

The Efficacy of Multimodal Prehabilitation in Elderly Patients Undergoing Elective Major Abdominal Surgery: A Systematic Review Protocol

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Protocol

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Abstract

Introduction

Multimodal prehabilitation has been touted as a potential strategy to better prepare our elderly and frail patients for major surgery. While randomized controlled trials and systematic reviews have been done to investigate the effect of prehabilitation on various surgical cohorts, most of these studies have focused on single modality prehabilitation and without an emphasis on the elderly. This systematic review aims to assess the effect of a multimodal prehabilitation program on elderly patients undergoing major abdominal surgery.

Methods

This protocol has been written according to the PRISMA-P statement and is registered in the International Prospective Register of Systematic Reviews (PROSPERO registration number 250281). MEDLINE, EMBASE, CENTRAL, CINAHL and PsychINFO databases will be searched. Only randomized controlled trials with an average study population age ≥ 65 that has undergone major abdominal operation with at least two components (physical, nutritional, psychological) of prehabilitation will be included. Clinical outcomes that will be collected include post-operative morbidity and mortality, length of stay, 30-day readmission and peri-operative 6-minute walking distance. The risk of bias in included studies will be assessed. Data will be pooled where possible.

Discussion

This systematic review will evaluate and establish the effectiveness of multimodal prehabilitation for the elderly, who represents the group of patients most likely to benefit from prehabilitation. This review with its focus on the elderly will provide us with fresh insight into the utility of prehabilitation that will better inform policy makers in its implementation.

PROSPERO Registration: On 20/04/2021, ID 250281

Background

Our population is ageing and the average age of patients undergoing major surgery is increasing. Many abdominal cancers and diseases afflict the elderly more than the young. At least 30% of patients that go through major abdominal surgery face post-operative complications. [1] This is likely due to increased physiological stress to the circulatory and pulmonary system, worse in the elderly population who has poorer functional reserves to start with. [2] This has been shown to be associated with a higher rate of post-operative complications. [3]

As a result, there has been increased emphasis on improving peri-operative care and surgical techniques such as with minimally invasive surgery. The advent of Enhanced Recovery After Surgery (ERAS) protocols has also led to increased awareness of the importance of peri-operative care and the positive

impact of a holistic approach towards patients undergoing major surgery. [4] These factors have allowed for less pain and faster post-operative recovery and have led to the ability to operate on older patients who are frailer. [5]

In recent years, multimodal prehabilitation has been touted as a potential strategy to better prepare our elderly and frail patients for major surgery. It has been described as a trimodal approach, comprising pre-operative exercises, nutritional optimization and psychological support.[6] Multimodal prehabilitation has been known to improve functional reserve and reduce postoperative complications. [3] While randomized controlled trials and systematic reviews have been done to investigate the effect of prehabilitation on various surgical cohorts, most of these studies have focused on single modality prehabilitation and without an emphasis on the elderly, who form the group most likely to benefit from prehabilitation. [6] To our knowledge, there has been no systematic review assessing the effect of multimodal prehabilitation on the elderly population undergoing major abdominal surgery.

This systematic review aims to assess the effect of a multimodal prehabilitation program on elderly patients undergoing major abdominal surgery compared to control groups without prehabilitation.

Methods And Design

This systematic review will be conducted in accordance with the Cochrane Handbook and reported in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) declaration. [7] This protocol has been written according to the PRISMA-P statement and is registered in the International Prospective Register of Systematic Reviews (PROSPERO registration number 250281).

Eligibility criteria

Types of studies

This study will only include randomized controlled trials (RCTs).

Types of participants

As our study aims to describe multimodal prehabilitation in the elderly population, we will include studies that have participants with mean/median age of 65 and above or had performed a subgroup analysis of patients aged 65 years and above within the study cohort. Participants must have undergone elective major abdominal surgery, defined as any operation that includes at least one gastrointestinal anastomosis and/or resection of organs in the following fields: colorectal, small bowel, esophageal, gastric, hepatobiliary, pancreatic, urological, kidney surgeries, and both laparoscopic and open surgical procedures are included.

Types of interventions

Studies will need to have at least 2 out of the 3 components of prehabilitation (physical, nutritional, psychological) to be considered as multimodal and incorporated in our systematic review. Exercise is defined as “any body movement causing an increase in energy expenditure that involves a planned or structured movement of the body performed in a systematic manner in terms of frequency, intensity and duration and is designed to maintain or enhance health-related outcomes”. [8] Preoperative nutritional optimization is defined as “any individualized supplement plans that help to meet the patient’s requirements and should start prior to surgery”. [9] Psychological prehabilitation refers to any psychological treatments that “can attenuate the patient’s depressive, anxiety and distress symptoms before surgery”. [10]

psychological treatments can

Comparators

Comparator interventions will be defined as standard care or control. Standard care is defined as the care a patient would normally receive had they not been included in the trial.

Types of outcome measures

Clinically relevant outcome measures will be explored and extracted from the included studies. These will include traditional peri-operative outcome measures as well as outcome measures that are more prehabilitation specific. Primary outcome measure will be the overall 30-day post-operative morbidity as reported by the Clavien-Dindo classification. Secondary outcomes will include the pre-op and post-op mean change in 6-minute walking distance from baseline and emergency department visits.

Other exclusion criteria

We will be excluding prehabilitation studies that involve pediatric or any non-human research. This study will not involve any emergency surgeries. We will also be excluding non-English articles.

Search strategy

We will conduct a systematic search according to the Cochrane Handbook for Systematic Reviews of Interventions. Preliminary electronic searches, citation pearl growing and reference searching will be undertaken to identify relevant references and to screen the papers for relevant search terms. An electronic systematic search for eligible studies in the following electronic databases: MEDLINE (using PubMed), EMBASE, CINAHL (EBSCO), PSYCHINFO (Ovid), CENTRAL (using Cochrane Library database) will be undertaken. The search matrix will consist of relevant keywords and MeSH/Thesaurus terms and will be combined using Boolean operators for (1) population, (2) intervention, (3) study design. Search terms will be adjusted for each database. Articles will then be sorted out with reference to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines. The reference management software EndNote will be used. The titles and abstracts will then be examined before full-text reports are looked at according to the inclusion criteria. Two authors (PNQ, TYX) will independently

screen the titles, abstracts and full text. Any differences in opinions between authors will be discussed until a consensus is reached or resolved by a third author (MS).

Data extraction and management

Data extraction will be performed independently by two authors (PNQ, TYX) and disagreements will be resolved via discussion until a consensus is reached, or by arbitration by a third author (MS). The data extracted will include (such as but not limited to): source, study methods, participants, interventions, outcomes, results, risk of bias assessment, funding sources and key conclusions.

Assessment of risk of bias

Two authors (PNQ and TYX) will independently assess the risk of bias in included studies. Any difference in opinion will be solved by a third author. The risk of bias assessment for each study will be presented in a table using the Cochrane Risk Of Bias (ROB) 2 tool. [11] This tool assesses the potential risk of bias in various aspects of the research methodology, including but not limited to, allocation concealment, blinding, sequence generation, selective reporting. It will also be used to assess the internal validity of the study. Each criterion will be rated as having low, unclear or high risk of bias.

Data synthesis

Continuous data will be expressed as a mean difference with 95% confidence intervals for outcomes measured with the same scale. If scales are used, standardized mean difference with 95% confidence intervals will be used. Categorical outcomes will be expressed as risk ratios with 95% confidence intervals. If the outcomes of two or more included studies can be combined, the effect size will be calculated using a random-effects meta-analysis adjusting to Hedges' g. If the included studies need meta-analysis to be pooled this will be performed, as described in Chap. 16.6.3 of the Cochrane Handbook.[12] An alpha level of 0.05 will be considered statistically significant. Narrative description of the outcome will be done if meta-analysis cannot be performed.

Assessment of heterogeneity

Heterogeneity will be examined using the Cochrane Q test and quantified with I^2 values and the between study variance τ^2 .

Sensitivity analysis

Sensitivity analyses will be performed on all outcomes of interest. Studies with a high risk of bias will be excluded.

Discussion

This systematic review will evaluate and establish the effectiveness of multimodal prehabilitation for the elderly, who represents the group of patients most likely to benefit from prehabilitation. To our knowledge,

no previous reviews or trials on prehabilitation have focused specifically on the elderly. Evidence on prehabilitation has been conflicted so far, with some studies observing clinically significant benefits for patients, [13–15] while others derived inconclusive final outcomes [16–18]. This has led to the inconsistency in implementation and a lack of international guidelines recommending prehabilitation as a pre-operative routine. We believe that this review, by focusing on the elderly, will provide us with fresh insight into the utility of prehabilitation that will better inform policy makers in its implementation.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and materials

Relevant data generated and analysed during this study are included in this published article. Data set not strictly relevant to the discussion will not be for public sharing due to future plans of extrapolated studies, however, might be available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

TYX played a huge role in the literature review and in writing the manuscript, and heavily involved in annotation and references. PNQ conceptualized the research questions, played a major role in writing manuscript, and also heavily involved in literature review. MS played a huge role in the derivation of the search terms, reconciled differences during study selection and in the process of writing the manuscript. All authors read and approved the final manuscript.

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Supplementary Files

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- [AdditionalFilePRISMAPchecklistMultimodalPrehab.docx](#)