The effectiveness of nurse-led cardiac rehabilitation programs following coronary artery bypass graft surgery: a systematic review protocol

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Review question/objective
Do nurse-led cardiac rehabilitation programs following coronary artery bypass graft surgery improve patients’ health-related quality of life and reduce hospital readmissions?

Background
Cardiovascular diseases (CVDs) are an emerging epidemic and the primary cause of premature death, disability, hospitalization and healthcare expenditure throughout the world.¹,² CVDs include vascular diseases of the brain and diseases of the blood vessels and heart. More people die annually from CVDs – primarily from stroke and heart attack - than from any other cause.² In 2008, of the 57 million deaths globally, 17.3 million (30%) were due to CVDs; a figure that is projected to rise to 25 million by 2030.²,³ The worst affected populations are those from low and middle income countries (LMICs), where over 80% of cardiovascular deaths occur, with approximately equal prevalence among men and women.²

There are 3.5 million (17%) Australians living with chronic CVD; the main types are coronary heart disease (CHD), cardiomyopathy or stroke and heart failure. In 2007-08, CHD was the principal diagnosis of 161,417 hospitalizations with rates twice as high for males than females, 60% of which occurred among those 65 years and over.⁴ In 2008, an estimated 48,453 deaths were due to CVD, with death rates in males aged 45 to 64 years almost three times higher than females of a similar age. However, a higher percentage of the female population is living longer and 78% of CVD deaths occur in females aged 75 years and over. The direct and indirect costs of CVD places great strain on healthcare resources worldwide.⁵ In 2004-05, Australia spent $5,942 million worth (11%) of healthcare expenditure on CVD; more than any other disease,⁵ and in excess of $500 billion is spent on CVD annually in the USA.⁵ According to Weerasinghe et al., 17,000 coronary artery bypass graft (CABG) surgeries are performed in Australia annually with the CABG rate second only to the US.⁶
The safety and efficiency of cardiac operations and surgical procedures has improved over the last three decades. In recent years, percutaneous coronary intervention (PCI), a non-surgical procedure, has become the treatment of choice for patients who may not survive CABG surgery. However, while PCI may be universally applicable, findings from meta-analysis have consistently shown increased rates of repeat procedures. Over the last decade, despite patients presenting with co-morbidities including hypertension and obesity, CABG remains superior to PCI as an excellent revascularization procedure for complex CHD, such as left ventricular dysfunction and diabetes mellitus. CABG enhances blood flow to the heart and offers long term survival, freedom from re-intervention due to failure of the initial procedure and adverse cardiac events, notably heart failure or stroke, as well as being a more cost-effective procedure.

Data collected from the Australia and New Zealand Global Registry of Acute Coronary Events (GRACE) - a large multinational acute coronary syndrome registry - reported that between 1999 and 2007, 20% of the 1048 patients that were readmitted within 6 months of discharge were from the CABG population. According to Sangu et al., revascularization by CABG surgery is associated with a lower risk of early readmission within 30 days after discharge, suggesting that better detection and appropriate revascularization treatment for patients with recurrent coronary occlusion and ST segment elevation myocardial ischemia may avoid early hospital readmission. Often preventable, readmission is a costly and common outcome among patients who survive a cardiac event. In a study by Price et al., CABG surgery accounted for most of the frequent causes for hospital readmission. Due to the high cost of in-hospital care, the introduction of guidelines and protocols has been successful in reducing hospital length of stay from 11 to 8 days to contain healthcare costs for patients following CABG surgery. However, findings from a number of studies have found that early discharge can lead to poorer outcomes and higher costs as the patient’s condition may be less stable and is more likely to result in major complications such as bleeding, wound infection and death. Quality improvement initiatives and cost containment should focus on the entire episode of care from initial hospitalization and the care that is required subsequently.

Over the past two decades, there has been a dramatic decline in CVD mortality rates in developed countries through individual healthcare approaches including screening of people in different care settings for early detection. In addition, population-wide primary prevention strategies, such as public awareness promotion about the risk factors for CVD (e.g., smoking, alcohol use and unhealthy eating), provides foundational knowledge for policy makers to deliver or support prevention and treatment programs. Current guidelines highlight the importance of patients participating in cardiac rehabilitation (CR) as is also recommended by cardiovascular experts for the management of CVD. CR has been defined as measures designed to help patients minimize recovery time following a cardiac event and maximize physical, social and psychological functioning by encouraging positive behaviors. Intervention consists of medical evaluation, cardiac risk factor modification, education, behavioral change and supervised exercise training for two to three days a week over a number of weeks, months or years to produce optimum improvements in patients’ health-related quality of life (HRQoL).

Patients’ perceptions of health are significant indicators of outcomes following a cardiac event. HRQoL assessments after CABG surgery and acute myocardial infarction (AMI) further provide extra measures of evaluating the effectiveness of medical and surgical treatments. Furthermore, with the increasing health and social care costs, CR has shown to be cost effective. There is consensus that the short-term
and long-term benefits of CR programs reduce hospital readmission rates, improve health-related quality of life and lessen subsequent mortality and myocardial infarct in patients with CVD, justifying the use of health related budget.\textsuperscript{11,16-26} Comprehensive reviews have concluded that a physician’s recommendation to CR is a strong indicator of participation, however as nurses spend more time with patients, patients who received recommendations from nurses demonstrated significantly higher CR attendance.\textsuperscript{13} Nurses are essential to the delivery of CR interventions as they encourage adherence and participation.\textsuperscript{24} Nurse-led CR programs can be distinguished by certain structures or features related to their purpose. These include emphasis on life management rather than intervention and diagnosis and a focus on health rather than illness.\textsuperscript{27} In addition to providing autonomy, nurse-led CR programs increase the opportunity for professional development among nurse practitioners. Nurse-led CR programs are staffed and managed solely by nurses with the ability to treat and consult, evaluate and refer patients to other health professionals as needed.\textsuperscript{27} Nurse-led services can optimize quality of care in managing patients with established CHD by diverting health consumers from busy general practice and hospital settings.\textsuperscript{27} This supports the view expressed by Johnson et al., that CR endorsement from nurses should be included in strategies to increase participation.\textsuperscript{13}

Uptake for CR remains poor due to many reasons, such as lack of ease of access and varies between individuals who have work commitments or competing roles and responsibilities.\textsuperscript{28,29} Usual care for non-participation in CR provides mandatory patient education including phone interaction or face-to-face contact with healthcare professionals, written materials available as pamphlets, brochures or online and audio-visual resources. Topics covered are related to pain and medication management, signs and symptoms of complications, activity performance and follow up procedures. Education included in usual care is provided free of charge in the form of either a group discussion or one-on-one, for a number of sessions and for a predetermined length of time.\textsuperscript{30} Tailored approaches such as coordination of care supported by liaison nurses, motivational communication and home visits may improve uptake and adherence in CR.\textsuperscript{28}

Optimum gains for patients participating in nurse-led CR are clear. This systematic review aims to investigate the effects of nurse-led CR programs on the HRQoL of patients and hospital readmissions following coronary artery bypass graft surgery. The review will add to the evidence base for nurse-led CR programs using the JBI review methodology.

**Keywords**

Cardiac rehabilitation; coronary artery bypass graft; health-related quality of life; nurse-led; readmissions

**Inclusion criteria**

**Types of participants**

This systematic review will consider studies that include male or female, post-CABG surgery patients, aged 60 years and older with a history of cardiovascular disease (CVD).

**Types of intervention(s)**

This systematic review will consider studies that evaluate nurse-led CR programs.
Comparator(s)
Non-participation in a nurse-led CR program, or usual care.

Types of outcomes
The outcomes of interest for this systematic review will focus on HRQoL and readmissions. Measures of HRQoL will be focusing on various validated instruments, such as the Medical Outcomes Study 36 Item Short Form (SF-36) and disease specific Seattle Angina Questionnaire (SAQ). Hospital readmission will be considered as the total number of cardiac-related admissions in the follow-up period following the CABG intervention. Any validated and published scales measuring readmission rates, for example the General Health Questionnaire, will be included.

Types of studies
The systematic review will consider randomized controlled trials (RCTs) that evaluate the efficacy of a nurse-led CR program on HRQoL and readmission. In the absence of RCTs, other research designs such as non-RCTs and before and after studies will be considered for inclusion.

Search strategy
The search strategy will identify both unpublished and published studies utilizing a three-step search strategy in each component of the review. An initial limited search of CINAHL and MEDLINE will be performed, followed by analysis of the text words contained in the abstract and title and of the index terms used to describe the article. An initial search of the Joanna Briggs Institute (JBI) Library of Systematic Reviews, the Cochrane Library and CINAHL database was conducted to ensure that no previous systematic reviews on this specific topic had been undertaken, which was found to be the case.

A second search using all identified index terms and keywords will then be undertaken across all included databases. The databases to be searched include:

- Cochrane Database of Systematic Reviews (CDSR)
- Cochrane Central Register of Controlled Trials (CENTRAL)
- JBI Library of Systematic Reviews
- Center for Reviews and Dissemination (CRD) website
- PubMed
- Embase OvidSP
- PsycINFO (EBSCOHOST)
- metaRegister of Controlled Trials (mRCT)
- ScienceDirect via Scopus
- British Library
- UK National Research Register of ongoing health research
Thirdly, the reference lists of all identified reports and articles will be hand searched for additional studies. The reporting of HRQoL and readmission outcome measures were more frequent over the last decade, therefore only studies published between 2000 and 2013 will be considered for inclusion in this review. Due to a lack of resources, time and facilities for translation, only studies written in the English language will be considered. All identified non-English language papers will be recorded with ‘language’ as the reason for exclusion. The search for unpublished studies will include:

World Health Organization Regional Databases

Science Citation Index (SCI)

Networked Digital Library of Theses and Dissertations (NDLTD)

Google Scholar-

Initial keywords to be used will be:

Cardiac rehabilitation

Coronary artery bypass graft

CABG

Revascularization

Nurse led

Nurse practitioner

Cardiac nurse

Usual care

Non-participation

Health related quality of life

HRQoL

Hospitalization

Readmission

Further keywords to be used for the subsequent search will be:

Readmission rates

Rehospitalization rates

Cost-effectiveness

Effectiveness

Compliance

Adherence

Retention

Consumer satisfaction
Assessment
Education
Consultation
Referral

During the conduct of the search, consideration will be given to the diverse terminology used and the variation in spelling of keywords, which might influence the identification of relevant studies.

All studies and documents identified during the database search will be assessed for relevance to the review based on the information provided in the title, abstract and descriptor/MeSH terms. If available, studies identified from reference list searches of identified studies will be assessed for relevance based on the study title and abstract. The full-text will be retrieved for all studies that meet the inclusion criteria. If there is uncertainty about the degree to which an article meets the inclusion criteria, the full text of the article will be retrieved. The study will then be re-assessed for relevance according to the inclusion criteria.

The bibliographical software package EndNote will be utilized to manage all references, as it facilitates the importation of references from electronic databases as well as the linkage of references into the JBI Comprehensive Review Management System (CReMS) for assessment of methodological quality using the JBI critical appraisal tools.

Assessment of methodological quality

Quantitative studies selected for retrieval will be independently assessed by two reviewers for methodological validity prior to inclusion in the review using standardized critical appraisal instruments from the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI) (APPENDIX I). Any disagreements that arise between the reviewers will be resolved through discussion, or with a third reviewer.

Data collection

Data will be extracted from studies included in the review using the standardized data extraction tool from JBI-MAStARI (Appendix II). Extracted data will include specific details about the study methods, interventions, populations and outcomes relevant to the review question and its specific objectives.

Data synthesis

Quantitative papers will, where possible, be pooled in statistical meta-analysis using JBI-MAStARI. All results will be subject to double data entry. Effect sizes expressed as odds ratios (for categorical data) and weighted mean differences (for continuous data) and their 95% confidence intervals will be calculated for analysis. Heterogeneity will be assessed statistically using the standard chi-square test and also explored using subgroup analyses based on the different quantitative study designs included in this review. Where statistical pooling is not possible, the findings will be presented in narrative form including tables and figures to aid in data presentation where appropriate.
Conflicts of interest

There are no conflicts of interest to declare.

Acknowledgements

I acknowledge the assistance of Dr Cannas Kwok for her valuable support.
References


## Appendix I: Appraisal instruments

**JBI Critical Appraisal Checklist for Experimental Studies**

<table>
<thead>
<tr>
<th>Reviewer</th>
<th>Date</th>
<th>Author</th>
<th>Year</th>
<th>Record Number</th>
</tr>
</thead>
</table>

1. Was the assignment to treatment groups truly random? [Yes, No, Unclear]
2. Were participants blinded to treatment allocation? [Yes, No, Unclear]
3. Was allocation to treatment groups concealed from the allocator? [Yes, No, Unclear]
4. Were the outcomes of people who withdrew described and included in the analysis? [Yes, No, Unclear]
5. Were those assessing outcomes blind to the treatment allocation? [Yes, No, Unclear]
6. Were the control and treatment groups comparable at entry? [Yes, No, Unclear]
7. Were groups treated identically other than for the named interventions? [Yes, No, Unclear]
8. Were outcomes measured in the same way for all groups? [Yes, No, Unclear]
9. Were outcomes measured in a reliable way? [Yes, No, Unclear]
10. Was appropriate statistical analysis used? [Yes, No, Unclear]

Overall appraisal: Include □ Exclude □ Seek further info. □

Comments (including reasons for exclusion):
Appendix II: Data extraction instruments

**MAStARI data extraction instrument**

### JBI Data Extraction Form for Experimental / Observational Studies

<table>
<thead>
<tr>
<th>Study Method</th>
<th>RCT</th>
<th>Quasi-RCT</th>
<th>Longitudinal</th>
<th>Retrospective</th>
<th>Observational</th>
<th>Other</th>
</tr>
</thead>
</table>

**Participants**

- Setting
- Population

**Sample size**

- Group A
- Group B

**Interventions**

- Intervention A
- Intervention B

**Authors Conclusions:**

- 
- 

**Reviewers Conclusions:**

- 
- 