

Effect of Preoperative Education on Patient Anxiety Level: A Scoping Review

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ABSTRACT

Context: A surgical intervention generally causes physical and psychological strain, which leads to excessive anxiety. The provision of knowledge and patient education during the preoperative period helps to reduce anxiety levels among surgical patients.

Aim: This review conducted to investigate the effect of preoperative education on anxiety levels among patients undergoing surgery or invasive procedure irrespective of general or local anesthesia.

Methods: Searching for related articles performed in four databases (MEDLINE, CINAHL, Trip, and Pub Med) between 2014 to 2018. Out of all searched literature, nine studies retrieved (5 randomized controlled trials, three quasi-experimental studies, and one descriptive study) to be included with a total of 1670 patients. The articles involved in the given review (verbal education, telephone, booklet, and PowerPoint presentation) used different types of educational media.

Results: All the studies where included in this literature review revealed that the most planned and structured preoperative education could reduce anxiety among patients scheduled for surgery or invasive procedure irrespective of general or local anesthesia.

Conclusions: Most of the articles demonstrate the positive effect of planned and structured preoperative educations on anxiety levels, regardless of the types of the media in delivering education to patients.

Keywords: preoperative education, anxiety level, patients, review.

1. Introduction

Despite the scientific and medical technology advancement, most patients undergoing surgical intervention usually experience worries and strains over outcomes such as becoming permanently disabled, loss of control over their body, pain, inability to wake up from anesthesia, and fear of death. Due to fear and anxiety, a majority of patients have difficulty in coping with the operation processor delay the healing process, decrease the quality of life and health during the post-surgical treatment (Kalogianni et al., 2016).

Preoperative anxiety is derived from stress responses toward perceived threat and danger related to the surgery and hospital environment (Bayraktar et al., 2018). Furthermore, the hospitalization produces anxiety in patients because of separation of family and home, health

care communication problem, nature of the illness, and its threats. However, prolonged and high level of preoperative anxiety has adverse effects on the healing process, and it is associated with morbidity and mortality (Nigussie Belachew, & Wolancho, 2014).

Although anxiety has been an issue of concern for many health care providers, still, the causes are puzzling. Some recent studies have suggested a relationship between patient education and anxiety; patients may experience anxiety if they have little or no information about the diagnosis and treatment methods (Bayraktar et al., 2018).

Preoperative education defined as providing the patient with health-related information, psychosocial support, and the opportunity to learn selected skills in preparation for surgery (Kalogianni et al., 2016). The objective of providing preoperative education to patients undergoing surgery is to prevent or decrease anxiety and postoperative complications that are connected with mortality, morbidity and prolonged hospital stay as well as accelerating postoperative recovery (Lemanu Singh, MacCormick,

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Arroll, & Hill, 2013).

Preoperative education is not only essential to decrease the risk of post-surgical complications but also enables patients to take an active role in recovery and can support them to gain a sense of control (Gonçalves, Cerejo, & Martins, 2017). This education described by involving standard instructional materials such as verbal information, video, or written information in a booklet according to patients' status.

Since many studies have been concerned with preoperative anxiety and its measurements, but the application of nursing education intervention on reducing anxiety has been less focused. The researchers decided to review the literature to investigate the effect of preoperative nursing education on anxiety levels among patients undergoing surgery.

2. Aim of the study

The given review aimed to investigate the effect of preoperative education on anxiety levels among patients undergoing surgery or invasive procedure irrespective of general or local anesthesia.

3. Methods

PICOT Question

PICOT	CONTENT	PICOT QUESTION
P	Preoperative patients	
I	preoperative education	Among preoperative patients, how does preoperative education affect an anxiety level?
C	Not applicable	
O	Reduction of anxiety level	
T	Before surgery	
Type	Interventional PICOT question	

3.1 Search Strategies

This literature, guided by Arksey & O'Malley (2005), stated five stages of methodology. First, the PICOT question was identified "Among preoperative patients, how does preoperative education affect an anxiety level." To guide the search process in the database. Then, to identify articles relevant to this literature review, which focus on the effect of preoperative education on reducing anxiety level, searching was initiated in the electronic database between October and November 2018. Recent articles were collected between 2014-2018 to identify the updated literature depending on inclusion and exclusion criteria. Finally, the thematic framework to guide the narrative account of existing literature and to collating, summarizing, and reporting the results.

3.2. Keywords

A combination of keywords was used, which include: 'preoperative education,' 'anxiety level,' and 'patients.'

3.3. Search Engines

The electronic searches performed in the following electronics databases: Database of Cumulative Index of Nursing and Allied Health Literature "CINHAL," Database of the National Library of Medicine "Pub Med," Database of Medical Literature Analysis and Retrieval System Online "Medline" and Database of Turning Research into Practice "Trip."

3.4. Inclusion and Exclusion Criteria

Inclusion and exclusion criteria developed to identify the most relevant articles to answer the PICOT question, which included the following:

3.4.1. Inclusion Criteria

- Articles available in the English language.
- Articles that focus on adult population > 18 years.
- Articles published in the last five years between 2014-2018.
- Articles that studies the effect of preoperative education with a different type of teaching materials provided to preoperative patients and measured patient's anxiety.
- Qualitative and Quantitative articles included.

3.4.2 Exclusion Criteria

- Articles not in the English language.
- Articles that were not relevant to the topic, such as articles, address only preoperative education or measure anxiety only, or study children's population.
- Articles were before 2014.
- Systematic reviews or quality projects.
- Studies with an unrepresented sample.

3.5. Articles Selection and Screening Process

PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) used to screen the identified literature. PRISMA contains a four-phase flow diagram explained in figure 1. Initially, 115 articles retrieved, 15 articles eliminated because of duplication. After following the inclusion and exclusion criteria, 83 articles related to irrelevant citations. Then 17 articles remained. The researchers screened titles, abstracts, and full texts manually, and only relevant articles were retrieved. Finally, 9 Full-text articles included. While eight articles eliminated since 2 of them were quality improvement projects, three articles measure anxiety only without any educational intervention, one systematic review, one pioret study with an unrepresented sample, and one measure preoperative education only without measuring anxiety level.

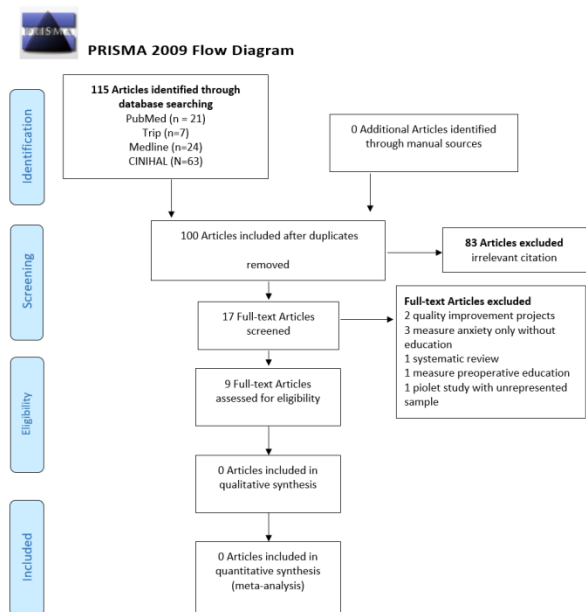


Figure (1): Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA statement guideline (Moher, Liberati, Tetzlaff, & Altman, 2009).

3.6. Quality assessment

The final studies included in this review were assessed for quality scoring by two different reviewers using the tool developed by Hawker et al., (2002). The evaluation of quality scored from 4, which indicated good quality to 1, which indicated poor quality. This 9-item tool covers many aspects of quality, which include abstract and title, introduction and aims, method and data sampling, data analysis, ethics and bias, findings/results, transferability, implications, and usefulness (Hawker, Payne, Kerr, Hardey, & Powell, 2002). After assigning the scores to each aspect, the total scores will be collected and should fall under one of the following categories: poor (9-18 points), fair (19-27 points), and good (28-36 points).

The results for this quality assessment were that all articles reviewed were good, with an exception for one study was fair in quality due to difficulties with implications and usefulness.

4. Finding and Results

The thematic analysis used to categorize retrieved articles into two themes. The first theme is types of teaching material, including five sub-themes according to the type of teaching materials such as telephone, booklet, PowerPoint presentation, and verbal education. The second theme is including two sub-themes regarding the effect/no effect of preoperative education on anxiety level. Themes and sub-themes illustrated in table 1 below. For each theme and sub-themes, a study discussion commenced distinctly.

TABLE 1: Scope Review Theme and Sub-themes

Themes/Sub Themes	Name	Author name / Publish year
Theme 1: Types of teaching material used		
1.1 sub-theme	Verbal	Ertürk & Ünlü (2018)
		Wongkietkachorn et al., (2017)
		Gonçalves et al., (2017)
		Kim et al., (2015)
1.2 sub-theme	Telephone	Amini et al., (2018)
		Mousavi et al., (2018)
		Kesänen et al., (2017)
1.3 sub-theme	PowerPoint presentation	Bayraktaret al. (2018)
1.4 sub-theme	Booklet	Kalogianni et al., (2016)
		Amini et al., (2018)
		Bayraktar et al., (2018)
Theme 2: Effect of preoperative education on anxiety level		
2.1 sub-theme	Effect	Kalogianni et al., (2016)
		Ertürk & Ünlü (2018)
		Kesänen et al., (2017)
		Wongkietkachorn et al., (2017)
		Kim et al., (2015).
2.2 sub-theme	No effect	Amini et al., (2018)
		Mousavi et al., (2018)
		Bayraktar et al., (2018)
		Gonçalves et al., (2017)

4.1 Theme 1: Types of teaching material used

Patient education has been identified as a way of reducing preoperative anxiety in patients undergoing surgical procedures. However, many questions have been raised as to the best media that can be adopted to provide the information to the patients. Many suggestions have been put forward for this, such as via face-to-face teaching, television, or by telephone. However, the education of patients should not be looked upon as the one-way transfer of information. Rather than the active role that patients play in communication with nursing and other staff to successfully managing their anxiety (Alanazi, 2014).

4.1.1 Sub-theme: Verbal

Six articles provide preoperative education verbally by a nurse to reduce the level of anxiety. Ertürk and Ünlü (2018) determined the influence of preoperative individualized verbal education for patients undergoing open-heart surgery on anxiety level and pain severity by using a quasi-experimental study among 109 patients. The individual interview was used to provide verbal education and anxiety measured by the State-Trait Anxiety Inventory (STAI) and visual analog scale (VAS) Tool. The researcher found that lack of knowledge is the most crucial factor inducing anxiety. Preoperative individualize verbal education had a significant effect on anxiety level at (p< 0.05).

Other Single-blind, randomized controlled trial study done by *Wongkietkachorn Wongkietkachorn, & Rhunsiri (2017)* with 450 patient scheduled day surgery (Intervention group: education based on patient's needs- 225 patients Control group: traditional education 225 patients) were involved to differentiate between education based on patient's needs and traditional education in order to identify how they affected on preoperative anxiety, satisfaction of patient, and time spent in education. The anxiety level score determined by the STAI scale, and the result showed a more significant decrease in anxiety in the intervention group at ($p < 0.001$).

Gonçalves et al. (2017) conducted another descriptive, correlational study to evaluate the effectiveness of traditional verbal preoperative information provided by nurses on the decreasing of preoperative anxiety level for patients undergoing elective surgery. Anxiety Inventory Scale (STAI) used to measure the anxiety level for 200 patients. The study suggested that no significant effect on the level of anxiety ($p = 0.449$). Besides, patients perceived that information about organizational aspects is more critical than information about nursing care.

Ninety-four patients enduring percutaneous vertebroplasty under local anesthesia participated in a quasi-experimental study to assess the effects of verbal information and handholding on the anxiety level (*Kim, Kang, & Choi, 2015*). The sample divided into three groups: Experimental Group I, $n = 34$ (handholding and spoken information provided), Group II $n = 30$ (handholding only), Group III $n = 30$ (control group). Researchers used Amsterdam Preoperative Anxiety and Information Scale (APAIS) to measure the anxiety level. The anxiety level in G I decreased compared to G II and the control group ($p = 0.001$).

Amini, Alihossaini, and Ghahremani (2019) explore the relationship between preoperative educations provided by booklet or verbal and the reduction of anxiety level before surgery. This RCT divided 60 participants into three groups: verbal group (V) presented face to face with one of the researchers, booklet group (B), and control group (C), which received routine education. STAI scale showed the positive effect of preoperative information on decreasing the anxiety level in patients scheduled for surgery, but it cannot be found out whether verbal or booklet was the more effective. ($p < 0.05$).

Another RCT study conducted by *Mousavi Malek, Zakerimoghadam, Esmaeili, and Kazemnejad (2018)* which aimed to examine the effects of nurses' supportive education on the patients' anxiety level and quality of sleep before the coronary artery bypass grafting (CABG). A total of 160 patients involved and equally divided into intervention (verbal education by interview method) and the control group received usual care. Spielberger's State Anxiety Inventory (SSAI) showed that supportive-educational nurse-led intervention could reduce patients' anxiety and improve sleep quality ($p < .001$).

4.1.2. Sub-theme: PowerPoint Presentation

One study used PowerPoint presentations as media to provide preoperative education. *Bayraktar et al. (2018)* investigated the effect of the pre-operative planned educations about the modifications in lifestyle on patient's knowledge, anxiety level, and problems during the postoperative period through a quasi-experimental study design. Total sample 102 patients divided into control and intervention groups. The intervention group received education via PowerPoint and control exposed to routine care of the hospital, including unplanned verbal information. Preoperative written and planned verbal education about modifications of lifestyle increase patients' knowledge and decreased anxiety, which measured by STAI ($p < 0.05$).

4.1.3. Sub-theme: Booklet

Booklet used as one of the educations media in three studies founded in this literature review. Randomized control trials conducted by *Kalogianni et al. (2016)*, 395 patients undergoing cardiac surgery were involved in investigating the influence of a preoperative nurses' education on anxiety level and postoperative complications in patients scheduled for elective surgery. Also, investigate the effect of preoperative education on both patients' rehospitalization and length of stay in hospital.

The researchers divide the sample into two groups: the interventional group received a booklet with information, and the control group received the traditional information. Level of anxiety measured by the STAI scale and the result showed that there was no difference in the anxiety level between the two groups on the day of admission and decreased only in the intervention group on the day before surgery ($p = 0.001$) and decrease in both groups before discharge. Besides, the result showed that there was a decrease in postoperative complications. On the other hand, no difference in readmissions or length of stay between intervention and control groups. *Amini et al. (2018)* conducted another two studies, and *Bayraktar et al. (2018)* used a booklet to provide preoperative education aimed to reduce the anxiety level.

4.1.4. Sub-theme: Telephone

RCT did by *Kesanen et al., (2017)* to assess the effect of preoperative education on the level of anxiety, health-related quality of life (HRQoL), disability, and pain in patients with spinal stenosis scheduled for surgery. STAI tool used to measures the anxiety level for 100 patients dived equally to receive either telephone or traditional education. Result proposed in the intervention group, a significant reduction in anxiety noted after educational intervention based on a knowledge test and an empowering telephone discourse, whereas in the control group, anxiety reduced only after the surgery ($p = 0.011$).

4.2. Theme 2: Effect of Preoperative Education on Anxiety Level

Preoperative anxiety can have a negative impact on surgical outcomes. Anxiety increases serum cortisol, adrenaline, and noradrenaline. This results in postoperative pain, increased postoperative analgesic requirements, prolonged hospital stay, and patient dissatisfaction. However, preoperative anxiety levels can be reduced.

A review of previous studies in this literature review aimed to determine the effect of perioperative educations on reducing anxiety levels. Nine studies were involved in this literature review, eight studies (*Kim et al., 2015; Kalogianni et al., 2016; Kesanen et al., 2017; Wongkietkachorn, Wongkietkachorn, & Rhunsiri, 2017; Amini et al., 2018; Bayraktaret al., 2018; Ertürk & Ünlü, 2018; Mousavi et al., 2018*) supported that perioperative education has significant effect on reduction of anxiety level in patients undergoing different types of surgeries or invasive procedures under local or general anesthesia.

On the other hand, one study conducted by *Gonçalves et al., (2017)* to investigate the traditional unplanned verbal preoperative education. The result presented that, no significant effect of traditional unplanned verbal preoperative education on anxiety level, which indicates that nurses should improve their role in the preoperative period to provide clear and adequate information about nursing education and measures to reduce preoperative patients, anxiety and improve quality of care.

All the studies, which included in this literature review, revealed that any media used in delivering planned and structured preoperative education could reduce anxiety in patients undergoing surgery or invasive procedure irrespective of general or local anesthesia. Even though the last study indicates no significant reduction in anxiety level after the routine preoperative education, which supports the idea of planned and structured preoperative education.

5. Discussion

Effect of preoperative education on reducing anxiety in patients undergoing different surgical or any invasive procedures under local or general anesthesia investigated in this literature review. Nine studies involved in this review, five randomized control trials, three quasi-experimental studies, and one descriptive study was investigating the effectiveness of numerous types of preoperative education in reducing anxiety. The types of preoperative teaching aids included in this review were verbal, PowerPoint presentation, telephone, and booklet. Also, the anxiety level measured by using different anxiety scale including Spielberger State-Trait Anxiety Inventory (STAI) (*Spielberger & Gorsuch 1983*), Visual Analog Scale (VAS) (*Hornblow & Kidson, 1976*) or Amsterdam Preoperative Anxiety and Information Scale (APAIS) (*Moerman, Frits, Van Dam, Muller, & Oosting, 1996*).

Five RCTs assessed the different types of preoperative education in reducing anxiety levels. Two of these RCTs used structured verbal preoperative educational intervention alone. The results indicated that verbal education has a

significant effect on the reduction of anxiety level, while used booklet with preoperative verbal education to differentiate between the two types of these educational media on reducing anxiety level. A positive effect of preoperative information has been noticed in decreasing the anxiety level of patients scheduled for surgery, but it cannot be found out whether verbal or booklet was the more effective. On the other hand, *Kalogianni et al., (2016)* demonstrated the effectiveness of booklet educational intervention, which presented that booklet education has a significant effect on the reduction of anxiety levels. Definitive RCT conducted by *Kesanen et al., (2017)* using the telephone in providing preoperative education, which also shows a significant reduction in anxiety level caused by increasing in the patients' knowledge level.

Three quasi-experimental studies investigated the influence of verbal education (*Kim et al., 2015; Ertürk & Ünlü, 2018*), PowerPoint presentation, and booklet (*Bayraktar et al., 2018*) on anxiety level. In this regard, there was a significantly decreased anxiety level. All of the previous eight studies proposed the positive impact of planned and structured preoperative education on patient's anxiety.

In contrast, a descriptive study performed by *Gonçalves et al., (2017)* investigates the traditional preoperative information provided by nurses to a patient undergoing elective surgery. Preoperative information presented no significant education in the level of anxiety. Therefore, traditional education is controversial. So, the nurses should improve their role in the preoperative period to provide adequate information about nursing care to reduce preoperative patients' anxiety and improve the quality of care.

However, the interpretation of these findings requires caution, as there was a significantly high risk of heterogeneity in intervention's content, depth, and duration because all of the studies not clearly mentioned the actual curricula that used in education — moreover, no explicit definition or explanation about the traditional education in control group. Even though the presence of heterogeneity, results indicated that there was a positive effect of most media used in delivering planned and structured preoperative education in reducing anxiety among patients scheduled for surgery.

On the other hand, despite the positive effect of planned and structure preoperative education among surgical patients to reduce anxiety level, nurses in such situations may encounter various challenges to demonstrate education. Three challenges were identified through searching in the literature. The first challenge, “lack of time,” is one of the most crucial challenges. Because to give planned and structured preoperative education, the nurse should have enough time besides their work to focus on each patient individually and to give complete, comprehensive, and accurate education, depending on the patient's conditions and needs.

The second challenge is the lack of sufficient nurse's knowledge because the nurse should have sufficient training and education to be highly qualified in giving

preoperative education. The third challenge is the different types of patient coping styles to deal with their anxiety. Each patient has a different coping style, some patients need more information to ease their anxiety, but others prefer not to know much about what they are going to face. Because of this, the nurse should first assess what the patient needs before the education process, which considers another challenge that the nurse will face.

Therefore, many solutions could be applied in the health care workplace to overcome these challenges. First, policymakers play a vital role in these issues, by helping nurses with designed structured and planned preoperative education, to provide high-quality care based on the patient's needs. Also, increase nurse's knowledge regarding preoperative education by providing them educational courses to make them more confident in providing education.

In conclusion, different types of planned and structured educational media have a significant effect on reducing anxiety level were found among undergoing surgical procedures such as via booklet, PowerPoint presentation, or by telephone. Also, health care providers, especially nurses, have a crucial role in providing preoperative education, which indicates that the nurses should increase their knowledge about providing education preoperatively based on the patient's needs.

6. Conclusion

In this review, most of the articles demonstrate the positive effect of preoperative educations on anxiety levels. Regardless of the media of delivering education to patients, preoperative anxiety levels reduced because of planned and structured preoperative education. However, more studies will need to identify the types of education and best intervention to be implemented and standardized as an essential role in nursing care for patients undergoing surgery. Therefore, standardized preoperative education curricula need to develop and reviewed by peers of medical psychologists.

7. Limitation and implication

The discrepancy in types of educational methods, the content of educational materials, the duration of the education intervention, and the type of surgeries consider as a limitation for this review. Also, the numbers of studies that have been founded in the last five years were insufficient. Therefore, future researches need to take into account to include all previous studies to provide sufficient evidence about the effect of preoperative education on patients' anxiety. Besides, future researches need to study the nurses' roles in delivering preoperative education.

The suggestion for future studies is to assess the essential elements of preoperative education provided by nurses for a patient scheduled for surgical or invasive procedure irrespective to local or general anesthesia, which help policymakers to make standardized preoperative education content. Also, to assess the factors affecting the

nurse's ability to provide adequate education to the patients preoperatively.

8. References

- Alanazi, A. A. (2014).** Reducing anxiety in preoperative patients. *British Journal of Nursing*, 23(7), 387-393. <https://doi.org/10.12968/bjon.2014.23.7.387>
- Amini, K., Alihossaini, Z., & Ghahremani, Z. (2019).** Randomized clinical trial comparison of the effect of verbal education and education booklet on preoperative anxiety. *Journal of Perianesthesia Nursing*, 34(2), 289-296. <https://doi.org/10.1016/j.jopan.2018.06.101>
- Arksey, H. & O'Malley, L. (2005).** Scoping studies: towards a methodological framework. *Int J Soc Res Meth*, 8(1), 19-32. <https://doi.org/10.1080/1364557032000119616>
- Bayraktar, N., Berhuni, O., Berhuni, M. S., Zeki, O., Sener, Z. T., & Sertbas, G. (2018).** Effectiveness of lifestyle modification education on knowledge, anxiety, and postoperative problems of patients with benign perianal diseases. *Journal of Perianesthesia Nursing*, 33(5), 640-650. <https://doi.org/10.1016/j.jopan.2017.03.006>
- Ertürk, E. B., & Ünlü, H. (2018).** Effects of pre-operative individualized education on anxiety and pain severity in patients following open-heart surgery. *International journal of health sciences*, 12(4), 26-34.
- Gonçalves, M. A. R., Cerejo, M. D. N. R., & Martins, J. C. A. (2017).** The influence of the information provided by nurses on preoperative anxiety. *Revista de Enfermagem Referência*, 4(14), 17-25. <https://doi.org/10.12707/RIV17023>
- Hawker, S., Payne, S., Kerr, C., Hardey, M. & Powell, J. (2002).** Appraising the evidence: Reviewing disparate data systematically. *Qual Health Res*, 12(9), 1284-99. <https://doi.org/10.1177/1049732302238251>
- Hornblow, A. R., & Kidson, M. A. (1976).** The visual analogue scale for anxiety: A validation study. *Australian and New Zealand Journal of Psychiatry*, 10(4), 339-341. <https://doi.org/10.3109/00048677609159523>
- Kalogianni, A., Almpiani, P., Vastardis, L., Baltopoulos, G., Charitos, C., & Brokalaki, H. (2016).** Can nurse-led preoperative education reduce anxiety and postoperative complications of patients undergoing cardiac surgery? *European Journal of Cardiovascular Nursing*, 15(6), 447-458. <https://doi.org/10.1177/1474515115602678>
- Kesänen, J., Leino-Kilpi, H., Lund, T., Montin, L., Puukka, P., & Valkeapää, K. (2017).** Increased preoperative knowledge reduces surgery-related anxiety: A randomized clinical trial in 100 spinal stenosis patients. *European Spine Journal*, 26(10), 2520-2528. <https://doi.org/10.1007/s00586-017-4963-4>
- Kim, B. H., Kang, H. Y., & Choi, E. Y. (2015).** Effects of handholding and providing information on anxiety in patients undergoing percutaneous vertebroplasty. *Journal of clinical nursing*, 24(23-24), 3459-3468. <https://doi.org/10.1111/jocn.12928>

Lemanu, D. P., Singh, P. P., MacCormick, A. D., Arroll, B., & Hill, A. G. (2013). Effect of preoperative exercise on cardiorespiratory function and recovery after surgery: a systematic review. *World journal of surgery*, 37(4), 711-720. <https://doi.org/10.1007/s00268-012-1886-4>.

Moerman, N., Frits, S. A. M., Van Dam, Muller, M. J., & Oosting, H. (1996). The Amsterdam Preoperative Anxiety and Information Scale (APAIS). *Anesthesia & Analgesia*, 82(3), 445-451. <https://doi.org/10.1097/00000539-199603000-00002>

Moher, D., Liberati, A., Tetzlaff, J. & Altman, DG., The PRISMA Group (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA Statement. *PLoS Med* 6(7), e1000097. <https://doi.org/10.1371/journal.pmed1000097>

Mousavi, Malek, N., Zakerimoghadam, M., Esmaeili, M., & Kazemnejad, A. (2018). Effects of nurse-led intervention on patients' anxiety and sleep before coronary artery bypass grafting. *Critical Care Nursing Quarterly*, 41(2), 161-169. <https://doi.org/10.1097/cnq.0000000000000195>

Nigusie, S., Belachew, T., & Wolancho, W. (2014). Predictors of preoperative anxiety among surgical patients in Jimma University specialized teaching hospital, South-Western Ethiopia. *BMC Surgery*, 14(1), 67. <https://doi.org/10.1186/1471-2482-14-67>

Spielberger, C. D., & Gorsuch, R. L. (1983). Manual for the state-trait anxiety inventory: form Y: "Self-evaluation questionnaire." Palo Alto: Consulting Psychologists Press.

Wongkietkachorn, A., Wongkietkachorn, N., & Rhunsiri, P. (2018). Preoperative needs-based education to reduce anxiety, increase satisfaction, and decrease time spent in day surgery: A randomized controlled trial. *World journal of surgery*, 42(3), 666-674. <https://doi.org/10.1007/s00268-017-4207-0>.

Appendix 1: Data Extraction Table/ Review Matrix

No	Authors	Study Objective	Study Design	Sample	Data Collection	Finding	Conclusion
1	Bayraktar et al., (2018).	To investigate the effect of the pre-operative planned education about the modifications in lifestyle on patient's knowledge, anxiety level, and problems during the postoperative period	a quasi-experimental design.	Total of 102 patients with benign perianal disease. Intervention group: 51 patients (hemorrhoid, 26; fissure, 25) used booklets and power-point presentations the day before the surgery. Control group: 51 patients (hemorrhoid, 25; fissure, 26) exposed to routine care	An anxiety scale developed by Spielberger, STAI-S.	Results revealed that nurse education about modification in the lifestyle of hemorrhoids and fissure was effective. (p<0.05)	Written and verbal planned preoperative education increase patients' knowledge level and decreased anxiety. Besides, per-anesthesia nurses can play an important role in delivering it.
2	Kesänen et al., (2017).	To assess the effect of preoperative education on the level of anxiety, health-related quality of life (HRQoL), disability, and pain in patients with spinal stenosis scheduled for surgery.	RCT	100 patients divided equally to receive either telephone or traditional education.	Knowledge Test Feedback Intervention (KTFI) + STAI Tool	The result showed that anxiety reduced significantly in IG while anxiety reduced only after the surgery in CG. Regarding HRQoL, disability and pain were improved significantly in both groups during a 6-month follow up.	Higher knowledge level may reduce preoperative anxiety but does not seem to affect the self-reported clinical outcomes of surgery.
3	Wongkietkachorn et al., (2017).	To differentiate between needs-based education and routine education in order to identify how they affected on preoperative anxiety, patient satisfaction, and time consumed in education.	RCT	450 Patients in day surgery. Intervention group: 225 patients (needs-based education) Control group: 225 patients (traditional education).	1-The needs-based patient education questionnaire. 2- Spielberger State-Trait Anxiety Inventory.	The intervention group experienced a more significant decrease in anxiety levels (p <0.001).	Education based on the patient's needs is more effective in reducing patient anxiety, increase patient's satisfaction, and decrease time consumed in education compared with traditional patient education.
4	Kalogianni et al., (2016).	To investigate the influence of a nurse-led preoperative education on anxiety and postoperative complications for patients scheduled for elective surgery. Also, investigate the effectiveness of teaching on both patients' rehospitalization and length of stay in hospital.	RCT	Total of 395 patients. Intervention group booklet with information (n=205). Control group: traditional information (n=190).	STAI scale	Anxiety level on the day of admission: no difference between the two groups. Anxiety level on the day before surgery: reduced only in the intervention group. Anxiety level before discharge: decrease in both groups There was a decrease in	The importance of preoperative nursing education to reduce anxiety level and postoperative complications for patients proposed for cardiac surgery was highlighted. Therefore, this information may help nurses to expand their knowledge about preoperative education to

						postoperative complications. There was no difference in readmissions or length of stay between the intervention and control group ($p = 0.001$)	control the patient's anxiety levels.
5	Gonçalves et al., (2017).	To evaluate the effectiveness of preoperative information provided by nurses on the decreasing of preoperative anxiety level for patients undergoing elective surgery.	Descriptive, correlational study.	200 patients undergoing elective surgery.	STAI scale	There was a relationship between gender and preoperative anxiety. Preoperative traditional information presented no significant effect on the level of anxiety ($p = 0.449$).	Nurses' should improve their rule in the preoperative period to provide adequate information about nursing care to reduce preoperative patients, anxiety, and improve the quality of care.
6	Kim et al., (2015).	To examine the effectiveness of handholding and verbal information on the patients' anxiety level who scheduled for percutaneous vertebroplasty under local anesthesia.	A quasi-experimental design.	Total of 94 patients. IG I: 34 patients (handholding and verbal information provided). IG II: 30 patients (handholding). CG: 30 patients (standard care).	Amsterdam Preoperative Anxiety and Information Scale (APAIS).	Psychological anxiety in IG I was decreased compared to IG II and the control group ($p=0.001$). Systolic blood pressure was significantly reduced in all groups.	During the preoperative period, handholding and verbal information used in nursing interventions to alleviate psychological and physiological anxiety with patients scheduled for percutaneous vertebroplasty.
7	Amini et al., (2018).	To compare the effectiveness of verbal and booklet education on pre-operative anxiety.	RCT	Total = 60 Divided into 3 groups: Verbal groups (V) face to face with one of the researchers Booklet group (B) The control group (C) routine educational	Spielberger's State-Trait Anxiety Inventory.	A positive effect of preoperative information has been noticed in decreasing the anxiety level of patients scheduled for surgery, but it cannot be found out whether verbal or booklet is the more effective ($p<0.05$).	Results revealed that time is cause pressure for nurses who works in Iran or other countries. Education by booklets that well designed can be used to reduce anxiety preoperatively.
8	Mousavi et al., (2018).	To examine the effects of nurses' supportive education on the patients' anxiety level and quality of sleep before the coronary artery bypass grafting (CABG).	RCT	Total of 160 patients equally divided into Intervention group: verbal education by interview method. Control group: received usual care.	Spielberger's State Anxiety Inventory (SSAI) used on the night before the surgery 2.Groningen's Sleep Quality Scale (GSQS). Used in the day of surgery.	The findings showed that nurses' supportive education could decrease anxiety levels and improve the quality of sleep patients in the night before CABG ($p<0.001$).	Non-pharmacological interventions (relaxation, deep breathing, explanation) should be located at the top of nurses' tasks, especially on the night before the surgery to improve sleep quality, which reduces preoperative anxiety.

9	Ertürk & Ünlü (2018).	To explore the effectiveness of pre-operative individualized education for patients scheduled for open-heart surgery on anxiety level and severity of pain.	quasi-experimental study	109 patients undergoing open-heart surgery	Individual interview + STAI, VAS Tool used in the day before and after the operation	There is a significant difference in mean scores for pre-operative anxiety regarding age groups and gender ($P \leq 0.05$). Also, there is a statistically significant association between a mean pre- and post-operative anxiety level and mean pain level. There is a direct correlation between pain and anxiety levels.	The individualized education in pre-operative could reduce postoperative pain levels in both sexes. The highest sources of anxiety during the preoperative period were insufficient knowledge, absence of family, fear of death, pain, discomfort, loss of privacy, and body image impairment.
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