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Surgical Patient's Pre-operative Anxiety-related Factors and its Nursing Countermeasure: A Quasi-experimental Design

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Abstract: Preoperative anxiety often affects the mental health and possible outcomes of patients undergoing surgery. This study will investigate the factors contributing to preoperative anxiety among surgical patients at a large tertiary hospital in Guizhou Province. By analyzing these factors, we aim to develop effective nursing strategies to establish a clearer clinical nursing plan. This study investigates different patients' demographic information and their temperament types. Researchers guided patients to complete the Amsterdam Preoperative Anxiety and Information Scale (APAIS-C) and the State-Trait Anxiety Inventory (STAI) to analyze the factors that caused preoperative anxiety in patients. Based on these factors and the patients' different temperament types, different nursing countermeasure were implemented, followed by post-tests to prove the effectiveness of the nursing interventions. The data in this study were managed with RaoSoft software to ensure the scientific validity of the initial sample size, resulting in a total sample of 382 people. Data analysis will be conducted using SPSS 29.0 for initial data checking, followed by statistical work using JAMOVI. The results will provide providing a foundation for preventing psychological anxiety issues in surgical patients before their operations. And insights into the development of evidence-based care strategies to effectively address preoperative anxiety and improve patient care outcomes.

Keywords: Mental Health; Nursing Countermeasure; Preoperative Anxiety; Psychological Assessment; Surgical Patients.

1. Introduction

In contemporary healthcare, the definition of health encompasses not only physical wellness but also mental and emotional stability. Preoperative anxiety is a critical psychological issue faced by surgical patients. It is not merely a transient emotional state but an influential factor that can negatively impact the outcome of surgical interventions. Studies have shown that up to 80% of patients experience some degree of anxiety before surgery (Liang J. et al., 2021). This anxiety can lead to harmful consequences, including delayed recovery(Ji. et al., 2022; Obbarius N.et al., 2021), increased postoperative complications, and impaired cooperation between patients and healthcare providers (Rashid, A. et al., 2021; Oteri, V. et al., 2021). Despite this growing body of evidence, the specific factors contributing to preoperative anxiety remain underexplored particularly in relation to cultural and institutional variables that shape patient experiences in different healthcare settings.

In China, the prevalence of surgery is rising due to the aging population and the growing burden of chronic diseases. Thus, understanding and addressing preoperative anxiety is vital to improving surgical outcomes. The study will be conducted in a tertiary-level hospital in Guizhou Province, a major clinical center with a high surgical case volume yet few local studies have focused on the psychological preparedness of patients undergoing surgery. Compounding the issue is the rapid modernization of healthcare in China, which brings challenges such as the intersection of traditional beliefs and modern medical practices (Wang C. et al., 2021). These cultural dynamics add complexity to the experience of anxiety before surgery, underscoring the need for culturally sensitive and individualized care.

To assess patient anxiety and develop appropriate responses, this study will utilize the State-Trait Anxiety Inventory (STAI), the Amsterdam Preoperative Anxiety and Information Scale – Chinese Version (APAIS-C), and a Temperament Type Scale(EPQ-RSC). The STAI is a validated tool for evaluating state and trait anxiety but requires a basic education level for comprehension. Therefore, the APAIS-C, with its simplified structure and cultural relevance, will serve as a complementary tool (Le, X., 2017). In addition, the temperament type scale, derived from the EPQ-RSC, enables the classification of patients by personality traits, helping nurses to customize their communication and care strategies based on individual patient characteristics.

This study will also highlight the important role of nursing strategies in managing preoperative anxiety. Evidence-based nursing strategies include introducing the surgical procedure, anesthesia, and postoperative recovery expectations to patients based on their different temperament types, thereby reducing fear of the unknown. Tailored interventions, thereby reducing fear of the unknown. Tailored interventions such as patient-centered counseling, temperament-informed communication, and assurance enhance the effectiveness of these measures. Furthermore, non-pharmacologic techniques such as music therapy (Kavak Akelma et al., 2020), deep-breathing exercises, and psychological support have shown effectiveness in reducing anxiety without medication. When implemented appropriately, these interventions improve both psychological well-being and postoperative outcomes.

Ultimately, this study seeks to identify the factors that contribute to preoperative anxiety and determine how personalized, culturally appropriate, and evidence-based nursing strategies can reduce it. The study aims to fill critical gaps in practice and literature. In doing so, it will contribute a practical framework for improving perioperative care and offer guidance for implementing targeted nursing responses

in hospital settings both locally and globally.

2. Study Objectives

- **General Objective**

The purpose of this study is to identify the related factors of preoperative anxiety in surgical patients, By analyzing the influencing factors that contribute to preoperative anxiety, corresponding nursing interventions will be developed. The research sample is divided into a control group N1 and an Intervention group N2. Non-intervention-based measurements are taken to obtain pre-test results. By analyzing the pre-test results, related factors of preoperative anxiety are identified. After implementing nursing interventions on N2, a post-test is conducted to explore the effectiveness of these nursing measures.

- **Literature References**

2.1. Preoperative Psychological Anxiety Factors and Their Significance for Surgical Patients

Surgery is an important way in the treatment of many surgical conditions. As usual, it represents a critical pathway to treat the surgical disease. Despite the advancement in surgical techniques, preoperative psychological anxiety remains a significant concern. It will impact patient outcomes and overall surgical experience that the preoperative anxiety (Luo Xiaolin, 2019; Jarmoszewicz et al., 2020; Modanloo M.et al., 2023; Nowicka-Sauer K.et al., 2024).The study used patients' preoperative anxiety scores as dependent variables, and based on the demographic information filled out by participants, temperament types, and the results of research tools (APAIS-C and STAI), identified the key factors influencing preoperative anxiety in surgical patients. These factors include the patient's first participation in surgery, fear of postoperative pain, panic about anesthesia during surgery, and uncertainty about surgical outcomes (Yin Hongyuan, 2021; Liang Jie et al., 2021; Yan Yuanyuan, 2020; Eberhart, L. et al., 2020). On the one hand, patients undergoing surgery for the first time may experience elevated anxiety due to unfamiliarity with the procedure. On the other hand, Patients with a temperament type that belongs to choleric and melancholic types will experience more severe anxiety, especially when there is no preoperative nursing education provided for these two types of patients. In addition, fear of postoperative pain and recovery is also an important factor in preoperative psychological anxiety (Shewangzaw E.et al. 2022). There are also unhealthy lifestyle habits such as smoking, drinking, and staying up late, which are also one of the reasons for patients to experience preoperative anxiety. Patients may worry about the outcomes of the surgery due to their unhealthy habits, leading to anxiety. These factors, as independent variables in this study, jointly led to preoperative anxiety. There are significant gaps in the literature regarding a comprehensive analysis of how these factors interact. Existing research tends to focus on these individual factors(Lanini et al., 2022; Zemla A.et al. 2019), rather than focusing on their cumulative effects. In addition, there is limited research on the impact of these factors across different patient demographics and types of surgery. Settling this gap is crucial for developing effective nursing measures. Accossingro identifying and analyzing these factors more thoroughly. This study goal is to provide insights into targeted interventions, which alleviate preoperative anxiety and improve patients' nursing care. This review emphasizes the need for understanding of the interplay between anxiety factors. In order to enhance the development of evidence-based nursing strategies.

2.2. Relevant Research on Preoperative Psychological Anxiety and Measurement Tools and difference (APAIS-C, STAI, Temperament types)

Preoperative psychological anxiety is a well-documented issue among surgical patients. Commonly used assessment tools such as the State-Trait Anxiety Inventory (STAI) and the Amsterdam Preoperative Anxiety and Information Scale (APAIS) have been validated for evaluating anxiety levels, including concerns related to anesthesia and surgery (Moerman et al., 1996; Eberhart et al., 2020). Their broad applicability is enhanced by the availability of culturally adapted versions, including the Chinese-translated APAIS-C (Wu et al., 2020; Ayele et al., 2021; LIU M.et al., 2022).

The STAI allows for detailed differentiation between situational (state) and dispositional (trait) anxiety. However, it requires a basic educational background to be understood, which makes it more appropriate for patients with at least a junior high school education (Tian Y.et al., 2018). For this reason, the APAIS-C, with its simpler structure, is used concurrently in this study to ensure accessibility and reliability across varying literacy levels.

To further understand individual variability, the temperament type scale—based on the EPQ-RSC (Eysenck Personality Questionnaire, Chinese version)—will also be used. Since personality traits can influence anxiety expression and patient comprehension, assessing temperament types provides an important dimension for tailoring nursing interventions. For example, patients with melancholic or choleric temperaments may require different communication strategies compared to those with sanguine or phlegmatic traits (Chow et al., 2019).

By comparing anxiety and temperament scale outcomes across demographic variables, the findings will support the formulation of individualized, culturally esponsive, and demographically sensitive nursing countermeasures to improve preoperative care.

2.3. The Role of Effective Nursing Interventions in Reducing Preoperative Anxiety in Surgical Patients

Numerous studies have established a significant relationship between preoperative psychological anxiety and nursing interventions. For instance, (Khorfan et al. 2020) found that patients who received structured preoperative education reported lower levels of anxiety and required less postoperative opioid use. Similarly,(Xu et al. 2020) conducted a randomized clinical trial demonstrating that preoperative nursing visits significantly reduced both anxiety and postoperative complications in patients undergoing laparoscopic cholecystectomy. In a quasi-experimental study showed that nurse-led education markedly decreased anxiety levels among patients awaiting coronary artery bypass graft surgery. Supporting this, (Jamwal et al. 2023) reported that structured patient education significantly reduced perioperative anxiety and depression in elective chest surgery patients. These findings collectively underscore that effective and timely nursing interventions are positively correlated

with reduced anxiety levels, as they enhance patient understanding of surgical procedures and promote psychological preparedness.

Further, Almutary and Almashi (2024) explored nurses' perceptions and practices of preoperative patient education in surgical units and emphasized the value of delivering accurate, comprehensive information. Likewise, O'Donnell (2018) advocated for evidence-based pain education prior to surgery to manage expectations and anxiety. A pilot study by Feninets et al. (2022) demonstrated that educational interventions tailored to the surgical context significantly improved patient preparedness and decreased anxiety.Importantly, adapting educational content to a patient's literacy and comprehension level further enhances the effectiveness of these interventions. In response to the identified factors contributing to preoperative psychological anxiety, a range of **evidence-based nursing countermeasures** have been proposed in the literature (Chen et al., 2024; Wang S.et al., 2023). One widely supported approach is **structured preoperative education**, which addresses concerns about surgery, anesthesia, postoperative pain, and recovery (Villa G.et al., 2020).. This includes not only verbal explanations but also written materials, visual aids, and videos (Feninets et al., 2022; Khorfan et al., 2020). Non-pharmacological techniques such as **music therapy** (Agüero-Millan et al., 2023; Kavak Akelma et al., 2020; Wang R.et al., 2022), Deep-breathing exercises (Aktaş, G. K et al., 2023), and guided imagery are also effective in reducing anxiety and improving preoperative mental status. Some studies incorporated **nursing interventions based on Roy's Adaptation Model**, addressing cognitive and physiological stimuli to lower anxiety levels (Han et al., 2024).

Another important factor is **individualizing interventions** based on the patient's personality traits. (Pittman et al., 2011; Liang J.et al., 2021; Quan L.et al., 2021; Wang J.et al. 2021) emphasized the importance of tailoring nursing communication and support to temperament types, as certain personalities (e.g., melancholic) are more prone to surgical fear (Xue G.et al., 2021). Despite the range of interventions, the literature still lacks consensus on standardized tools for tailoring interventions. This study aims to bridge this gap by identifying anxiety-related factors and analyzing how different nursing strategies—grounded in validated tools and tailored approaches—can address patient needs effectively.

However, despite the proven benefits, Hartanti and Handayani (2021) noted a persistent gap in assessing patients' actual understanding of preoperative information. They stressed the need for evaluating patient comprehension and timing of education to maximize impact. Thus, addressing these gaps is crucial for developing individualized, evidence-based nursing strategies that effectively mitigate preoperative anxiety and improve surgical outcomes.

2.4. Conceptual Framework

This study will assist patients who meet the inclusion criteria within the hospital to complete the EPQ-RSC scale along with a general demographic survey, based on their voluntary participation. Purposeful sampling will be used to select the research sample population from the results (total sample size: 382 people). The samples will then be divided into two groups N1 (control group) and N2 (experimental group) to by comparing the results of the General Demographic Survey and the EPQ-RSC scale, the independent sample t-test and SMD/ ANOVA were used to ensure similarity between the two groups, thereby controlling and reducing between-group bias.

Next, the APAIS scale and STAI scale were filled in for the N1 group (control group) and the N2 group (experimental group) without any intervention, and the influencing factors of the patients' preoperative psychological anxiety were determined from the scale results. The known "preoperative psychological anxiety influencing factors" were included in the N2 experimental group, and targeted nursing measures were taken for the experimental group according to these factors. Then, the N2 experimental group filled in the APAIS-C scale and the STAI scale, and the results after the intervention were analyzed.

Finally, the results of the pre-test and post-test in the N2 experimental group will be compared to determine the effectiveness of the nursing intervention. This framework could provide a reference for studying the relevant factors of preoperative anxiety and the effective nursing interventions in alleviating patients' preoperative anxiety.

3. Statistical Analysis of Data

3.1. Research Method

The research data were collected in China using Questionnaire Star, and after the data were collected, the collected data were cleaned using SPSS software. Use SPSS 26 to check and confirm that there are no missing values in the data.

The first group of data used the EPQ-RSC scale and the general situation questionnaire, combined with the purposive sampling method,

The questionnaire Invalid criteria:

1) Filling time is less than 10 minutes.

2) All options are the same, all "yes" or all "no".

3) All people have the same answers / the results are highly simila.

A total of 414 questionnaires were distributed, 414 questionnaires were recovered, the recovery rate was 100%, and 32 invalid questionnaires were eliminated, and finally 382 valid questionnaires were obtained, with an effective recovery rate of 92.27%. By using SPSS to clean and preprocess the data, the data is checked for missing/error data frequency, and finally the first set of data is integrated.

The second set of data involves dividing the 382 samples into N1 (control group) and N2 (experimental group) based on sample gender and temperament type, with each group containing 191 people. Subsequently, participants completed the APAIS-C scale and the STAI scale, and finally, relevant algorithms were used to ensure the similarity between the two groups, N1 and N2, and to reduce bias.

The third set of data, By asking 191 patients in the N2 group who underwent nursing intervention to fill out the APAIS-C scale and the STAI scale, Valid data is obtained. By comparing the pre-test and post-test data, the reduction in anxiety levels in the post-test data proves the effectiveness of the nursing intervention.

3.2. Descriptive Statistics

Table 1. Comparison of Baseline Variables between Control and Intervention Group before Intervention

Variable	Categories	Mean ± SD	Statistic (Test)	p-value
Anxiety	Control	11.43 ± 3.60	Mann-Whitney U = 18060.00	0.867
	Intervention	11.37 ± 3.67		
Need-for-information	Control	5.90 ± 2.06	Mann-Whitney U = 17797.00	0.678
	Intervention	5.81 ± 2.10		
APAIS-total	Control	17.32 ± 5.27	Mann-Whitney U = 17821.00	0.697
	Intervention	17.18 ± 5.20		
SAI	Control	50.14 ± 2.83	Mann-Whitney U = 17408.50	0.438
	Intervention	49.90 ± 2.52		
TAI	Control	49.49 ± 3.00	Mann-Whitney U = 17792.50	0.742
	Intervention	49.49 ± 2.85		
STAI	Control	99.63 ± 4.20	Mann-Whitney U = 17608.00	0.557
	Intervention	99.59 ± 3.54		

At baseline, there were no significant differences between the control and intervention groups in anxiety ($p = 0.867$), need-for-information ($p = 0.678$), APAIS total score ($p = 0.697$), SAI ($p = 0.438$), TAI ($p = 0.742$), or STAI ($p = 0.557$). This confirms the comparability of both groups before the intervention.

3.3. Nursing Intervention

We observed that the anxiety levels of full-time workers are higher than those of unemployed or retired participants. Through interviews, we learned that the main source of anxiety for full-time workers is the concern that prolonged hospitalization will affect their jobs. For such patients, we provide more humanitarian care.

In this study, it can be observed through APAIS-C and STAI that the anxiety levels are quite high among the Melancholic and Choleric populations. We found that the majority of the subjects in this study are Melancholic and Choleric. For patients with Melancholic traits, we implemented a music therapy intervention before surgery. We arranged for these patients to stay in a comfortable environment with appropriate temperature and humidity, and gentle lighting. During the preoperative education, we provided more detailed explanations to the patients and their families, offering thorough explanations regarding the type of surgery and its duration, while also informing them of the success rate of the surgery, giving patients greater encouragement and confidence.

In addition, there is a significant proportion of patients in the study with a Choleric temperament type. These patients are primarily prone to preoperative psychological anxiety due to focusing on postoperative complications or prognosis. This anxiety is mainly reflected in disturbances in sleep patterns. For the nursing intervention of these patients, we utilized deep breathing exercises and attention diversion techniques. We guided these patients to relax their anxious state before sleep through effective breathing, using the '4-7-8 breathing technique'. This primarily involves instructing the patient to inhale through the nose while placing the tip of their tongue against the roof of their mouth, behind the upper front teeth, and holding this position for the entire duration of the exercise for 4 seconds. Then, they should hold their breath for 7 seconds and begin to exhale while making a 'whoo' sound, slowly expelling all air over 8 seconds. Inhale-hold-exhale forms one cycle, and the entire exercise is repeated four times, while gentle music can be used to divert attention.

For patients with sanguine temperament, we can conduct pre-surgical education on preventing postoperative complications based on their strong plasticity characteristics. For patients who need to rest in bed after surgery, in order to prevent venous thrombosis in the lower limbs caused by postoperative bed rest, we proactively guided patients to master ankle pump exercises. Increasing the guidance on postoperative complication prevention plans can reduce the anxiety levels of patients with this temperament type. And patients with a phlegmatic temperament type, due to their steady and reserved characteristics, we still enhance the level of preoperative education for them. This includes informing patients about the type of surgery, duration, preoperative preparations, prognosis, and preventive measures for complications. We also advise patients not to endure their negative feelings too much and to communicate directly with the staff if they have any questions.

3.4. Effectiveness of the Nursing Intervention

Table 2. Comparison of Variables Before and After Intervention (Intervention Group only)

Variable	Timepoint	Mean ± SD	Statistic (Test)	*p*-value
Anxiety	Pre	11.37 ± 3.67	Wilcoxon W = 4457.50	< .001
	Post	8.97 ± 4.21		
Need-for-information	Pre	5.81 ± 2.10	Wilcoxon W = 2381.50	< .001
	Post	4.02 ± 1.86		
APAIS-total	Pre	17.18 ± 5.26	Wilcoxon W = 3613.50	< .001
	Post	12.99 ± 5.60		
SAI	Pre	49.69 ± 2.36	Wilcoxon W = 6548.50	0.536
	Post	49.90 ± 2.52		
TAI	Pre	49.69 ± 2.85	Wilcoxon W = 12038.50	< .001
	Post	51.53 ± 2.82		
STAI	Pre	99.59 ± 3.54	Wilcoxon W = 10547.00	< .001
	Post	101.23 ± 3.77		

Within the intervention group, Wilcoxon signed-rank tests revealed a significant reduction in anxiety ($p < 0.001$), need-for-information ($p < 0.001$), and APAIS total score ($p < 0.001$) after the intervention, indicating a marked decrease in preoperative anxiety and information-seeking need. Interestingly, TAI ($p < 0.001$) and STAI ($p < 0.001$) showed significant increases post-intervention, while SAI scores remained stable ($p = 0.536$).

3.5. Conclusion

From the above nursing interventions, it can be concluded from Table 6 that the anxiety levels significantly decreased after the intervention compared to the pre-test results. This indicates that the nursing interventions tailored to the patient's temperament and demographic characteristics are effective. However, this study still has limitations. When nursing staff are too busy to assess the personality types and temperaments of patients, and given that most of the anxious patients in the study are concentrated in the Melancholic and Choleric groups, can we determine that patients who are more likely to experience preoperative psychological anxiety are mostly from the Melancholic and Choleric groups when conducting preventive nursing interventions for preoperative anxiety in clinical settings? Therefore, in clinical practice, under the premise that there is no time to measure the temperament types of patients in advance, do the nursing measures implemented for such patients have applicability? This is also a question that needs to be explored. Although effective nursing measures were developed through the grasp of preoperative anxiety-related factors, which played a certain role in the prevention and identification of preoperative anxiety in clinical nursing work, there were still some limitations in this study. Mainly due to cultural differences. In addition, there are patients who have two types of temperament at the same time, and the factors that contribute to their anxiety also need to be explored. this study can only have a certain reference significance for the preoperative psychological anxiety of surgical patients in China, and can provide little reference for exploring the preoperative anxiety factors of surgical patients around the world. It is necessary to break through cultural differences in future research fields and make research that is more adaptable to globalisation.

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