Effect of Preoperative Teaching Sessions on Postoperative Outcomes among Patients undergoing Thoracic Surgeries

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Abstract

Background: Despite progress in surgery, thoracic surgery continues to be accompanied by complications and is associated with significant rates of postoperative morbidity and readmission to the hospital. Patient education preoperatively is recommended to enhance recovery after surgery enable patients to cope with postoperative pain and anxiety and improve postoperative outcomes**. Aim:** to evaluate the effect of preoperative teaching sessions on postoperative outcomes among patients undergoing thoracic surgeries. **Methods:** A quasi-experimental research design was utilized in this study. A Purposive sample of 80 patients aged 18 years or more of both genders who underwent thoracic surgery at the cardiothoracic surgery unit at Mansoura University Hospital, Egypt. The patients were classified into two equal groups, intervention and control groups, with 40 patients in each group. **Tools**: three tools were used for data collection; patient assessment sheets, the Modified American Pain Society Patient Outcome Questionnaire (APS-POQ- 1995) & State-Trait Anxiety Inventory. **Results:** The intervention and control groups showed statistically significant differences in all aspects of post-operative pain management. This included pain severity, functional interference, and affective experiences like anxiety and depression, all with P-values of 0.001. Side effects such as nausea and dizziness also differed significantly (P=0.001). Additionally, the intervention group significantly improved State-Trait Anxiety Inventory scores compared to the control group (P=0.005). **Conclusion:** Based on results obtained in the current study, the intervention group's postoperative outcomes improved after the implementation of teaching sessions. This improvement was evidenced by enhanced knowledge regarding pain management, encompassing activities, pain severity, side effects, affective experience, and perception of the car. Additionally, the intervention group exhibited a reduced level of postoperative anxiety compared to the control group. **Recommendations:** Planned preoperative teaching should be provided to all patients and their families scheduled for thoracic surgeries as part of standard hospital care preoperatively. Further studies have to be carried out to assess nurse's knowledge and practices regarding care provided for patients undergoing thoracic surgeries

Keywords: Preoperative, Teaching Sessions, Thoracic Surgery, Patients, Postoperative Outcomes.

Introduction

Thoracic disorders constitute a significant public health challenge, characterized by both their complexity and severity. These conditions affect approximately 13 million Americans, with over 7.5 million requiring thoracic surgical interventions annually. Notably, thoracic diseases contribute to nearly 500,000 deaths each year, representing half of the total annual mortality from various causes. The lack of comprehensive understanding of the pathophysiological mechanisms underlying these disorders significantly delays the development of more effective therapeutic strategies. This knowledge gap necessitates focused research efforts to explain disease processes, which is critical for reducing the substantial morbidity and mortality associated with thoracic diseases as mentioned by the **American Thoracic Association (ATA) (2023).**

Thoracic surgery is a major event that can be highly stressful for both the patient and their family. It often results in several specific issues related to the patient's physical and emotional challenges, as well as their rehabilitation. Surgical treatment of thoracic diseases has become an important strategy for relieving symptoms, limiting the consequences of illness, and preventing death (Bakul, 2021).

Thoracic surgery is performed either for diagnostic or therapeutic purposes. It deals specifically with disorders of the lungs and esophagus; and diagnostic purposes such as exploratory thoracotomy. However; it is used for therapeutic indications for repairing organs located in the thorax as well as blunt chest trauma, reflux esophagitis, esophageal and lung cancers, lung transplantation, and emphysema **(Denver, 2021; Voldar , Karem and John, 2023).**

Thoracic surgery is widely performed in the United States. It was estimated that more than 780,000 thoracic surgeries are performed worldwide every year. Thus, over 360,000 thoracic surgery operations are performed annually in the United States of America. **In Egypt, according to statistical records of the Thoracic Surgery Unit (2023),** it was clarified that, from total patients admitted to the different surgeries during the year 2023, approximately 49% of the patients needed thoracic surgical interventions as a life-saving therapy. Unfortunately, many complications are provoked by thoracic surgeries such as mediastinal shift, subcutaneous emphysema, as well as acute pulmonary edema, respiratory insufficiency, pneumothorax, hemothorax, pulmonary embolism, and thrombophlebitis. It was estimated that about 40 - 63 % of patients undergoing thoracic surgeries suffer from postoperative complications. Fortunately, all of these complications may be controllable and preventable **(Warren & Mary,2022)**

Pain and anxiety are the most clinically challenging problems in these patients postoperatively, and may lead to an increase in the hospital stay and subsequent increase in the cost. No matter how thoracic surgery causes stress and poses risks for complications. Many variables such as the age of the patients, the general medical conditions, and the procedures performed affect determining the level of pain and anxiety pre and post-thoracic surgeries. Recent data indicate that 89% of patients experience severe pain following surgery; thus, any procedure involving a body cavity, such as thoracic surgery, should be considered inherently painful. Postoperative pain after thoracic surgery is a complex reaction to tissue trauma incurred during the procedure, which induces hypersensitivity in the central nervous system. Additionally, all patients (100%) experience anxiety and stress before the surgery **(Finkeleier, 2021)**. According to **Cakmak et al. (2018),** postoperative pain significantly contributes to morbidity in thoracic surgery patients, while preoperative anxiety, which affects 25-80% of these patients as **Ruis et al. (2017),** exacerbates both the healing process and post-surgical pain. Elevated anxiety levels, stemming from fears related to the surgery and anesthesia, not only reduce patient comfort and wellbeing but are also linked to increased postoperative pain and could predict greater postoperative complications, including heightened morbidity and mortality.

Research indicates that in the preoperative stage, the assessment and education of patients are crucial responsibilities of healthcare providers. These activities are key to reducing surgical risks and enhancing patient outcomes. Effective preoperative primary care is linked to fewer perioperative complications, and improved patient satisfaction **(Salzwedel et al., 2018)**. Patients who are well-prepared both physically and mentally for surgery generally experience better results. Such preparation also aids patients in managing postoperative pain more effectively. Preoperative education should address the informational needs of patients concerning their upcoming surgery, which can help in reducing much of their anxiety. Patients who are well-informed about post-surgical expectations and are given the chance to discuss their goals and concerns tend to manage postoperative pain and reduced mobility more successfully (**Gonullu et al., 2018)**.

Teaching sessions aim to educate patients to actively participate in their own treatment, improve outcomes, help identify errors before they occur, decrease pain and anxiety, and reduce the length of stay in the hospital. Teaching sessions for thoracic surgery patients are considered an important step- toward assuring quality of patient care. Its focus is to provide a framework within which the multiple activities of patient care are performed and the needs to be determined. A very commonly used framework for organizing teaching sessions is the structure, process, and outcome attributes in evaluating quality of care. It

provides instructions used to determine what a patient should or should not do **(Donna , Dale and Jane,2023).**

Primary care providers have an opportunity toeducate patients on alternative methods and treatments available to treat acute pain and decrease anxiety levels effectively during the pre-operative period, patients who had been traveling the outpatient clinic have been invited to join interactive training periods. patients were also knowledgeable about what to expect all through the immediate preoperative, and postoperative intervals until discharge, and have been invited to express their feelings of anxiety and their worries about surgery and recuperation. furthermore, patients have been furnished with booklets with statistics regarding surgery and predicted outcomes **(Apfelbaum et al., 2021).**

Significance of the Study

Even though preoperative teaching sessions were commonly implemented for thoracic surgery patients during the 80s and 90s and were adopted by many countries globally, they were not utilized in Egypt in either public or private hospitals until 2023. In that year, Dar-El-Fouad, a private hospital in Cairo, began using these sessions. The data collected from this initiative could enhance the care provided to such patients. **According to the Statistical Record of Thoracic Surgery Unit (2023)** In 2022, 410 patients were admitted to the hospital for thoracic surgeries. Currently, in 2023, 243 patients diagnosed with thoracic conditions are on the waiting list for scheduled thoracic surgeries at the thoracic surgery unit of Mansoura University. These numbers underscore the growing demand and pressing need for effective surgical interventions in thoracic conditions. This study aims to assess the impact of preoperative teaching sessions on thoracic surgery recovery, focusing on pain management and anxiety reduction. By preparing patients for what to expect, the study seeks to enhance patient outcomes, improve care practices, and reduce anxiety and pain. It is also hoped that the findings will generate greater attention and motivate further research into the effectiveness of preoperative teaching sessions within thoracic surgery, establishing a stronger evidence base for its widespread implementation

Aim of the study:

This study aimed to evaluate the effect of preoperative teaching sessions on postoperative outcomes among patients undergoing thoracic surgeries.

Research Hypothesis

H 1: Patients undergoing thoracic surgery participating in preoperative teaching sessions will experience lower pain levels than those receiving standard hospital care (control group).

H 2: Patients undergoing thoracic surgery who participate in preoperative teaching sessions will show a reduction in anxiety levels compared to those receiving standard hospital care (control group).

Operational Definition Teaching Sessions and Postoperative Outcomes:

- **Teaching Sessions**: Scientifically written instructions that guide, support, and teach the patients the specific points to be taken to determine what a patient should or should not do and help patients make decisions regarding care provided pre and postoperative to improve outcomes.
- **The postoperative outcomes for patients undergoing thoracic surgeries include**: decreased post-operative pain and reduction of anxiety level**.**

Subjects and Methods

Research design

A quasi-experimental research design was applied to attain the aim of the current study.

Settings:

The study was conducted in the Cardiothoracic Surgery Unit affiliated with Mansoura University Hospital, located in the Dakahlia Governorate of Egypt, specifically within the cardiothoracic surgery department and the cardiothoracic intensive care unit. At this unit, thoracic surgeries were performed daily, averaging ten cases per week.

Sample:

A Purposive sample of 80 patients aged 18 years or more of both genders who performed

thoracic surgeries in the cardiothoracic surgery unit of Mansoura University Hospital. There were 40 patients in each of the two equal groups, intervention and control groups. The sampling procedure was easy to follow and random by lottery technique. Specifically, one subject was placed between the control and intervention groups, drawn from the list of applicants for thoracic surgeries who fulfilled the requirements for inclusion.

The inclusion criteria included the following: thoracic surgery patients who had been hospitalized for a minimum of 72 hours immediately following surgery agreed to participate in the study and had not participated in similar programs before. They were conscious and able to communicate, had no visual or auditory problems, and did not have cognitive impairment. Also, did not have post-operative confusion. Patients who had serious organ malfunction requiring mechanical ventilation and patients who already had thoracic surgeries before were excluded from the present study.

I. **Intervention group (40):** involved the patient who had received teaching sessions along with the routine hospital care.

II. **Control group (40):** involved the patient who had received routine hospital care only.

Sample size calculation

The sample size was calculated according to the following formula **(Krejci & Morgan, 1970) .**

$$n = \frac{x^2 \, N \, P \, (1 - P)}{d^2 \, (N - 1) + x^2 \, P \, (1 - P)}$$

Where:

- n = the sample size
- N = Population size = 243 Patients in 2023 at Cardiothoracic Surgery Unit
- P= Population Proportion, Kergcie & Morgan suggest to be 0.5
- d = Error rate, usually it is set to 0.05
- x^2 =Chi square at significance 0.05

Substituting n= 80 patients, divided into Control and Intervention groups with 1:1 ratio.

Data Collection Tools:

The following three tools were utilized to collect data in order to meet the study's aim:

Tool I: Patient assessment sheet: The researcher created this tool after looking through current, relevant literature and academic publications **(Illgen & Pellino 2022; Hayaf, 2019)**. Aimed to ascertain patients' knowledge about pain. This tool covers the following topics: structured interview questionnaire sheet, medical and surgical data, and sociodemographic data. It is divided into three separate sections. These were gathered, and the researcher completed the data collection sheet by interviewing patients, getting their medical histories, and assessing their level of pain awareness. Multiple-choice questions were included in this tool.

Part I: Socio-demographic data: Assessing the patient's profile—which comprised gender, age, occupation, level of education, marital status, and employment —was the main goal of this section.

Part II: Surgical and Medical data: was concerned with the patient's date of admission, certain behaviors (such as drinking, smoking, or drug addiction), previous surgical procedures, surgical diagnosis, and the total length of hospital stay.

Part III: Knowledge Questionnaire: To identify the patient's awareness of pain and how they can manage it. It included 40 multiple-choice questions written in Arabic and 14 true-or-false questions.

Scoring system:

With the Knowledge Questionnaire, a total of 54 items measuring the patient's knowledge were observed, categorized, and scored, with one point awarded for a correct response and zero for a wrong response. Patients were classified as having an unsatisfactory knowledge level if their score was less than 60%, and as having a satisfactory knowledge level if their score was equal to or higher than 60% **(AbdelHakim et al., 2014)**.

Tool II: **Modified American Pain Society Patient Outcome Questionnaire (APS-POQ- 1995):** It was utilized to evaluate the effects of pain management, with an emphasis on patient satisfaction, as part of the acute pain quality assurance (QA) guidelines that assist healthcare organizations in looking into patient experiences and outcomes. The guidelines' initial American iteration, referred to as the APS-POQ, was released in 1991. The APS QA guidelines were then updated and revised in 1995. Researchers and experts made some changes to the APS-POQ in 2011. Specifically, they changed the way pain management outcomes were evaluated, starting on the day after surgery and continuing for the first two days following surgery.

It included these aspects:

Using a numerical pain rating scale to quantify pain disruption of function (activities) Performing tasks in bed, such as turning, sitting up, shifting positions, Engaging in activities such as strolling, sitting in a chair, standing at the sink, falling, and being asleep, and having an affective experience (emotional) while not in bed: as helpless, scared, depressed, and anxious adverse reactions (safety): such as nausea, fatigue, rash, and lightheadedness; perception of treatment (satisfaction) It asked the following queries: If the patient is permitted to engage in as much decision-making as possible regarding their course of pain management? Is the patient happy with how their pain management while in the hospital went? Did the patient receive any information regarding choices for treating their pain? If so, how helpful was the patient in utilizing this knowledge? To treat pain, for example, what are the indications and side effects of nonsteroidal anti-inflammatory medications (NSAIDS)? If so, the patient described the nonpharmacological techniques they used. How often did a medical professional or nurse advise him or her to try non-pharmacological techniques, such as massage, relaxation, music therapy, prayer, cold and hot packs, distraction, meditation, and imagery?

Scoring system

Score	Non	Mild	Moderate	Severe
	0	1-3	4-6	7-10

Tool III: State-Trait Anxiety Inventory:

Anxiety assessment was done using State-Trait Anxiety Inventory (STAI) by **Spelberger et al (1990)** which was translated and standardized for Egyptian by **Abdel –khalek (1992).** This inventory measures two dimensions of anxiety first, anxiety as a state and second anxiety as a trait. Each dimension of the inventory consists of 20 items regarding present feelings. On the Likert scale, where 1 means strongly agree and 4 means strongly disagree. A few of the questions have reverse scoring and are related to the lack of anxiousness. The scale's anxiety-inducing dimension was created specifically for this study. Each State-Trait Anxiety Inventory score ranges from 20 to 80, with 20 to 39 points denoting mild anxiety.A score of 40–59 denotes moderate anxiety.Severe anxiety is indicated by 60–80 points.

Validity and Reliability

Three Experts in Critical Care & Emergency Nursing, Medical-Surgical Nursing, and Psychiatric & Mental Health Nursing and two Medical professionals in the field of thoracic surgery from the faculty of medicine, at Mansoura University reviewed the tool's content validity. Their critiques and recommendations were taken into consideration. The professionals analyzed the tools to ensure the necessary, accuracy, clarity, comprehensiveness, and appropriateness of the questions. The consensus of experts was 94% for most of the questioning. The consistency of the tool was confirmed by the Cronbach's alpha coefficient, indicating its reliability. The patients' State-Trait Anxiety Inventory (STAI) total scores between the intervention and control groups were 0.901, the reliability score of their knowledge questionnaire about pain and its management was 0.884, and the overall score of the postoperative pain management outcome questionnaire was 0.876 in all areas.

A pilot study:

Ten percent of the study subjects (8 patients) participated in a pilot study, which

was carried out to evaluate the study tools' applicability and clarity, as well as to find out how long it would take the researcher to complete each tool and identify any possible obstacles that would hinder data collection. In light of the results of the pilot study, the required modifications were done for more applicable tools to collect data. The patients selected for the pilot study were excluded from the study subjects.

Ethical considerations:

The ethical approval was obtained from the Research Ethics Committee of the Nursing Faculty, Mansoura University (Ref. No. P 0554). Before starting the study work. the researcher informed the patients who will participate in the study about its purpose. Informed consent was obtained from the patients to participate in the study. The researcher received assurances about data confidentiality and anonymity. Likewise, they received assurances that the patients' personal data would be kept private because there was no link between the patient identities and the data collected.

Fieldwork phase

Data collection covered 6 months from the beginning of November 2023 to the end of March 2024, data were collected during morning and afternoon shifts. The researcher attended the Cardiothoracic Surgery Unit 7 days per week (four days preoperatively and three days postoperative). It was approximately 30-45 minutes for each session. In each session, the average number of patients is between two and four.; there were a total of three sessions were conducted for each patient. The fieldwork was carried out throughout four phases to achieve the aim of the current study as the following:

Phase (1): Assessment Phase:

In this phase, the researchers started with stating the study problems, and formulating a hypothesis. The study tools were designed after the researchers acquainted with the extent of the study hypothesis. Tools (I) were developed by the researchers after an extensive reviewed literature, while the standardized tools (II&III) used without any content modifications.The final version of the tools were reviewed by experts to test the content validity. Then the final version of the tools was piloted for possible modifications and then settled for data collection. Written approval to conduct the study was assembled from the relevant authorities before the beginning of data collection. Each patient was interviewed individually to collect baseline data using all the study tools after the researchers introduced themselves; explained the study's nature, purpose, and plan; confirmed that collected data would be used only for the study, and after obtaining the approval from each patient. After that, the researchers filled out the questionnaire using tools **(I, II, III)** .

Phase (II): Planning phase"

This phase is based on the assessment data, patients‟ expectations, and recent literature. The researchers used "a step-by-step guide" to develop the booklet which comprises the following steps: select and prioritize a topic, agree on objectives, establish a team involved experts, construct awareness and commitment, collect information and baseline assessment. The educational booklet was designed in printed Arabic with simple pictures including theoretical content and techniques of pain and anxiety management, and then revised by specialized professors.

Phase (III): Implementation of the Teaching Sessions:

- This phase was conducted through three sessions, the duration of each session ranged from 30-45 minutes according to the patients' needs and condition. Teaching sessions were conducted three days per week through face to face using different teaching methods (interactive lectures with open discussion, printed handouts, and instructional media with graphics. To make sure the patients understood, education was reinforced, and given feedback based on their requirements. Each patient received a copy of the printed Arabic booklet to ease and assist remembering the techniques of pain and anxiety management during teaching sessions implementation. Patients were informed about the time of the next session at the end of the current session.
- Every session began with a review of the previous one's contents and the objectives of

the next session. The researchers also obtained feedback from the patients at the end of each session to make sure they were receiving maximum benefit. **The content that was used for the teaching sessions was divided into three sessions and organized as the following:**

- **First session:** This session involved information about the definition of thoracic surgery, types of thoracic surgery, indications of thoracic surgery, and anatomy of the respiratory system, and explanation of pain and anxiety (factors affecting pain and anxiety, Definition, types, symptoms & signs of pain, anxiety, complications of unrelieved pain and anxiety and teach the patient how to use).
- **Second session**: Included teaching regarding pain control measures (pharmacological & non-pharmacological) and anxiety management methods.
- **Third session:** Applying non-pharmacological ways for managing pain and anxiety, such as massage, relaxation techniques, music therapy, prayer, walking, cold and hot packs, distraction, meditation, and imaging.

Phase IV: Evaluation Phase

Evaluation the effect of preoperative teaching sessions on postoperative outcomes among patients undergoing thoracic surgeries was reassessed using tools (II, III). This phase was carried out three days starting on the day after surgery and continuing for the first two days following surgery (1st 24hrs, 48hrs,72hrs).

Statistical analysis:

Version 20.0 of SPSS for Windows was used for all statistical analyses (SPSS, Chicago, IL). The continuous data were presented as mean ± standard deviation (SD) and had a normal distribution. Categorical data were expressed in number and percentage. T- test was used for the comparison of two variables with continuous data. Chi-square test was used for comparison of variables with categorical data. With continuous data, correlations between two variables were examined using the correlation coefficient test. The study computed the internal consistency test, or reliability test, for the questionnaires employed. At $p<0.05$, statistical significance was established.

Results:

Table 1: shows the demographic data of the Intervention and control groups. As regards to age it shows one third 35% of the Intervention group less than 40 years with mean age (44.4 ±14.5)& 45% in the control group range from 40 to 50 years with mean age (44.6 ±15.1). As regards to gender, male & female are nearly equal in both groups. Moreover, 47.5% of the Intervention group was married & 37.5% of the control group was unmarried and divorced. Approximately one-third 30% of the Intervention group and control groups were basic education & university education respectively. Regarding employment, 50%& 57.5% of the Intervention and control group have worked respectively. More than half of Intervention and control groups 55% &57.5% were smoker in that order. Nearly two-thirds didn't have a history of previous surgery.

Table 2: Showed that, in relation to patients' mean score of pain and its management, there was no statistically significant difference between the intervention and control groups pre- intervention (P= 0.664). However, there was a significant difference between the two groups post-intervention (P = 0.005).

Figure 1: It was noticed that there was no significant difference between the Intervention and control groups in the first 24 hours post-intervention (P= 0.938). At 48 hours and 36 hours, the Intervention group saw a decrease in pain severity with an average of 6.5 ±1.1 & 4.8± 1.3, while the control group experienced 7.0 ±1.7 & 6.4 ± 1.1, respectively. There was a significant difference between the Intervention and control groups (P=0.001).

Table 3: Illustrated that, with a (P-value = 0.001) there was a significant statistical difference in the Intervention and control groups' perceptions of care. The Intervention group exhibited a significantly lower intake of analgesics per day and a shorter duration of hospital stay after surgery compared to the control group (P-value = 0.001).

Table 4: Showed that there was a statistically significant difference in interference with function (activities in bed and out of bed, falling asleep and staying asleep) between the Intervention and control group, with the Intervention group's interference with function (activities) was lowed (P-value= 0.001).

Table 5: Indicated that, the intervention group's emotional affective experience was better than the control group's emotional affective experience; patient anxiety and fear at 24 hours, 48 hours, and 72 hours were statistically significant (P-value= 0.001). There was a statistically significant difference in depression between the intervention and control groups 48 and 72 hours after surgery (p-value = 0.001).In terms of helplessness, there was a statistically significant difference at 24 hours, 48 hours, and 72 hours between the intervention and control groups (P-value= 0.003, 0.049, and 0.001). However, there was no statistically significant difference found in the first 24 hours with regard to emotional experiences such as depression.

Table 6. Showed that, the intervention group's post-operative side effects (safety) were lower than those of the control group. It was found that there was a significant difference in nausea between the two groups at 24 and 72 hours (P-value = 0.001), in relation to drowsiness there was a statistical difference between the two groups at 24 hrs and 48 hrs & 72 hrs as (P = 0.001, 0.019 & 0.001 respectively), concerning dizziness there was a significant difference between the two groups at 72 hrs (P=0.001), regarding itching there was statistical difference between two groups at 24 hrs and 48 hrs & 72 hrs as (P-value= 0.001). However, there was no statistically significant difference in the side effects of nausea after 48 hours and dizziness in the first two postoperative days (P = 0.176, 0.571, and 0.285, respectively).

Table 7. Showed that, in relation to the total mean score of the State-Trait Anxiety Inventory (STAI), there was no statistically significant difference between the intervention and control groups pre-intervention (P= 0.667). Otherwise, post-intervention, there was a highly significant difference between the two groups (P= 0.001).

Figure 2. Illustrated that there was a significant improvement in State-Trait Anxiety Inventory (STAI) mean scores in the study group compared to the control group post-intervention (P= 0.005).

Table 8: Showed that there was a statistically significant difference between the intervention and control groups for all items of the post-operative pain management outcome questionnaire; related to Pain severity as *P*-value=0.001, interference with function (activities in bed & out of bed – falling asleep & staying sleep) as *P*-value = 0.001, Affective experience (anxiety, depression, fright & helplessness) where *P*-value =(0.001, 0.007, 0.001&0.001) respectively, regarding side effects (Nausea, Drowsiness, Dizziness &itching) as *P*-value =0.001.

Table 1. The sociodemographic, medical and surgical data of the study population

	Intervention		Control			
	n	%	n	%	X^2 /t	P
Age						
<40	14	35.0	12	27.5		
40 – 50	13	32.5	15	45.0		
>50	13	32.5	13	27.5	0.297	0.862
Mean ±SD	44.4 ±14.5		44.6 ±15.1		0.060	0.952
Gender						
Female	20	50.0	21	52.5		
Male	20	50.0	19	47.5	0.050	0.823
Marital Status						
Married	16	47.5	13	25.0		
Unmarried	14	25.0	14	37.5		
Divorced	10	27.5	13	37.5	0.702	0.704
Educational level						
Read and write	10	25.0	9	22.5		
Basic education	11	30.0	9	22.5		
Secondary	8	22.5	10	25.0		
University	12	22.5	12	30.0	0.518	0.915
Employment						
Working	20	50.0	21	57.5		
Not working	20	50.0	19	42.5	0.050	0.823
Special Habits						
Smoker	22	55.0	23	57.5	0.051	0.822
Alcoholic	16	40.0	15	37.5	0.053	0.818
Drug addict	19	47.5	18	45.0	0.050	0.823
Previous surgical procedures					0.056	0.813
Yes	14	35.0	13	32.5		
No	26	65.0	27	67.5		

Table 2. Comparison of the patients' knowledge about pain and its management total score pre and post intervention

	Intervention	Control		
	Mean ±SD	Mean ±SD	t	P
Pre-Intervention	25.7 ±4.9	26.2 ±5.8	0.436	0.664
Post-Intervention	30.9 ±7.2	26.3 ±7.0	2.885	0.005

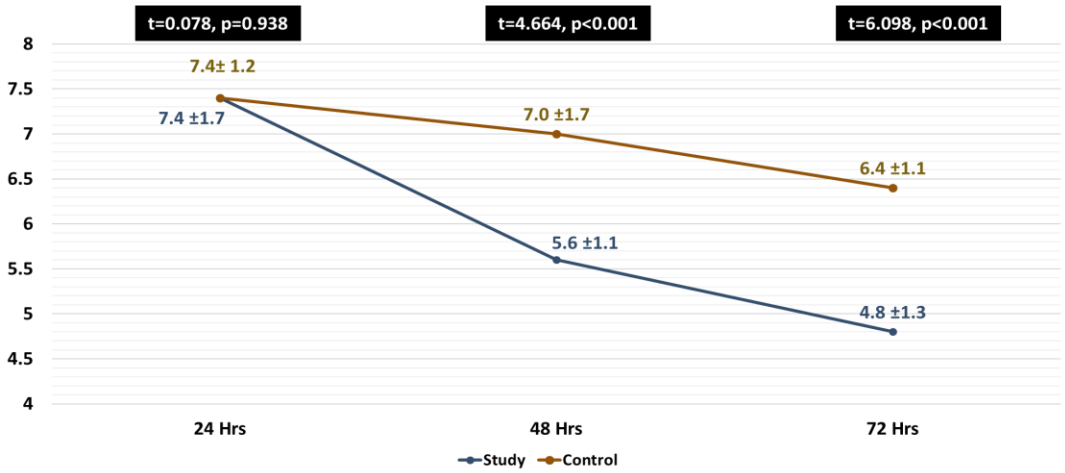

Figure 1. Comparison of pain severity between Intervention and control groups

Table 3. Comparison between Intervention and control group regarding to patients' perception of care.

	Intervention		Control			
	N	%	N	%	X^2/t	P
Used non-medical methods for pain relief						
None	4	10.0	24	60.0		
Used one or two methods	17	42.5	9	22.5		
Used more than two methods	19	47.5	7	17.5	22.286	<0.001
Received information about pain treatment options						
No	19	47.5	31	77.5		
Yes, but the information was not helpful	6	15.0	7	17.5		
Yes, the information was helpful	15	37.5	2	5.0	12.898	0.002
Allowed to participate in treatment options						
No	15	37.5	30	75.0		
Yes	25	62.5	10	25.0	11.429	<0.001
Satisfied about treatment options						
No	12	30.0	27	67.5		
Yes	28	70.0	13	32.5	11.257	<0.001
Analgesic consumption per day (Mean ±SD)	1.55 ±1.1		2.7 ±1.1		4.458	<0.001
Length of hospital stay (Mean ±SD)	4.1 ±1.9		6.6 ±2.6		4.959	<0.001

Table 4. Comparison between the Intervention and control groups in relation to post-operative activities.

	Intervention	Control		
	Mean ±SD	Mean ±SD	t	P
Activities in bed				
After 24hrs	6.1 ±0.9	7.9 ±0.8	9.573	<0.001
After 48hrs	5.0 ±0.8	7.1 ±0.8	11.329	<0.001
After 72hrs	3.2 ±1.2	6.1 ±0.9	12.807	<0.001
Activities out of bed				
After 24hrs	5.9 ±1.4	8.7 ±1.1	10.320	<0.001
After 48hrs	5.8 ±0.7	8.0 ±0.9	12.404	<0.001
After 72hrs	3.6 ±1.1	6.1 ±0.8	11.591	<0.001
Falling asleep				
After 24hrs	6.9 ±0.9	7.9 ±0.8	5.747	<0.001
After 48hrs	6.0 ±0.9	7.1 ±0.8	5.918	<0.001
After 72hrs	4.4 ±1.2	6.2 ±0.8	7.552	<0.001
Staying asleep				
After 24hrs	7.1 ±0.8	7.9 ±0.8	4.941	<0.001
After 48hrs	5.8 ±0.8	6.9 ±0.8	5.824	<0.001
After 72hrs	5.1 ±0.8	5.9 ±0.8	4.785	<0.001

Table 5. Comparison between Intervention and control groups in relation to post-operative emotional experience

	Intervention	Control		
	Mean ± SD	Mean ± SD	t	P
Anxiety				
After 24hrs	3.8 ±0.9	4.7 ±1.1	4.146	<0.001
After 48hrs	2.8 ±0.9	4.2 ±0.9	7.007	<0.001
After 72hrs	1.9 ±0.8	2.9 ±0.9	5.616	<0.001
Depression				
After 24hrs	3.9 ±0.8	4.0 ±1.2	0.216	0.830
After 48hrs	2.9 ±1.2	3.8 ±0.8	4.191	<0.001
After 72hrs	2.8 ±0.8	2.8 ±0.8	0.139	<0.001
Fright				
After 24hrs	3.4 ±0.5	4.4 ±1.2	4.872	<0.001
After 48hrs	3.1 ±0.8	3.8 ±0.7	4.621	<0.001
After 72hrs	2.2 ±0.8	3.1 ±0.8	5.298	<0.001
Helplessness				
After 24hrs	3.2 ±1.2	3.9 ±0.9	3.103	0.003
After 48hrs	2.8 ±1.0	3.3 ±1.1	1.998	0.049
After 72hrs	1.9 ±0.8	2.8 ±1.2	3.592	<0.001

Table 6. Comparison between the Intervention and control groups in relation to post-operative side effects.

	Intervention	Control		
	Mean ± SD	Mean ± SD	t	P
Nausea				
After 24hrs	3.6 ±0.5	4.2 ±0.8	3.664	<0.001
After 48hrs	3.3 ±0.8	3.5 ±0.5	1.367	0.176
After 72hrs	2.1 ±0.8	2.9 ±0.7	4.710	<0.001
Drowsiness				
After 24hrs	3.0 ±0.8	3.9 ±0.8	5.309	<0.001
After 48hrs	2.9 ±0.9	3.4 ±1.1	2.388	0.019
After 72hrs	2.3 ±0.9	2.9 ±0.8	3.715	<0.001
Dizziness				
After 24hrs	4.5 ±1.2	4.6 ±0.7	0.569	0.571
After 48hrs	4.2 ±0.7	4.4 ±1.1	1.076	0.285
After 72hrs	1.5 ±0.5	4.3 ±0.8	18.402	<0.001
Itching				
After 24hrs	4.5 ±0.7	5.1 ±0.8	3.779	<0.001
After 48hrs	3.4 ±1.1	4.2 ±0.8	3.860	<0.001
After 72hrs	1.6 ±0.5	2.9 ±0.8	8.066	<0.001

Table 7. Comparison of the patients' State–Trait Anxiety Inventory (STAI) total mean scores between Intervention and control groups pre- and post-intervention

	Intervention		Control			
	N	%	N	%	X^2 or t	P
Pre-intervention						
Mild	8	20.0	10	25.0		
Moderate	13	32.5	12	30.0		
Severe	19	47.5	18	45.0	0.289	0.865
Total mean score (Mean ±SD)	56.6 ±15.8		55.3 ±15.8		0.431	0.667
Post intervention						
Mild	20	50.0	8	20.0		
Moderate	13	32.5	13	32.5		
Severe	7	17.5	19	47.5	10.681	0.005
Total mean score (Mean ±SD)	38.8 ±15.0		58.8 ±13.9		6.201	<0.001

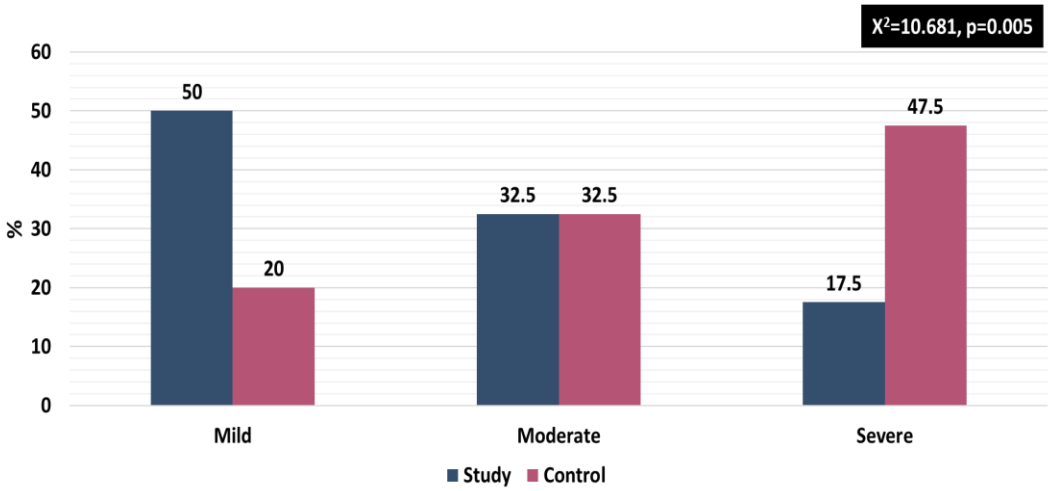

Figure 2. Comparison of the patients' State –Trait Anxiety Inventory (STAI) scores between Intervention and control groups post-intervention

Table 8. Comparison of all aspects of post-operative pain management outcome questionnaire between Intervention and control group

	Intervention	Control		
	Mean ± SD	Mean ± SD	t	P
Pain severity	5.9 ±0.8	6.9 ±0.8	5.528	<0.001
Activities in bed	4.8 ±0.6	7.0 ±0.5	18.000	<0.001
Activities out of bed	5.0 ±0.6	7.6 ±0.6	19.913	<0.001
Falling asleep	5.8 ±0.6	7.1 ±0.4	12.000	<0.001
Staying asleep	6.0 ±0.5	6.9 ±0.5	8.422	<0.001
Anxiety	2.8 ±0.5	3.9 ±0.4	10.175	<0.001
Depression	3.2 ±0.5	3.6 ±0.5	2.795	0.007
Fright	2.9 ±0.4	3.8 ±0.5	8.703	<0.001
Helplessness	2.7 ±0.6	3.3 ±0.6	4.722	<0.001
Nausea	2.9 ±0.4	3.5 ±0.4	6.498	<0.001
Drowsiness	2.7 ±0.5	3.5 ±0.5	6.496	<0.001
Dizziness	3.4 ±0.5	4.4 ±0.6	9.145	<0.001
Itching	3.2 ±0.5	4.1 ±0.5	9.065	<0.001

Discussion

Thoracic surgery is one of the most common surgical operations, which can have a negative effect on postoperative outcomes (pain and anxiety) due to a variety of physical and psychological consequences. One of the most common causes and a major issue affecting patients' recovery and length of hospital stay is a lack of preoperative teaching. Preoperative teaching for patients undergoing thoracic surgery has been determined to be one of the most important and main methods of optimizing postoperative outcomes (pain and anxiety). So, this study aimed to evaluate the effect of preoperative teaching sessions on postoperative outcomes in patients undergoing thoracic surgery.

The discussion addressed the primary findings as follows:

Regarding socio-demographic characteristics; The majority of the control group in the current study was between the ages of 40 and 50, while one-third of the intervention group was younger than 40. These results are consistent with results of study done by **Zahran et al. (2020),** who reported that thoracic surgery was more common in younger age groups and that the most common risk factors related to thoracic surgery in the aged 20–49 range. These medical conditions might be linked to common risk factors for thoracic surgery at this young age.

According to the current study, most participants in both the intervention and control groups did not have a previous surgical history. About 50% of the intervention group was married, and the majority in both groups had a secondary or university education. These findings contrast with the results of **Shady, Abo Seada, and Mostafa (2020),** which indicated a higher prevalence of thoracic surgeries among married patients with low socioeconomic status. From the researchers' perspective, this outcome could be explained by various factors, such as congenital or acquired conditions affecting the chest wall, pleura, lungs, airways, mediastinum, and diaphragm. These include conditions like mediastinal and bronchogenic carcinoma, lung cancer, chest trauma, empyema, and recurrent pneumothorax, which often necessitate thoracic surgery. Additionally, genetic factors may play a role, particularly in populations where consanguineous marriages are more prevalent.

According to the current study, significant differences were found in postoperative pain and anxiety levels between the intervention and control groups. These findings are consistent with **Shady, Abo Seada, and Mostafa (2020),** who observed a significant difference in pain severity change between their study and control groups ($t14 = 5.29$, $p < .01$). Similarly, **Zahran et al. (2020)** reported significant differences in pain severity between adult patients who received preoperative teaching

sessions before inguinal hernia surgery and those in the control group ($p < 0.001$).

Regarding postoperative activities, the current study results demonstrated a highly significant difference in the patient's post-operative activities in & out of bed between the intervention and control groups. **Doughery (2023)**, concurred with the study's findings, which showed that patients are more likely to get up and walk around when nonpharmacological pain treatment techniques like music and relaxation are used. According to research by **Chang et al (2020),** pre-operative teaching sessions that combine targeted instruction with cognitive methods like visualization, relaxation, and reinforcement of favorable results have an even bigger effect on post-operative autonomic activity. According to **Xu, , Zhang, & Liu, (2021),** early postoperative activity performance is substantially correlated with preoperative teaching about of postoperative pain management.

Regarding postoperative emotional experiences such as anxiety and depression, the current study revealed a highly significant difference in postoperative anxiety ($p = 0.001$). These findings were supported by **Kim et al., (2023)**, who found a statistically significant difference in postoperative anxiety scores between a control group and adult patients who received preoperative teaching sessions before inguinal hernia surgery within 48 hours post-procedure. Similarly, **Wang et al. (2021)** reported lower mean postoperative anxiety scores in a study group undergoing Coronary Artery Bypass surgery compared to a control group ($P = .01$). **Doughery (2023)** also supported these findings, highlighting the impact of preoperative teaching sessions on nonpharmacological pain management strategies.

The current study identified a statistically significant difference (P-value = 0.01) between the intervention and control groups regarding postoperative side effects, particularly nausea. This result was supported by **Choi, Park, and Kim (2022)**, who conducted a study showing that patients undergoing laparoscopic cholecystectomy and receiving preoperative information experienced a reduced incidence of postoperative nausea within the initial 16 hours ($p = 0.039$). For this reason, they extremely need an ongoing source of information that is accessible to understand and helps them identify the disease and how to deal with it.

According to the study's findings, there was a statistically significant difference in the **length of hospital stay** between the intervention and control groups. In accordance with **chang et al (2020)**, who stated that, After a knee joint arthroplasty, preoperative patient education shortens hospital stays. The mean length of stay was significantly shorter in the Education group ($P < 0.01$) than it was in the Conventional group (7 days), and **Jheon, et al (2020)**, agreed that preoperative teaching had a beneficial impact on shortening postoperative hospital stays. These results were also validated by a meta-analysis. Preoperative education improved postoperative outcomes and reduced hospital stays in 67% of patients, according to studies done by **Shady, Abo Seada, and Mostafa (2020).**

The results of this study demonstrated a statistically significant difference in postoperative pain severity between patients in the intervention group who used more than two nonpharmacological methods for controlling pain and those in the study group who used just one or two of these approaches. The study's conclusions, which are also corroborated by **Kim et al. (2023)** ,recommend using a combination of therapies to treat pain in order to minimize side effects and pain intensity. However, a study by **Xu, Zhang, and Liu (2021)** found that on postoperative days 1 ($p < 0.01$) and 2, the group receiving complementary alternative medical therapies experienced a significant reduction in pain levels following surgery due to the availability of numerous non-drug strategies. From the researchers' point of view, the lack of information in patients undergoing thoracic surgery may be attributed to the absence of standardized teaching sessions for those patients.

Concerning study hypotheses, Based on the forgoing discussion it can be concluded that the results of the present study disclose that, there were highly significant

improvements in all aspects of pain and anxiety among the intervention group post-implementing teaching sessions.

Conclusion

Based on the findings of the current study, it was concluded that preoperative teaching sessions effectively enhanced patients' understanding of pain and its management. Furthermore, these sessions improved various postoperative outcomes such as pain severity, activities, emotional experiences, side effects, and perception of care compared to the control group. Additionally, they contributed to a reduction in postoperative anxiety among patients in the intervention group.

Recommendations

Based on the findings of the current study, the following recommendations can be suggested:

- Scheduled preoperative teaching sessions should be integrated into standard hospital preoperative care protocols for thoracic surgeries.
- A concise and illustrated booklet should be given to patients before surgery, containing concise information about preoperative preparations, the surgical procedure, postoperative pain management, physical activities, emotional experiences, potential side effects, perceptions of care, and strategies for anxiety reduction.
- All patients scheduled for thoracic surgery require sufficient knowledge and skills to facilitate their adjustment to life following the procedure.
- The patient should be at the forefront of their care, fully informed, and involved in every aspect of their care plan.
- It is recommended to conduct a similar study with a larger probability sample to enhance the generalizability and broader application of the designed program.
- Further research is necessary to evaluate nurses' knowledge and practices in caring for patients undergoing thoracic surgery.

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