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REVIEW ARTICLE

Recommendations for patient preparation in the preoperative period of cardiac surgeries: a scoping review

Recomendações para o preparo do paciente em pré-operatório de cirurgias cardíacas: revisão de escopo

Recomendaciones para la preparación del paciente en el preoperatorio de cirugías cardíacas: revisión del alcance

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ABSTRACT

Objective: To map the production of knowledge regarding the recommendations for the preoperative preparation of any type of cardiac surgery, whether elective or urgent, of patients over 18 years old in hospitalization units. **Method:** A scoping review carried out in December 2020 in 11 data sources, following the Joanna Briggs Institute recommendations, with descriptive data analysis. **Results**: A total of 27 studies were selected and characterized, identifying the following as the main preoperative recommendations for cardiac surgeries: preoperative education, medications, scales for postoperative risk stratification, inspiratory muscle training and tests. **Conclusion:** The recommendations presented efficacy in hemodynamic stability, attenuation of the patient's fear and anxiety regarding the surgery, of the number of arrhythmias and hospitalizations, of the mortality rate and of postoperative complications.

Descriptors: Cardiovascular Surgical Procedures; Preoperative Care; Perioperative Assistance.

RESUMO

Objetivo: Mapear a produção de conhecimento a respeito das recomendações para o preparo pré-operatório de qualquer tipo de cirurgia cardíaca, eletiva ou de urgência, de pacientes com idade superior a 18 anos em unidades de internação hospitalar. **Método:** Revisão de escopo realizada em dezembro de 2020, em 11 fontes de dados, seguindo as recomendações do Instituto Joanna Briggs, com análise de dados descritiva. **Resultados**: Foram selecionados e caracterizados 27 estudos, identificando-se como principais recomendações pré-operatórias de cirurgia cardíaca: a educação pré-operatória, medicações, escalas para estratificação de risco pós-operatório, treinamento muscular inspiratório e realização de exames. **Conclusão:** As recomendações apresentaram eficácia na estabilidade hemodinâmica, atenuação do medo e ansiedade do paciente quanto à cirurgia, de arritmias, internação hospitalar, taxa de mortalidade e complicações pós-operatórias.

Descritores: Procedimentos Cirúrgicos Cardiovasculares; Cuidados Pré-Operatórios; Assistência Perioperatória.

RESUMEN

Objetivo: Mapear la producción de conocimiento sobre las recomendaciones para la preparación preoperatoria de cualquier tipo de cirugía cardiaca, electiva o urgente, de pacientes mayores de 18 años en unidades de hospitalización. **Método:** Revisión de alcance realizada en diciembre de 2020, en 11 fuentes de datos, siguiendo las recomendaciones del Instituto Joanna Briggs, con análisis descriptivo de datos. **Resultados:** Se seleccionaron y caracterizaron 27 estudios, las principales recomendaciones preoperatorias para cirugía cardiaca que se identificaron son: educación preoperatoria, medicamentos, escalas para estratificación de riesgo postoperatorio, entrenamiento de músculos inspiratorios y exámenes. **Conclusión:** Las recomendaciones fueron efectivas para mejorar la estabilidad hemodinámica, disminuir el miedo y la ansiedad del paciente por la cirugía, las arritmias, el tiempo de estancia hospitalaria, la tasa de mortalidad y las complicaciones postoperatorias.

Descriptores: Procedimientos Quirúrgicos Cardiovasculares; Atención Preoperatoria; Asistencia Perioperatoria.

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INTRODUCTION

Cardiovascular diseases (CVDs) are one of the leading causes of death in the world, with the possibility of reaching more than 23.6 million cases by 2030. In Brazil, in 2018, 395,700 deaths due to CVDs were estimated; of these, 32.2% were due to ischemic heart diseases, with Acute Myocardial Infarction (AMI) as the main cause[1,2].

Coronary Artery Disease (CAD) is caused by the formation of fatty deposits in the coronary arteries, a process known as atherosclerosis. The coronary failure caused by the obstruction generates a broad clinical condition, with symptoms such as chest pain, which may be associated with nausea, vomiting, cold sweating and lipothymia under physical efforts[1].

Clinical and pharmacological interventions are treatment options but, when they are insufficient to control and maintain the cardiac patient's health, surgical correction is necessary[3]. The preoperative period begins with the identification of the surgical need until its performance, being devoted to the preparation of the patient in all aspects, and in this, many physical and psychological complications can be avoided, ensuring greater safety in the surgery and postoperative recovery[4].

In this sense, meetings, preoperative visits and surgical evaluations by a multiprofessional team are essential to prepare the surgical patient and systematize care[5]. In the preoperative period, the objective is to ensure the patients' well-being, as they can develop feelings that negatively affect their emotional state[6].

Cardiac surgeries are very frequent. It is noted that, for every 1 million inhabitants, there are approximately 2,000 annual heart surgeries in the United States of America and 350 in Brazil[7]. Myocardial revascularization surgeries and those for heart valve implants are the most common cardiac surgical procedures[7]. These types of surgeries can generate anxiety, fear and uncertainties[6].

It is important to ensure assistance based on diverse scientific evidence and on clinical reasoning for the care each patient[6]. Nurses must previously obtain human resources, materials, knowledge and skills for quality pre-surgical preparation[5,7].

This study is justified for collaborating with the scientific community on the main multiprofessional recommendations in the preoperative preparation for cardiac surgeries for adult patients in hospitalization units. It is beneficial for health care as it offers recommendations capable of structuring protocols and/or checklists based on diverse scientific evidence, capable of assisting the multiprofessional team in directing their care during the preoperative preparation of cardiac surgeries.

Initially, to verify scoping reviews or protocols similar to the objective of this study, a search was carried out in the following platforms: Database of Abstracts of Reviews of Effects (DARE), International Prospective Register of Ongoing Systematic Reviews (PROSPERO), JBI Clinical Online Network of Evidence for Care and Therapeutics (COnNECT+) and Open Science Framework (OSF). The results pointed to nonexistence of studies with an objective equivalent to that of this review.

The objective is to map the production of knowledge regarding the recommendations for the preoperative preparation of any type of cardiac surgery, whether elective or urgent, of patients over 18 years old in hospitalization units.

METHOD

This is a scoping review, with the objective of mapping concepts on a given topic, identifying and analyzing existing gaps in knowledge[8]. The recommendations established by the Joanna Briggs Institute (JBI) were followed[8], as well by the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRSMA-ScR) checklist[9], and the study was registered at OSF (https://osf.io/sab5j/).

To formulate the research question, the Population, Concept and Context (PCC) strategy was adopted, with Population (P): patients over 18 years old; Concept (C): recommendations for preoperative preparation; and Context (C): preoperative period of elective or urgent cardiac surgeries in hospital inpatient units. The research question was formulated as follows: "Which are the recommendations for the preoperative preparation of any type of cardiac surgery, whether elective or urgent, for patients over 18 years old in hospitalization units?"

The following Descriptors in Health Sciences were used: "*Cirurgia Torácica*", "*Procedimentos Cirúrgicos Cardíacos*", "*Procedimentos Cirúrgicos Cardiovasculares*", "*Cuidados Pré-operatórios*",

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"*Assistência Perioperatória*" and "*Unidades Hospitalares*"; according to the Medical Subject Headings: "Thoracic surgery", "Cardiac Surgical Procedures", "Preoperative Care", "Perioperative Care" and "Hospital Units". The following keywords were chosen: "*Cirurgia Cardíaca*/Cardiac Surgery", "*Assistência no Período Pré-operatório*/Preoperative Procedure" and "*Unidades de Cuidados*/Care Units". The Boolean operators "*AND*" and "*OR*" were adopted.

The following search strategy was developed: (*Thoracic Surgery OR Surgery Cardiac OR Cardiac Surgical Procedures OR Myocardial Revascularization*) *AND* (*Preoperative Care OR Preoperative Procedure OR Perioperative Care*) *AND* (*Care Units OR Hospital Units*), being adapted according to each data source.

Studies published online, in full and without time or language restrictions were included, which addressed recommendations for the preoperative preparation of elective or urgent cardiac surgeries for adult patients in hospitalization units. Studies not compatible with the research question were excluded.

The search was carried out in December 2020 in 11 data sources: *Catálogo de Teses e Dissertações* (CAPES), Cochrane Library, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Gale Academic Onefile, *Literatura Latino-Americana e do Caribe em Ciências da Saúde* (LILACS), *Repositórios Científicos de Acesso Aberto de Portugal* (RCAAP), ScienceDirect, Scientific Electronic Library Online (SciELO), Scopus, Trove - National Library of Australia and Web of Science.

The search was performed independently by two researchers. In case of differences in selection of the studies, a third party carried out the analysis and made the final decision. Subsequently, considering the criteria for inclusion, exclusion and removal of duplicates, 256 articles were selected for full reading, of which 27 comprised the results. It is noted that, for the elaboration of the flowchart, the updated guidelines were used for its development, according to PRISMA 2020[10] along with the JBI recommendations[8].

Synthesis of the articles included in the sample was described in a chart containing data on: year, country, reference and the main recommendations for cardiac surgery preoperative preparation.

RESULTS

Figure 1 presents a flowchart referring to the process of identification, screening and inclusion of studies in the results, as shown below:

The most prevalent years of publication were as follows: 2020 with 22.22% of the studies and 2019 (14.81%). The countries that published the most were the following: Germany with 22.22% and Brazil (14.81%). Figure 2 presents the synthesis of the data extracted from the studies.

DISCUSSION

Proximity of the surgery brings about fear and uncertainties about the results of the intervention. These feelings can be associated both with the lack of information regarding the surgical procedure, anesthesia, care measures performed, and with deficiencies in the patients' physical, psychological and spiritual preparation in the preoperative period[39].

Preoperative education confers greater hemodynamic stability and satisfaction to the patients, as well as it attenuates fear, anxiety and ICU stay, generating lower hospital costs. The patients were encouraged to expose their thoughts and feelings about the surgery so that the professionals could intervene, using understandable language when guiding them[12,15-17,19,23,27,34,36,38]. In this bias, a study showed that the presence of a holistic nurse in the preoperative period of myocardial revascularization surgeries allowed reducing stress, anxiety and depression in the patients[22].

In the educational process, videos and booklets were mainly used, increasing short-term memory, allowing for more active learning[27,34,38].

Statins present benefits for patients with Acute Coronary Syndrome (ACS), as well as for those subjected to percutaneous coronary interventions. There is evidence of a reduction in atrial fibrillation in patients who used statins in the preoperative period[33], as well as of short-term mortality[32,33] and of the emergence of stroke[33],but its use in cardiac surgery patients still needs more evidence[32,33].

Anemia is associated with an increase in adverse events in cardiac surgery, including mortality[40]. A number of randomized clinical trials[14,28] used erythropoietin in the preoperative period of anemic patients, being effective in reducing allogeneic red blood cell transfusion[40]. When combined with iron, folic acid, and vitamin B12, it assisted in perioperative recovery[14].

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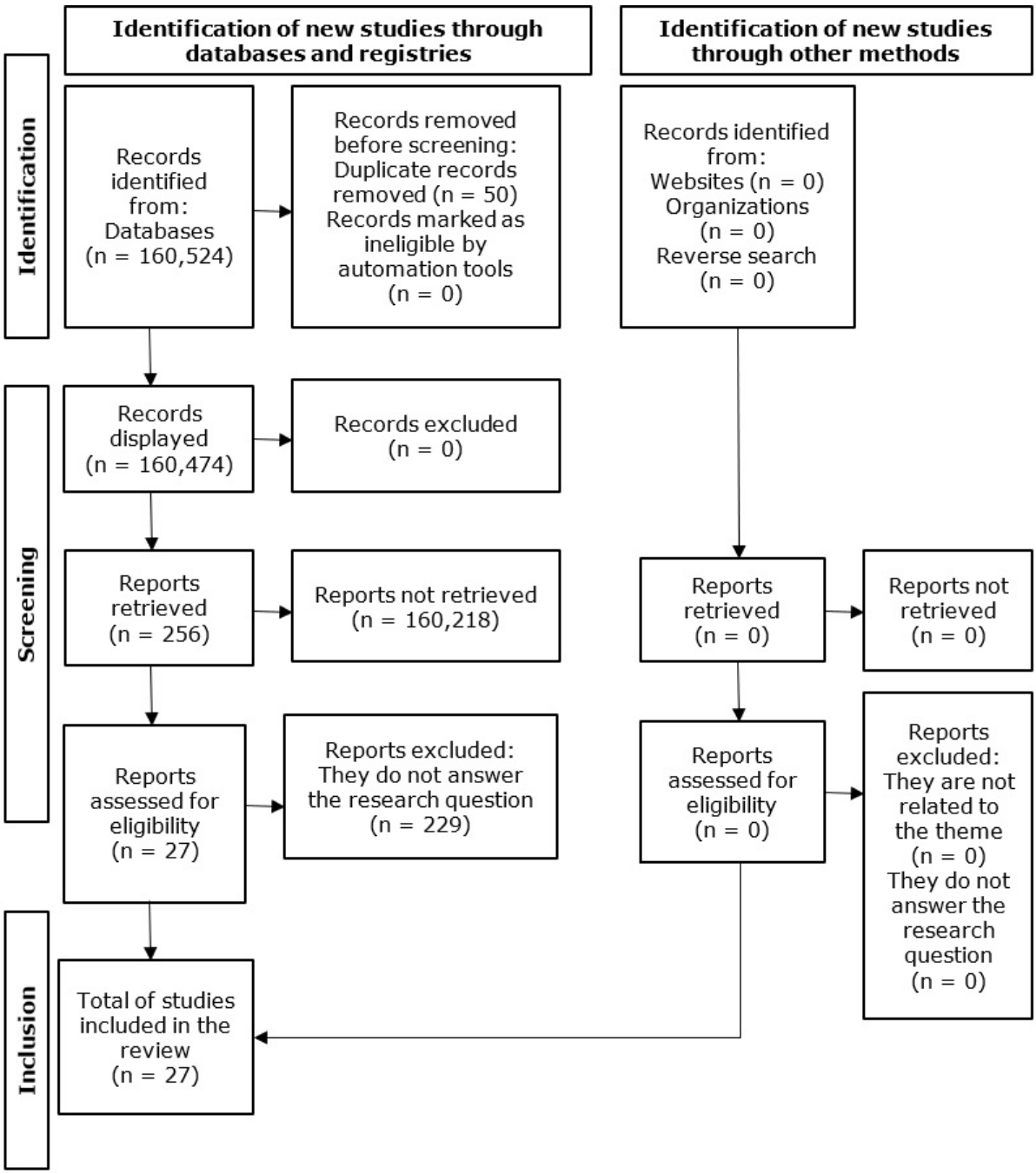

Figure 1 - Flowchart (PRISMA-ScR). Natal, RN, Brazil, 2021
Source: Adapted from Page et al.[10].

Anxiety can cause a long QT interval, contributing to an increase in ventricular arrhythmias and risk of death. Lorazepam is effective in reducing anxiety in cardiac surgery[18]. Although the use of benzodiazepines can alter the electrocardiographic parameters[41], this medication does not affect them directly and is recommended for reducing anxiety[18].

The use of ACEIs is also demonstrated. These drugs allowed reducing the postoperative renal failure rates[13]. A study used the combination therapy of clopidogrel and aspirin for seven days before the surgical procedure, revealing that the group that underwent the therapy needed more blood and plasma units, not indicating the therapy for

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Year/ Country/ Reference	Recommendations for cardiac surgery preoperative preparation
2020/Brazil[11]	Measurement of maximal inspiratory (MIP) and expiratory pressure, assessing respiratory muscle weakness.
2020/China[12]	Video about the ICU, invasive devices in the postoperative period, pain management, surgery, family visit and communication between patient, professionals and family members.
2020/USA[13]	Angiotensin Converting Enzyme Inhibitor (ACEI) 48 hours before the cardiac surgery.
2020/Switzerland[14]	Ferric carboxymaltose with a maximum dosage of 1,000 mg; erythropoietin alpha 40,000 U; 1 mg of vitamin B12; 5 mg of folic acid in the anesthetic evaluation.
2020/Turkey[15]	Preoperative education on mechanical ventilation through educational books.
2020/Turkey[16]	Hospital discharge education with 20-minute sessions and a booklet on CAD, preoperative procedures, ICU admission, and home care.
2019/USA[17]	Guidelines, printed material or apps about the procedure and its objectives; drink with 24 g of carbohydrate 2 h before the surgery.
2019/Turkey[18]	0.04 mg/kg of lorazepam the night before and 2 hours before the surgical procedure.
2019/Iran[19]	Digital narrative of 30-minute stories about recovery and hospital discharge with candidates subjected to cardiac surgeries.
2019/China[20]	Inspiratory muscle training at 30% of MIP for 20 minutes, twice a day, in the last five days, under supervision of a physical therapist.
2018/Germany[21]	Association of the following scales: Risk Screening 2002 (NRS-2002) and Malnutrition Universal Screening Tool (MUST), Subjective Global Assessment (SGA), Mini Nutritional Assessment (MNA), and Short Nutritional Assessment Questionnaire (SNAQ) and EuroSCORE and Duration of Cardiopulmonary Bypass (CPB).
2018/Iran[22]	Generating trust between patient and nurse; usual preoperative care and conversation about stress, training or relaxation methods.
2017/Brazil[23]	Educational video for guidance on myocardial revascularization (MRV) surgery, preoperative, intraoperative and postoperative care.
2017/Brazil[24]	Inspiratory muscle training, performed daily, with a MIP with a 15% to 60% load and lasting from 20 to 30 minutes.
2017/Spain[25]	Society of Thoracic Surgeons (STS) Score and EuroSCORE II scales to calculate surgical risk, considering frailty and functional capacity.
2016/Germany[26]	Chest Computed Tomography (CT) to assist in the surgical strategy and predict mortality and stroke in the postoperative period.
2016/Brazil[27]	Video about the MRV surgery and *PowerPoint* presentation of complementary information.
2015/Italy[28]	8,000 IU of erythropoietin, two days before the surgery. All the patients received 15 ml/day (40 mg/day) of iron supplementation from admission.
2014/Iran[29]	Blood sample 48 h before the surgery for total lymphocyte count.
2012/China[30]	Exercise divided into: warm-up, training and cool-down phase, with a maximum 0_2 consumption of 50% to 60%. Performed up to twice a week, lasting from 40 to 60 minutes, two weeks before the surgery.
2010/Germany[31]	Combination therapy: clopidogrel (75 mg/day) and aspirin (100 mg/day) for seven days before the surgery.
2008/Germany[32]	Statins in all hyperlipidemic patients with multiple cardiac risks and coronary heart disease.
2008/Italy[33]	Rosuvastatin (20 mg/day), seven days before the surgical procedure.
2007/Sweden[34]	Booklet containing the following: hygiene; heart diseases and surgical approaches; medications; wound infections and surgical complications; possible psychological reactions; postoperative lifestyle.
2006/Netherlands[35]	Chlorhexidine gluconate 0.12% from admission to mouthwash (10 ml) and apply to the gingival and dental surfaces; chlorhexidine nasal ointment, 4 times a day in the nostrils.
2006/Lebanon[36]	Education about the ICU equipment, visit, explanation and demonstration of breathing exercises, leg exercises, possible complications, pain management and early ambulation.
2005/Germany[37]	Measurement of troponin I levels 24 h before the surgery.
2004/Turkey[38]	Booklet on: the heart and its functions; CAD and valve disease; cardiac surgery; preoperative exercises; laboratory and imaging tests, preparations on the morning of the surgery and care in the ICU.

Figure 2 - Main preoperative recommendations. Natal, RN, Brazil, 2020
Source: Prepared by the authors, 2020.

patients in the preoperative period of myocardial revascularization[31].

Surgical site infection ranks 3rd among the Healthcare-Associated Infections (HAIs)[42], extending hospital stay and increasing morbidity/mortality[43]. A study indicated a reduction in the number of HAIs in patients subjected to cardiac surgery, mainly at the surgical site, through 0.12% chlorhexidine as mouthwash, nasal application four times a day from admission to surgery and two baths with chlorhexidine gluconate antiseptic (40 mg/mL) the day before the surgery[35].

When performed in the cardiac surgery preoperative period, inspiratory muscle training promotes less use of the non-invasive ventilator[11,30], lower length of hospital stay[20,24] and fewer postoperative pulmonary complications[11,20,24], as well as an improvement in expiratory volume strength[24] and in the patient's quality of life[30].

A research study described the training of respiratory muscles in the preoperative period of thoracic and abdominal surgeries. It reveals that, when performed preoperatively, this type of training is capable of preventing pulmonary complications after surgery by increasing respiratory muscle strength, in addition to describing improvements in pulmonary resistance and postoperative hospitalization time[44].

Scales are also used during the preoperative period of cardiac surgeries[21,25], presenting efficacy in predicting length of ICU stay when associated with EuroSCORE and CPB[21]. A study evidenced the ability of NYHA to predict the functional status of the patients in the perioperative period and their mortality. It also describes EuroSCORE, Cleveland Clinic Score (CCS), Magovern Score (MS) and STS as the best to predict mortality at 30 days and 1 year, with EuroSCORE being most used for low-risk patients and STS, for high risk[45].

As for the preoperative tests, the following stand out: measurement of the serum troponin I levels[37] and chest CT[26]. The first is effective in preoperative risk stratification. Thus, high serum levels (1.5 ng/ml) are associated with higher mortality, low cardiac output syndrome and AMI[37]. Patients with AMI and high troponin I levels have a lower success rate in PCI and a higher risk for long-term cardiac mortality[37].

As for the total lymphocyte count, high levels (1,500 cells/μL) were associated with an increased need for inotropic support, infectious complications and acute renal failure[29]. Low levels (≤ 1,000 cells/μL) were associated with diabetes and with impaired microcirculation[29].

Chest CT in the cardiac surgery preoperative period can be used to stratify the risk of CVDs and for planning interventions to improve the assistance provided[46]. This preoperative test allowed reducing mortality and the incidence of postoperative stroke, as well as optimizing the surgical approach[26].

This review had the following limitations: lack of detail of the preoperative recommendations in some studies, in addition to the reduced amount of information in the literature on preoperative assistance in the prevention of HAIs. Another limitation of this review was the non-inclusion of studies with pediatric patients, which could perhaps present some preoperative recommendations different from those found in adults.

CONCLUSION

The cardiac surgery preoperative recommendations are related to education, medications, inspiratory muscle training, scales and tests. In preoperative education, guidelines were provided regarding the surgical procedure, pain management and postoperative period through videos and illustrative pamphlets. The most prevalent medications were statins, erythropoietin and lorazepam. The following was also observed: inspiratory and expiratory training and diaphragmatic breathing, in addition to the use of scales such as EuroSCORE and NYHA. Tests such as serum troponin I levels, total lymphocyte count and chest CT are also described.

These recommendations were effective for hemodynamic stability, reduction of fear, anxiety, arrhythmias, hospital stay, mortality and postoperative complications.

This study provides diverse scientific evidence for greater theoretical grounds on the main recommendations regarding cardiac surgery preoperative management for the multiprofessional team, helping professionals from several areas to carry out evidence-based practice, which will mitigate negative pre-cardiac-surgery feelings and reduce the patient's lack of information about the surgical procedure, as well as assist in the client's physical and psychological preparation.

CONFLICTS OF INTEREST

The authors have no conflict of interest to declare.

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