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Effect of pre-operative education on post-operative pain management among adult patients undergoing elective surgery: An integrative review

Abstract

Introduction: Adequate pain control for surgical patients is an important aspect of their post-operative care. To manage pain, health care professionals use pharmacological and non-pharmacological strategies. A significant worldwide increase in the number of surgical procedures and their associated cost has led to a focus on non-pharmacological interventions, like education, to prevent post-operative complications. Education in the pre-operative phase aims to assist patients in overcoming their fears about upcoming surgery, promote pain management and enhance the recovery process.

Objective: This integrative review aims to assess the effectiveness of pre-operative education on post-operative pain management among surgical patients.

Method: Whittemore and Knafl's framework guided this integrative review. Three databases were searched for peer-reviewed studies published in English between 2016 and 2022. Twenty-one primary sources reporting the influence of pre-operative education on post-operative pain were selected for review and critically appraised using the Mixed Methods Appraisal Tool. Data was extracted and thematically analysed, and the results were synthesised.

Results: Two themes emerged from data comparison – 'factors affecting pre-operative pain education' and 'outcomes of pre-operative education'.

Conclusion: The implementation of pre-operative education is effective in reducing post-operative pain. The results provide a landscape of the current pre-operative education practices, which indicates the need to develop a pain education program for nurses and patients. This education will allow for the implementation of interventions that improve surgical patients' post-operative pain.

Keywords: pre-operative, post-operative, pain management, patient education, elective surgery

Introduction

Pre-operative patient education is a standard intervention in nursing practice that is associated with improved care outcomes. Pre-operative patient education aims to provide patients with necessary health information and psychological support as well as teach them the skills to minimise complications and discomfort.¹ Every year, 310 million surgeries are performed globally.² In 2020, around 40 to 50 million surgeries were performed in the United States of America (USA) and around 20 million in Europe.² Surgery can improve the quality of life and decrease the risk of death for millions of patients worldwide; however, surgery may potentially cause harm, including pain.³

Post-operative pain has been widely reported by patients where surgeries are performed on soft or hard tissues.⁴ It is estimated that 50 per cent⁵ to 75 per cent⁶ of patients have inadequate pain relief post-operatively. One of the barriers to attaining optimal pain management is patients' lack of knowledge regarding pain management strategies and their potential side effects.⁶ In an elective setting, surgeons, anaesthetists and nurses have the opportunity to work with patients to improve their overall health. Using education as an intervention in an elective setting has been found to be effective in enhancing patients' behaviours and attitudes toward pain management.⁷ Therefore, this review aims to identify and synthesise evidence of the impact of patients' pre-operative education about pain and its management on post-operative pain in patients undergoing elective surgery.

Background

A significant worldwide increase in the number of surgical procedures and their cost has led to a focus on interventions like education to prevent post-operative complications.⁸ Pre-operative education is an effective strategy to reduce post-operative complications, such as pain and discomfort.⁹

The International Association for the Study of Pain¹⁰ (para. 3) defined pain as an 'unpleasant sensory and emotional experience associated with or resembling that associated with actual or potential tissue damage'. Pain after surgery is an unpleasant and complex sensory response to tissue trauma occurring due to a surgical procedure.¹¹ In a study by Venkatesan et al.,⁵ 50 per cent of patients reported moderate pain after urological surgeries, 60 per cent of patients reported severe pain after orthopaedic surgery and 70 per cent of general surgery patients reported severe post-operative pain.

A high prevalence of moderate and severe pain among post-operative patients has been reported globally: 79 per cent in the USA,³ 68 per cent in the United Kingdom,⁵ 84.17 per cent in India,⁵ 88.5 per cent in Turkey,¹² 87 per cent in Jordan¹³ and 85.7 per cent in the United Arab Emirates.¹⁴ Persistent post-operative pain is a major cause of chronic pain.¹⁵ For example, Narinder et al.¹⁵ reported that the incidence of persistent post-operative pain after thoracotomy, mastectomy and hernia repair is 30 to 50 per cent. The risk is higher after limb amputation. Pain management is the actions intended to decrease patients' post-operative pain before their discharge time.⁵

Post-operative pain may lead to significant negative consequences if not alleviated effectively.¹⁶ These negative consequences can be

physical or psychological. Physical consequences include limitations in movement, delay in wound healing,¹⁷ respiratory impairment¹⁸ and chronic pain.¹⁹ Psychological consequences include frustration,⁵ fear, anxiety,²⁰ depression and stress.²¹ In addition, pain after surgery has been linked to increased chances for readmissions and emergency room visits.²² Several factors have been identified as contributing to poor post-operative pain management. These factors include poor communication, inadequate pain assessment and lack of knowledge.²³ Other factors are inadequate employee training, lack of interest, workload and the perception that pain after surgery is a natural, harmless and passing experience that patients must tolerate.²⁴

Aim

Health care services attach great importance to patient education and pain management. However, the gap in knowledge about the relationship between pre-operative education and post-operative pain management needs to be addressed. Therefore, this integrative literature review aims to assess the effectiveness of pre-operative education on post-operative pain management and the impact this may have on surgical outcomes.

Methods

Design

An integrative review using Whittemore and Knafl's framework²⁵ was conducted. An integrative review provides insight into the current state of research about a research problem and enables synthesis of studies by incorporating different research methods.²⁶ This comprehensive approach is a rigorous and systematic methodology²⁵ that guides the synthesis of data by capturing the emergent phenomena and complexity

Table 1: Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Peer-reviewed studies	Secondary sources such as literature reviews
Studies in full text and written in English	Articles written in languages other than English
Studies published from 2016 to 2022	Studies published before 2016
Studies of participants aged 18 years or older	Studies of participants younger than 18 years old
Studies that assess the impact of pre-operative education on post-operative pain	Studies that do not include education as an intervention
Studies of elective surgeries	Studies about pre-operative pain
	Studies of emergency surgeries and cardiac surgeries

of varying perspectives,²⁷ such as those included in the provision of pre-operative care. Whittemore and Knafl's five-step framework²⁵ for conducting an integrative review was incorporated in this review to ensure rigor and standardisation in reporting the findings. These steps are problem identification, literature search, evaluation of the data, analysis of the data and presentation of results.²⁵

Literature search

The literature search was conducted in three electronic databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, and Medline. The keywords were based on the following research question: How does pre-operative patient education in adults undergoing elective surgery affect their pain management after surgery? The key terms used in the search were pre-operative or pre-operative*, post-operative or post-operative*, pain management*, post-operative pain*, patient education*, teaching*, adult*, elective surgery*, and surgery. To lead the screening and evidence-reviewing process, the Covidence online platform was used. The initial literature search yielded 593 articles for further evaluation.

Data evaluation

The initial evaluation of the literature found 21 eligible original, peer-reviewed studies after removing duplicates and screening for the inclusion and exclusion criteria (see Table 1). These studies examined the impact of education on post-operative pain in elective cases using general, regional or local anaesthesia. Because the aim was to investigate the most up-to-date literature, only articles published within the last seven years (during or after 2016) were included in the search process. Peer-reviewed studies provided verifiable, accurate and valuable contributions to this integrative review. Studies about cardiac surgery were excluded from this review as post-operative cardiac cases require intensive care, observation and a specific pain management protocol. Of the 21 studies included, 20 were quantitative research and one was qualitative. A summary of the screening process is presented in the flow chart found in Figure 1. The Mixed Method Appraisal Tool (MMAT) version 2018 was used to appraise the quality of the 21 studies.

The MMAT is a critical appraisal tool established to systematically examine the trustworthiness of quantitative, qualitative and/or mixed methods studies.²⁸ Based

on the criteria set in the MMAT, the quantitative studies included six randomised controlled trials and 14 non-randomised studies. The non-randomised studies consisted of seven quasi-experimental studies, four cohort studies, one case series and two case-control studies. The qualitative study was a case study. The appraisal process was undertaken by the primary author of this review and verified by another reviewer. The methodological rigor of each potential study was evaluated to indicate its appropriateness for further appraisal against a set of questions. The questions were divided into two screening questions to assess the clarity of the research questions and their relevance to the data collection. This initial evaluation of the articles was followed by five different questions related to methodological quality. Based on the criteria set in the MMAT, the 21 studies were found to be of adequate quality and were included for further analysis.

Data analysis

Data analysis involves reduction, display and comparison of data as well as conclusion drawing and verification.²⁵ Data from the 21 studies were summarised and presented using data extraction

sheets. A specific data extraction process from primary sources in an integrative review will facilitate accurate retrieval and summary of relevant information.²⁵ The extracted information was tabulated in the data display phase to capture relevant information in a concise and focused manner (see supplementary material).

The characteristics tabulated were author and country, aim, methodology, setting, sample size and design, educational intervention, relevant findings, and limitations and strengths. The differences between and similarities of the studies were then identified, followed by a synthesis of findings. During the

data comparison phase, each group of data was reviewed for differences, commonalities and relationships.²⁵ In the data verification phase, multiple revisions by two reviewers were conducted to ensure the accuracy of the findings.

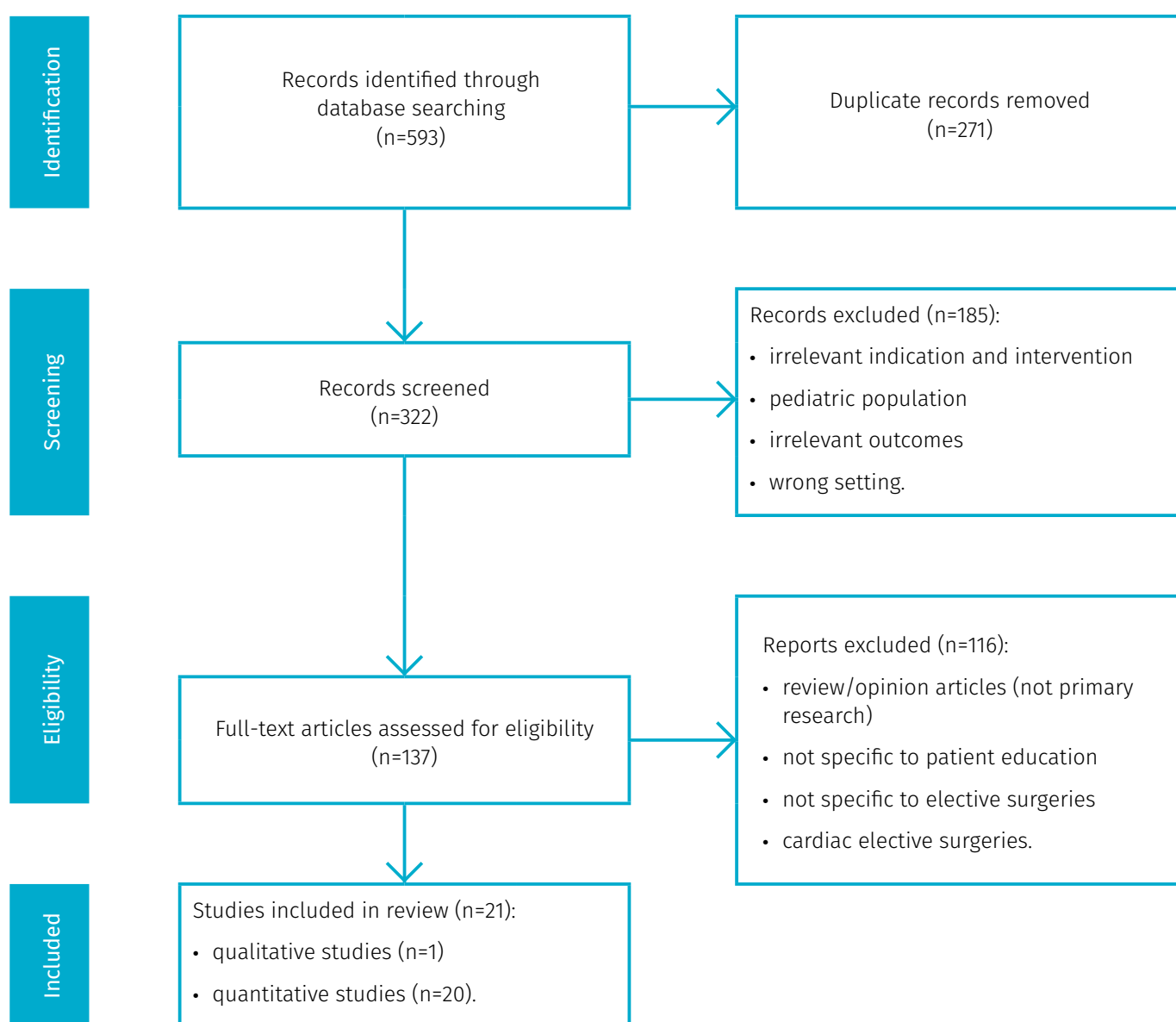


Figure 1: PRISMA flow diagram of study selection process

Results

Two themes emerged following data comparison in this review – ‘factors affecting pre-operative pain education’ and ‘outcomes of pre-operative pain education’.

Factors affecting pre-operative pain education

Several factors that affect the quality of pain education provided to surgical patients were identified in this integrative review. These factors were:

- pain communication and assessment
- standardisation of education
- educational resources
- education providers
- timing of education.

Pain communication and assessment

Good communication and exchange of inquiries between health care providers and patients are associated with effective education decisions for surgical patients. In the studies by Best et al.²⁹ and Kennedy et al.,³⁰ the participants stated that nurses who had multiple pre-operative tasks were unfocused and rushed, which resulted in poor communication. Lack of communication is a contributing factor in poor pain management.^{30–32}

Pain treatment and education are also impacted by pain assessment. Van Dijk et al.³³ evaluated 1184 nurses working at 73 hospitals and found that only 63 per cent of nurses’ impressions about patients’ pain matched patients’ pain scores. This discrepancy between nurses’ assessments and patients’ experiences of pain was a result of nurses’ lack of appropriate pain assessment. Best et al.²⁹ described the use of an appropriate pain

assessment tool as a strategy for appropriate pain assessment. Appropriate pain assessment may guide nurses to provide effective pain education³⁰ and provide patients with a clear understanding of pain management strategies and expectations.³³

Standardisation of education

The literature highlights the importance of standardised patient education in pain management. Parrish et al.³⁴ reported that a standardised educational pathway was associated with a significant reduction in post-operative pain scores compared to non-standardised educational pathways ($p = .005$). In addition, Best et al.²⁹ found a significant relationship between uniform and standardised pain education and post-operative pain control ($p = .03$). YaDeau et al.³⁵ compared patient pain scores on the first day after surgery and found that surgical patients who received standardised pre-operative education with detailed information about pain expectations and management had lower pain scores with movement ($p < .001$) and at rest ($p = .01$) compared to patients who received non-standardised education.

Educational resources

A core element in successful patient education is the use of combined educational methods. The literature showed no differences based on the setting or type of surgery; however, the type of educational resources used had a significant impact on patient understanding. Using multiple educational tools including multimedia devices resulted in better patient outcomes.^{31,35,36} Ilyas et al.³⁷ examined the impact of educational presentations through handheld tablets and found a significant reduction in opioid consumption after surgery ($p < .05$). In a study

by Gunduz and Caliskan,³⁶ the key findings indicated significantly higher pain relief in the group that received verbal and video instructions ($p < .05$) compared with only verbal information. In addition, verbal discussion with a written booklet has been found to significantly lower pain^{38–40,42–44} and anxiety.^{38–41,43,44}

Educational materials for patients should be tailored to their needs and literacy levels.⁴⁵ Ho et al.⁴⁶ reported that verbal and written pre-operative education was beneficial for patients who were able to read, while patients who had low literacy benefited from verbal discussion and diagrams. Togac and Yilmaz³⁸ evaluated the effectiveness of individualised pre-operative verbal discussion combined with audio-visual material that included videos and leaflets. They found that post-operative pain, vomiting and nausea scores at zero, two, four, six and eight hours post-operatively were significantly lower ($p < .05$) in the group that received the education. These differences were seen in quality of life ($p = .001$), daily living activities ($p = .001$) and feelings related to the condition ($p = .005$).

Education providers

The literature revealed better pain outcomes when education was provided by more than one health care provider. According to Yanjnik et al.,⁴⁷ the involvement of a multidisciplinary team in the pain education process played a significant role in early ambulation, decreased opioid consumption and improved post-operative pain management. Khorfan et al.³¹ reported that 95 per cent of those who received education from both nurses and surgeons were prepared for surgery compared with 69 per cent of the participants who only received education from nurses ($p = .009$). Louw et al.⁴¹ found that professionals who received additional

pain education had fewer barriers to managing patient pain and higher levels of confidence and knowledge.

Timing of education

Ideally, pain education is provided for surgical patients in the pre-operative, post-operative, recovery and discharge phases. Literature has stressed the importance of reinforcing the pre-operative educational sessions provided to patients at the time of discharge from the hospital due to their impact on patient recovery.^{31,32,34,42} Sabesan et al.⁴⁵ found that pain scores during the post-operative period were significantly lower among participants who received education at 24 and 48 hours post-operatively (p = .036). Lemay et al.⁴⁸ indicated that pain education provided solely during the pre-operative period resulted in no statistical differences in pain reports, while pain education provided in both the pre- and post-operative periods resulted in lower pain scores 24 hours post-operatively. Among the 112 participants in a study by Khorfan et al.,³¹ those who received pre-operative and post-operative pain education were confident in managing their pain (p < .01) and used fewer opioids (p = .02).

Outcomes of pre-operative pain education

Several outcomes of pre-operative pain education were investigated in the studies included in this review. The outcomes were patients':

- pain control^{36,42,43}
- anxiety^{39,40,45,49}
- satisfaction^{34,50}
- knowledge about pain management³³
- opioid consumption.^{31,43,50}

Table 2 summarises the positive impacts of pre-operative pain education on these outcomes. Pre-operative pain education has also been found to significantly lower coughing and improve mobility in bed,^{39,43} improve walking ability,⁴⁴ decrease nausea and vomiting scores,³⁸ enhance the recovery process³⁹ and increase functional scores.⁴⁴

Pain control

Patient ability to control post-operative pain increases with pre-operative education. Rahmani et al.⁴¹ found that the severity of post-operative pain among participants who received pain education was lower (p = .005) compared to those

who did not receive education. Furthermore, Gunduz and Calskan³⁶ and Sabesan et al.⁴⁵ reported favourable pain experiences among participants who received pre-operative education in their studies.

Anxiety

People usually feel some anxiety about going for surgical procedures,³⁹ which may impact their attention to education and desire to learn.⁴⁹ Consequently, reduced anxiety may improve the desire to learn and promote attention to health status post-operatively. The pre- and post-operative anxiety levels of participants enrolled in studies by Cetkin and Tuna³⁹ and Lee et al.⁴⁰ were assessed and researchers found decreased anxiety levels post-operatively in the groups who received pre-operative education. Ho et al.⁴⁶ found improved state and trait anxiety inventory scores (p < .001) among participants who received education during hospitalisation.

Satisfaction

Patient satisfaction is impacted by pain education. Gunduz and Caliskan³⁶ examined patient satisfaction with pre-operative educational sessions and found that participants expressed being very satisfied with the pain-training video (80 per cent) and pain-training booklet (65 per cent). Stepan et al.⁵⁰ reported that participants who received pain education using multiple tools were satisfied with their pain management post-operatively, while participants who did not receive proper education were dissatisfied (p = .03).

Table 2: Positive impacts of pre-operative pain education on outcomes of surgery

Outcome	Impact of pre-operative pain education
pain	reduced severity and intensity of post-operative pain
anxiety	low post-operative anxiety level
satisfaction	satisfaction level higher after than before surgery
knowledge about pain management	patients have high level of knowledge (nurses need advanced pain education training)
opioid consumption	reduced or absent

Knowledge about pain management

Education is associated with improved knowledge levels among patients undergoing surgery. Van Dijk et al.³³ reported a significant increase in knowledge among patients who received education ($p = .001$) and a higher level of knowledge among nurses who received pain management training. In addition, Lemay et al.⁴⁸ and Van Dijk et al.³³ highlighted the need for advancing surgical nurses' knowledge through continuous educational programs about pain management. A strong association exists between nurses' education and their knowledge of post-operative pain management.

Opioid consumption

Reliance on opioids for pain management is decreased through pain education. Kwan et al.³² found that 80 per cent of patients who received pain education used non-opioid pain medication post-operatively and only 7.6 per cent required an opioid prescription at discharge. Sabesan et al.⁴⁵ reported that 24 per cent of patients who received education consumed one dose of opioids in the first 48 hours post-operatively compared with 100 per cent of participants in the group that did not receive pain education. The rate of unused opioids among participants who received pre-operative pain education has been investigated in several studies. For example, Stepan et al.⁵⁰ reported unused opioids in 42 per cent of patients who received pre-operative pain education compared to 25 per cent of those who did not receive this education ($p = .01$). Similarly, Korfan et al.³¹ reported a 29.8 per cent rate of unused opioids

in participants who received pre-operative education compared with zero per cent among those who did not receive education ($p < .05$).

Discussion

The focus of this integrative review was to examine the effectiveness of pre-operative education on post-operative pain management and the impact this may have on surgical outcomes. Pre-operative pain education was found to positively promote post-operative pain management and surgical experience. This review identified various factors affecting pain education that should be considered by health service organisations aiming to improve the quality of education provided to their patients. These factors were pain communication and assessment, standardisation of education, educational resources, educational providers and timing of education. In addition, the findings from this review emphasised that pre-operative pain education contributed to better patient health outcomes in terms of pain, anxiety, satisfaction, knowledge and opioid consumption.

Factors affecting pre-operative pain education

The studies in this review indicated that appropriate assessment of and effective communication about pain lead to effective education decisions and increased patient confidence in managing pain. According to Ferrell and Shindo,⁵¹ a well-established assessment of patient risk factors and expectations is a valuable component of effective patient-tailored, pre-operative pain education. In addition, this review found standardisation of pre-operative education to be critical in meeting the expectations of surgical patients.

In a study by Eschallier et al.,⁵² the authors reported a significantly improved level of knowledge ($p = .015$) for patients undergoing total knee arthroplasty following the use of a standardised pre-operative educational booklet compared to those who were provided with regular education. Using multiple educational tools during educational sessions was shown in this review to have better patient outcomes. Agarwal et al.⁵³ and Eschallier et al.⁵² found that combining verbal and written instructions or visual graphics that were tailored to patients' level of understanding improved health literacy and patient satisfaction. To be effective, educational resources should meet the needs of individual patients. A systematic review by Shlobin et al.⁵⁴ strongly supported the need to assess patient knowledge and health literacy to guide the provision of information and tailor health information on an individual level.

Moreover, the literature in this review also revealed the importance of involving more than one health professional in patient education. Collaboration among health professionals involved in the care of surgical patients was found to improve pain outcomes. These findings were in line with a study by Harris et al.⁴⁹ who stated that patient education about surgical care provided by nurses and surgeons contributed to increased patient understanding, alleviating anxiety and promoting learning readiness.

Health professionals' level of knowledge about pain and pain medications was identified as a key element that influenced post-operative outcomes. This integrative review revealed that professionals who had pain management training and education were able to assess and manage patients' pain

effectively. In an evaluation of pain management education among nurses, Bonkowski et al.⁵⁵ found that nurses' ability to manage patients' pain was improved with continuous pain management training and the use of pain management guidelines. This integrative review also revealed that providing education throughout the perioperative phases – pre-operative, post-operative, recovery and discharge phases – positively influenced surgical patients' health outcomes.

Outcomes of pre-operative pain education

Pre-operative pain education has positively impacted patients' pain control, anxiety, satisfaction, knowledge about pain management and opioid consumption. Pre-operative educational sessions decreased surgical patients' pain and anxiety levels post-operatively. Satisfaction and knowledge levels were strongly linked with effective patient education during the pre-operative phase. Patient satisfaction was investigated in a cross-sectional study by Dessie et al.⁵⁶ in which participants who received pain education were satisfied with managing their post-operative pain. Satisfaction with education may not be attained when education provided to surgical patients is not interactive and does not support patients' engagement in the process. In addition, this review showed a decrease in the rate of opioid consumption and an increase in the rate of unused opioids among patients who received proper pain education. In a study by Carender et al.,⁵⁷ the researchers found a significant reduction in opioid use and a significant cessation of opioid use six days post-operatively among participants who received pre-operative education.

Strengths and limitations

This integrative review has several strengths and limitations. Strengths are the process of evidence selection was carefully performed by a team of researchers, the quality of the included studies was assessed using a validated tool and the included literature covered current literature published within the last six years. This review also covered a wide range of surgical procedures in relation to post-operative pain management. The limitations include the exclusion of studies not published in English, which may have excluded relevant findings. In addition, only one qualitative study was identified and included. The inclusion of qualitative studies may have changed the conclusions of this review as a qualitative design could help in exploring various perspectives and represent participants' experiences with pain management. It is important to note, nonetheless, that different quantitative designs were included in this review, such as randomised control trials, quasi-experimental studies and a qualitative case study.

Implications and recommendations

Education and pain management are interrelated. Educational interventions related to pain management should be developed that include materials for patients covering all aspects of post-operative pain management. Further, educational content should be standardised and provided in sessions across all stages of perioperative care.

Surgical nursing roles involve conducting proper pain assessment and evaluation of surgical patients' learning needs to offer comprehensive pre-operative pain management interventions.

Accordingly, nurses should acknowledge the association between patient education and pain management and individualise surgical patients' interventions and care. Additionally, educational activities for nurses and other health professionals about pain management should be developed to enhance their competence in identifying patient pain management strategies. This would have a positive influence on health professionals' capacity for optimum post-operative pain management. Moreover, future studies should explore and compare health professionals' collaboration in delivering pain education to patients as well as nurses' role in leading this collaboration.

Conclusion

This integrative review aimed to explore the association between pre-operative education and post-operative pain management as well as identify components of pre-operative patient education interventions that lead to better pain control post-operatively. This integrative review is an important work that captures the depth and breadth of the impact of pre-operative pain education on post-operative pain management among surgical patients undergoing elective surgery. Factors affecting pre-operative pain education and outcomes of pre-operative pain education emerged as the main themes. Health care professionals should consider pain communication and assessment, standardisation of educational sessions, the use of a variety of resources in education, competent education providers and effective timing of education as contributing factors to better pain education. Effective pre-operative education has positive outcomes on surgical patients' pain, anxiety, satisfaction, knowledge, and opioid

consumption. The findings of this integrative review can guide health care professionals' improvement of the quality of pain management for surgical patients through education.

Declaration of conflicting interests

The authors have declared no competing interests with respect to the research, authorship and publication of this article.

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