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Educational interventions in the perioperative period of the patient undergoing cardiac surgery: a scoping review of the literature

Interventi educativi nel periodo perioperatorio del paziente sottoposto a cardiochirurgia: una scoping review della letteratura

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ABSTRACT

Background: Caring for patients undergoing cardiac surgery is very delicate since it is aimed at a person who is afraid, worried, anxious and very often fragile or elderly. Exposure to high levels of stress in the pre and post-operative period affects body function and can aggravate the symptoms of cardiovascular disease by developing a post-traumatic stress disorder that causes an extension of recovery times, an increase in post-operative pain, a slower recovery from anaesthesia, a greater demand for drugs and a prolonged hospital stay. In this context, the nurse implements educational interventions aimed at informing and making patients aware of what they are going to experience, thus reducing the sense of anxiety, increasing their knowledge and laying the foundations for a more conscious recovery.

Aim: The aim of this study is to map the various types of educational interventions that nurses use, in order to guarantee an improvement in patients undergoing cardiac surgery outcomes.

Methods: It was carried out a scoping review of literature according to the PRISMA-ScR methodology in MEDLINE, Scopus, PsycINFO and CINAHL databases between November 2019 and January 2020.

Results: Initially, 598 studies were selected. A total of 19 articles met the inclusion criteria. Brochures, videos, verbal counselling and psychological interventions were used more frequently and with the best outcomes. Often a mix of these was used. Furthermore, three main moments were identified in which the interventions were delivered: preoperative, postoperative or both.

Conclusion: Evidence from this scoping review suggest that a multimodal approach gives the best outcome. Furthermore, whatever the types of interventions are, it is recommended to individualize them, according to the patient's needs.

Keywords: educational intervention; cardiac surgery patient; nurse; outcome; self-care.

RIASSUNTO

Introduzione: L'assistenza al paziente in cardiochirurgia è molto delicata poiché si rivolge ad una persona molto spesso fragile o anziana che ha paura, è preoccupata ed ansiosa. L'esposizione a livelli elevati di stress nel pre e post-operatorio influisce sulla funzionalità corporea e può aggravare i sintomi della malattia cardiovascolare, sviluppando un disturbo post traumatico da stress che provoca un'estensione dei tempi di recupero, un aumento del dolore post-operatorio, un recupero più lento dall'anestesia, una maggiore richiesta di farmaci e una degenza ospedaliera prolungata. In questo contesto, l'infermiere attua interventi educativi volti a informare e sensibilizzare i pazienti su ciò che sperimenteranno, riducendo così il senso di ansia, aumentando le loro conoscenze e gettando le basi per un recupero più consapevole.

Obiettivo: Lo scopo di questo studio è di mappare e descrivere i vari tipi di interventi educativi che gli infermieri utilizzano per garantire un miglioramento dei risultati delle cure nei pazienti sottoposti a cardiochirurgia.

Materiali e Metodi: È stata effettuata una scoping review della letteratura secondo la metodologia PRISMA-ScR nei database MEDLINE, Scopus, PsycINFO e CINAHL tra novembre 2019 e gennaio 2020.

Risultati: Inizialmente, sono stati selezionati 598 studi. Un totale di 19 articoli ha soddisfatto i criteri di inclusione. I tipi di interventi più utilizzati e con i migliori risultati sono stati opuscoli, video, consulenza verbale ed interventi psicologici. Spesso veniva usato un mix di questi. Inoltre, sono stati identificati tre momenti principali in cui gli interventi sono stati svolti: nel preoperatorio, nel postoperatorio o in entrambi.

Conclusioni: Le evidenze di questa revisione suggeriscono che con un approccio multimodale si ottengono i migliori outcome assistenziali. Inoltre, qualunque siano i tipi di interventi, si consiglia di personalizzarli, in base alle esigenze del paziente.

Parole chiave: intervento educativo; paziente cardiochirurgico; infermiere; risultato; self-care.

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INTRODUCTION

Caring for patients undergoing cardiac surgery is very delicate since it is aimed at a person who is afraid, worried, anxious and very often fragile or elderly. Faced with the fear of undergoing such a delicate intervention on a vital organ, emotional and psychological tensions increase. The psychological discomfort generates stress in the individual. Exposure to high levels of stress in the pre and post-operative period affects body function and can aggravate the symptoms of cardiovascular disease by developing a post-traumatic stress disorder that causes an extension in the length of time spent in recovery[1], an increase in post-operative pain, a slower recovery from anaesthesia, a greater demand for drugs and a prolonged hospital stay.

In this context, the nurse implements educational interventions aimed at informing and making patients aware of what they are going to experience, thus reducing the sense of anxiety, increasing their knowledge and laying the foundations for a more conscious recovery[2,3]. Moreover, the nurse advocates and promotes health education, supporting the patient and providing him with the necessary instruments to achieve his well-being.

The contexts in which the studies are reported were of the most varied: Iran[4-9], Greece[10], Canada[11,12], Brazil[13], Norway[14], Taiwan[15], Denmark[16-18], Turkey[19,20], Portugal[21] and India[22]. The global spread of the problem demonstrates how important it is to scope the extent, range and nature of research activity around cardiac education. All kinds of interventions have been documented, from mixed techniques consisting of brochures, group meetings[23], lectures and explanatory videos[24-28] to breathing exercises and psychoeducational interventions to improve tolerance for activity, self-efficacy and quality of life[29-35]. Furthermore, patients underwent different cardiac surgical operations such as coronary artery bypass grafting (in most cases), elective sternotomy, and other heart surgeries not better specified. Even at the time of discharge and in the transition from hospital to home, the nurse continued to follow the patient and promote their autonomy. Many patients' outcomes were assessed, including the improvement of quality of life, participation in cardiac rehabilitation programs, hospital readmission, knowledge, economic impact, postoperative pain and delirium, anxiety and selfcare.

The aim of the review is, therefore, to offer a comprehensive map of the various types of educational interventions that nurses use and identify, which are more effective and able to guarantee an improvement in patients' outcomes.

METHODS

The search for studies from international literature was conducted in accordance with the PRISMA-ScR (PRISMA extension for Scoping Reviews)[36] methodology and was carried out within some main databases of bio-medical interest: MEDLINE, Scopus, CINAHL and PsycINFO.

The data were collected between November 2019 and January 2020.

The keywords used were nurse; education; patients; cardiac surgery; cardiac surgery patients.

The latter were helpful in formulating the research question according to the PCC (Population, Concept and Context) methodology. (**Table 1**)

Review question: "What are the best educational interventions to guarantee an improvement in cardiac surgery patients' outcomes?". To date, interventions have been documented either only for the pre-operative period or only for the post, but never in both at the same time and specifically for the patient undergoing cardio-thoracic surgery[37].

The search strategy was built using the Boolean operators "AND" and "OR", Mesh Terms and the truncation function, to guarantee maximum search sensitivity and specificity:

(Nurs*) AND (education) and (cardiac surgery patients OR open-heart surgery patients)

The below-mentioned selection criteria were followed to identify the studies for this review.

Inclusion criteria:

- publication date starting from 2009 to include the most recent literature of the past 10 years;
- articles written in Italian and / or English;
- primary experimental studies: True experimental research designs such as RCT (Randomized Controlled Trial) and Quasi-experimental research design;
- nurse-led interventions.

Exclusion criteria:

- articles written in a language other than Italian and English;
- gray literature;
- non-experimental studies (observational studies, case studies, pretest-posttest research designs);
- guidelines and position statements;
- letters and commentaries;
- literature reviews;
- qualitative studies.

DATA ANALYSIS

To increase consistency among reviewers, all of them screened the same publications, discussed the results and amended the screening and data extraction manual before beginning screening for this review. Two reviewers sequentially evaluated the titles, abstracts and then full text of all publications identified by our searches for potentially relevant ones. We resolved disagreements on study selection and data extraction by consensus and discussion with the other reviewer if needed.

The following data were collected for each paper: title of the study, first author, year of publication, sample and design of the study, objective, intervention, outcome and summary of the results.

The approach used to group the articles was thematic: the main objective of the thematic analysis is to identify similar concepts in the set of data collected, exploring their relationships of meaning. These reports can be used to further develop and corroborate the interpretation of theories that seek to investigate the phenomena studied[38].

The main information of the relevant articles were organized in a data extraction table (**Table 2**).

RESULTS

Initially, 598 studies were selected. A total of 19 articles met the inclusion criteria.

Table 1. PCC

POPULATION	Cardiac surgery patients
CONCEPT	Nurse-led educational interventions
CONTEXT	Perioperative period

Tab. 2 - Data extraction table

TITLE, AUTHOR, YEAR	SAMPLE AND STUDY DRAWING	AIM	INTERVENTION	OUTCOMES AND RESULTS
Effectiveness of Discharge Counseling on Compliance and Problems of Patients who have Undergone Heart Valve Replacement Ramya et al. (2012)	n. 60 patients mean age = 30 RCT	Evaluate the effectiveness of counselling at the time of discharge on compliance and on the various problems of patients undergoing heart valve replacement.	• Individual discharge advice.	Through individual discharge advice, the patient's compliance and the distance he could cover walking in the postoperative period improved. Complications have diminished when compared to routine care.
Can nurse-led preoperative education reduce anxiety and postoperative complications of patients undergoing cardiac surgery? Kalogianni et al. (2016)	n. 395 patients mean age = 65 RCT	Estimate the effectiveness of the preoperative education conducted by the nurse on anxiety and postoperative outcomes.	• Mixed preoperative education: a booklet with information on cardiac surgery and the perioperative process, respiratory exercises, pain and anxiety control, movement management.	Mixed preoperative education administered by nurses improved anxiety reduction and diminished postoperative complications of patients undergoing cardiac surgery, but it was not effective in reducing readmissions or length of stay.
The impact of an educational pain management booklet intervention on postoperative pain control after cardiac surgery Bjørnnes et al. (2016)	n. 416 patients mean age = 66 RCT	Examine the impact of an educational intervention with booklet on postoperative pain management after cardiac surgery. Pre-surgery pain and pain medications will also be described.	• Routine assistance plus an educational booklet at the time of discharge with support telephone follow-up on the tenth postoperative day.	The approach used in this study did not reduce pain intensity compared to the control group.
Web-Based Nursing Intervention for Self-Management of Pain After Cardiac Surgery: Pilot Randomized Controlled Trial Martorella et al. (2012)	n. 60 patients mean age = 64 RCT	Improve pain relief in patients undergoing cardiac surgery.	• Web-based intervention: SOULAGE-TA-VIE includes a 30-minute preoperative session via Web and 2 short face-to-face postoperative recall sessions. The app generates reflective activities and personalized educational messages based on patients' beliefs and attitudes. The messages are transmitted through videos, animations and texts.	Patients reported significantly less pain during breathing and coughing and consumed more analgesics than those in the control group. However, the administration of the intervention did not result in less pain intensity.
Effect of Instructional Videos on Postoperative Respiratory Function in Patients Undergoing Off-Pump Open Heart Surgery Salehmoghaddam et al. (2016)	n. 60 patients mean age = 57 RCT	To determine the effect of instructional videos on patients' respiratory function after open heart surgery.	• Educational videos lasting 15 minutes the day before surgery. The control group was trained with a booklet and face-to-face verbal information.	Instructional videos considered the patient's education level and were better than booklets and face-to-face training in improving postoperative respiratory function.

Cardiac Rehabilitation Increases Physical Capacity but Not Mental Health After Heart Valve Surgery: A Randomised Clinical Trial Sibilitz et al. (2016)	n. 147 patients mean age = 62 RCT	To evaluate the effects of cardiac rehabilitation compared to traditional treatments after heart valve surgery.	• In the post-operative period, the intervention group was followed up with individualized physical exercises and monthly psychoeducational consultations while the control group received the usual treatments.	Cardiac rehabilitation after valve surgery improved the peak of VO_2 at 4 months but showed no improvement on mental health.
Effects of pre-operative individualized education on anxiety and pain severity in patients following open -heart surgery Erturk et al. (2018)	n. 109 patients mean age = 63 Quasi-experimental study	Study the effects of individualized preoperative education on post-operative anxiety and the severity of pain in patients undergoing open heart surgery.	• Evaluation of anxiety through the STAI (State-Trait Anxiety Inventory) one day before and one day after the intervention. Pain assessment via visual analogue scale (VAS) one day after surgery. The intervention consisted of individualized education and targeted assistance to the patient's needs.	This study indicated a statistically significant relationship between the average score in pre and post-operative anxiety and pain. The study also showed reduction in post-operative pain levels, in both sexes, can be achieved through individualized preoperative education.
Multimedia Exercise Training Program Improves Distance Walked, Heart Rate Recovery, and Self-efficacy in Cardiac Surgery Patients. Wang et al. (2016)	n. 60 patients mean age = 61 Quasi-experimental, longitudinal study	Examine the effects of a training program (6MWT) in patients undergoing cardiac surgery.	• In the "6-Minute Walking Test" (6MWT) the patient in the post-operative period must walk as far as possible on a 30-meter corridor for 6 minutes. Heart rate, saturation and blood pressure are monitored before and during the test.	Training has improved the distance covered in the test and heart rate recovery, thus increasing patient tolerance and self-efficacy at the time of discharge. Endurance and self-efficacy were also maintained for up to 1 month after discharge.
The Effectiveness of Discharge Training for Patients After Cardiac Surgery Coskun et al. (2018)	n. 180 patients mean age = 58 RCT	Evaluate the effects of a written and verbal education at the time of discharge compared to a single verbal education.	• In the control group, the patient received a verbal education. The intervention group, on the other hand, received a verbal and written education. Patient knowledge levels were assessed with questionnaires before the educational intervention and 1 month after discharge.	The results showed that verbal and written education improved patients' knowledge and helped them reducing readmissions and the related health costs.
Effects of the First Phase of Cardiac Rehabilitation Training on Self-Efficacy Among Patients Undergoing Coronary Artery Bypass Graft Surgery Borzou et al. (2018)	n. 60 patients mean age = 61 RCT	Assess the effects of the first phase of a cardiac rehabilitation program on self-efficacy in patients undergoing coronary artery bypass grafting.	• The control group received standard care and therapy. The intervention group instead received, in the first phase of rehabilitation, a greater education both theoretical (anatomy, cardiac diseases and symptoms, risk factors) and practical (breathing and movement exercises).	The study shows that the first phase of the cardiac rehabilitation program, consisting of theoretical and practical sessions, reinforced self-efficacy in daily activities among post-coronary artery bypass graft patients.

Protocol for the PREHAB study Pre-operative Rehabilitation for Reduction of Hospitalization After Coronary Bypass and Valvular Surgery: A Randomised Controlled Trial Stammers et al. (2015)	n. 244 patients mean age = 65 RCT	Compare the standard care provided to elderly patients with frailty syndrome with health promotion interventions and interdisciplinary exercises to see if the new interventions improve the results 3 and 12 months after the operation.	• Standard control was provided to the control group, and 8 weeks of physical exercises and educational interventions were provided to the intervention group beyond standard care.	The study provides scientific evidence in favour of health interventions that improve fragility, tolerance to activity and the risk of post-operative complications in elderly patients.
Effects of Nurse-Led Intervention on Patients' Anxiety and Sleep Before Coronary Artery Bypass Grafting Mousavi Malek et al. (2018)	n. 160 patients mean age = 61 RCT	Examine the effects of nursing education interventions on patients' anxiety and sleep before undergoing coronary artery bypass.	• Explain the procedure, encourage the patient to talk about his anxieties and fears, correct the wrong ideas, teach stress management methods for relaxation (e.g. deep breathing, Benson's guided imagination, repetition of prayers).	Non-pharmacological and supportive interventions can reduce patient anxiety and sleep disturbances before coronary artery bypass grafting.
Can a Multifaceted Intervention Including Motivational Interviewing Improve Medication Adherence, Quality of Life, and Mortality Rates in Older Patients Undergoing Coronary Artery Bypass Surgery? A Multicenter, Randomized Controlled Trial with 18-Month Follow-Up Lin et al. (2016)	n. 288 patients mean age = 59 RCT	To evaluate the long-term effects of multiple interventions on adherence to drugs, on quality of life and mortality rates in elderly patients undergoing coronary artery bypass grafting.	• Multifaceted interventions: psychoeducation, motivational interview and short messaging service	Multiple interventions may improve drug adherence in elderly patients undergoing coronary artery bypass grafting. The improvements are maintained for 18 months.
Effectiveness of video resources in nursing orientation before cardiac heart surgery De Oliveira et al. (2016)	n. 90 patients mean age = 62 RCT	Assess the effectiveness of video resources in increasing patient knowledge during preoperative orientation compared to a standard orientation.	• Patients in the intervention group received an orientation with a short video and a presentation with slides the day before the intervention. The patients in the control group received standard orientation.	The orientation performed with the help of video resources is more effective for increasing the knowledge of patients than verbal orientation alone.
The effects of multimedia education on postoperative delirium in patients undergoing coronary artery bypass graft: A randomized clinical trial Fahimi et al. (2019)	n. 110 patients mean age = 59 RCT	Determine the effects of multimedia education on postoperative delirium in patients undergoing coronary artery bypass grafting.	• 5-7 days before the intervention, a CD containing three educational videos was provided to the intervention group.	Considering the lower incidence of post-operative delirium in patients who received multimedia education rather than in the control group, the use of this non-pharmaceutical method is recommended to prevent delirium in such patients.

Quality of life after coronary artery bypass graft surgery - results of cardiac rehabilitation programme Moreira et al. (2019)	n. 11 patients mean age = 64 Quantitative experimental study	Describe the process of skills development in rehabilitation nursing care that was possible in the context of the final phase in which it was designed, implemented and evaluated in an intervention program in the area of cardiac rehabilitation.	• Cardiac rehabilitation: physical and educational exercises (6-minutes' walk test).	The application of the rehabilitation nursing program has proven effective and has led to significant improvements in quality of life after coronary artery bypass grafting. Exercise has reduced factors that increased coronary artery patient post-operative mortality such as: obesity, high blood pressure, type II diabetes mellitus and dyslipidemia.
Early physical training and psycho-educational intervention for patients undergoing coronary artery bypass grafting. The SheppHeart randomized 2 × 2 factorial clinical pilot trial Hojskov et al. (2016)	n. 60 patients mean age = 65 RCT	Assess the patient's acceptance of the intervention, safety and tolerability.	• Patients who took part in the study were divided into four different groups: - standard care + exercise - standard care + psycho-educational intervention - standard treatments + physical and psycho-educational interventions - only standard care during the four post-operative weeks	The group with the rehabilitation program that includes physical and psycho-educational exercise shows greater inclusion, tolerability and safety.
Early Physical And Psycho-Educational Rehabilitation In Patients With Coronary Artery Bypass Grafting: A Randomized Controlled Trial Højskov et al. (2018)	n. 326 patients mean age = 64 RCT	Assess the impact of early rehabilitation compared to standard care in patients who perform coronary artery bypass grafting.	• Early rehabilitation program including physical exercise and psychoeducational interventions in order to improve resistance to activity, muscle strength, respiratory complications and psychological symptoms such as anxiety, depression and insomnia.	In general, the interventions did not have much physically or psychologically effect except for a slight improvement in depressive symptoms. However, in the patients who joined the program, the interventions also showed improvements at a psycho-physical level.
Does a "continuous care model" affect the quality of life of patients undergoing coronary artery bypass grafting? Razmjoee et al. (2017)	n. 66 patients mean age = / RCT	Check if the continuous care model can change the quality of life compared to standard care in patients undergoing coronary artery bypass grafting.	• The intervention group received continuous assistance based on intervention orientation, information, post-discharge brochures, telephone follow-up.	The study indicates that ongoing care plays an important role in controlling post-operative complications. Awareness and involvement of relatives / caregivers in follow up and continuous assistance could promote quality of life.

Abbreviations: RCT = Randomized Controlled Trial; VO_2 = Maximal oxygen uptake; CD = Compact Disk.

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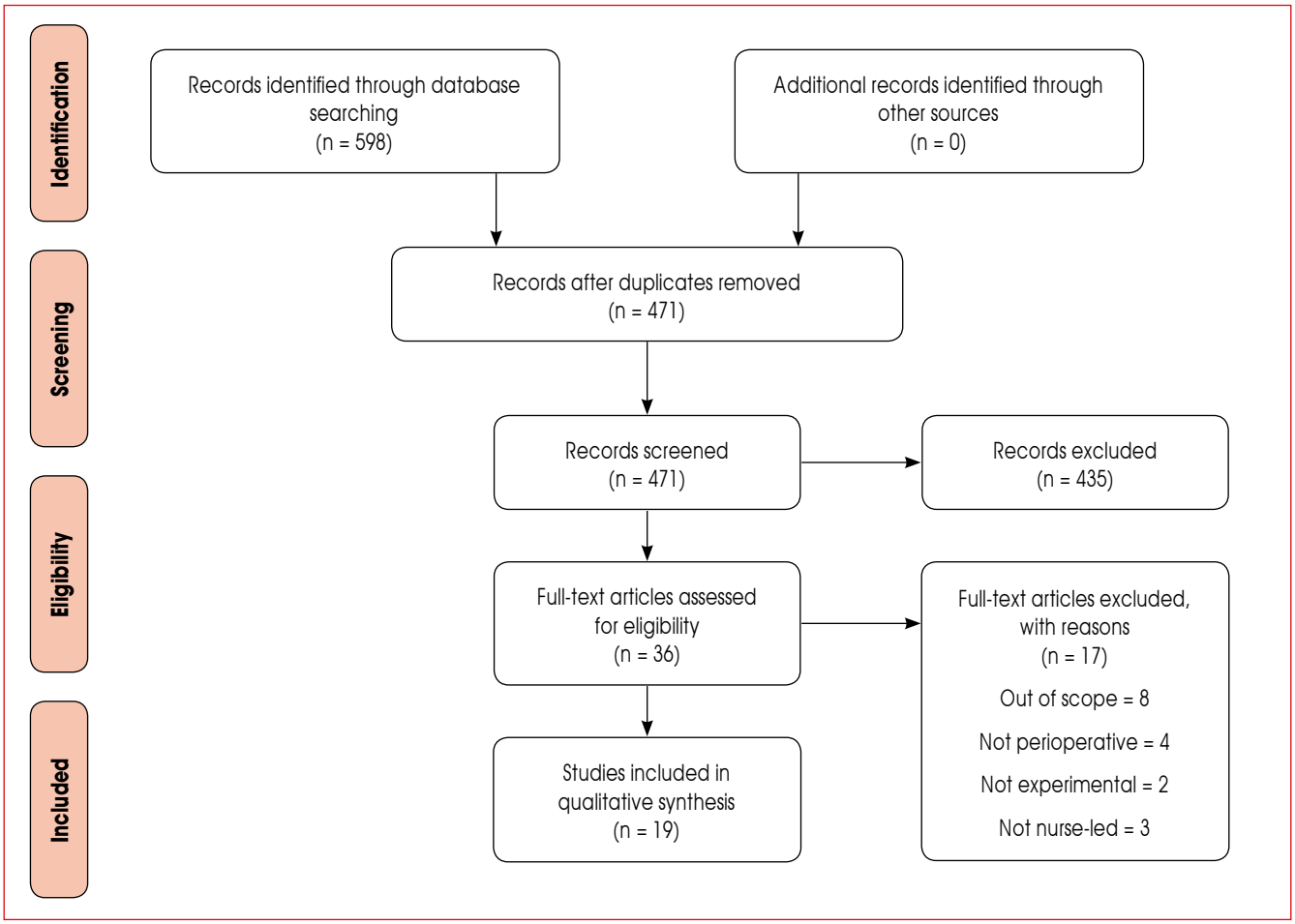
Fig. 1 - PRISMA Flow Diagram for reviewed articles



We included studies conducted in 10 different countries, but the most of them were from Iran; the majority were RCT. Participants were predominantly older than 60; ethnicity was not reported in 11 studies. The studies included a sample ranging from a minimum of 11[21] to a maximum of 416[14] patients. The most recent study dates back to October 2019[21], while the most dated one was from July 2012[11].

It emerged that the treatments aimed at cardiac surgery patients can be organized in three stages: in the preoperative[4-6,12,13,19], in the postoperative[7] and in both times[8,9,14,16,20,22]. It is also possible that the educational interventions may have a long course so that they can be carried out: both in the preoperative and in the postoperative[10,11], or in the postoperative and after discharge[15,21] or in all three periods[17,18].

Evidence from the literature suggest that the easiest educational intervention methods are those carried out as personalized counselling[22] but also using information brochures[8,9,14,20] which have the advantage of being able to be delivered to the patient and consulted at the need. Since most of the articles deal with the interventions in multiple moments of the assistance, below are reported the results emerged, with the related outcomes, divided by type of delivered intervention (**Fig.2**). The Fig.2 summarizes which type of intervention can lead to an improvement (green circles) or no improvement (red circles) in the different outcomes, if carried out during the targeted periods. The main outcomes that were reported in the studies were: anxiety, readmissions – length of stay, pain, mental health, knowledge, physical health and postoperative complications.

Verbal and written interventions

In Greece, Kalogianni et al. (2016) conducted an RCT, whose results indicate that the preoperative education provided by nurses, allowed a reduction of the anxiety and postoperative complications of patients undergoing cardiac surgery, but did not allow to reduce readmissions or length of stay[10]. The experimentation involved 395 people divided into two groups (intervention and control). The intervention group received preoperative education thanks to a brochure, as well as the presentation of respiratory exercises and methods of controlling pain and anxiety by trained nurses. A booklet was also used by Bjørnnes et al. (2016) to evaluate the management of postoperative pain compared to the administration or not of drugs. It did not indicate an increase in pain control in the intervention group[14].

Coskun et al. (2018) provided verbal education on discharge to the intervention group while the others received a written one. Through the administration of pre-test and post-test questionnaires, it emerged that both written and verbal education allow to increase knowledge levels and to reduce hospital readmissions and, consequently, health costs[6,7,20,22].

Technology-based interventions

Several papers highlighted the role of technology as a tool to implement patient self-care[4,5,8,11,15].

In Martorella's et al. (2012) work, the use of a 30-minute preoperative Web session and two postoperative sessions was tested by adequately trained nurses for cardiac surgery patients. From the analysis of the questionnaires completed by the patients, it was deduced that the experimental group did not present less pain intensity, but the frequency of episodes decreased compared to the control group. It also emerged that those who received the additional educational intervention, made more use of analgesics than the

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control group[11].

The study of Salehmoghaddam et al. (2016) suggests the superiority of educational videos rather than the use of brochures and F2F (Face-to-Face) training to improve post-operative respiratory function[4]. Also, Oliveira et al (2016) demonstrated greater knowledge and preparation of the patient through multimedia supports, compared to verbal orientation[13]. Technology has also proved useful in allowing a continuous dialogue between patients and healthcare professionals, by sending SMS (Short Message Service), to be able to check the state of health and promote their degree of self-care, as proven by Lin et al. (2016)[8]. The study of Wang et al. (2016) relates both the aid of technology and physical exercise, wanting to examine the effect of a multimedia training program on the 6-minute walk test (6MWT). From the emerged data, those who received the multimedia training program showed a significantly greater improvement than those of the control group in the distance travelled, better heart rate and self-efficacy, with effects even more than a month after discharge[15].

Psycho-educational exercises

Other studies have highlighted the crucial role of exercise[12,19,21]. Sibilitz et al. (2016) provided rehabilitation based on exercise and psychoeducational consultations in one group, while the other provided routine care. The intervention team showed a beneficial effect on the physical but not mental level[16].

The psychological aspect is explored by the study of Hojskov et al. (2016) that assesses the acceptance, safety and tolerability of the intervention between different samples of patients who have received different types of management: standard care and exercise, standard care and psycho-educational intervention, standard care accompanied by exercise and psycho-educational intervention and only standard care during the four post-operative weeks. The group with the rehabilitation program including physical and psycho-educational exercise showed the best results[17].

In contrast, the results of an RCT by Højskov et al. (2018) did not detect a great effect neither physically nor psychologically except for a slight improvement in depressive symptoms[18].

DISCUSSION

In this scoping review we identified 19 primary studies addressing nurse-led interventions for patients undergoing cardiac surgery, across various settings of care published between 2009 and 2019. Our findings indicate an abundance of researches focusing specifically on interventions to improve patient's outcomes, but a limited number of studies that met our research question and aim. These studies reported prevalence for our three target delivery moments: only in the preoperative period, only in the postoperative period or in both. We also found that trained and educated nurses, are frequently employed to introduce and promote strategies for mixed interventions. They intervene throughout the

Fig. 2 - Comparison chart between the three moments in which the interventions were delivered, the type of interventions and the effect they had on the outcomes detected.

TIMING / OUTCOMES	PREOPERATIVE	POSTOPERATIVE	BOTH
ANXIETY	• Booklet 🟢 • Respiratory exercises 🟢 • Pain and anxiety control 🟢 • Movement management 🟢 • Individualized education 🟢		
READMISSIONS _LENGHT OF STAY	• Booklet 🔴 • Respiratory exercises 🔴 • Pain and anxiety control 🔴 • Movement management 🔴	• Verbal and written education 🟢	• Telephone follow up 🟢
PAIN	• Individualized education 🟢	• Booklet 🔴	• Videos, animations and texts 🔴
MENTAL HEALTH	• Non-pharmacological and supportive interventions 🟢 • Videos 🟢	• Psychoeducational consultations 🟢	
KNOWLEDGE	• Videos (n = 2) 🟢	• Verbal and written education 🟢 • Theoretical education (anatomy, cardiac diseases and symptoms, risk factors) 🟢	
PHYSICAL HEALTH	• Videos 🟢 • Physical exercises 🟢	• Physical exercises 🟢 • "6-Minute Walking Test" (6MWT) (n=2) 🟢	• Discharge Counseling (n=2) 🟢 • Multifaceted interventions: psychoeducation, motivational interview and short messaging service 🟢
POSTOPERATIVE COMPLICATIONS	• Booklet 🟢 • Respiratory exercises 🟢 • Pain and anxiety control 🟢 • Physical exercises 🟢 • Videos 🟢	• "6-Minute Walking Test" (6MWT) (n=2) 🟢	

Tab. 3 - Groups of interventions with the relative number of studies

Type of intervention	N (studies)
Verbal and written interventions	7
Technology-based interventions	6
Psycho-educational exercises	6

patient's hospital stay and sometimes also follow him during the follow-up. Moreover, these studies clearly support an increased effort to improve the quality of nursing care provided in multiple settings in the last decade.

In this scoping review, our purpose was to appraise what kind of educational intervention and which type of it, reports a wider range of outcomes and improvements of them (minimize symptoms of depression, anxiety, reduce pain, improving self-care and decrease the length of stay). Whilst heterogeneity in the populations and differences in the way that interventions were ascertained make comparisons across studies difficult, the data do suggest that a multimodal approach is the most promising one.

This review suggests that both preoperative and postoperative education interventions can result in positive outcomes in cardiac surgery patients. The research produced mixed results. It revealed that, in line with the results of previous studies, the development and implementation of evidence-based pre and postoperative teaching materials, help patients and caregivers prepare for cardiac surgery and self-care after discharge[39].

Regarding to the interventions that have proven most favourable in reducing psychological distress such as anxiety and depression, findings reported that an information booklet and verbal counselling at the moment of discharge may be useful[40-43]. Lifestyle counselling intervention demonstrated an improvement in health outcomes and a reduction in readmissions. Healthcare facilities should recommend and organise individualised well-structured cardiac rehabilitation programmes since it is a safe and cost-effective way to improve patients' outcome[44]. Another widely used tool is mass produced pamphlets in conjunction with videos and face-to-face patient education. This method enables patients to identify their own self-care priorities and achieve improved outcomes such as decreased anxiety and depression, lower readmission rates, and have fewer physical complications post-surgery[45]. Multimedia instruments are becoming increasingly popular because patients of all ages embraced the use of video education and felt more confident and informed on discharge about the expectations of caring for their heart disease and the need for cardiac rehabilitation. A video delivered via an iPad was used to provide adjunct discharge education to patients who underwent percutaneous coronary intervention procedures. Despite knowing the benefits of cardiac rehabilitation, it remained an underutilized resource because not everyone has the economic opportunity to get one[46]. Again, patients subjected to a verbal description for goals of care (life-prolonging care, limited care, and comfort care) and a 6-minute video, were more informed and more likely to select a focus on comfort, compared with patients receiving verbal information only[47,48].

Limitations

Our study has some limitations that should be mentioned. In our analysis, only research articles published in English and Italian were included, which may have produced a language bias regarding the conclusion, as some scientific papers were published in other languages. Moreover, we included only primary studies in the research, and it is possible that we have missed relevant ones that may have documented other interventions that have not emerged here. A limitation of such an approach is that the review does not include an assessment of the quality of the included studies or evaluate the effectiveness of interventions. However, evaluative research in this area is limited and we are confident that this scoping review provides a comprehensive summary of current evidence relating to examine the extent, range and nature of research activity around nurse-led interventions, patient's outcomes and delivery moments for people undergoing cardiac surgery. However, our search strategy was guided according to established guidelines for scoping reviews and we employed extensive database and lateral searches.

CONCLUSION

The aim of this scoping review was to identify the most appropriate interventions for improving cardiac patient's outcomes. Evidence suggest that a multimodal approach in patient education is the best one if implemented in all three of the following times: preoperative, postoperative and/or both. Furthermore, whatever the types of interventions are, it is recommended that they be individualized according to the patient's needs, to obtain the maximum possible improvement in the healthcare outcomes. There is a need for more research looking at the ways in which having comorbidities impacts on clinical care, how process of care and different services can adapt to the needs of people undergoing cardiac surgery and explore how other interventions not mentioned here might improve selfcare. This advocates high quality research being needed to determine what kind of intervention techniques may be of benefit for this population and to help guide nurses as how to deliver this.

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