IBM SPSS Statistics software, version 27.0.

Results

The sample consisted of 150 participants, 53.3% of whom were women with a mean age of 58.4 ±14.8 years, ranging from 21 to 86 years old.

The diagnosis and type of surgery were diverse, so they were grouped into categories. The diagnosis was "cancer" (40.7%) and "non-cancer disease" (59.3%), and the surgeries were grouped into five categories: "colorectal surgery" (37.3%), "esophageal, gastric, and duodenal surgery" (27.3%), "hepato-biliary-pancreatic surgery" (18%), "endocrine and thoracic surgery" (6.7%) and "abdominal wall and limb surgery" (10.7%). Most participants (81.3%) had chronic diseases, with hypertension and dyslipidemia being the most common. During hospitalization, 14% had complications, with bleeding being the most common. The mean length of hospital stay was 5.83 ± 4.81 days (Table 1).

Table 1

Sociodemographic and clinical characteristics (N = 150)

		N	%
1. Age	*M* = 58.4 *SD* = 14.8		
	Min = 21 *Max* = 86		
2. Gender	Male	70	46.7
	Female	80	53.3
3. Marital status	Single	18	12.0
	Married/ De facto	117	78.0
	Divorced/ Separated	5	3.3
	Widowed	10	6.7
4. Academic qualifications	No qualifications	2	1.3
	4th grade	53	35.3
	6th grade	23	15.3
	9th grade	22	14.7
	12th grade	27	18.0
	Bachelor/ Master/ Ph.D.	23	15.3
5. Diagnosis	Cancer	61	40.7
	Non-cancer disease	89	59.3
6. Chronic illnesses	No	28	18.7
	Yes	122	81.3
7. Type of surgery	Colorectal surgery	56	37.3
	Esophageal, gastric, and duodenal surgery	41	27.3
	Hepato-biliary-pancreatic surgery	27	18.0
	Endocrine and thoracic surgery	10	6.7
	Abdominal wall and limb surgery	16	10.7
8. Length of hospital stay	*M* = 5.83 *SD* = 4.81		
	Min = 2 *Max* = 29		
9. Sleeping medication	No	75	50.0
	Yes	75	50.0
10. Complications during hospital stay	No	129	86.0
	Yes	21	14.0

Note. N = Frequency; % = Relative frequency; *M* = Mean; *SD* = Standard deviation.

Results of the anxiety analysis show that the most frequent anxiety symptoms reported by the participants were: "feeling nervous", "having a fear of the worst", "being unable to relax" followed by "having a fear of dying" and "feeling scared".

The global BAI score shows that higher values correspond to greater anxiety. At admission, the mean value (*M* =16.17) was lower than the midpoint of the measurement scale (0-63), which corresponds to 25.7% of the scale. At discharge, the global BAI score was *M* = 15.07, lower than the midpoint of the measurement scale (0-63), which corresponds to 23.9% of the scale (Table 2).

Table 2

Anxiety at admission and at discharge (hospitalization)

	N	*M*	*SD*	%CV	*Min*	*Max*
Beck Anxiety Inventory global score - Admission	150	16.17	6.59	41	0	33
Beck Anxiety Inventory global score - Discharge	150	15.07	6.94	46	0	38

Note. *N* = Frequency; *M* = Mean; *SD* = Standard deviation; *CV* = Coefficient of variation; *Min* = Minimum; *Max*= Maximum.

The global BAI score is divided into four categories. At admission, 6% of participants had a minimal level of anxiety, 38% mild anxiety, 47.3% moderate anxiety, and 8.7% severe anxiety. During hospitalization, 10% had a minimal level of anxiety, 36.7% had mild anxiety, 45.3% had moderate anxiety, and 8% had severe anxiety (Table 3).

Table 3

Anxiety levels at admission and at discharge (hospitalization)

Anxiety levels	**Admission**		**Discharge**	
	N	%	*N*	%
Minimal level of anxiety (0-7)	9	6.0	15	10.0
Mild anxiety (8-15)	57	38.0	55	36.7
Moderate anxiety (16 – 25)	71	47.3	68	45.3
Severe anxiety (26 – 63)	13	8.7	12	8.0
Total	150	100.0	150	100.0

Note. *N* = Frequency; % = Relative frequency.

No significant differences were observed when comparing anxiety levels between admission and discharge (hospitalization) according to the sign test (Z = -1.120; p = .263). It can therefore be inferred that anxiety, as measured by the BAI-PT score, does not vary significantly from admission to discharge.

Analysis of sleep quality during hospitalization showed that 72.8% of the participants needed more than 30 minutes to fall asleep. The wake-up time for 87.4% of the patients was between 6 and 7 a.m., and the total number of hours of sleep per night was between 3 and 6 hours for 72.7% of the patients.

The most frequent sleep disturbances were: "Waking up in the middle of the night or early morning" (96.7%), "having to get up to use the bathroom" (78%), and "Not getting to sleep within 30 minutes" (70.7%).

During hospitalization, 50% of the patients took sleeping medication, with "Alprazolam", "Diazepam" and "Lorazepam" being the most frequent pharmacological prescriptions.

The PSQI-PT components that scored higher than the midpoint of the measurement scale were: "Component 1 - Subjective sleep quality" (M = 1.61), "Component 2 - Sleep latency" (M = 1.87), "Component 3 – Sleep duration" (M = 2.05), "Component 4 - Sleep efficiency" (M = 2.20) and Sleep quality - global score (M = 10.97; Table 4).

Table 4

Sleep quality during hospitalization

	N	*M*	*SD*	%CV	*Min*	*Max*
Sleep quality – global score	150	10.97	4.19	38	1	19
Component 1 – Subjective sleep quality	150	1.61	0.62	39	0	3
Component 2 – Sleep latency	150	1.87	1.12	60	0	3
Component 3 – Sleep duration	150	2.05	0.87	42	0	3
Component 4 – Sleep efficiency	150	2.20	0.99	45	0	3
Component 5 – Sleep disturbances	150	1.13	0.41	36	0	2
Component 6 – Use of sleeping medication	150	1.38	1.42	103	0	3
Component 7 – Daytime dysfunction	150	0.74	0.90	122	0	3

Note. *N* = Frequency; *M* = Mean; *SD* = Standard deviation; *CV* = Coefficient of variation; *Min*= Minimum; *Max* = Maximum.

During hospitalization, around 10.7% of the participants had good sleep quality (PSQI ≤ 5) and the remaining 89.3% had poor sleep quality (PSQI > 5).

Spearman's correlation was used to establish the relationship between anxiety and sleep quality at discharge. The correlations between the BAI-PT global score and all the PSQI-PT components and global score are all positive and statistically significant ($p \leq .001$ or $p \leq .05$), with the correlation being higher for "Sleep quality - global value" ($r_s = 0.583$; $p < .001$) and for "Component 1 - Subjective sleep quality" ($r_s = 0.545$; $p < .001$). It can thus be inferred that an increase in anxiety is associated with an increase in the PSQI-PT global score and its components, with sleep quality decreasing significantly as anxiety increases (Table 5).

Table 5

Correlation between anxiety and sleep quality at discharge (hospitalization)

N = 150		Beck Anxiety Inventory score – Portuguese version
Component 1 – Subjective sleep quality	ρ	0.545
	p	*** 0.000
Component 2 – Sleep latency	ρ	0.400
	p	*** .000
Component 3 – Sleep duration	ρ	0.445
	p	*** 0.000
Component 4 – Sleep efficiency	ρ	0.458
	p	*** 0.000
Component 5 – Sleep disturbances	ρ	0.343
	p	*** 0.000
Component 6 – Use of sleeping medication	ρ	0.176
	p	* 0.031
Component 7 – Daytime dysfunction	ρ	0.476
	p	*** 0.000
Sleep quality – global score	ρ	0.583
	p	*** 0.000

Note. *N* = Frequency; ρ = Spearman's correlation coefficient; *p* = *p*-value.
* $p < 0.05$; *** $p < 0.001$.

In the following analysis, as one of the classes being compared was small, the Kolmogorov-Smirnov test was used to assess normality. It was determined that this assumption was met, thus the parametric *t*-test was utilized. The mean value of the BAI-PT global score is higher for poor sleep quality, and the differences are statistically significant (t = -3.062; p = 0.003; Table 6).

Table 6

Relationship between anxiety and PSQI-PT global score at discharge (hospitalization)

		N	*M*	*SD*	*t*	*p*
Beck Anxiety Inventory-PT global score	Good sleep quality (= < 5)	16	10.19	6.06	-3.062	** 0.003
	Poor sleep quality (> 5)	134	15.66	6.83		

Note. *N* = Frequency; *M* = Mean; *SD* = Standard deviation; *t* = Student's *t*-test; *p* = *p*-value. ** $p < 0.01$.

In summary, overall sleep quality and its components deteriorate significantly during hospitalization as anxiety increases.

Discussion

Surgery is an event that generates stress and anxiety and can trigger physical and psychological symptoms that can affect surgical treatment and patient recovery (Fernandes, 2022; Melchior et al., 2018).

In this study, 38% of participants had mild anxiety in the preoperative period and 56% had moderate to severe anxiety. These results are in line with scientific evidence (Dias et al., 2022; Fernandes, 2022; Gonçalves et al., 2017; Melchior et al., 2018;). In the study by Melchior et al. (2018), anxiety was detected in 53% of participants by applying the Hamilton scale to 200 patients in the preoperative period of elective surgery. A study by Gonçalves et al. (2017) showed a mean level of state anxiety of 46.33, and Fernandes (2022) obtained a mean level of trait anxiety of 45.91 in patients admitted for elective surgery. Dias et al. (2022) found that anxiety/depression was present in 64% of participants, 32% of whom had severe levels of anxiety/depression.

At the time of discharge, most participants had anxiety levels similar to those observed preoperatively. These data indicate the need to improve the care of individuals undergoing perioperative care, making it essential to implement nursing interventions that meet the needs of the patient during this period to reduce anxiety levels.

The information provided in the preoperative period helps to reduce anxiety levels, as well as meet the information needs of patients (Breda & Cerejo, 2021; Fernandes, 2022; Lemos et al., 2019; Lucena et al., 2020; Xu et al., 2020). Xu et al. (2020) observed a reduction in anxiety and postoperative complications in the experimental group that received a preoperative nursing visit and education about the surgery and anesthesia, and postoperative care compared to the control group. However, the study conducted by Fernandes (2022) found that there was no reduction in anxiety after the implementation of the preoperative education program, although patients felt more informed.

Hospitalization brings about changes in patients' sleep patterns due to environmental and patient-related factors, which can lead to sleep disturbances and consequently affect the patient's recovery process.

When analyzing sleep quality during hospitalization, poor sleep quality (PSQI > 5) was prevalent in 89.3% of participants. The results of this study are consistent with current evidence. A cross-sectional study of 338 patients admitted to medical and surgical services found a prevalence of poor sleep quality (PSQI > 5) in 76.62% of participants, but when sleep quality was analyzed in surgical patients, this prevalence (PSQI > 5) increased to 78.5% (Singh et al., 2021). Tegegne and Alemnew (2022) also found that the prevalence of poor sleep quality in the postoperative period was 64.9%.

In this study, a worsening of sleep quality was observed during hospitalization, both in the global score and its components, namely "sleep efficiency", "sleep duration", "sleep latency", and "subjective sleep quality". In other words, during hospitalization, participants took longer to fall asleep, woke up earlier, and slept fewer hours, so their sleep was less efficient, and their perception of their sleep quality during hospitalization was worse.

When anxiety was compared with sleep quality, an increase in anxiety was associated with a decrease in sleep quality and its components. Statistical analysis shows that as anxiety levels increase, sleep quality decreases significantly. Studies investigating the relationship between anxiety and sleep quality also show a positive association. Barbosa et al. (2018) found an association between mood disorders (anxiety and depression) and sleep disturbances. Also in the study conducted by Merchior et al. (2018), the main signs and symptoms of anxiety were found to be anxious mood, tension, and insomnia. Anxious and depressed surgical patients were more likely to develop poor sleep quality (Tegegne & Alemnew, 2022).

Conclusion

Undergoing surgery has a physical, emotional, and social impact on a person's life. These changes cause patients to experience feelings of anxiety and fear, which can affect the success of the surgical procedure as well as the recovery process.

This study was able to answer the research questions and found that 56% of the participants had moderate to severe anxiety that persisted during hospitalization. This study found a prevalence of poor sleep quality (PSQI > 5 = 89.3%) and concluded that sleep quality worsens significantly as anxiety levels increase.

We reiterate the importance of structured and individualized care throughout the perioperative period to reduce anxiety, improve sleep quality, prevent postoperative complications, and facilitate the surgical patient's recovery process. These interventions include a humanized welcome, pre- and postoperative education, a preoperative nursing visit, information about the surgery and anesthesia, clarification of doubts, discharge planning and family reintegration, and psycho-emotional support. The results contribute to the understanding of anxiety as a factor influencing sleep quality during hospitalization, especially in surgical patients.

As a final reflection on the research carried out, it should be reiterated that from the outset of the study's conceptualization, there was a concern to develop rigorous methodological work. However, the limitations of this study are the small sample size compared to the number of patients admitted for surgery in the same period, as well as the inhomogeneity of the sample in terms of the type of surgery performed.

Finally, we suggest encouraging clinical and documented monitoring of anxiety levels and sleep quality to support future studies and proposed recommendations for clinical nursing practice.

Author contributions

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