

A SYSTEMATIC REVIEW ABOUT CARDIAC SURGERY INTERVENTIONS FOR PREVENTING POSTOPERATIVE COMPLICATIONS

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Abstract: Over the present years, the patient population going through heart surgery has actually wound up being older, sicker and higher-danger. Patients of 65 years and older represent virtually 60% of heart surgical treatments and expose substantial heterogeneity in postoperative outcomes.

After getting rid of the duplicates, the database searches and the extra snowball online search engine cause 1335 citations. In screening on domain and addition requirements, 1304 short posts were omitted. In 689 research studies, similarly patients who went through other surgery were consisted of and no distinction was made to heart surgery patients just and in 214 research study research studies the primary intervention was not in heart surgery patients. In 175 research study research studies patients with a mean age listed below 60 years were included and in 162 research study studies the age of consisted of patients was not provided. In 60 research studies the intervention was not specified and 4 research study studies focused on dose action relation only. Finally, 31 posts remained. In fundamental, good quality research study studies found that multi-component interventions have an impact on avoiding postoperative issues in older heart surgery patients.

The literature on postoperative concerns in cardiac surgery patients reveals high events of postoperative concerns such as delirium, stress and anxiety, pressure ulcer, infection, lung issues and atrial fibrillation. These issues are related to useful and cognitive decrease and a decrease in the quality of life after discharge. Different research studies aimed to prevent numerous postoperative issues by preoperative interventions. Here we provide an extensive summary of both numerous and single part preadmission interventions produced to prevent postoperative concerns.

I. INTRODUCTION

Over the current decades, the patient population undergoing heart surgery has become older, sicker and higher-danger^(1;2;3). Patients of 65 years and older represent almost 60% of heart surgeries⁽³⁾ and reveal substantial heterogeneity in postoperative outcomes⁽⁴⁾. Whereas some older individuals have actually little bit increased risk of adverse occasions compared with the basic population^(4;5), vulnerable older patients (who are vulnerable to physical or emotional injury) are more likely to experience negative intra- and postoperative events^(6;7).

The reported occurrence of postoperative issues after heart surgery patients is high: ranging from 17% to 43.1% for delirium⁽⁸⁾ from 17.5% to 28.7% for depression^(9;10) from 14.3% to 18% for pressure ulcer^(11;12); from 10.6% to 54.5% for healthcare facility infection^(13;14;15); from 10.6% to 12.1% for postoperative pulmonary problems^(16;17;18) and from 15.2% to 33.3% for atrial fibrillation⁽¹⁹⁾. These complications are connected with functional and cognitive decline and a decrease in quality of life and wellness after discharge^(20;21).

Already in the nineties⁽²²⁾ concluded that preoperative teaching may facilitate admission of the heart surgical patient on the day of surgery, which could shorten the length of healthcare facility stay. Other attempts have been made to prepare

patients for cardiac surgery in the preadmission duration^(23; 24; 25; 26) in order to prevent negative occasions in the postoperative duration. Numerous common and comorbid illness, especially in older persons, are multifactorial in etiology. These multi-factorial syndromes are health conditions where more than one threat element is related to the outcome^(27; 28). A fine example of a multi-factorial geriatric syndrome is delirium, which results from a complex and dynamic interaction in between the various danger factors in a vulnerable patient. An effective intervention ought to for that reason effectively address this multifactorial origin⁽²⁸⁾. Due to the multifactorial origin of syndromes more postoperative complications can happen at the exact same time in one susceptible patient and risk elements are typically related to more issues⁽²⁷⁾. Nevertheless, in the literature numerous interventions that showed proof of effectiveness focused on avoiding a single negative outcome^(19;29;17;14;15), while others reported effectiveness of a combined multifactorial method targeted at preventing numerous unfavorable results all at once^(27;30;28;31). As a consequence, it is still unclear how older cardiac surgery patients can best be gotten ready for their heart surgery. Therefore, the function of the present methodical review is to supply a summary of both multi-component and single preadmission interventions developed to prevent single and multiple postoperative issues in older elective cardiac surgery patients.

II. METHODOLOGY

We searched Medline, PubMed, Cochrane, and CINHALL databases for studies reporting and concerning with post operative complications surgery that was published in English language and in the period of establishment of these databases up to 2016, December. We used cardiac surgical and the following free Mesh terms; “Cardiac surgical procedure, Preadmission preventive measures, Postoperative complications, Older patients”. And we restricted our search to the English-language literature on human subjects. Reference lists were screened manually to find more relevant studies.

III. RESULTS AND DISCUSSION

After eliminating the duplicates, the database searches and the additional snowball search engine result in 1335 citations. In screening on domain and addition criteria, 1304 short articles were excluded. In 689 studies, likewise patients who went through other surgery were consisted of and no difference was made to cardiac surgery patients only and in 214 research studies the primary intervention was not in cardiac surgery patients. In 175 research studies patients with a mean age younger than 60 years were included and in 162 research studies the age of consisted of patients was not provided. In 60 research studies the intervention was not defined and four studies focused on dosage action relation only. Finally, 31 posts stayed.

The short articles then went through a critical appraisal, and 22 randomized clinical trials and 1 accomplice study of preventive interventions for older heart surgery patients were picked. Methodological factors for leaving out 8 posts were uncertain randomization in 7 research studies, no blinding (none of the three: caretaker, researcher and patient) in seven studies, 5 research studies were underpowered and in one research study there was no description of the results. Finally, nine of the included research studies^(29; 30; 7; 17; 14; 31; 15; 26) were of high quality (quality level A2) and the staying fourteen research studies were of reasonable quality (quality level B)^(32; 33; 34;19;35;36; 37;38; 39; 40; 41; 42; 43; 44).

Table 2 explains the included studies. The sample size of the 23 picked research studies ranged from 45 to 991 patients. The research studies consisted of various kinds of interventions, including integrated (multi part) and single component interventions targeting both numerous and single problems. Twelve studies were designed to prevent a single adverse result and eleven studies were designed targeting multiple negative results. Furthermore, in seventeen short articles a single element intervention was studied and in only six short articles a multi element intervention was studied.

In top quality studies (quality level A2), a reduction in healthcare facility infections^(13;14), postoperative lung complications⁽¹⁷⁾, anxiety⁽³⁰⁾, family doctor goes to⁽³⁰⁾, stress and anxiety and pain⁽³¹⁾ was found. Furthermore, these studies discovered an increase in postoperative physical activity⁽³⁰⁾. In fair quality research studies (quality level B), interventions were determined that accomplished a decrease in the incident of the following: depression^(45;46; 38;47); atrial fibrillation⁽¹⁹⁾; postoperative pulmonary issues⁽⁴⁸⁾; length of healthcare facility stay^(32; 45; 38; 40); length of intensive care unit stay^(32;40); hypertension^(49; 45;46; 50), high cholesterol and, high BMI^(36;50); anger, tiredness, confusion and minimized vigor⁽³⁹⁾; anxiety^(52; 36; 38; 50); high heart rate and pain^(46; 47); stress⁽⁴⁶⁾; and smoking⁽⁵⁰⁾. In addition, these research studies examined interventions that increased physical activity⁽⁵⁰⁾ and quality of live^(32; 45; 50).

Some interventions were applied just in the preoperative duration, and some were used both preoperatively and postoperatively. The start of the intervention durations varied from nine months prior to surgery to one day before surgery. The ending of the intervention periods varied from prior to admission to after surgery at the time of health center discharge. Application of the interventions varied from regular monthly to a single occasion prior to the operation.

Thirteen interventions were designed for patients going through separated coronary artery bypass grafting surgery, one for patients undergoing off-pump coronary artery bypass grafting surgery, 7 for patients undergoing basic cardiac surgery (consisting of heart-valve surgery), one for cardiac surgery patients with chronic kidney disease, and one study of high-risk patients undergoing heart surgery.

In seven research studies, the intervention showed no result at all (see Tables 1). In the staying sixteen studies the interventions under study revealed a significant decrease in postoperative issues (see Table 1).

Within the included studies, research study was done on the prevention of depression, atrial fibrillation, postoperative lung complications and extended length of healthcare facility stay for patients who underwent coronary artery bypass grafting surgery. In patients who went through a general cardiac surgery procedure, the avoidance of depression, confusion and delirium, nosocomial infections, postoperative kidney failure, prolonged length of healthcare facility stay and quality of live were assessed. No research studies of high quality were found that explained reliable interventions to prevent postoperative delirium. No research studies were discovered that taken a look at the avoidance of pressure ulcers in older cardiac surgery patients.

In this organized review we identified a series of multi-component and single preadmission interventions that have been revealed with a sufficient level of proof to reduce single and numerous postoperative complications in older patients going through optional heart surgery. The susceptibility for these issues is connected to the vulnerability of older heart surgery patients due to multifactorial geriatric syndromes^(27, 28).

Only one of the 23 studies in our systematic review was aimed at delirium. This was done within a multi outcome setting, e.g. intensive care unit-stay and length of hospital stay, using a single pharmacological intervention: oral rivastigmine. No effect was found. In medication studies in other surgery populations, no effect was found after low-dose haloperidol⁽⁵³⁾ or donepezil⁽⁵⁴⁾ in elective orthopedic surgery patients. Notwithstanding that a patient experiencing a delirium will also benefit from a single pharmacologic treatment, evidence for a possible ability of preventive medication in decreasing the incidence of delirium in older patients after surgery, is still lacking.

Table 1

Summary data from 23 studies.

Author, year (ref.) (design)	Type of surgery (sample size)	Intervention	Postoperative outcome	Effect & effect size	Study quality
Arthur, 2000 (RCT)	CABG (146)	Individualized supervised exercise training twice weekly for eight weeks and monthly nurse-initiated telephone calls	Prolonged ICU stay, prolonged LOS, decrease in QoL	Significant decrease in ICU stay (median diff. 1.5 h) and LOS (med diff. 1 d) and significant increase in QoL physical component (mean diff. 3 points); no effect in QoL mental component	B+
Bay, 2008 (RCT)	CABG (166)	Five chaplain visits focusing on positive and negative religious coping items, preoperatively during admission	Anxiety, depression, hopelessness	No effect found	B
Brasher, 2003 (RCT)	Cardiac Surgery (230)	Omission of deep breathing exercises at each physiotherapy visit preoperatively preoperative during	Early postoperative mobilization	No effect found	B

		admission			
Calo, 2005 (RCT)	CABG (160)	N-3 polyunsaturated fatty acids for a minimum of five days preoperatively until hospital discharge	Atrial fibrillation	Significant reduction in both atrial fibrillation (risk diff 0.19) and LOS (mean diff. 0.9 d)	B
DeRiso, 1996 (RCT)	Cardiac surgery (230)	0.12% chlorhexidine gluconate (CHX) oral solution, for 30 s twice daily Oropharyngeal decontamination and nosocomial infections preoperatively until ICU discharge	Oropharyngeal decontamination and nosocomial infections	Significant reduction of infections (risk diff 0.09) infected patients and mean diff. 18 and accompanied antibiotic prescription (reduc. 55%)	A2
Furze, 2009 (RCT)	CABG (204)	HeartOp Program: Cognitive-behavioral 45–60 min first interview eight weeks before surgery	Postoperative physical activity, depression and GP visits	Significant decrease in depression (reduction 11.7 points), clasp mobility (reduc. 0.95 points) and cardiac beliefs (reduc. 3.5 points); no effects found in reduction of GP visits	A2
Gamberini, 2009 (RCT)	Cardiac Surgery (120)	Prophylactic short-term administration of oral rivastigmine, a cholinesterase inhibitor: 1.5 mg of oral rivastigmine daily, before surgery until six days post-surgery	Postoperative delirium, haloperidol and Lorazepam use, ICU-stay and LOS	No effect found	A2

Six studies in our systematic review were aimed to target depression, from which five studies within a multi complication setting. The interventions were mainly relaxation, education, exercise, motivational interview and lifestyle counseling. Similar results in preventing depression were found in older patients after hip fracture surgery⁽⁵⁵⁾ and older patients with breast cancer after hip fracture surgery⁽⁵⁶⁾.

In our systematic review we did not find studies on preoperative interventions targeting postoperative pressure ulcer in older cardiac surgery patients, neither did we find such studies in other surgical domains. This is probably due to the nature of pressure ulcers. The causes of pressure sores are mechanical pressure, shear and frictional forces on the skin and underlying tissue. Risk factors that could be targeted in a multi component approach are neuropathy, nutrition deficiency, moist skin and infection⁽⁵⁷⁾.

Four studies in our systematic review were targeted postoperative pulmonary complications as a single complication. The interventions were nutritional supplementation and respiratory physiotherapy. We did not find studies concerning preventive interventions in other populations applicable in the preadmission period. In a review,⁽⁵⁹⁾ found evidence for perioperative noninvasive respiratory support decreasing atelectasis formation.

Only one study was aimed at prevention of atrial fibrillation as a single complication, using a single intervention: e.g. N-3 polyunsaturated fatty acids. In a recent study in coronary artery bypass grafting surgery patients, physical activity in the year before surgery showed a decrease in the incidence of postoperative atrial fibrillation during post-acute rehabilitation⁽⁵⁸⁾.

To totally appreciate these outcomes, 3 additional points must be considered. Fourteen of the 23 research studies were of fair quality (level B). The grading for this quality level has a range of analytical and methodological characteristics. A common imperfection in the research studies included in this systematic review was the reporting of the blinding of scientists, caretakers and patients. If caretakers or patients can not be blinded, like in the case of pastor visits as an intervention, still the scientists can be blinded. In lots of studies this was not reported. Another common drawback was the quality of the analytical analysis. In a few of these studies, parametric statistical tests were used in a population that was not typically distributed. We offered a grade of B to research studies with more imperfections and a B+ to research studies with less imperfections.

Second, the more vulnerable older patients were not talked about independently in the identified short articles. For that reason, although most of these populations is 65 years and older, we might not show which part of the determined evidence can be attributed to the older population and which part can be attributed to the more youthful and more vital population. When our findings are generalized, this need to be taken into account.

Third, we utilized a detailed search strategy so that we would not miss interventions. This detailed search technique yielded divergent results, e.g. single and multi-component interventions targeting single and several complications. On one hand, due to multi-factorial method, one can argue that this evaluation has a diverse nature. On the other hand, multifactorial geriatric syndromes in older patients need a multi-factorial technique, which by nature will lead to both concrete and less tangible outcomes. The various results were too divergent to be pooled as in a meta-analysis, the advantage of this multifactorial technique is that it offers an overview of the offered preventive interventions.

IV. CONCLUSIONS

In general, good quality studies found that multi-component interventions have an impact on preventing postoperative problems in older cardiac surgery patients. The current evaluation suggests that there are numerous interventions that can reduce the incident of postoperative depression, lung issues (both multi element interventions), atrial fibrillation (N-3 polyunsaturated fats) and infection (combined disinfection and immune-enhancing dietary supplements) in older cardiac surgery patients. To this day there is no high quality proof for procedures focused on preventing delirium and pressure ulcers in cardiac surgical patients in the preadmission period. Multifactorial techniques are the most appealing, but strong research study of efficient preventive preadmission interventions for postoperative delirium and pressure ulcers is urgently needed.

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