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Application of Evidence-Based Nursing in The Preoperative Phase in Cardiac Surgery Patients To Optimize Physical and Psychological Preparation*: Literature Review*

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ABSTRACT

Introduction : Heart surgery patients need optimal physical and psychological conditions before surgery. This study aimed to explore nursing interventions to prepare the physical and psychological patients for preoperative phase cardiac surgery so that it can be a guide in improving the quality of care and clinical outcomes.

Method: This study used the 2020 *Preferred Reporting Items for Systematic Review and Meta-Analysis* (PRISMA) guidelines with *Scopus*, *PubMed*, *ScienceDirect*, and *Proquest* databases.

Results: The results of the study found six types of interventions, namely preoperative education, inspirational muscle training, use of technology and educational media, operating room nurse visits, music and relaxation interventions, and discharge education.

Conclusion: Interventions to prepare heart surgery patients in the preoperative phase do not only focus on the physical aspects, but a holistic approach that includes knowledge, physical exercise, psychological support, and the use of technology needs to be improved and developed to optimize overall patient readiness.

Keyword: cardiac surgery, evidence based nursing, preoperative

INTRODUCTION

Cardiac surgery in the preoperative phase is a critical stage that requires a holistic approach to ensure the patient's physical and psychological readiness (1). Complex cardiac surgery procedures, such as *coronary artery bypass surgery* (CABG) or valve replacement, has a high risk of postoperative complications including infection, respiratory distress, and hemodynamic instability (2). To minimize this risk, evidence-based nursing interventions (*Evidence-Based Nursing*/EBN) became the main choice. EBN integrates up-to-date scientific evidence, nurses' clinical experience, and patient preferences in designing effective interventions, such as procedural education, specific physical exercise, and anxiety management (3–5).

However, a literature review that specifically discusses the application of EBN in the preoperative phase of cardiac surgery is still limited, so a systematic review is needed to identify strategies that have proven optimal (3).

Globally, heart surgery is one of the most performed medical procedures. Data from *American Heart Association* (AHA) shows more than 1.3 million heart surgeries are performed each year in the United States, with a complication rate of 30% (6). In Indonesia, the high prevalence of cardiovascular disease has contributed to an increase in the number of heart surgeries by up to 15% per year, according to the Indonesian Ministry of Health. However, the disparity in the availability of facilities and human resources in remote areas is a challenge in implementing optimal preoperative preparation protocols (7). This condition emphasizes the urgency of implementing EBN interventions to equalize the standard of care and improve the quality of health services.

EBN intervention in the preoperative phase includes a series of evidence-based actions aimed at optimizing the patient's physical and psychological preparation. Patient education via video or virtual tours to the ICU has been shown to reduce anxiety by improving understanding of surgical procedures and the postoperative environment (8). Inspirational muscle training for five days before surgery increases lung capacity, lowering the risk of respiratory complications by up to 40% (9). Meanwhile, psychological support such as music therapy, hypnosis, or an operating room nurse visit reduced the anxiety score from 8.2 to 4.5 (10). This intervention not only prepares patients physically through improved fitness, but also builds mental resilience to the surgical procedure, thereby improving compliance and overall quality of care(11,12).

Lack of physical and psychological preparation in the preoperative phase can have serious consequences. Patients with low lung capacity are at risk of developing postoperative pneumonia, while unmanaged anxiety increases the need for analgesics and the risk of depression (9). Study by Arpag & Öztekin (2023) showed that patients who did not receive adequate education needed a 30% longer recovery time. Therefore, nurses need to implement EBN to optimize patient preparation through measurable interventions. This study aimed to explore effective nursing intervention strategies in preparing preoperative cardiac surgery patients physically and psychologically, so that it can be a guide in improving the quality of care and clinical outcomes.

METHOD

This systematic review study was conducted on the *2020 Preferred Reporting Items for Systematic Review and Meta-Analysis* (PRISMA) guidelines to ensure a structured and transparent process. A list of keyword combinations is prepared to perform article searches in online library databases, namely *Scopus*, *PubMed*, *ScienceDirect* and *Proquest*. Keywords used in searches include: *("evidence-based" OR "evidence-based" OR "empirical" OR "data-driven") AND ("intervention" OR "strategy" OR "approach" OR "method") AND ("cardiac surgery" OR "heart surgery" OR "cardiothoracic surgery" OR "cardiac procedure") AND ("preoperative" OR "pre-surgery" OR "preoperative phase" OR "preoperative care") AND ("outcome" OR "result" OR "effectiveness" OR "efficacy")*. The selected articles cover publications in the 2019 to 2024 time frame, with a primary focus on original research addressing preoperative nursing interventions in cardiac surgery. Articles are only included if they are written in English. Articles that do not meet the inclusion criteria, such as case studies, books, policy summaries, theses/dissertations, and *non-peer review articles*, are excluded from this systematic review.

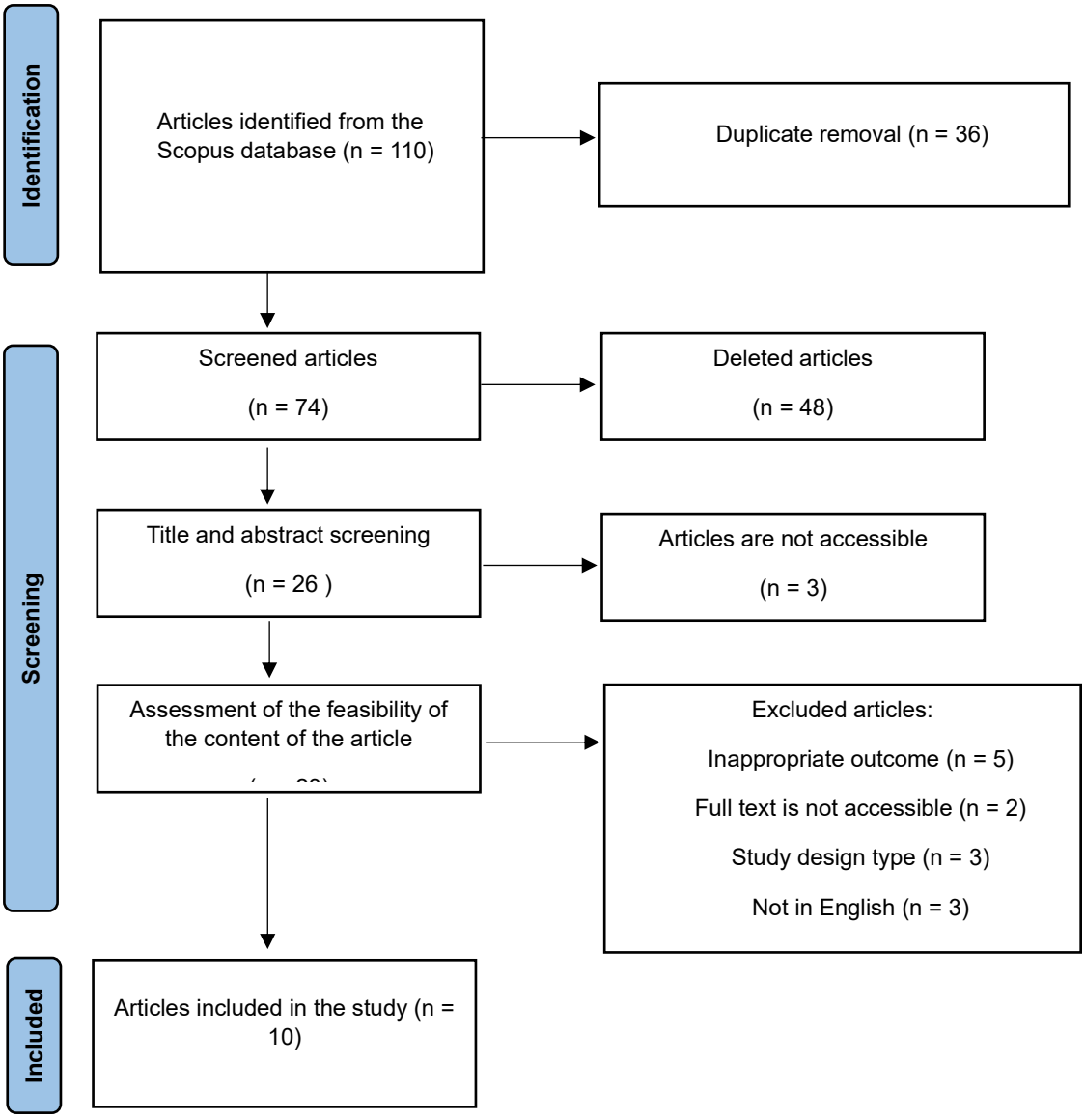

Figure 1. *Literature Search* Flowchart

All articles identified through an online database search are then imported into the *Mendeley Desktop* library, and duplicates are removed before the filtering process begins. The screening process is carried out in several stages. In the first stage, articles are selected by title to identify their relevance to the topic of discussing preoperative nursing interventions in cardiac surgery. Irrelevant articles are immediately removed. In the second stage, the abstract of the article is read in depth to evaluate whether the study reported on a nursing intervention. If the article does not report on the nursing intervention, then the article is removed in the third stage. In the fourth stage, the full text of articles that passed the previous selection is further reviewed. Only *peer-reviewed* articles published in scientific journals are included, while *non-peer review* articles, reports, case studies, theses/dissertations, books, and policy summaries are excluded from systematic review. In the fifth stage, a summary of each selected article is systematically recorded for further analysis. Details of the article selection process for analysis are shown in Figure 1.

RESULT

Based on the results of the article selection, the researcher found 10 articles to be analyzed in more depth through a systematic review. The results of the review are presented in table 1. The following:

Table 1. Articles Included in the Research After Screening

Journal Identity	Research Methods	Research Results
Effect of a preoperative evidence-based care education on postoperative recovery of cardiac surgery patients: A quasi-experimental study	Experimental	The list of evidence-based preoperative care presented can be safely used in nursing practice for patients. This list provides effective normothermia, reduces pain levels, shortens hospital stays, and reduces the number of postoperative complications.
Effect of Preoperative education and ICU Tour on Patient and Family Satisfaction and Anxiety in The Intensive Care Unit after Elective Cardiac Surgisery: A Randomized Controlled Trial	*Randomized Control trial*	Preoperative education consisting of videos and ICU tours provides comprehensive preoperative information about the ICU to elective heart surgery patients, increases patient and family satisfaction levels, and can lower patient anxiety levels.
The Effecys of Five Days of Intensive Preoperative Inspiratory Muscle Training on Postoperative Complications and Outcome in Patients Having Cardiac Surgery: A Randomized Controlled Trial	*Randomized Control trial*	A five-day intensive preoperative inspirational muscle training pattern reduced the incidence of postoperative lung complications and the duration of postoperative hospitalization in patients undergoing heart surgery.
The Effects of Preoperative Education of Cardiac Patients on Heamodynamic Patameters, Comfort, Anxiety, and Patient-Ventilator Synchrony: A Randomised, Controlled Trial	*Randomized Control trial*	Compared to participants in the control group, participants in the intervention group who received education had higher levels of patient-ventilator synchronization, comfort, and hemodynamic stability, as well as lower levels of anxiety when they used mechanical ventilation.
Discharge Education Intervention to Reduce Anxiety and Depression in Cardiax Surgery Patients: A Randomized Controlled Study	*Randomized Control trial*	Discharge educational intervention reduces depression in heart surgery patients
Effectiveness of Video Resources in Nursing Orientation before Cardiac Heart Surgery	*Randomized Control trial*	Onboarding done with the help of video resources is more effective for knowledge retention in preoperative patients, compared to verbal orientation alone.
The Effect of Visits by Operating Room Nurses Before Cardiac Surgery on Anxiety and Pain Management	Experimental	The participation of operating room nurses in preoperative patient care can contribute to the management of anxiety and pain and opioid reduction. Such an approach is recommended to be implemented as an independent nursing intervention given its potential contribution to the ERCS protocol.
The effect of a smartphone-based perioperative nursing intervention: Prayer, education, exercise therapy, hypnosis, and music toward pain, anxiety, and early mobilization on cardiac surgery	Experimental	A smartphone-based therapy model of prayer, education, exercise, hypnosis, and music given to patients before heart surgery can be used by nurses to reduce pain, anxiety, and improve early mobilization in heart surgery patients.
The Effect of a Preoperative Education Program on The Quality of Life and The Reduction	Experimental	Preoperative education programs in CABG patients have been shown to improve quality of life and reduce anxiety.

Symptoms of Anxiety Artery Bypass Graft Surgery – A Quasi-Experimental Study		
Effects of Music and Preoperative Education on Coronary Artery Bypass Graft Surgery Patients' Anxiety	Experimental	Multiple integrative nursing interventions (music and pre-operative education) were effective in reducing anxiety in CABG patients.

A detailed risk assessment of each study reviewed in table 1 was conducted using the JBI *critical appraisal checklist* for Randomized Controlled Trial and Experimental studies. The following are some nursing interventions in the preoperative phase to optimize the physical and psychological preparation of heart surgery patients:

Preoperative Education

Preoperative education prepares patients and families through evidence-based care, videos, ICU visits, and details on procedures, postoperative care, and recovery. It includes pain management, complication prevention, medication guidance, and mechanical ventilation communication for CABG patients.

Preoperative Physical Exercise

This intervention aims to ensure the patient's body is ready for the surgical procedure and minimize the risk of postoperative complications. Involves intensive muscle training for five days before surgery to increase lung capacity.

Use of Technology and Educational Media

Technology and educational media are used to support patient understanding and provide emotional support. Smartphone-based therapy that includes prayer, education, physical exercise, hypnosis, and music. Onboarding with short videos and slides to provide information on preoperative procedures and care.

Operating Room Nurse Visit

These interventions aim to provide emotional support and direct information to patients. The operating room nurse conducts preoperative visits to explain the surgical procedure and provide hands-on support.

Music Intervention and Relaxation

This intervention combines an art and educational approach to support the patient's physical and psychological preparation so as to provide a relaxation effect.

Discharge Education

Discharge education is provided before surgery to prepare patients for recovery. Provides clear information about postoperative care and recovery stages.

DISCUSSION

Evidence-based nursing interventions in the preoperative phase in cardiac surgery patients have an important role in preparing patients physically and psychologically before undergoing surgical procedures (14). One effective approach is preoperative education, which includes various methods such as evidence-based care information, the use of videos, ICU visits, as well as educational programs for coronary artery bypass surgery (CABG) (15). Research by Ongun et al (2024) Indicates that an evidence-based list of preoperative treatments can be safely used to reduce pain, shorten hospitalizations, and reduce postoperative complications. In addition, the research Ka et al (2020) found that the combination of educational videos and ICU visits provided comprehensive information to patients and families, thereby increasing satisfaction and lowering anxiety levels. Educating patients about mechanical ventilation and the use of communication panels to interact with medical personnel during recovery can improve patient-ventilator synchronization, comfort, hemodynamic stability, and reduce anxiety (16). CABG program education, as researched by Cygnarowicz & Milaniak (2024) It also helps to improve quality of life and reduce anxiety symptoms in patients. This education is essential to provide a clear understanding of surgical procedures, risks, and stages of recovery.

In addition to education, preoperative physical exercise is also a key element in the preparation of heart surgery patients. One intervention that has been shown to be effective is intensive inspirational muscle training for five days before surgery. Research by Chen et al (2019)

suggests that this exercise can reduce the incidence of postoperative lung complications and shorten the duration of postoperative hospitalization. The exercise focuses on the respiratory muscles, which increases the patient's lung capacity thereby reducing the risk of respiratory complications during and after surgery (18,19). By increasing lung capacity, patients are better prepared for surgical procedures and postoperative recovery, which in turn can speed up recovery and reduce hospital stays (20).

Modern technology also plays an important role in supporting the preparation of heart surgery patients (21). One example is therapy-based *Smartphone* which includes prayer, education, exercise, hypnosis, and music. Research by Awaludin et al (2022) Suggests that this smartphone-based therapy model can be used by nurses to reduce pain, anxiety, and improve early mobilization in cardiac surgery patients. This therapy gives patients more control over their condition and can be accessed at any time, thus providing ongoing psychological support. In addition, video orientation the day before surgery was also shown to be more effective in improving preoperative patient knowledge retention compared to verbal orientation alone (23). Short videos and slides explaining preoperative procedures and treatments help patients better understand information, thereby improving their readiness for surgical procedures.

Operating room nurse visits prior to surgical procedures also play an important role in reducing anxiety, pain, and opioid use in preoperative patients (24). Research by Arpag & Öztekin (2023) Suggests that the participation of operating room nurses in preoperative care can provide patients with much-needed emotional support leading up to the day of surgery. This approach helps build a sense of security and a strong professional relationship between the patient and the medical team, so that the patient feels more calm and prepared for the surgical procedure. Music therapy with preoperative education to provide a relaxing effect by playing relaxation music while providing information about surgical procedures has been shown to be effective in reducing anxiety in patients undergoing coronary artery bypass surgery (10). Discharge education is provided before surgery to prepare patients for the recovery period, with information about postoperative care and recovery stages. This intervention was effective in reducing depression and anxiety related to discharge (25). Overall, the combination of preoperative education, physical exercise, use of technology, and operating room nurse visits proved effective in thoroughly preparing patients, reducing postoperative complications, and improving their care experience. Implementation *Evidence-Based Nursing* (EBN) is highly recommended to improve the treatment outcomes of heart surgery patients.

CONCLUSION

The application *of Evidence-Based Nursing* (EBN) in the preoperative phase in cardiac surgery patients has been proven to be effective for optimizing physical and psychological preparation. A variety of evidence-based interventions, such as evidence-based preoperative education, preoperatively inspirational muscle exercises, the use of technology (educational videos and smartphone apps), operating room nurse visits, as well as a combination of music and preoperative education, have shown a positive impact in reducing anxiety, pain, and postoperative complications. In addition, this intervention also accelerates patient recovery, shortens the length of hospitalization, and improves the patient's quality of life. Preoperative education provides a better understanding of surgical procedures, while psychological approaches and emotional support help patients feel more prepared and calm ahead of surgery. Overall, the application of EBN is highly recommended to improve the treatment outcomes of cardiac surgery patients holistically.

Conflicts of interest

Author declared no conflict of interest.

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