**Supplementary Material for**

**Readmissions following hospitalisations for cardiovascular disease: a scoping review of the Australian literature**

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Appendix S1 – Search terms for OVID Medline

Appendix S2 – Search terms for EMBASE

Appendix S3 – Search terms for CINHAL

Appendix S4 – Search term for grey literature

Appendix S5 – Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI)

Appendix S6 – Predictors of readmissions

Appendix S7 – Description of interventions

**Appendix S1: Search terms for OVID Medline**

Date searched – 11 March 2016

Patient Readmission OR re-presentation.mp. OR Patient Admission OR representation.mp. OR hospitalisation.mp. OR Hospitalization OR Treatment Outcome OR revisit$.tw. OR readmission$.tw. OR rehospitali$.tw. OR rehospitaliz$.tw. OR represent$.tw. OR rehospitali$.tw. OR unplanned.tw. OR return.tw. AND exp Australia OR western australia.tw. OR new south wales.tw. OR south australia.tw. OR victoria.tw. OR queensland.tw. OR northern territory.tw. OR australian capital territory.tw. OR tasmania.tw. OR   australia.tw. OR perth.tw. OR sydney.tw. OR adelaide.tw. OR melbourne.tw. OR brisbane.tw. OR darwin.tw. OR canberra.tw. OR hobart.tw. AND *Cardiovascular Diseases OR Adult OR *Heart Failure OR *Stroke OR  *Peripheral Arterial Disease OR *Peripheral Vascular Diseases OR *Atrial Fibrillation OR  *Heart Valves OR   *Aortic Valve OR *Heart Valve Diseases OR *Atherosclerosis OR *Myocardial Infarction *Coronary Disease/ or *Acute Coronary Syndrome or *Angina, Unstable or *Myocardial Ischemia or *Coronary Artery Disease OR *Cardiovascular Diseases OR *Cardiac Surgical Procedures OR *Angiography/ or *Coronary Angiography/ OR *Chest Pain OR *Coronary Artery Bypass OR *Cardiopulmonary Bypass/ OR  *Cardiac Catheterization/


Limited to English language and humans and yr="2000 -Current" and "all adult (19 plus years)" and English and humans.

**Appendix S2: Search Terms for EMBASE**

Date searched – 28 July 2016

're presentation' OR hospitalisation OR revisit OR revisit* OR readmi* OR rehospitali* OR unplanned AND ('australia'/exp OR australia OR 'western australia' OR 'new south wales' OR 'south australia' OR 'victoria' OR 'queensland' OR 'northern territory' OR 'australian capital territory' OR tasmania OR perth OR sydney OR adelaide OR melbourne OR brisbane OR darwin OR canberra OR hobart) AND ('cardiovascular disease*' OR 'heart failure' OR stroke OR 'peripheral artery disease' OR 'peripheral vascular disease' OR 'atrial fibrillation' OR 'heart valves' OR atherosclerosis OR 'myocardial infarction' OR 'coronary disease' OR 'chest pain' OR 'coronary artery bypass' OR 'cardiopulmonary bypass' OR 'cardiac catheteri*ation') AND ([adult]/lim OR [middle aged]/lim OR [aged]/lim) AND [humans]/lim AND [english]/lim AND [2000-2016]/py

**Appendix S3: Search terms for CINHAL**

Date searched - 21 September 2016

coronary disease OR acute coronary syndrome OR angina OR myocardial ischemia OR coronary artery disease OR Cardiac Surgical Procedures OR angiography OR Chest Pain OR coronary artery bypass* OR Cardiopulmonary Bypass OR cardiac catheterization) AND (australia OR western australia OR new south wales OR south australia OR victoria OR queensland OR northern territory OR australian capital territory OR tasmania OR perth OR sydney OR adelaide  OR melbourne OR brisbane OR darwin OR canberra OR hobart )) AND (cardiovascular disease OR adult OR heart failure OR stroke OR peripheral artery disease OR peripheral vascular disease OR atrial fibrillation OR heart valve* OR aortic valve* OR heart valve disease OR atherosclerosis OR myocardial infarction OR coronary disease OR acute coronary syndrome OR angina OR myocardial ischemia OR coronary artery disease OR Cardiac Surgical Procedures OR angiography OR Chest Pain OR coronary artery bypass* OR Cardiopulmonary Bypass OR cardiac catheterization )) AND (Patient Readmission OR re-present* OR Patient Admission OR represent* OR hospitalisation OR hospitalization OR treatment outcomes OR revisit* OR readmission* OR rehospitali* OR unplanned   AND coronary disease OR acute coronary syndrome OR angina OR myocardial ischemia OR coronary artery disease OR Cardiac Surgical Procedures OR angiography OR Chest Pain OR coronary artery bypass* OR Cardiopulmonary Bypass OR cardiac catheterization AND coronary disease OR acute coronary syndrome OR angina OR myocardial ischemia OR coronary artery disease OR Cardiac Surgical Procedures OR angiography OR Chest Pain OR coronary artery bypass* OR Cardiopulmonary Bypass OR cardiac catheterization

**Limiters** - Published Date: 200000101-20160831; English Language; Research Article; Human; Journal Subset: Australia & New Zealand; Publication Type: Journal Article; Language: English

**Appendix S4: Search terms for grey literature**

A Google search was conducted on Sunday 11 Sep 2016 using the terms 'Australia hospital readmissions cardiovascular'. The first 20 pages of about 149,000 results were analysed. There were 10 links per page so first 200 websites were searched.

The Australian and New Zealand clinical trial registry was searched on 1 October 2016 with search terms cardiovascular readmission and gave 14 results.

Moreover, the Australian clinical trials website was also searched on 1 October 2016 with the search parameters readmission cardiovascular and gave 16 results.

All federal and state government health websites, the Australian Institute of Health and Welfare, the Australian Bureau of Statistics, the Australian Heart Foundation, the Australian Commission on Safety and Quality in Health Care and the Bureau of Health Information were all searched for cardiovascular readmission data.

## JBI Critical Appraisal Checklist for Comparable Cohort/ Case Control

Reviewer _____ Date _____

Author _____ Year _____ Record Number _____

|   | | Yes | No | Unclear | Not Applicable |
|---|---|---|---|---|---|
| 1. | Is sample representative of patients in the population as a whole? | ☐ | ☐ | ☐ | ☐ |
| 2. | Are the patients at a similar point in the course of their condition/illness? | ☐ | ☐ | ☐ | ☐ |
| 3. | Has bias been minimised in relation to selection of cases and of controls? | ☐ | ☐ | ☐ | ☐ |
| 4. | Are confounding factors identified and strategies to deal with them stated? | ☐ | ☐ | ☐ | ☐ |
| 5. | Are outcomes assessed using objective criteria? | ☐ | ☐ | ☐ | ☐ |
| 6. | Was follow up carried out over a sufficient time period? | ☐ | ☐ | ☐ | ☐ |
| 7. | Were the outcomes of people who withdrew described and included in the analysis? | ☐ | ☐ | ☐ | ☐ |
| 8. | Were outcomes measured in a reliable way? | ☐ | ☐ | ☐ | ☐ |
| 9. | Was appropriate statistical analysis used? | ☐ | ☐ | ☐ | ☐ |

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

Comments (Including reason for exclusion)

_____

_____

_____

# JBI Critical Appraisal Checklist for Randomised Control / Pseudo-randomised Trial

Reviewer _____ Date _____

Author _____ Year _____ Record Number _____

| | Yes | No | Unclear | Not Applicable |
|---|---|---|---|---|
| 1. Was the assignment to treatment groups truly random? | ☐ | ☐ | ☐ | ☐ |
| 2. Were participants blinded to treatment allocation? | ☐ | ☐ | ☐ | ☐ |
| 3. Was allocation to treatment groups concealed from the allocator? | ☐ | ☐ | ☐ | ☐ |
| 4. Were the outcomes of people who withdrew described and included in the analysis? | ☐ | ☐ | ☐ | ☐ |
| 5. Were those assessing outcomes blind to the treatment allocation? | ☐ | ☐ | ☐ | ☐ |
| 6. Were the control and treatment groups comparable at entry? | ☐ | ☐ | ☐ | ☐ |
| 7. Were groups treated identically other than for the named interventions | ☐ | ☐ | ☐ | ☐ |
| 8. Were outcomes measured in the same way for all groups? | ☐ | ☐ | ☐ | ☐ |
| 9. Were outcomes measured in a reliable way? | ☐ | ☐ | ☐ | ☐ |
| 10. Was appropriate statistical analysis used? | ☐ | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ | ☐ |

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

Comments (Including reason for exclusion)

_____
_____
_____

**Appendix S6:** Predictors of readmissions

| Paper | Time | Condition | Significant Variables | Insignificant Variables | C-Stat |
|---|---|---|---|---|---|
| Murphy et al (2008)[1] | 30 days | CABG surgery | Older age<br><br>Being unmarried<br><br>Living alone<br><br>History of hypertension<br><br>Higher HADS (anxiety) on admission | Sex<br><br>Country of birth<br><br>School leaving age<br><br>Manual occupation<br><br>High cholesterol<br>Smoking status<br><br>BMI<br><br>Family history of CVD<br><br>Diabetes<br><br>Previous MI<br><br>Length of time on waiting list<br><br>Length of hospital stay<br>NHYA class<br><br>HADS (depression) on admission | Not given |
| Rana et al (2014)[2] | 30-day IHD readmission | MI | Total time in emergency<br><br>Number of emergencies<br><br>Number of emergency-to-ward transfers<br><br>Unstable angina<br><br>Chest pain<br><br>Sepsis<br><br>Hyperkalaemia<br><br>Hypokalemia<br><br>Fluid overload<br><br>Acute kidney failure | Nil given | AUC for 3 models<br><br>HOSPITAL score = 0.60<br><br>Comorbidities =0.53<br><br>EMR model = 0.78 |

| | | | Urinary tract infection | | |
|---|---|---|---|---|---|
| | | | Long-term use of anticoagulants | | |
| | | | Disorders of magnesium metabolism | | |
| | | | Left ventricular failure | | |
| | | | Presence of cardiac device | | |
| | | | Invasive coronary investigation undertaken in past year | | |
| | | | Debridement of skin and subcutaneous tissue | | |
| Yu et al (2016)[3] | 6 months cerebrovascular events | Ischemic stroke | Depression (but not after adjustment) | Anxiety | Not in the paper |
| Huynh et al (2015)[4] | 30-day all cause | HF <br><br>**death or readmission** with *nonclinical data* | Length of stay <br><br> Living alone <br><br> Age <br><br> Discharge during winter <br><br> Remoteness index categories <br><br> Number of coded diagnoses at discharge <br><br> Male | Not given | Can't find in paper |
| | | **death or readmission** with *clinical data* | HF NYHA classification <br><br> Blood urea nitrogen <br><br> Serum albumin <br><br> Heart rate <br><br> Respiratory rate | Not given | 0.72 |

| | | | | | |
|---|---|---|---|---|---|
| | | | Diuretic use ACEI/ARB use Presence of life-threatening arrhythmia Presence of abnormal troponin | | |
| | | **Death or readmission** with *clinical and nonclinical* | HF NYHA classification Blood urea nitrogen Serum albumin Heart rate Respiratory rate Living alone Diuretic use ACEI/ARB use Presence of abnormal troponin Remoteness index Discharge during winter Presence of life threatening arrhythmia | Not given | 0.76 for death or readmission 0.82 for death 0.69 for readmission |
| Parker et al (2008)[5] | 1-year depression and CV outcome | ACS | Age CABG on admission Diabetes history LVEF <35% Past history of CVA/TIA New depression onset post baseline | Female sex Past admission for heart condition Current smo0ker Taking SSRI, TCA or MAOI Depressed pre-baseline Incident depression | Not reported |
| Betihavas et al (2015)[6] | 28-day CV event | HF | Age | Female sex | 0.8 |

| | | | Living alone<br><br>Sedentary lifestyle<br><br>Multiple comorbidities | Years since HF diagnosis | |
|---|---|---|---|---|---|
| Tully et al (2008)[7] | 6 month | CABG surgery | Peripheral vascular disease | Depression<br><br>Aged $\geq$ 71<br><br>CCS class III/IV<br><br>hypertension | Not in the paper |
| Slamowicz et al (2008)[8] | 30 day* | CABG surgery<br><br>(multivariate model) | Charlson comorbidity<br><br>Multiple ED visits<br><br>Female sex<br><br>Index LOS | Waiting time<br><br>Age | Not in the paper |

*Models for 7 days and 6-month models not present.

HADS = hospital anxiety and depression scale

CABG = coronary artery bypass graft

CVD = cardiovascular disease

ACS = acute coronary syndrome

IHD = ischemic heart disease

MI = myocardial infarction

NYHA = New York Heart Association classification

LOS = length of stay

CCS = Canadian Cardiovascular Society (CSS) Functional Classification of Angina

**Appendix S7:** Description of the interventions

| Study | Intervention Description |
|---|---|
| Davidson et al (2010) [9] | 12-week multidisciplinary weekly cardiac rehab program. Patients were counselled to undertake home-based exercise program tailored to their needs, promote self-management and treatment. Nursing, pharmacy, physiotherapy occupational therapy and dieticians involved. Compared to usual care. |
| Driscoll et al (2013) [10] | A survey was mailed to 48 program coordinators asking them to identify specific interventions implemented in their program. Examined the effect of chronic heart failure management programs from 27 centres (mixture of hospital and home-based programs). Each program was given an intervention score |
| Stewart et al (2012) [11] | The nurse led clinic-based intervention group received ongoing management via specialist, multidisciplinary clinic without home visits. Home intervention was predominantly managed via out-reach program of home visits by a specialist heart failure nurse with close liaison with the patient's family physician and referral to other health care services as required. |
| Roughead et al (2009) [12] | The exposed group were veterans who had received Home Medicine Review (HMR) and had all health services fully subsidised by the Department of Veteran Affairs (DVA), were dispensed beta blocker subsidised for heart failure in the 6 months before the HMR and aged 65 years and older at time of review. The unexposed group were veterans who had all health services fully subsidised by the DVA and aged 65 years and older who had been dispensed a beta blocker but had NOT had an HMR. |
| Barker et al (2012) [13] | A pharmacist visited patients within 96 hours of discharge and a 6-month follow-up. Usual care discussion was generic about how they were feeling, no pharmacy advice was given unless patient asked. The intervention group had a discussion about medication regime to ensure medication use was as prescribed and followed evidence based guidelines, follow-up appointment and expired medications and disposed of them. |
| Scott et al (2004) [14] | Provision of comparative baseline feedback at a facilitative workshop combined with hospital-specific quality-improvement interventions supported by onsite quality officers and a central program management group. |
| Mudge et al (2010) [15] | Education and performance feedback for hospital and primary care practitioners, clinical decision support tools, individualised guideline-based treatment plans, patient education and self-management support and improved hospital community integration. |
| Stewart et al (1999) [16] | Both arms of the study were essentially nurse-led (two teams at each site) with tertiary qualified nurses with post-graduate qualifications in cardiac care and experience in heart failure management. The key point of differentiation was the mode of delivery, the clinic-based intervention group received ongoing management via a specialist, multi- |

| | |
|---|---|
| | disciplinary clinic and no home visits were applied. Alternatively, the home intervention group was predominantly managed via an out-reach program of home visits by a specialist heart failure nurse with close liaison with the patient's family physician and referral to other health care services as required. This approach did not preclude home-based intervention patients attending a cardiology outpatient clinic. |
| Stewart et al (2015)[17] | Face-to-face home visits with additional telephone support Communications with other health professionals delivered via automated reporting systems based on standardised and structured assessments |
| Martin et al (2016)[18] | A single and simultaneous page to the cardiology team to facilitate rapid access to the cardiac catheterisation laboratory, this was called the 'Cath Lab Code'. In addition, the Cath Lab Code with a pre-hospital notification system activated by paramedics in the field. |

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