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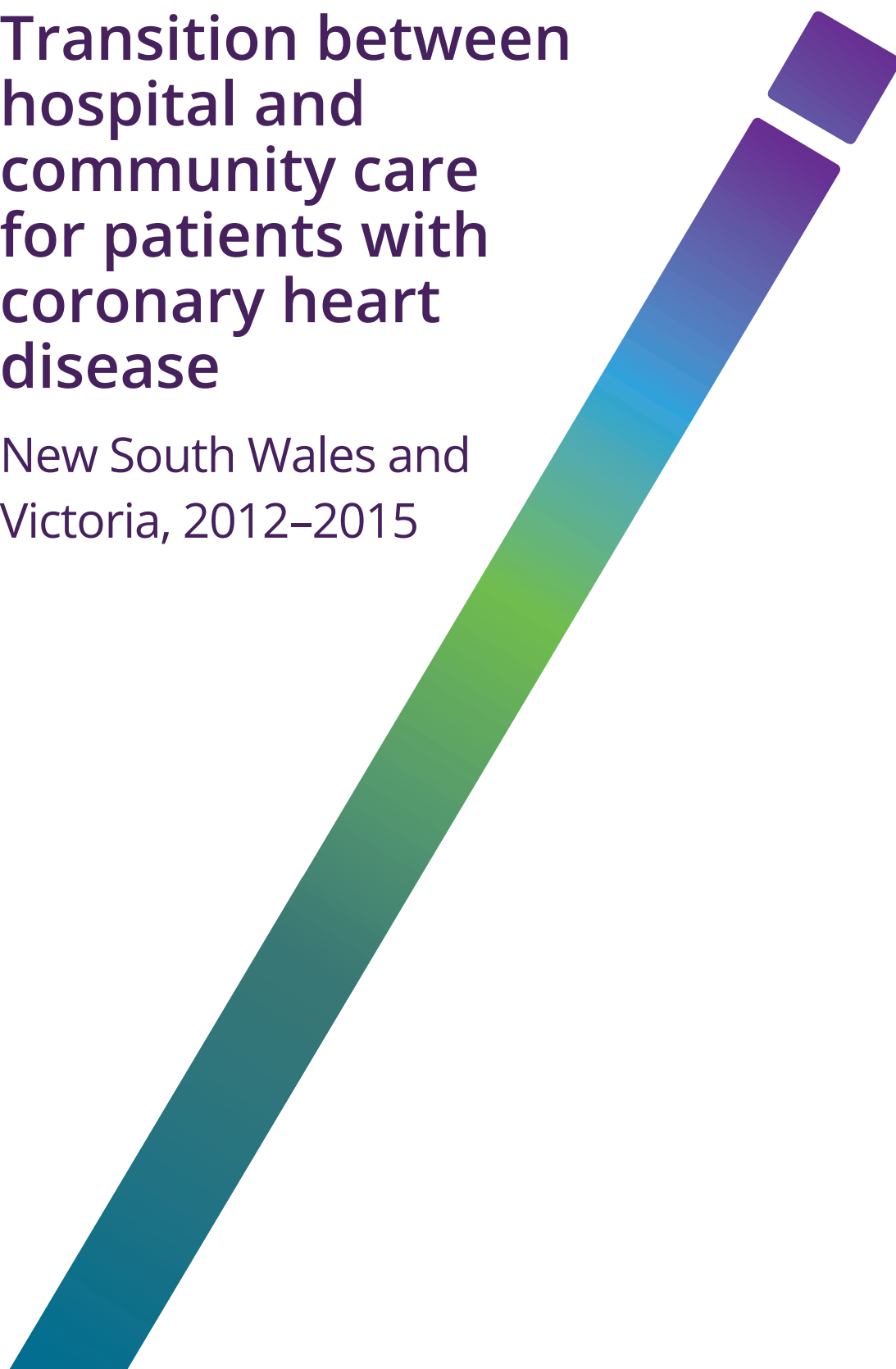
Transition between hospital and community care for patients with coronary heart disease

New South Wales and
Victoria, 2012–2015



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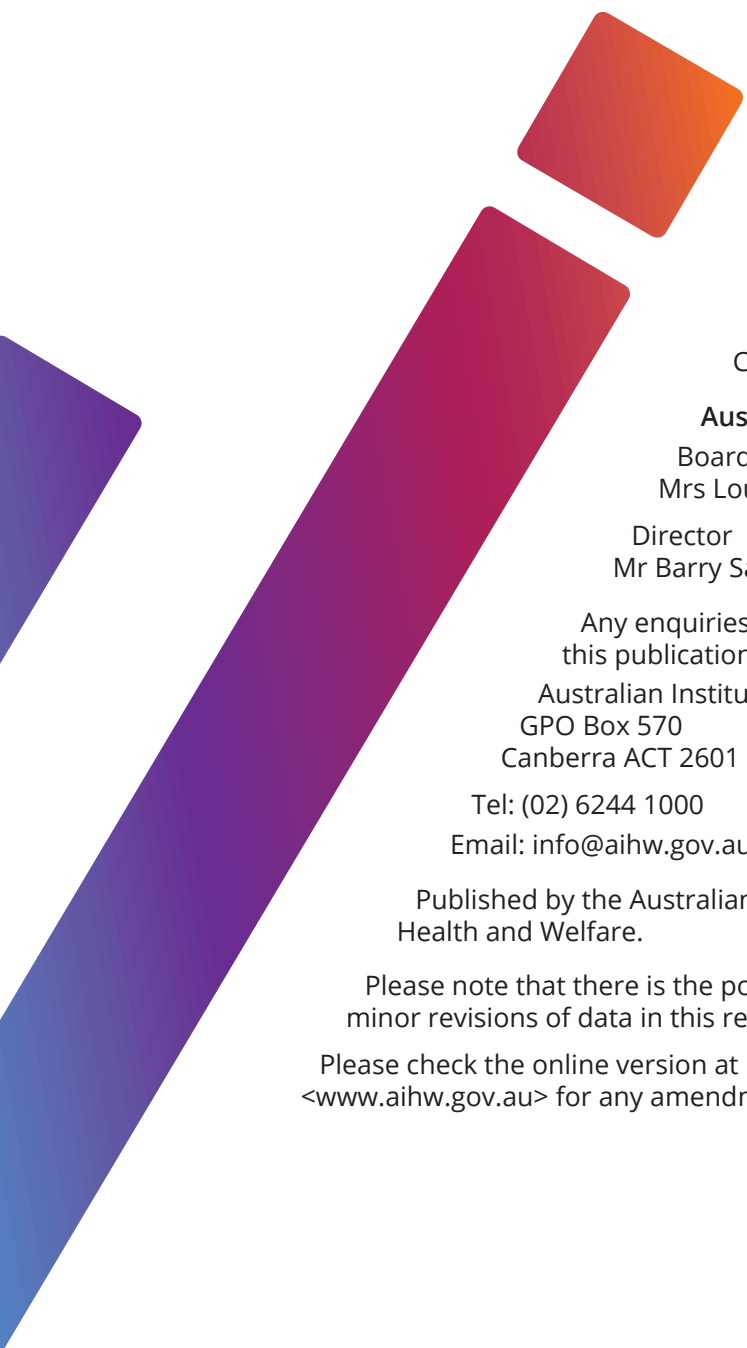
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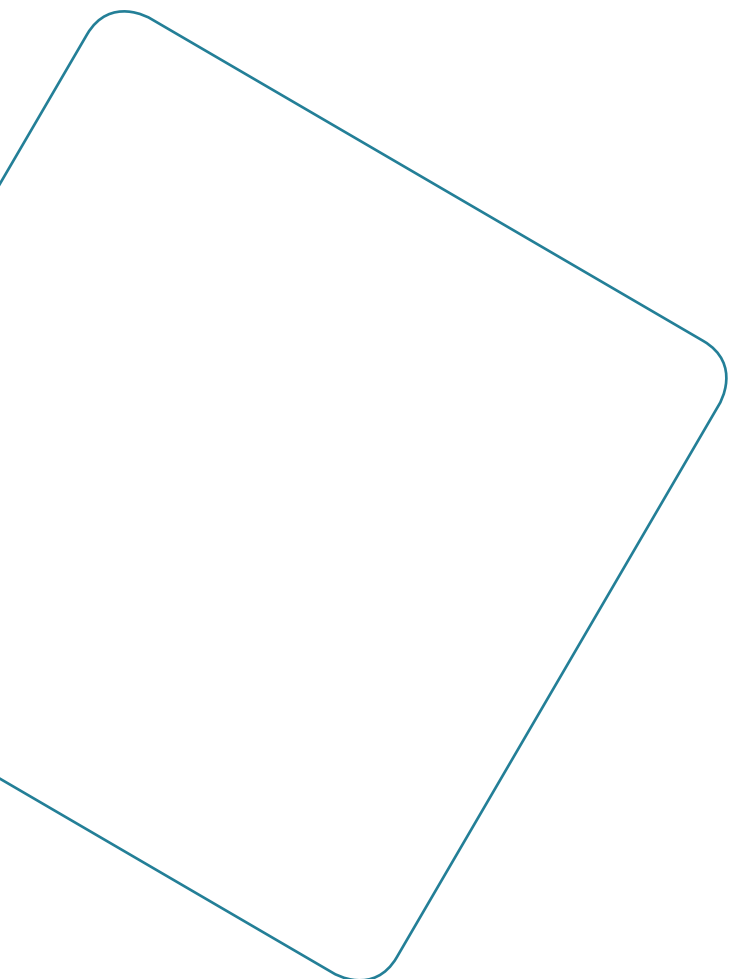
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Abbreviations

ABS	Australian Bureau of Statistics
ACHI	Australian Classification of Health Interventions
AIHW	Australian Institute of Health and Welfare
AMI	acute myocardial infarction
CABG	coronary artery bypass grafting
CDMP	chronic disease management plan
CHD	coronary heart disease
COPD	chronic obstructive pulmonary disease
CVD	cardiovascular disease
GP	general practitioner
GPMP	general practitioner management plan
HR	hazard ratio
ICD-10-AM	The international statistical classification of diseases and related health problems, 10th revision, Australian modification
MBS	Medicare Benefits Schedule
MI	myocardial infarction
NIHSI AA	National Integrated Health Services Information Analysis Asset
NDI	National Death Index
NSTEMI	non-ST-elevation myocardial infarction
PBS	Pharmaceutical Benefits Scheme
PCI	percutaneous coronary interventions
RS	regularity score
STEMI	ST-elevation myocardial infarction
TCA	team care arrangement
UPI	usual provider continuity index

Summary

People with chronic conditions often require complex health care. For patients discharged from hospital with chronic conditions, regular follow-up visits to their primary health-care providers can be important for their long-term health. People with coronary heart disease (CHD, including heart attack or angina) are at higher risk of recurrent heart attacks and other cardiovascular diseases such as heart failure and atrial fibrillation. Effective and appropriate health care after an acute hospitalisation for CHD has been shown to improve a patient's health outcomes.

In one of the first studies of its kind within Australia, the AIHW examined the health services used by people with CHD after their discharge from hospital. More than 37,300 CHD patients who were discharged from hospital between April 2012 and June 2013 were followed in the data for 2 years to see if visiting a general practitioner (GP) or a cardiologist, or claiming Medicare Benefits Schedule (MBS) items for specific health services, affected their chances of being re-admitted to hospital or dying.

The study analysed linked de-identified hospitalisation data from New South Wales and Victoria to MBS data and National Death Index data. By analysing linked multiple data sets, the study provides insights into hospital and community-based health care that cannot be explored using single data collections. It also provides a deeper understanding of the ways people interact with the health system, and may help to inform policies to improve health-care delivery for people with chronic conditions.

The study has shown that the vast majority of CHD patients visited their GP within 30 days of being discharged from hospital and that they had, on average, 1 or 2 visits per month during the two year timeframe. Timely and regular contact with a GP were associated with lower risk of having an emergency re-admission to hospital for cardiovascular disease (CVD).

Future research could explore how a person's use of primary health-care services affects their pharmaceutical treatment, and focus on identifying approaches to improve regular primary health care use.

Most CHD patients were over 55

Eight in 10 (80%) patients hospitalised for CHD were aged over 55, and 3 in 10 (30%) were aged 65–74. More than two-thirds (68%) of all patients were men (25,400 compared with 12,000 women).

1 in 4 CHD patients were re-admitted to hospital and 1 in 10 died within 2 years

Almost 1 in 4 patients hospitalised for CHD (8,800; 24%) had at least 1 emergency re-admission due to cardiovascular disease (CVD) within 2 years of being discharged. About 40% of these people had their first emergency CVD re-admission within 90 days.

Almost 1 in 10 patients hospitalised for CHD died during the 2 year follow-up period (8%, 3,000 people). Around 40% of these deaths were due to CVD. One in 4 of the CVD related deaths occurred within 90 days after discharge.

CHD patients with co-existing conditions were at higher risk of having an emergency re-admission for CVD

People aged 75–84 had a 9% higher risk of emergency re-admission for CVD compared with those aged 25–54.

A higher risk for emergency re-admission was also found for people:

- with an acute myocardial infarction (heart attack) who did not have cardiovascular procedures such as a percutaneous coronary angioplasty during the initial hospital stay
- who had chronic obstructive pulmonary disease (COPD), renal failure or heart failure treated during the hospital stay, or previous hospitalisations.

The risk of dying from CVD was 7%–29% higher in patients who had cancer, COPD, renal failure or heart failure in the index hospital stay or previous hospitalisations.

8 in 10 CHD patients visited a GP within 30 days of being discharged

More than 9 in 10 (95%) of patients hospitalised for CHD had a follow-up visit with a GP within 2 years of being discharged. Eight in 10 visited their GP within 30 days (61% within the first week and 23% between 8 and 30 days). Over half of patients with CHD (56%) had a cardiologist follow-up, and this generally occurred after 30 days following discharge (35%). Most patients who made an MBS claim in relation to a new chronic disease management plan and health assessment did so after 30 days following discharge.

Follow-up care associated with lower risk of re-admission and death due to CVD

After controlling for a range of factors (such as age, sex, type of CHD diagnosis, coexisting conditions), patients with CHD who had at least 1 GP or cardiologist follow-up or claimed a new chronic disease management plan within 2 years of discharge from hospital had 5%–11% lower risk of emergency CVD re-admission and 4%–6% lower risk of CVD death than those who did not use these services.

Lower risk of emergency CVD re-admission for patients who had 1 to 2 GP visits per month

After controlling for the selected factors, the risk of having an emergency CVD re-admission was 12%–13% lower in CHD patients who, on average, visited a GP 1–2 times each month over the 2-year follow-up period than patients who did not visit a GP. The re-admission rate was not significantly different for patients with more than 2 GP visits per month than those who did not visit a GP.

Lower risk of emergency CVD re-admission for patients who visited a GP in first week and had evenly timed GP visits

After controlling for a range of factors, patients who had a GP follow-up within 1 week after discharge had 5% lower risk of emergency re-admission for CVD compared with those who visited a GP after 30 days. Patients with the most evenly timed GP visits had 13% lower risk of emergency CVD re-admission compared with those with more sporadic GP visits.



1

Introduction





Coronary heart disease (CHD) is the largest contributor to the burden of disease in Australia, accounting for 8% of the total disease burden in 2011 (AIHW 2016). People with coronary heart disease (including heart attack or angina) are at higher risk of recurrent heart attacks and other cardiovascular diseases such as heart failure and atrial fibrillation. This project is one of the first to be undertaken to use the management of CHD as a case study to examine complex health care delivered by multiple providers across hospital and community care settings. This report focuses on follow-up care after hospitalisation and its association with health outcomes. The timely, effective and appropriate secondary prevention—the management and treatment of established CHD to prevent recurrent cardiovascular events and disease progression—after hospitalisation for an acute CHD event has been shown to improve health outcomes for people with CHD (Clark et al. 2005; Kirchmayer et al. 2013).

This case study comprised more than 37,300 people with CHD who were discharged from a public hospital in New South Wales or Victoria between 1 April 2012 and 30 June 2013. Patients were followed up for 2 years in the data to examine their use of community-based health-care services after their hospital discharge, including use of GPs, specialist cardiologists, health assessments and chronic disease managements plans, and allied health services (subsidised by Medicare).

The main objectives of the report are to examine for people who were discharged from hospital following an acute CHD event:

- their use of community-based health care (for services subsidised by Medicare); also reported by sociodemographic and clinical characteristics
- their hospital re-admission and mortality rates
- the association between community-based health-care use patterns and hospital re-admission and mortality rates.

This examination—of the relationships between diagnosis, health service use and health outcomes—was possible because the study accessed a database created by the AIHW <<https://www.aihw.gov.au/our-services/data-linkage/approved-aihw-linkage-projects>> as part of the National Data Linkage Demonstration Project, under the auspices of the Australian Health Ministers Advisory Council. This database comprised hospitalisation data from New South Wales and Victoria, 'linked' with the MBS, Pharmaceuticals Benefits Scheme (PBS) and National Death Index (NDI) data. The database also includes PBS data, but this component was not used for this report.

Using linked data can provide a deeper understanding of the ways people interact with the health-care system that may inform policy making and decisions about improving health-care delivery.



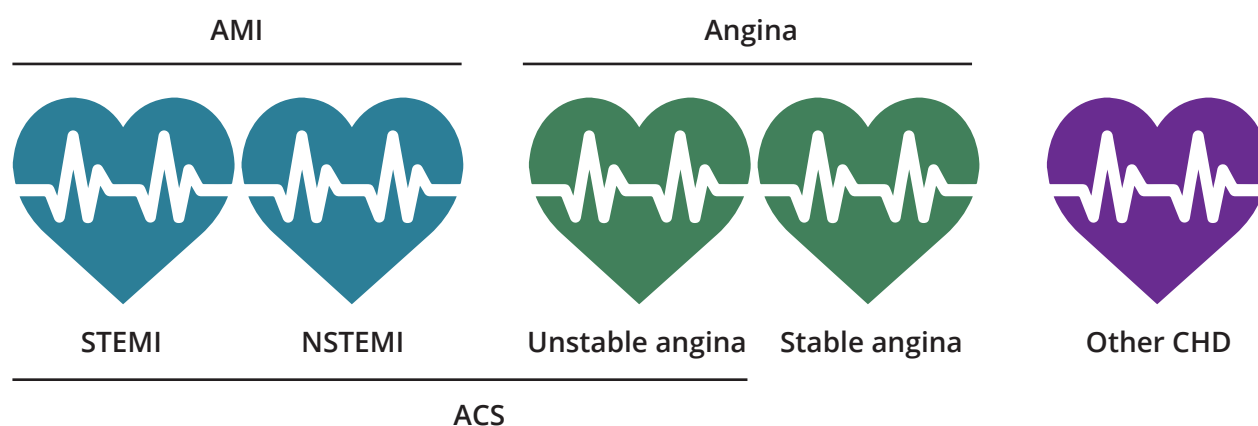
1.1 What is CHD?

CHD occurs when there is a blockage in the blood vessels that supply blood to the heart muscle. There are 2 major clinical forms of CHD:

- Heart attack—also known as acute myocardial infarction (AMI)—is an acute life threatening event where the blood vessel is blocked, threatening to damage the heart muscle and its functions, requiring prompt treatment. Clinically, AMI is often categorised based on the pattern that appears on an electrocardiogram (ECG) (a diagnostic tool that measures and records the electrical activity of the heart):
 - STEMI—ST segment elevation myocardial infarction, so named because the ‘ST segment’ on the ECG appears elevated. STEMI is a type of heart attack almost always caused by a complete blockage to a major coronary artery.
 - NSTEMI—Non-ST segment elevation myocardial infarction. Unlike STEMI, the ‘ST segment’ on the ECG is not elevated. NSTEMI is a type of heart attack in which an artery is frequently partially blocked severely reducing blood flow.
- Angina—a chronic condition in which non-sustained episodes of chest pain can occur periodically when the heart has a temporary deficiency in its blood supply. Stable angina is generally not life threatening on its own, although unstable angina is the most dangerous and less predictable form, due to a changing severity in partial coronary blockages, and is medically treated in a similar manner to heart attacks. Unstable angina may progress to NSTEMI and STEMI.

Heart attacks and unstable angina are considered to be part of a continuum of acute coronary artery diseases, described as ‘acute coronary syndrome (ACS)’ (Figure 1.1). They are sudden, severe and life-threatening events and require timely and evidence-based management. Other CHD includes complications following MI and chronic coronary heart diseases.

Figure 1.1: Clinical forms of CHD



Note: Other CHD includes complications following MI and chronic coronary heart diseases.

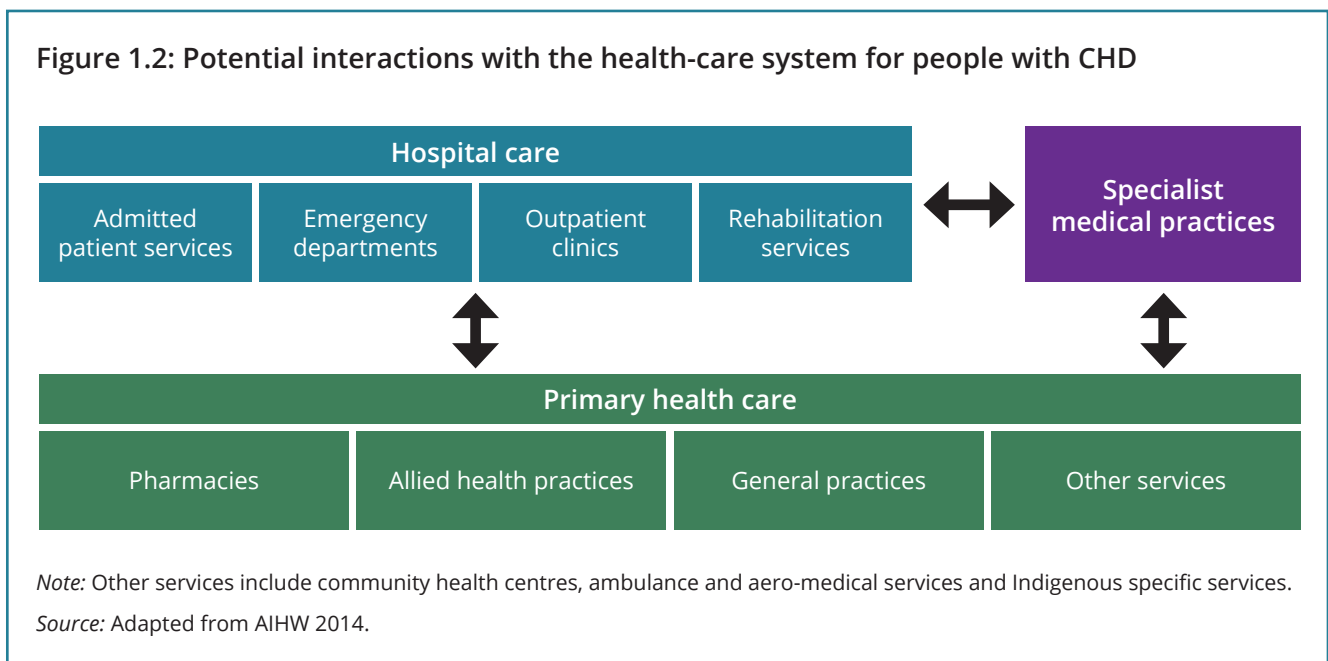


1.2 How is CHD managed and treated?

The aim of managing and treating CHD is to alleviate symptoms and prevent future cardiovascular events, such as unstable angina, AMI and death.

Although symptoms can occur suddenly, such as when a person has their first heart attack, CHD events are usually preceded by an extended history of CHD or risk factors for the disease. Primary health-care providers play a vital role in preventing or delaying the onset of CHD by monitoring and treating risk factors and other determinants. This treatment is called primary prevention. For people with established CHD, health care is focused on managing symptoms and preventing another heart attack or complications. This treatment is called secondary prevention, and can include procedures that restore blood flow to the coronary arteries and heart muscle (revascularisation procedures such as percutaneous coronary interventions (PCI) and coronary artery bypass grafting (CABG)), lifestyle modifications, treatment with drugs and cardiovascular rehabilitation including exercise. Timely, effective and appropriate secondary prevention after an acute hospital admission for CHD has been shown to significantly reduce the risk of re-admission to hospital and death (Clark et al. 2005; Kirchmayer et al. 2013).

After being discharged from hospital, patients with CHD can need care from various health providers, as illustrated in Figure 1.2.



Effective and seamless transition between these health-care services and providers can optimise a person's quality of life and improve health outcomes. Mortality rates are higher for patients hospitalised for an acute CHD event for at least 7 years after hospital discharge (Smolina et al. 2012). One in 3 patients hospitalised with CHD experience another event within 2 years, and repeat hospitalisations are common (Atkins et al. 2014; Nedkoff et al. 2012).



High-quality primary health care, including access to and continuity of care, is associated with better adherence to medication regimens and improved clinical outcomes (Czarnecki et al. 2013; Warren et al. 2015). There is also evidence that people with multiple chronic conditions require more complex care and medication regimens to manage their conditions, and often experience worse health outcomes and higher health-care costs (Hutchinson et al. 2015; Palladino et al. 2016).

1.3 What are the benefits of using linked data to examine health outcomes for people with CHD?

Previous national reports on the treatment of CHD have largely focused on individual aspects of treatment using single data collections, such as hospitalisations, use of medicines or contact with primary health-care providers. This provides valuable information, but does not enable the relationships between diagnosis, use of health services, supply of medication and health outcomes to be investigated.

Such an investigation requires the ‘linking’ of individual administrative data sets. This report uses de-identified data resulting from linking 4 data sets—hospitalisations data from public hospitals in New South Wales and Victoria, and data from the NDI and MBS—to examine community-based health care and clinical outcomes for people with CHD after their discharge from hospitals.

This case study presents a more comprehensive picture of the ways people interact with the health-care system than is possible using single data collections. Further, by using data from the 2 largest states in Australia, the study records health-care services used across state borders to some extent. This has not been possible in previous, similar linkage studies.

1.4 What is in this report?

The report comprises the following:

- Chapter 2 describes the study's data sources, project scope, population, time period, analysis variables, statistical methods and limitations.
- Chapter 3 presents the profile of the study cohort and examines their re-admission rates and mortality rates after discharge from hospital.
- Chapter 4 examines community-based care use patterns following discharge from hospital and association with clinical outcomes (re-admission and mortality).
- Chapter 5 discusses the next steps.
- Appendixes present detailed information on the data sources and methods.
- A glossary defines the key terms.



Terminology used in this report

Primary health care: includes general practice, allied health services and community pharmacy. It is generally the first point of contact people have with the health system. It relates to the treatment of non-admitted patients in the community.

Community-based health care: includes primary health care and care provided by specialists for community-based patients.

Continuity of care: refers to the situation where patients experience an episode of care as complete, or consistent, or seamless, even if it is provided in a number of different consultations by different providers.

Data linkage: the bringing together (linking) of information from 2 or more different data sources that relate to the same entity, such as the same individual or the same institution. This can provide more information about the entity and, in certain cases, provide a time sequence, helping to 'tell a story', show 'pathways' and perhaps unravel cause and effect. The terms used synonymously with 'record linkage' and 'data integration'.

Index hospital stay: A hospital stay for an admitted patient is the period from admission into hospital to discharge from hospital or death, with any number of transfers in between. The index hospital stay refers to the first time between April 2012 and June 2013, in a series of hospital stays for CHD, that a patient was discharged from a public hospital in New South Wales or Victoria.

2

Methods





This chapter outlines the project scope and the statistical methods, data sources and populations used in the study.

2.1 Data sources

This project used the data set created by the AIHW <<https://www.aihw.gov.au/our-services/data-linkage/approved-aihw-linkage-projects>> for the National Data Linkage Demonstration Project under the auspices of the Australian Health Ministers' Advisory Council. The database includes data for public hospitals—from New South Wales and Victoria—and 3 national data sources—the MBS, PBS and NDI. This project used the hospitals data, the MBS and the NDI from 2010–11 to 2014–15. This report did not use the PBS component of the database.

For more information about all of the data sets, see Appendix A.

2.2 Study population

The study population comprised over 37,300 patients aged 25–84 who had an index hospital stay for CHD (coded using the International Classification of Disease, 10th Revision, Australian Modification as I20–I25) and discharged between 1 April 2012 and 30 June 2013.

When a patient was discharged from one hospital and directly admitted to another hospital (or the same hospital) within 1 day, it was deemed as a 'transfer' and the 2 'episodes of hospital care' were combined in one 'hospital stay'. The index hospital stay refers to the first time between April 2012 and June 2013, in a series of hospital stays for CHD, that a patient was discharged from a public hospital in New South Wales or Victoria. This allowed for a 2 year risk assessment period and a 2 year follow up period. The separation date of the last episode of an index hospital stay was used as the discharge date of the index hospital stay (see Appendix A for further details).

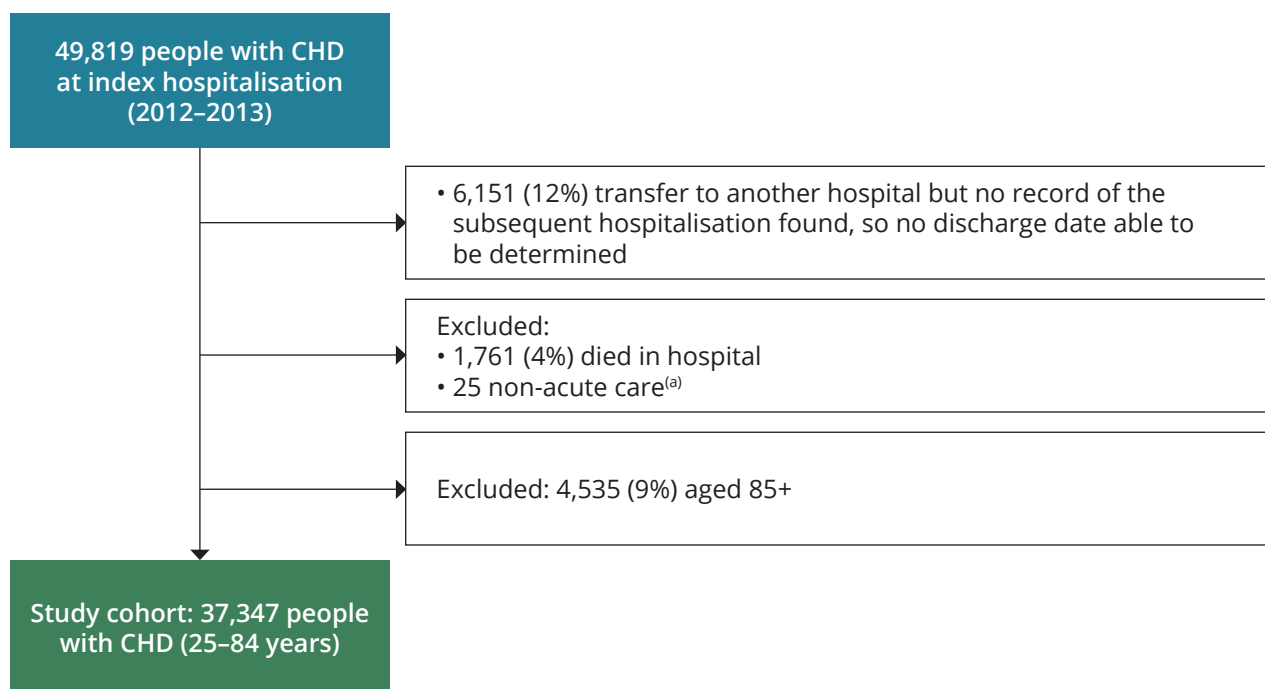
In this report, the severity of CHD subtypes ranged from STEMI (most severe), NSTEMI, unstable angina and stable angina, to other CHD (least severe) (Lopez et al. 2017). If different CHD types were recorded as the principal diagnosis across multiple episodes of hospital care within a hospital stay, the most severe type of CHD was used as the diagnosis for the index hospital stay.

Around 49,800 people with CHD were admitted between 2012 and 2013, 12% (around 6,200) had a separation mode of 'transferred to another acute hospital' but did not have a subsequent hospitalisation episode identified in the database (Figure 2.1). They may have been transferred to a private hospital or public hospital outside New South Wales and Victoria. These people were excluded from analysis because the discharge date for the hospital stay could not be determined due to the absence of private hospital data and public hospital data outside New South Wales and Victoria. Because the focus of the study was on the association between GP care and health outcomes, people who died in hospital were excluded from the analysis. Further exclusions were made for non-acute care records. Patients who aged 85 or over at the index hospital stay were also excluded from the study, because very old people may have different care patterns and health outcomes compared with other age groups (Montilla Padilla et al. 2017). No patient under 25 was found in the data set.

About 3% (around 900 people) of the study cohort were admitted to a public hospital in a different state to their state of usual residence.



Figure 2.1: Identification of the study cohort, 2012–2013



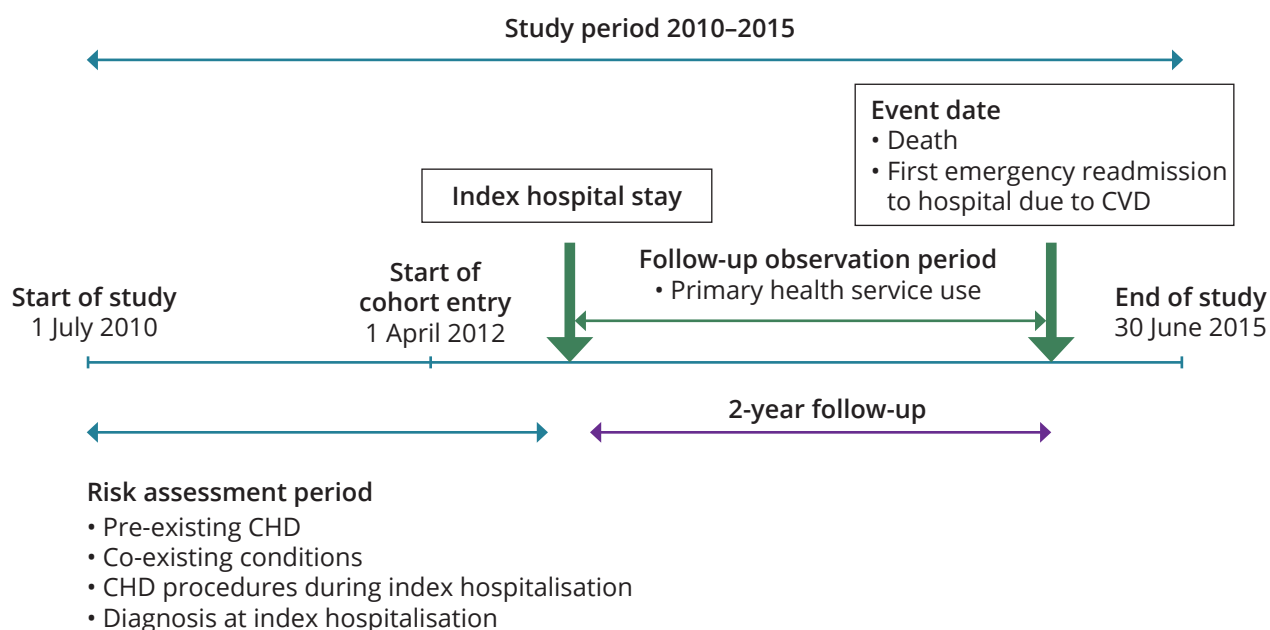
(a) Non-acute care includes rehabilitation care, palliative care, geriatric evaluation and management, psychogeriatric care, maintenance care, other admitted patient care, hospital boarder and organ procurement.

Source: AIHW analysis of National Data Linkage Demonstration Project Database.

2.3 Study period

This study covered 1 July 2010 to 30 June 2015, which included a risk-assessment period and a follow-up observational period (Figure 2.2).

Figure 2.2: Flow chart for study population





The look-back period was from 1 July 2010 (start date of the data set) to the index hospital stay. Diagnosis and procedure codes were used to determine whether an individual had a prior hospitalisation for CHD and/or cardiovascular procedures, and any other coexisting condition.

The follow-up period started on the first day after the index hospital stay (see Appendix A for further details). Each individual was followed up until one of the following occurred:

- death (after the index hospital stay)
- first emergency hospital re-admission with a CVD principal diagnosis (ICD-10-AM I00–I99)
- the end of the follow-up observational period (2 years after start date).

2.4 Analysis variables

Major CVD outcomes

People with coronary heart disease (CHD, including heart attack or angina) are at higher risk of recurrent heart attacks and also other cardiovascular diseases such as heart failure and atrial fibrillation. A number of CVD outcome measures after the index hospital stay and during follow-up period were examined. These CVD outcomes include:

- non-emergency hospital re-admissions due to CVD within 2 years after the index hospital stay
- emergency hospital re-admissions due to CVD within 2 years after the index hospital stay
- all-cause death
- death due to CVD.

This report focuses on emergency re-admissions and deaths due to CVD.

Why focus on emergency re-admissions?

The admission urgency status is an indicator assigned to an admission in the hospitalisation database to determine whether admission occurred on an emergency basis. Non-emergency admissions in this report include elective admissions and admissions with urgency status not assigned or unknown. An elective admission is an admission of a patient for care or treatment that, in the opinion of the treating clinician, is necessary and admission for which can be delayed for at least 24 hours. An emergency admission is an admission of a patient for care or treatment that, in the opinion of the treating clinician, is necessary and admission for which should occur within 24 hours.

The re-admission rates in this report may be an underestimate because the linked data set does not include admissions to private hospitals or to hospitals out of New South Wales and Victoria. Validation analysis of the unlinked hospitalisation data in New South Wales and Victoria from the National Hospital Morbidity Database provided evidence that 59% of non emergency admissions due to CVD were to private hospitals, while only 8% of emergency re-admissions due to CVD were to private hospitals. This report focuses on emergency re-admissions because a large proportion of non-emergency re-admissions were potentially in the private hospitals and not included in the linked data (see Table B1 for further details).



Community-based health care

Early follow-up with a primary health-care provider after being discharged from hospital may influence health outcomes (Brooke et al. 2014). The following types of community-based health care, based on MBS claim records, were assessed (see Table A1 for further details):

- MBS items for general attendances
 - GP visits
 - after-hour GP visits
 - attendances of specialists/ consultant physicians with cardiology specialty, referred to as ‘cardiologist attendance’ in this report
- MBS items for specific health services
 - health assessments
 - chronic disease management plans
 - medication management reviews
 - MBS-subsidised allied health services.

Characteristics of GP care

GP care is a corner stone of primary health care. Four aspects of GP care were measured in this report (see Table A1 for more further details):

- average number of GP visits per month
- time from discharge to the first GP visit
- regularity of GP care (whether the GP visits were evenly timed or sporadic)
- continuity of GP care (whether a patient visited the same GP or different GPs).

Sociodemographic characteristics and clinical information

CVD outcomes and community-based health service use patterns are also affected by many factors, including patients’ sociodemographic characteristics (such as age, sex, remoteness of residence and socioeconomic groups) and clinical characteristics (such as pre-existing CHD, co-existing conditions and cardiovascular procedures). These variables were also examined in this report (Table A1 for more details).



How were the CVD outcomes measured?

Proportion of people re-admitted due to CVD

Proportion of people re-admitted to hospital due to CVD were calculated as the number of people who had an emergency/non-emergency hospital admission with a principal diagnosis of CVD between the date of index hospital separation and June 2015, divided by total population in the study cohort. Emergency and non-emergency re-admission rates due to CVD were reported separately.

Proportion of people who died due to CVD

Proportion of people who died due to CVD were calculated as the number of deaths with an underlying cause of death of CVD between the date of index hospital separation and June 2015, divided by total population in the study cohort.

Hazard ratio

A hazard ratio (HR) is a comparison of risk of emergency CVD re-admission or death in patients who attended primary health-care services compared with those who did not attend these services, adjusting for age, sex, CHD type, pre-existing CHD, CHD procedures (PCI and CABG), coexisting conditions (heart failure, diabetes, kidney failure, cancer, COPD, hypertension and PVD/cerebrovascular disease), socioeconomic disadvantage and remoteness. An HR of 1.0 indicates similar rates in each group. An HR less than 1.0 indicates people who used a certain primary health-care service have a lower risk for emergency CVD re-admission or death compared with those who did not use this service.

Hazard ratios and 95% confidence intervals were calculated using Cox proportional hazards models to examine association between primary health care use on CVD outcomes (i.e. emergency re-admission due to CVD/CHD/heart failure, death due to CVD/CHD). The variances of the model parameter estimates were calculated as part of the modelling process. Confidence intervals for the parameter estimates were formed by assuming that they have a normal, or an approximately normal, distribution. These were converted to confidence intervals for the hazard ratios by exponentiating the bounds. Separate models were developed for each CVD outcome. Note, that if a patient had an emergency CVD re-admission, they were still included in the analysis for the outcome of death or CVD death.



2.5 Study limitations

In interpreting the results from this study, it is important to note:

- Private hospital records were not included in the database so the re-admission rate, especially non-emergency re-admission rate, is likely to be underestimated.
- The linked data set does not contain every component of a CHD patient's care, such as home and community care services. Some primary health-care services are provided outside the MBS and are not covered in this study, such as some cardiologist attendances in outpatient clinics of public hospitals and privately funded physiotherapy/allied health services. Residential aged care services were not included in the linked data set, therefore particular aged care programs such as the Transition Care Program and Home Care Packages Program were not examined in this study.
- Some patients did not have contact with any community-based care after discharge. The reason for not having follow-up care is not available in the data set. These patients may be at the greatest risk of adverse CVD outcomes.
- Diagnoses and reasons for GP attendances, allied health services and pathology tests are not recorded in the MBS data set. Therefore, it is not possible to confirm whether patients with CHD used these services for managing and treating their CHD or for another reason.
- Information on coexisting conditions was derived from hospital records during the risk assessment period (including the index hospital stay), so the findings rely on this information being identified and accurately recorded. Hospital records do not explicitly capture coexisting conditions (so they may not be a complete record). However, they do contain diagnoses that affect treatment and care, and these were used as proxies for medical history and coexisting conditions at the index and previous hospitalisations. Note not all coexisting conditions may have been identified in the hospital records due to the relatively short risk assessment period or where they were not actively managed during the index hospital stay.

3

Profile of patients and major CVD outcomes





Key findings

- Most patients hospitalised with CHD in this study were aged 55 and over.
- Men were more likely to have CHD procedures in hospital than women.
- 1 in 4 patients with CHD had an emergency re-admission due to CVD within 2 years.
- 1 in 10 died within 2 years.
- Patients with pre-existing conditions, with a diagnosis of STEMI or NSTEMI at the index hospital stay, who did not receive PCI or CABG during the index hospital stay, or those aged 75–84 were at an increased risk of CVD re-admission or death.

This chapter provides an overview of the 37,300 people aged 25–84 with a principal diagnosis of CHD who were discharged from a public hospital in New South Wales or Victoria between 2012 and 2013 (see Chapter 2 for more details).

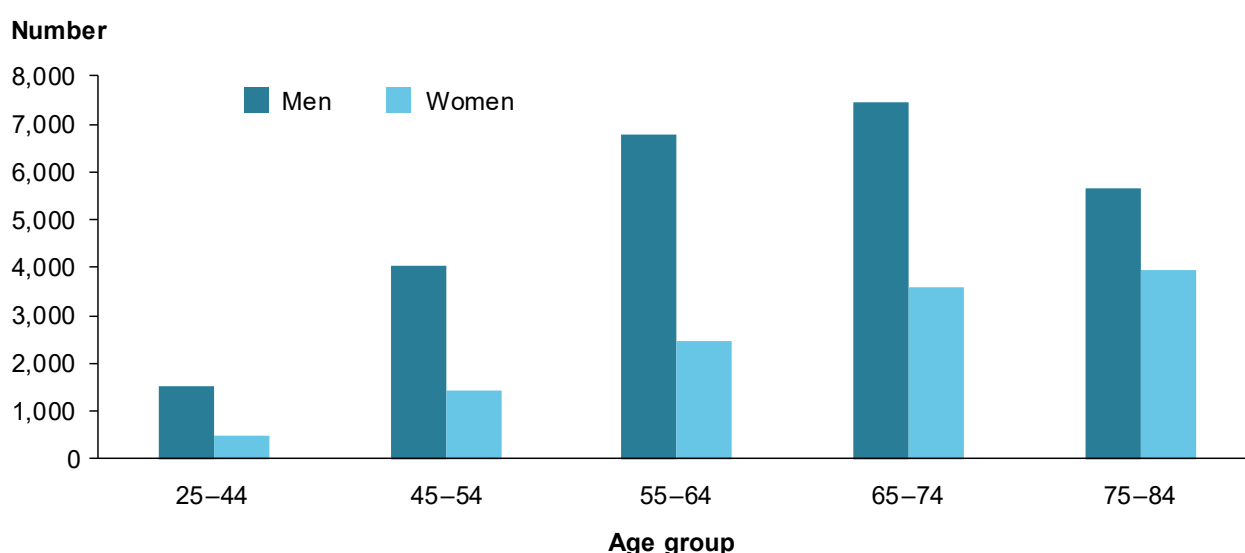
3.1 Patient characteristics

Most CHD patients were aged over 55

The majority (80%) of people with an index hospital stay of CHD were aged 55 and over and nearly 30% of all patients were aged 65–74 (Table B2).

About two-thirds (68%) of patients were men (25,429 compared with 11,917 women), almost 1-in-3 (29%) of whom were aged 65–74. For women, the largest age group was 75–84 (Figure 3.1).

Figure 3.1: Age and sex distribution of people with an index hospital stay of CHD, 2012–2013



Source: AIHW analysis of National Data Linkage Demonstration Project Database.

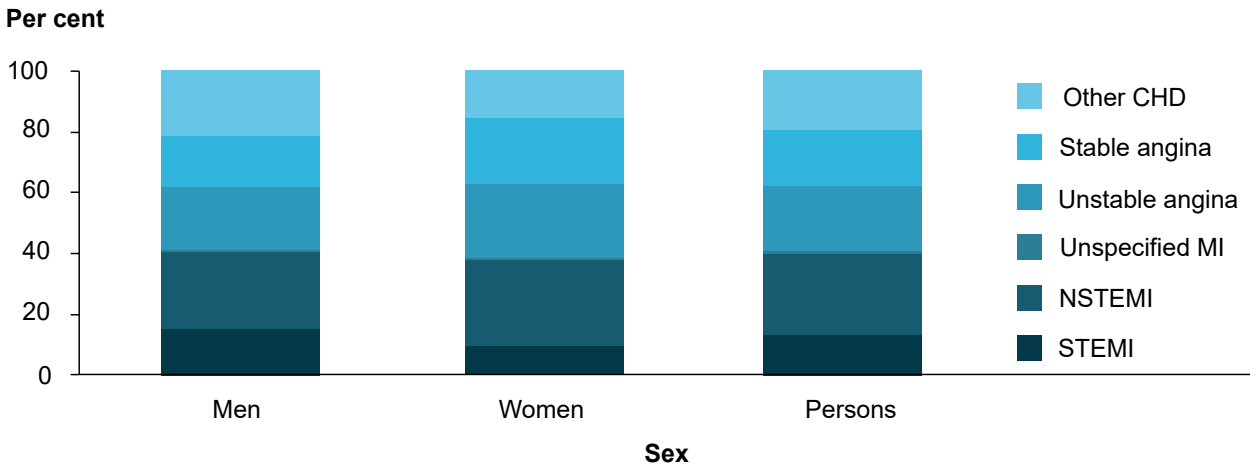


4 in 10 patients had a heart attack

The most common CHD diagnosis for the index hospital stay (see Chapter 2 for further details) was NSTEMI (26%), followed by unstable angina (22%) and other CHD (20%) (Figure 3.2). At the index hospital stay, almost 2 in 3 (62%) people had a diagnosis of ACS (that is, STEMI, NSTEMI, unspecified MI and unstable angina) and 41% had a diagnosis of AMI (that is STEMI, NSTEMI and unspecified MI).

Women were more likely to be diagnosed with stable angina or unstable angina but less likely to be diagnosed with STEMI or other CHD (Table B2).

Figure 3.2: CHD type among people with an index hospital stay of CHD by sex, 2012–2013



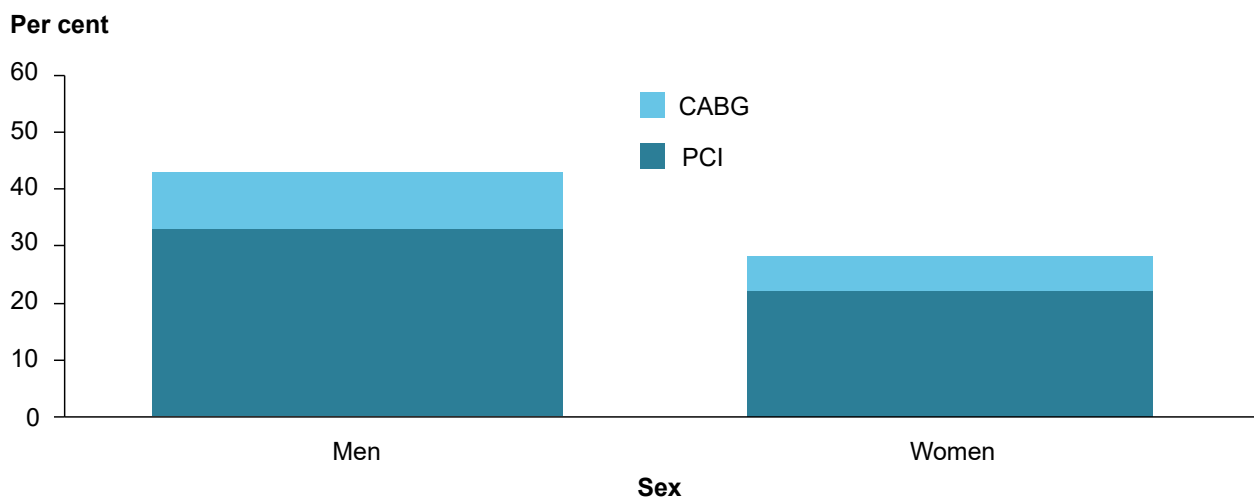
Note: Other CHD includes complications following myocardial infarction and chronic coronary heart disease.

Source: AIHW analysis of National Data Linkage Demonstration Project Database.

Men are more likely to have CHD procedures

About 30% of people hospitalised for CHD had a PCI and 10% had a CABG at the index hospital stay. Men were more likely to have a PCI (33%) or CABG (10%) than women (22% PCI and 6% CABG).

Figure 3.3: Cardiovascular procedures among people with an index hospital stay of CHD by sex, 2012–2013

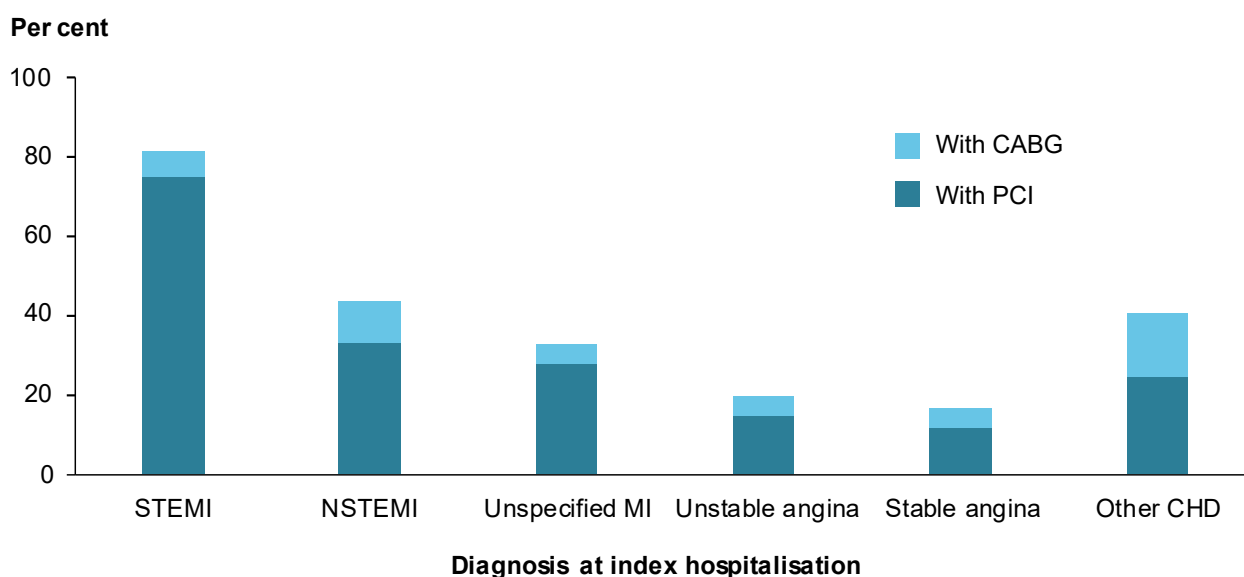


Source: AIHW analysis of National Data Linkage Demonstration Project Database.



Procedures varied by CHD type (Figure 3.4). People diagnosed as STEMI at the index hospital stay were much more likely to have PCI than those with other CHD types. People diagnosed with 'other CHD' were much more likely to have a CABG than all other CHD types (Table B3).

Figure 3.4: Cardiovascular procedures among people with an index hospital stay of CHD, by CHD type, 2012–2013



Note: Other CHD includes complications following myocardial infarction and chronic coronary heart disease.

Source: AIHW analysis of National Data Linkage Demonstration Project Database.

About 1 in 4 people had pre-existing CHD

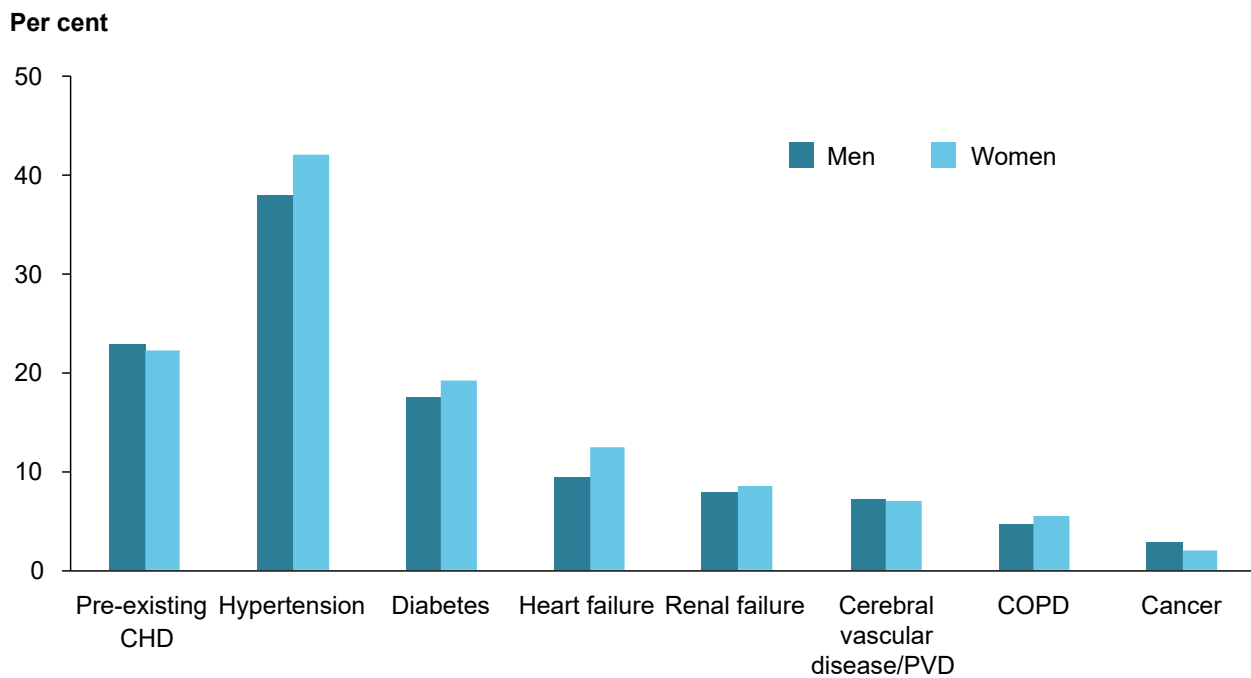
Almost 1 in 4 (23%) people had pre-existing CHD in the 2–3 years before their index hospital stay.

Almost 1 in 2 (47%) people had at least 1 of 7 relevant coexisting conditions (hypertension, diabetes, heart failure, kidney failure, COPD, cancer or cerebral vascular disease/peripheral vascular disease) before the index hospital stay. This was based on principal and additional diagnoses identified in previous hospitalisations from 2010 to the index hospital. Because hospital records do not explicitly capture coexisting conditions, and patients may have been treated for these conditions in a hospital other than a public hospital in New South Wales and Victoria, coexisting conditions may be underestimated in the data. The most common coexisting condition was hypertension (39%), followed by diabetes (18%) and heart failure (10%; Figure 3.5; Table B2).

Pre-existing CHD and coexisting conditions were similar for men and women.



Figure 3.5: Pre-existing CHD and relevant coexisting conditions among people at index hospitalisation for CHD, 2012–2013



Source: AIHW analysis of National Data Linkage Demonstration Project Database.

3.2 Major CVD outcomes

This report measured the following CVD outcomes:

- proportion of people who had non-emergency hospital re-admissions due to CVD within 2 years after the index hospital stay
- proportion of people who had emergency hospital re-admissions due to CVD within 2 years after the index hospital stay
- proportion of people who died within 2 years after the index hospital with the underlying cause of death as CVD.

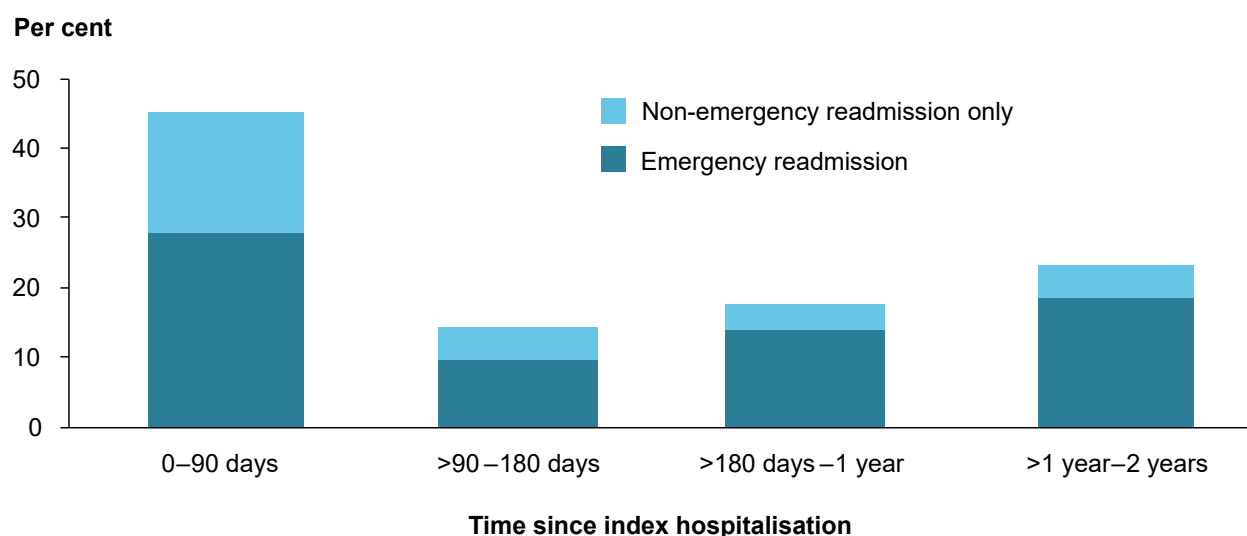
Hazard ratios and 95% confidence intervals were calculated using Cox proportional hazards models to examine associations between primary health-care use and CVD outcomes (that is, emergency re-admission due to CVD and death due to CVD).

1 in 3 patients re-admitted due to CVD within 2 years

One in 3 (34%, 12,600) patients hospitalised for CHD were re-admitted to hospital due to CVD during the 2-year follow-up period. Of these, almost half (45%) had their first re-admission within 90 days after an index hospital stay, 1 in 3 (33%) were first re-admitted between 90 days to 1 year and nearly 1 in 4 (23%) were re-admitted after the first year (Figure 3.6; Table B4).



Figure 3.6: CVD re-admission during the 2-year follow-up period after an index hospital stay discharge for CHD, by the time since index stay, 2012–2015



Note: The proportion of re-admissions include re-admissions to public hospitals in New South Wales and Victoria only.

Source: AIHW analysis of National Data Linkage Demonstration Project Database.

Of patients re-admitted during the 2-year period, 70% had at least 1 emergency CVD re-admission, 30% had non-emergency CVD re-admissions only and 6% had at least one non-emergency CVD re-admission before emergency re-admission.

More than half (57%) of patients who had only non-emergency re-admissions were re-admitted within 90 days after the index hospital stay and more than half of this group (56%) were re-admitted for a PCI or CABG (Table B5).

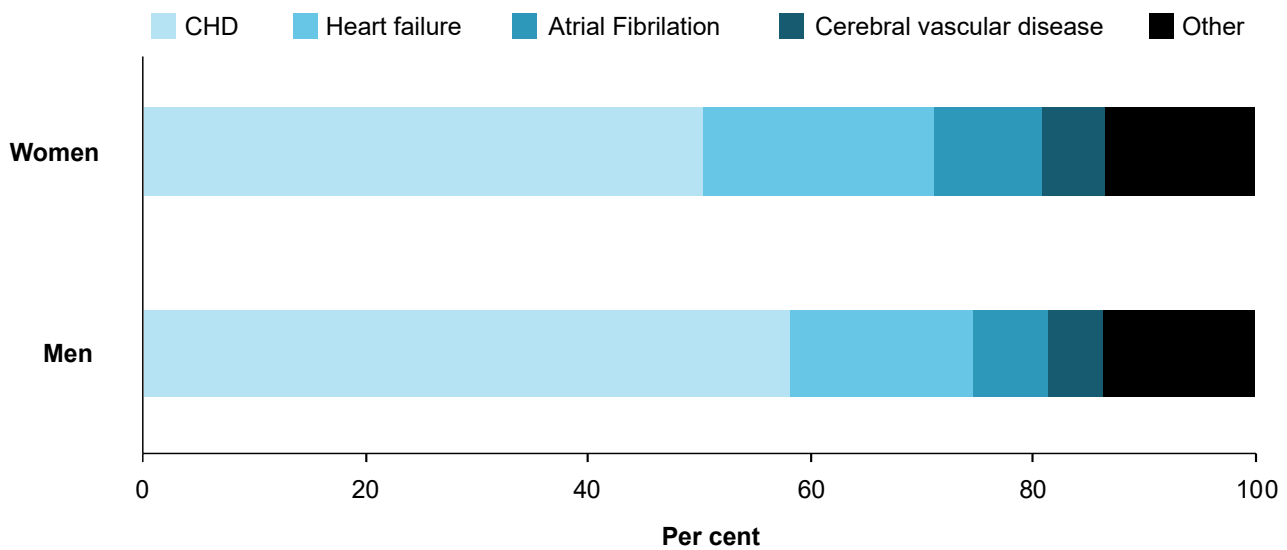
4 in 10 emergency re-admissions were within 90 days

Of the patients who had an emergency re-admission for CVD within 2 years of their index hospital stay, 40% were re-admitted within 90 days, 33% between 90 days and 1 year and 27% after 1 year (Figure 3.6; Table B4).

The most common principal diagnosis for the first CVD-related emergency re-admission was CHD (55%), followed by heart failure (18%) and atrial fibrillation (8%). Women were less likely to be re-admitted due to CHD (50%) compared with men (58%), but more likely to be re-admitted due to heart failure (21%) or atrial fibrillation (10%) compared with men (heart failure 16% and atrial fibrillation 7%; Figure 3.7; Table B7).



Figure 3.7: Common principal diagnoses for CVD emergency re-admission during the 2-year follow-up period after an index hospital stay discharge for CHD, 2012–2015



Source: AIHW analysis of National Data Linkage Demonstration Project Database

Who was more likely to have an emergency re-admission?

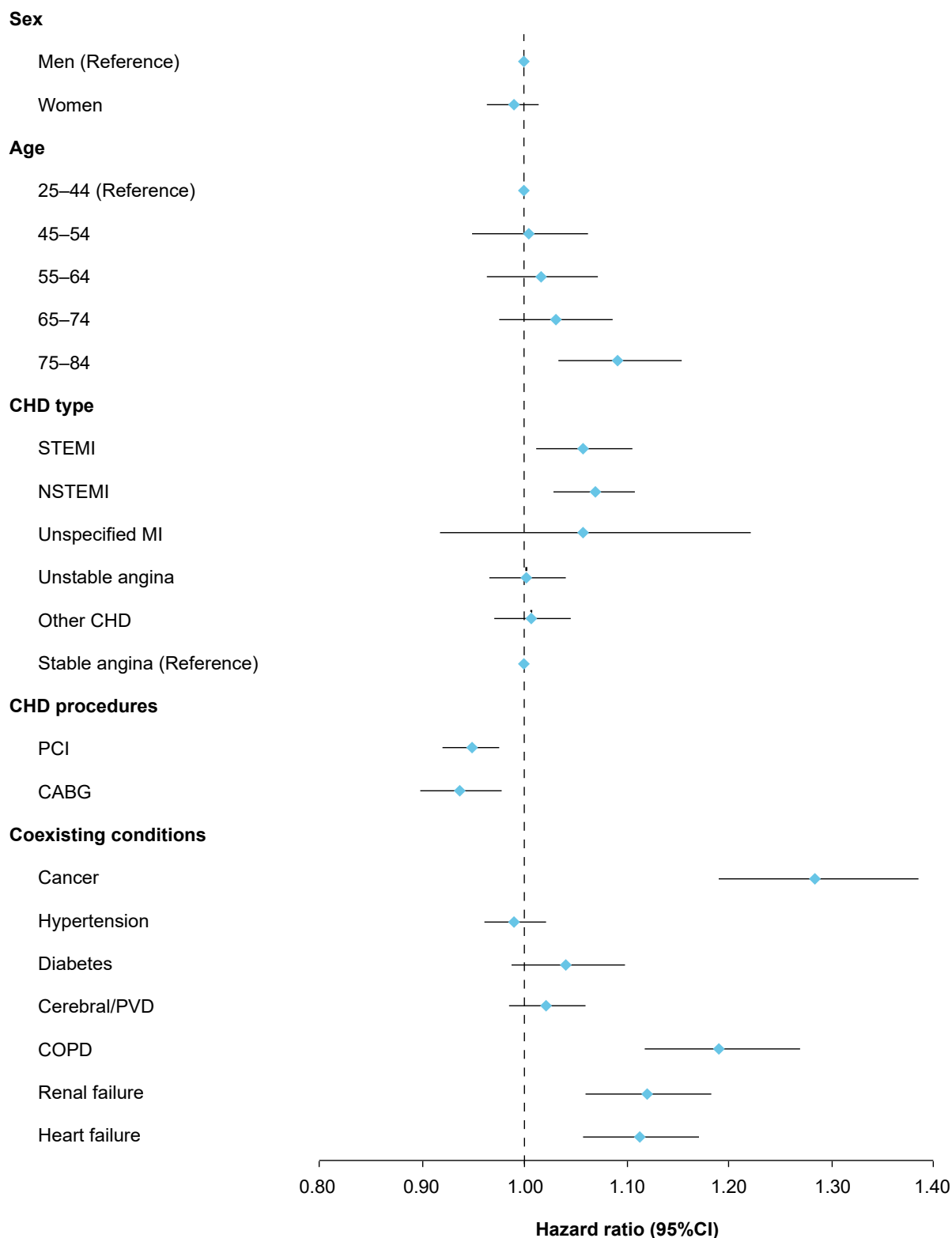
A person's age, diagnosis and CHD procedures at the index hospital stay, as well as their coexisting conditions at the index and previous hospitalisations, can affect their likelihood of having an emergency re-admission. According to the risk-adjusted hazards ratio based on the Cox proportional hazards models (see Box 3.1 for further details) patients were at an increased risk of an emergency CVD re-admission if they (Figure 3.8; Table B8):

- were aged 75–84 (9% higher than the 25–44 age group)
- were diagnosed with STEMI or NSTEMI at the index hospital stay (6%–7% higher than those who were diagnosed with stable angina)
- did not have PCI or CABG during the index hospital stay (5%–6% higher than those who had these procedures)
- were diagnosed with STEMI or NSTEMI and did not have PCI (8%–11% higher than those who had PCI; Table B9)
- had cancer, heart failure, COPD or renal failure (11%–28% higher than those who did not have these conditions).

These findings were similar for men and women (Table B10).



Figure 3.8: Hazard ratios of CHD patients having a CVD emergency re-admission during the 2 year follow-up period after discharge, by characteristics at the index hospital stay, 2012–2015



Note: Hazard ratios were derived using a Cox proportional hazard model and adjusted for age, sex, remoteness, socioeconomic groups, CHD diagnosis and procedures at the index hospital stay and coexisting conditions at the index and previous hospitalisations. The reference groups used in the model were men, people aged 25–44, people with stable angina, people without PCI or CABG, and people without selected coexisting conditions.

Source: AIHW analysis of National Data Linkage Demonstration Project Database.

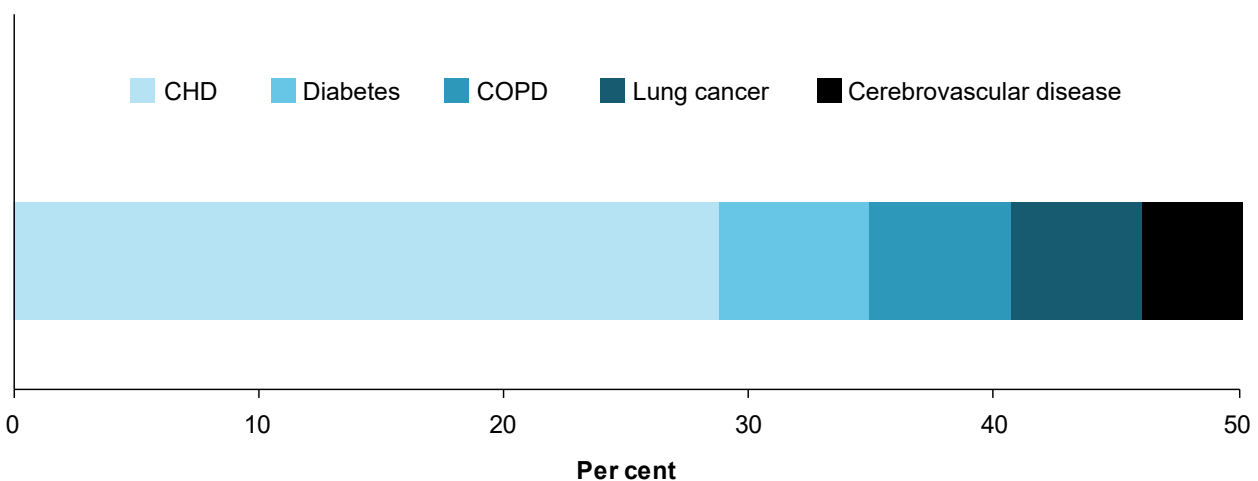


1 in 10 patients died within 2 years

Almost 1 in 10 patients died during the 2 year follow-up period (8%; 3,000). Of these, 1 in 4 died within the first 3 months of being discharged and about half had an emergency re-admission due to CVD before death. Note that patients who died at the end of the index stay were excluded from the analysis.

CHD (29%) was the most common underlying cause of death, followed by diabetes (6%) and COPD (6%) (Figure 3.9, Table B11). About 40% of deaths were due to CVD.

Figure 3.9: Leading underlying causes of death during the 2-year follow-up period after an index hospital stay discharge for CHD, 2012–2015



Source: AIHW analysis of National Data Linkage Demonstration Project Database.

Who was more likely to die from CVD?

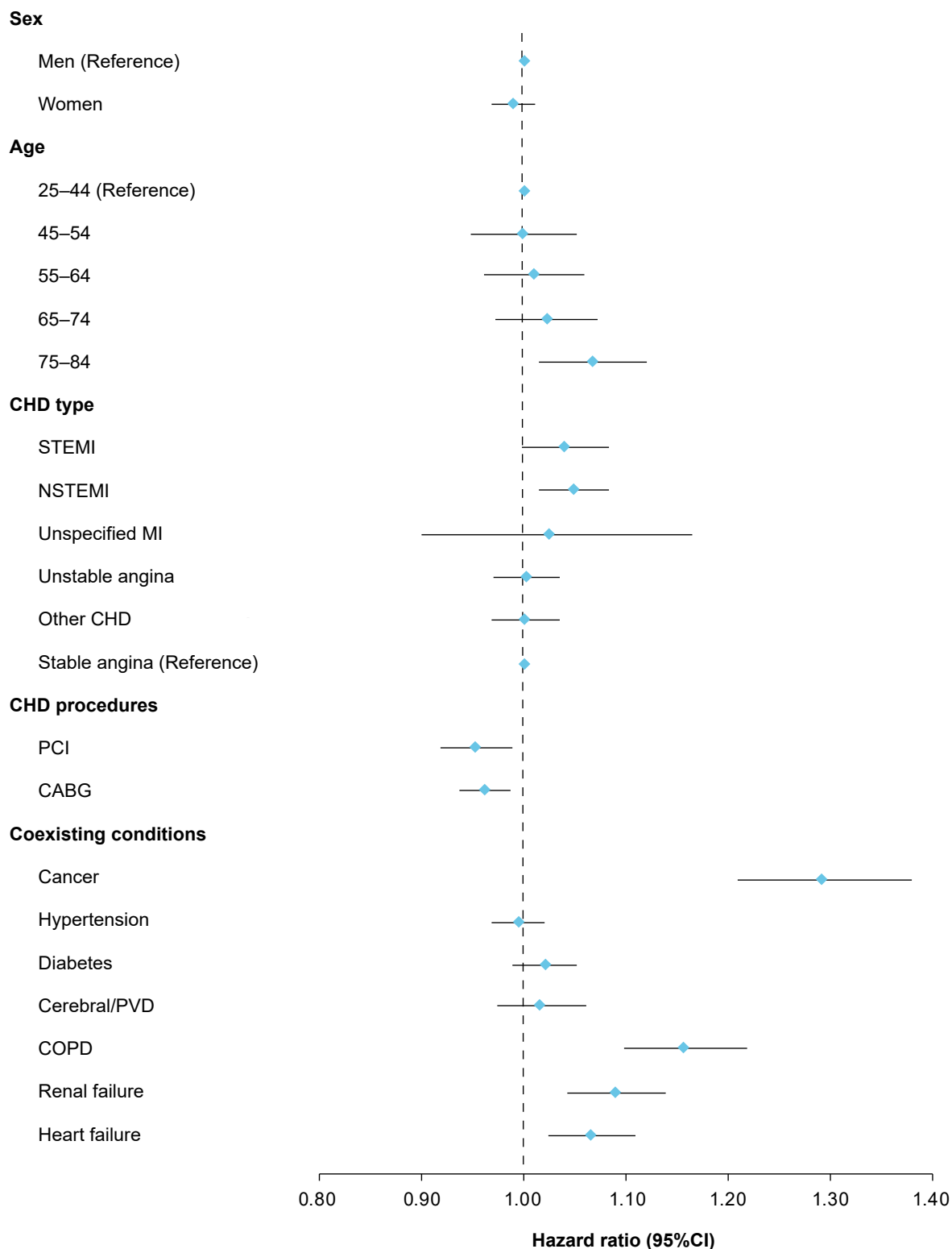
When controlling for a range of factors to assess factors associated with rates of CVD death within the 2-year follow-up period, patients with an index hospital stay of CHD were at an increased risk of CVD death if they:

- were aged 75–84 (7% higher than those aged 25–44)
- were diagnosed with STEMI or NSTEMI at the index hospital stay (4%–5% higher than those who were diagnosed with stable angina)
- did not have PCI or CABG during the index hospital stay (4%–5% higher than those who had these procedures)
- had cancer, heart failure, COPD or renal failure (7%–29% higher than those who did not have these conditions; Figure 3.10; Table B12).

These findings were similar for men and women.



Figure 3.10: Hazard ratios of CHD patients who died from CVD during the 2-year follow-up period after discharge, by characteristics at the index hospital stay, 2012–2015



Note: Hazard ratios were derived using a Cox proportional hazard model and adjusted for age, sex, remoteness, socioeconomic groups, CHD diagnosis and procedures at the index hospital stay and coexisting conditions at the index and previous hospitalisations. The reference groups used in the model were men, people aged 25–44, people with stable angina, people without PCI or CABG, and people without selected coexisting conditions

Source: AIHW analysis of National Data Linkage Demonstration Project Database.

4

Community-based health care





Key findings

- Most patients hospitalised for CHD visited a GP (95%), more than half (56%) visited a cardiologist and about half (48%) of the patients had a chronic disease management plan (under Medicare) in the 2 years following discharge.
- Six in 10 (61%) patients visited a GP in the first week following discharge and most (78%) visited a GP 1 to 2 times each month for the 2-year period.
- Risk of emergency re-admission or death due to CVD was lower for people who visited a medical practitioner or used community-based care.
- Risk of emergency CVD re-admission was lower for patients who visited a GP in the first week after discharge, had on average 1–2 GP visits per month, and had evenly timed GP visits.

This chapter examines use of community-based health care by CHD patients for the 2-year follow-up period following their discharge from hospital. It compares the emergency CVD re-admission rates and CVD death rates of those who used relevant community-based health care with those who did not.

Regular GP care after a hospital stay for CHD has been shown to be associated with improved outcomes (Einarsdottir et al. 2011) and this study focuses on 4 aspects of GP care:

- average number of GP visits per month
- time from discharge to the first GP visit
- regularity of GP care (whether the GP visits were evenly timed or sporadic)
- continuity of GP care (whether a patient visited the same GP or different GPs).

4.1 Most CHD patients visited a medical practitioner after discharge

Nearly all people (99%) hospitalised for CHD in 2012–2013 used 1 or more relevant services subsidised by Medicare within 2 years of their index hospital stay. Most people visited a GP (95%) and more than half (56%) visited a cardiologist (Figure 4.1; Table B13).

Of those who did not visit a cardiologist, 68% visited other specialists and 52% of these visited general medicine physicians. Medical practitioner attendance patterns varied by remoteness of a patient's usual residence. Patients living in *Remote* and *Very remote* areas were less likely to visit a GP (88%) or a cardiologist (53%) after discharge from hospital compared with patients living in *Major cities* (95% visited a GP and 62% visited a cardiologist).

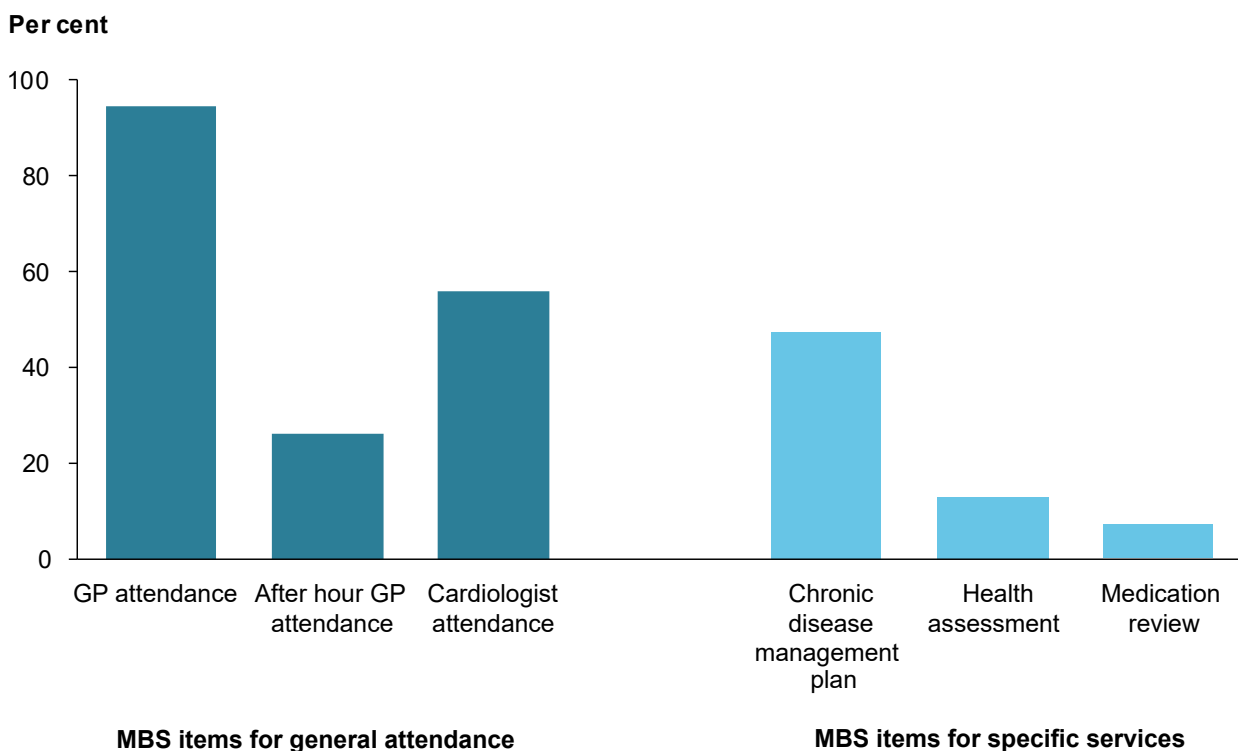
Around half (48%) of the CHD patients claimed a MBS item for chronic disease management plan (under Medicare) during the 2-year follow-up period (Figure 4.1; Table B13).



The Medicare items for chronic disease management plans (CDMPs) are for GPs to prepare a plan for management of the health care of people with chronic or terminal medical conditions, including those requiring multidisciplinary, team-based care from a GP and at least 2 other health or care providers. A person who has a chronic or terminal medical condition (with or without multidisciplinary care needs) can have a GP Management Plan (GPMP) service. Those who require care from a multidisciplinary team can have a GPMP and team care arrangements (TCAs). Most of the CHD patients had a new GPMP (41%) or a TCA (36%). About 1 in 4 (26%) had an existing GPMP or TCA reviewed. GPMPs and TCAs are renewed annually. One in 5 patients who did not make a new CDMP claim had a CDMP 1 year before their index hospital stay, so they may not have been eligible for a new claim after discharge (Table B14).

Patients who have both a GPMP and TCAs may be eligible for the individual allied health services on the MBS. Similarly, residents of residential aged care facilities may also be eligible for these allied health items when a GP has contributed to a care plan prepared for the resident by the residential aged care facility and referred them for allied health services. More than half (58%) of patients who claimed a GPMP or TCA, or were eligible patients in residential aged care, visited an allied health service that was covered by Medicare. Around 1 in 3 (35%) of these patients visited a podiatrist, 18% visited a physiotherapist and 9% visited a dietician (Table B15).

Figure 4.1: Proportion of people who had relevant community-based care after their index hospital stay for CHD during the 2-year follow-up period, 2012–2015



Note: Cardiologist consultations occurring in some public hospital outpatient clinics are not included in the MBS data, so this report may not capture all cardiologist consultations.

Source: AIHW analysis of National Data Linkage Demonstration Project database.



Risk of emergency CVD re-admission lower for people who used community-based health care

After adjusting for a range of factors (age, sex, type of CHD diagnosis and CHD procedure at the index hospital stay, coexisting conditions, socioeconomic group and remoteness), the risk of having an emergency re-admission due to CVD for CHD patients was significantly lower for people who had visited a GP or cardiologist. This was also the case for patients who had a chronic disease management plan or health assessment compared with those who did not (Figure 4.2; Table B17).

Compared with patients who did not use the community-based health care included in this study, the risk of having a CVD emergency re-admission was:

- 11% lower in those who had visited a GP
- 6% lower in those who had visited a cardiologist
- 5% lower in those who had a chronic disease management plan
- 6% lower in those who had a health assessment.

These findings were similar for men and women (Table B18).

Figure 4.2: Hazard ratios of emergency re-admission due to CVD during the 2-year follow-up period after an index hospital stay discharge for CHD, by type of community-based care, 2012–2015

MBS item for general attendance

GP attendance

After hour GP attendance

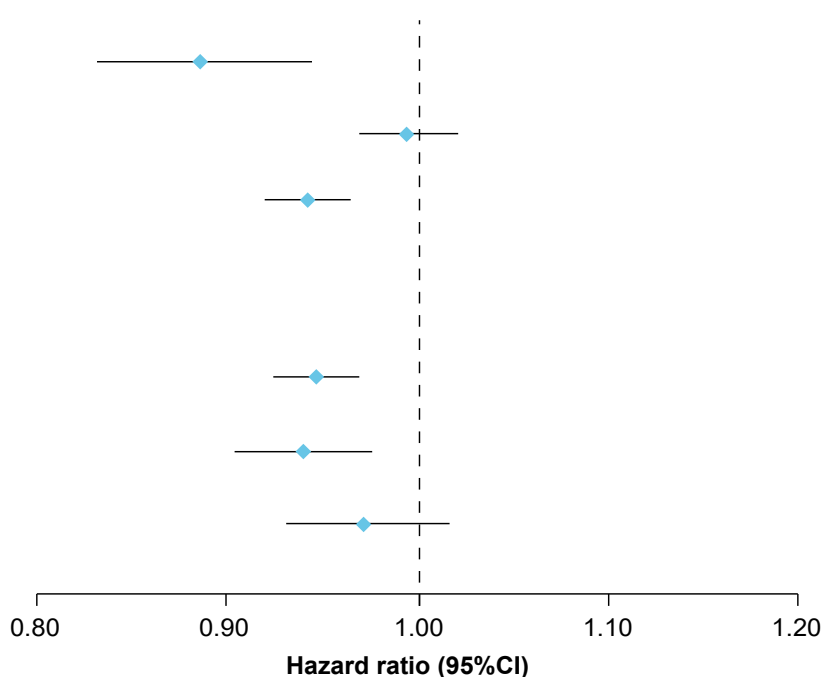
Cardiologist attendance

MBS item for specific services

Chronic disease management plan

Health assessment

Medication review



Notes

1. Hazard ratios were derived using a Cox proportional hazard model and adjusted for age, sex, remoteness, socioeconomic group, type of CHD diagnosis and procedures at the index hospital stay and coexisting conditions at the index and previous hospitalisations. People who did not attend relevant medical practitioners or use relevant services were used as the reference groups in the model.
2. Cardiologist consultations occurring in some public hospital outpatient clinics are not included in the MBS data, so this report may not capture all cardiologist consultations.

Source: AIHW analysis of National Data Linkage Demonstration Project database.



Among those diagnosed with ACS (more severe form of CHD, including heart attack and unstable angina) during the index hospital stay, the risk of emergency CVD re-admission within 2 years after the index hospital stay was also lower in people who visited a GP (13% lower) and cardiologist (7%) than those who did not. The risk of emergency CVD re-admission was also lower in people with ACS who had a chronic disease management plan (6%) or health assessment (7%) than those who did not (Table B19).

Sensitivity analysis excluding patients re-admitted or died within 30 days

About 6% of people hospitalised for CHD had an emergency re-admission due to CVD, or died, within 30 days of being discharged. These people were older and more likely to be diagnosed with NSTEMI at the index hospital stay. One in 3 of these patients did not see a GP before re-admission or death.

When excluding people who were re-admitted or who died within 30 days of discharge, the association between GP visits and emergency CVD re-admission was not statistically significant. However, there remained a significantly lower risk of emergency CVD re-admissions within 30 days for people who visited a cardiologist and had a chronic disease management plan or health assessment (Table B20). The adverse CVD events within the first 30 days after discharge may reflect the quality of hospital-related care. It is also possible that early GP follow-up at the transition point of hospital care and community-based care is more important than GP visits at a later stage. More information and further analysis will be required to understand the reason of early re-admission.

Risk of death due to CVD is lower for people who used community-based health care

After adjusting for the selected factors, the risk of death due to CVD was 6% lower in people who visited a GP, and 4% lower in people who visited a cardiologist, than for people who did not see these medical practitioners (Table B21).

The risk of CVD death was 4% lower in people who had a chronic disease management plan or a health assessment than for those who did not have them (Table B21).

The pattern was similar for people with a diagnosis of ACS for the index hospital stay. The risk of death due to CVD was reduced by 4%–6% if they visited a GP or cardiologist and 4% lower if they had chronic disease management plan or health assessment in the 2 years after being discharged from hospital (Table B23).

No significant difference in the risk of all-cause mortality was observed between people who used relevant community-based health care after the CHD hospital stay and those who did not.

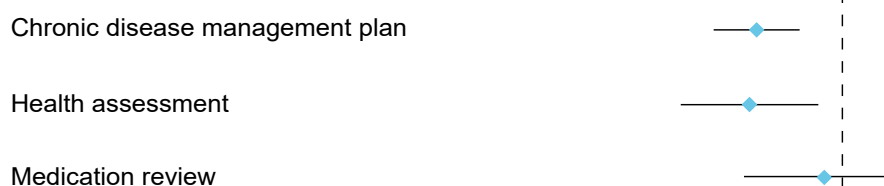


Figure 4.3: Hazard ratios of death due to CVD during the 2-year follow-up period after an index hospital stay discharge for CHD, by type of community-based health care, 2012–2015

MBS item for general attendance



MBS item for specific services



Hazard ratio (95%CI)

Notes

1. Hazard ratios were derived using a Cox proportional hazard model and adjusted for age, sex, remoteness, socioeconomic group, type of CHD diagnosis and procedures at the index hospital stay and coexisting conditions at the index and previous hospitalisations. People who did not attend relevant medical practitioners or use relevant services were used as the reference groups in the model.
2. Cardiologist consultations occurring in some public hospital outpatient clinics are not included in the MBS data, so this report may not capture all cardiologist consultations.

Source: AIHW analysis of National Data Linkage Demonstration Project database.

4.2 Nearly all CHD patients visited a GP

Most people hospitalised for CHD visited a GP (95%) during the 2-year follow-up period. The 5% of patients who did not see a GP (Table B24):

- were more likely to be older (32% aged 75–84 compared with 25% for all those who visited a GP)
- were more likely to be diagnosed as NSTEMI during the index hospital stay (34% compared with 26%)
- were less likely to have a PCI during the index hospital stay (23% compared with 30%)
- had similar characteristics by sex, coexisting conditions, socioeconomic group and remoteness to those who visited a GP.

The reason for not having GP follow-up is unknown. It is possible that patients who did not visit a GP could have issues that affected their access to or use of primary health-care services such as homelessness, lack of transport or mental illness. These patients may be at the greatest risk of adverse CVD outcomes.



Most patients visited a GP 1 to 2 times per month

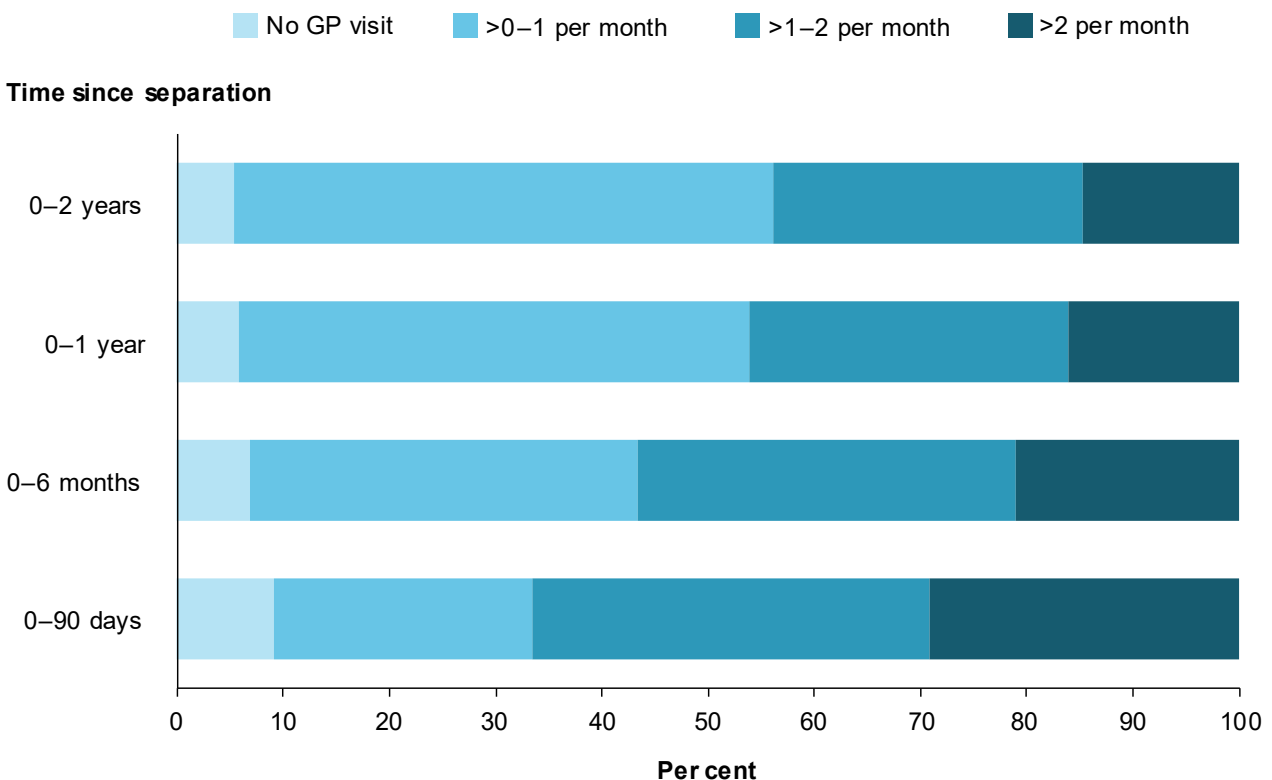
The proportion of CHD patients with no GP follow-up after being discharged from hospital fell from 9% (within the first 90 days) to 5% (over the 2 years).

On average, the number of times a patient visited a GP per month was the highest in the first 90 days and reduced over the 2 years (Figure 4.4; Table B25):

- Within 90 days of discharge, 61% of patients visited a GP 1–2 times per month and 29% had more than 2 visits per month, on average.
- Within 2 years of discharge, most (78%) of the patients visited a GP 1–2 times per month. Only 15% had more than 2 visits per month, on average.

People who visited a GP more than twice per month were older and more likely to have coexisting conditions than those who had 1 or 2 visits per month.

Figure 4.4: Average frequency of GP visits per month after an index hospital stay for CHD, by time since discharge, 2012–2015



Source: AIHW analysis of National Data Linkage Demonstration Project database.

A much lower proportion of people had a cardiologist consultation subsidised through Medicare during the follow-up period (56% compared with 95% for GP visits). Cardiologist visits were also much less frequent than GP visits, with 37% of people having 1 or 2 cardiologist consultations per year after discharge (Figure 4.4; Table B26).



Lower risk of emergency re-admission for patients who visited a GP 1–2 times each month

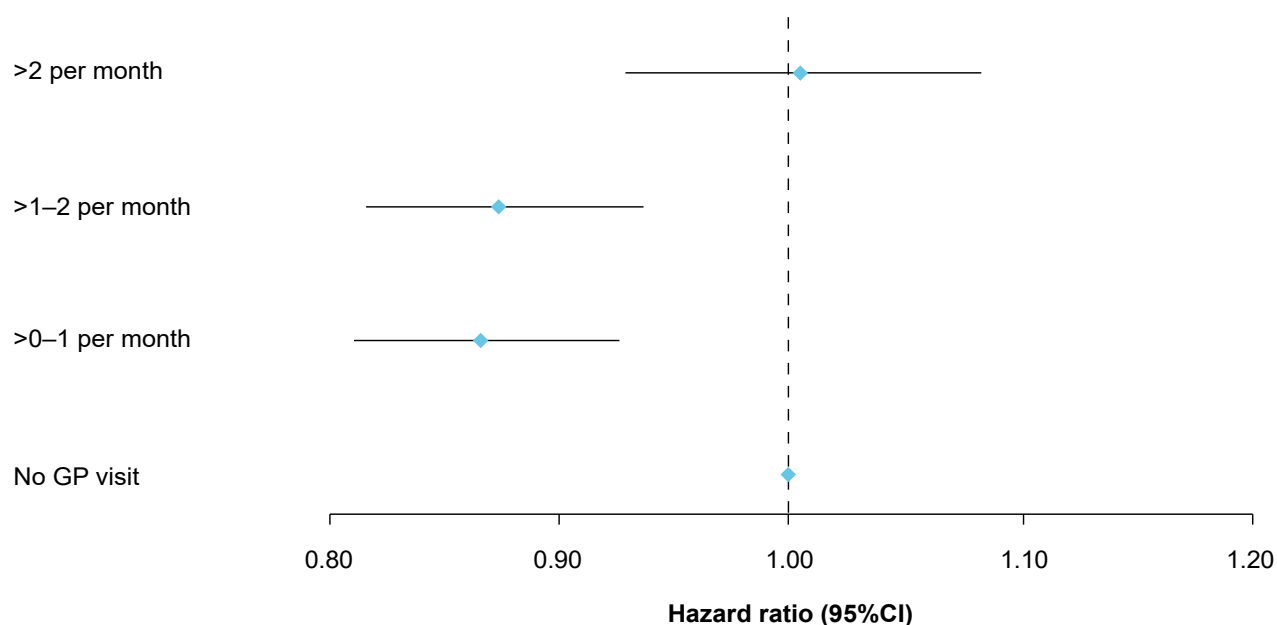
After adjusting for the selected factors, the risk of having an emergency re-admission due to CVD was significantly lower in those that had on average 1–2 GP visits per month compared with those with no visits to a GP within the 2 years (Figure 4.5; Table B27):

- 13% lower risk in those who visited a GP once per month
- 12% lower risk in those who visited a GP twice per month.

The risk of emergency CVD re-admission was not significantly different for those with more than 2 GP visits per month than those who did not visit a GP within the 2 years. Patients who visited a GP more than twice per month may have had more coexisting conditions and may have more complex care needs.

Figure 4.5: Hazard ratios of CHD patients having emergency re-admission due to CVD within 2 years after discharge, by GP visits per month, 2012–2015

GP visits per month



Note: Hazard ratios were derived using a Cox proportional hazard model and adjusted for age, sex, remoteness, socioeconomic groups, CHD diagnosis and procedures at the index hospital stay and coexisting conditions at the index and previous hospitalisations. People with no GP visit during follow-up were used as the reference group in the model.

Source: AIHW analysis of National Data Linkage Demonstration Project database.

6 in 10 patients visited a GP in first week

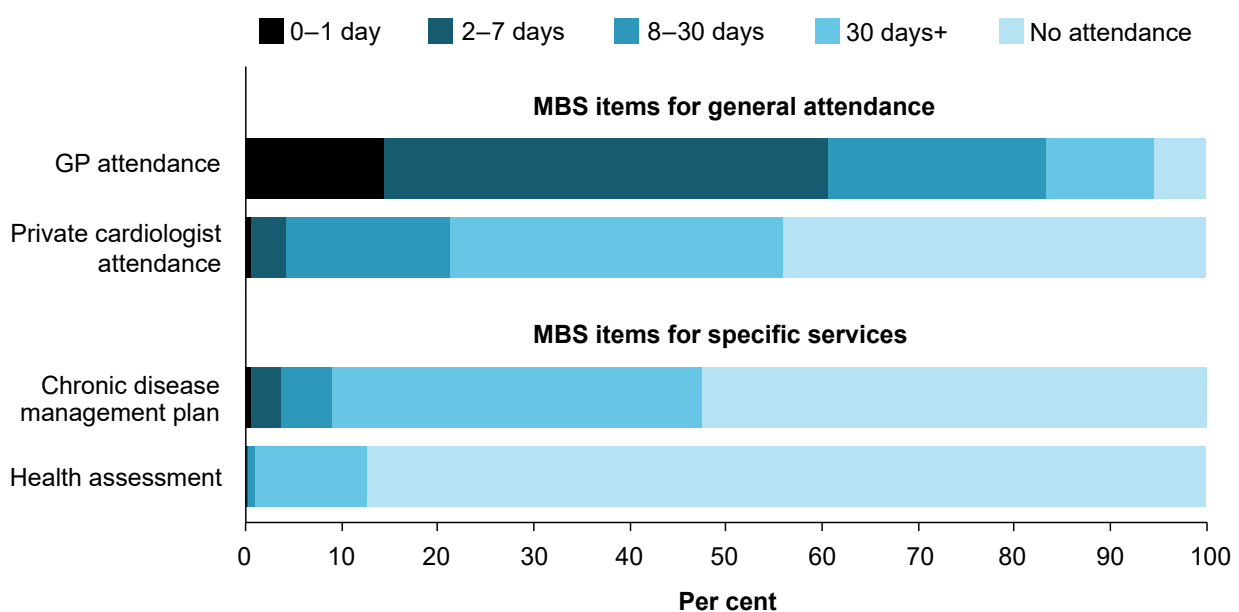
After a person is discharged from hospital, a GP is generally their first point of contact for follow-up health care. The timing of this visit is an important factor in effective and high-quality care. After being discharged from hospital, CHD patients were most likely to see their GP within the first week. About 6 in 10 (61%) patients visited a GP within 1 week of being discharged, 23% within 8–30 days, 11% after 30 days and 5% did not see a GP within 2 years. The vast majority (99%) of those who visited a GP had their first follow-up within the first 6 months (Figure 4.6; Table B30).



For those CHD patients who visited cardiologist or used other services, the first contact with cardiologists or claim relating to a chronic disease management plan or health assessment generally occurred within 1 month after discharge (Figure 4.6; Table B30):

- Almost 1 in 20 (4%) people visited a cardiologist within 1 week of being discharged, 1 in 3 (35%) after 30 days and 44% did not visit within 2 years.
- Almost 1 in 20 (4%) people had claimed a chronic disease management plan within 1 week of being discharged, 38% after 30 days and 53% did not have a claim within 2 years.
- Very few people (0.3%) had a claim for a health assessment within 1 week of being discharged, 12% had a claim after 30 days while 87% did not have an assessment within 2 years.

Figure 4.6: Time to the first primary health-care service use after an index hospital stay discharge for CHD, 2012–2015



Note: Cardiologist consultations occurring in some public hospital outpatient clinics are not included in the MBS data, so this report may not capture all cardiologist consultations.

Source: AIHW analysis of National Data Linkage Demonstration Project database.

Lower risk of re-admission for people who visited a GP in first week

People who visited a GP early were also more likely to visit a GP more frequently. Therefore, frequency of GP attendance per month was adjusted for in the model. After adjusting for the number of GP visits a person had per month, in addition to all of the selected factors, CHD patients had (Figure 4.7; Table B27):

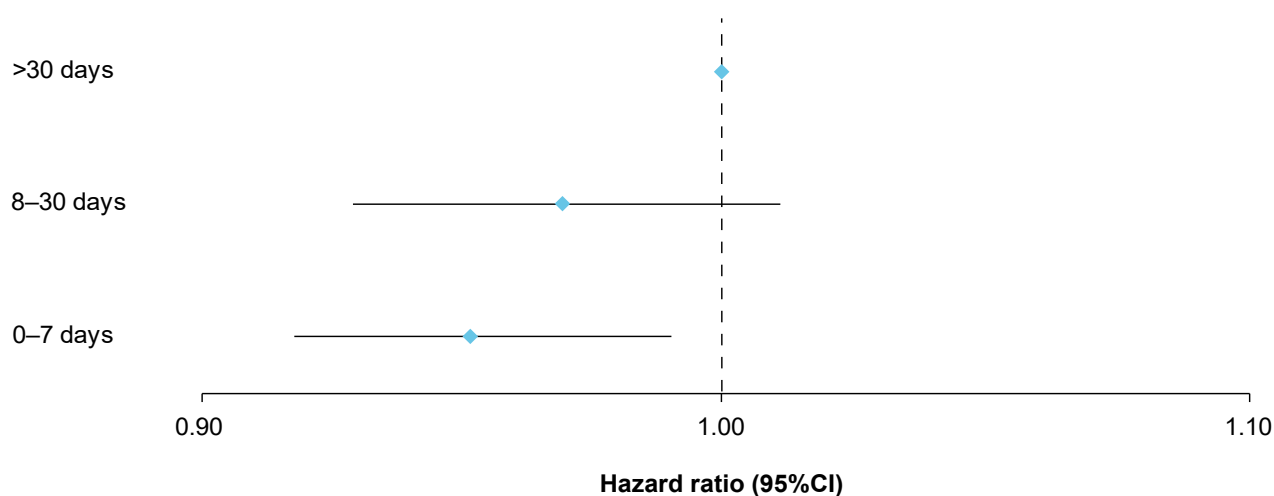
- five per cent lower risk of having an emergency CVD re-admission if they visited a GP within 1 week compared with those who visited after 30 days
- a similar risk of having an emergency CVD re-admission if they visited a GP within 8–30 days, compared with those who visited more than 30 days after discharge.

These findings were similar for men and women.



Figure 4.7: Hazard ratios of CHD patients having emergency re-admission due to CVD within 2 years after discharge, by time to first GP attendance, 2012–2015

Time to first GP visit



Note: Hazard ratios were derived using a Cox proportional hazard model and adjusted for age, sex, remoteness, socioeconomic groups, CHD diagnosis and procedures at the index hospital stay and coexisting conditions at the index and previous hospitalisations. People with GP follow-up after 30 days were used as the reference group in the model.

Source: AIHW analysis of National Data Linkage Demonstration Project database.

Lower risk of re-admission with evenly timed GP visits

Regularity of GP visits were calculated using scores that measure the variation in intervals between consecutive GP visits and categorised into 5 population groups (see Table A1 for further details). CHD patients in Group 1 had the most evenly timed GP visits (highest regularity scores) and patients in Group 5 were more sporadic in visiting a GP (lowest regularity scores). Regularity scores varied by characteristics at the index hospital stay (Table B32). On the whole:

- women had had more evenly timed GP visits than men
- older age groups had more evenly timed GP visits when compared to those in younger age groups
- people with selected coexisting conditions had more evenly timed GP visits than people without these conditions.

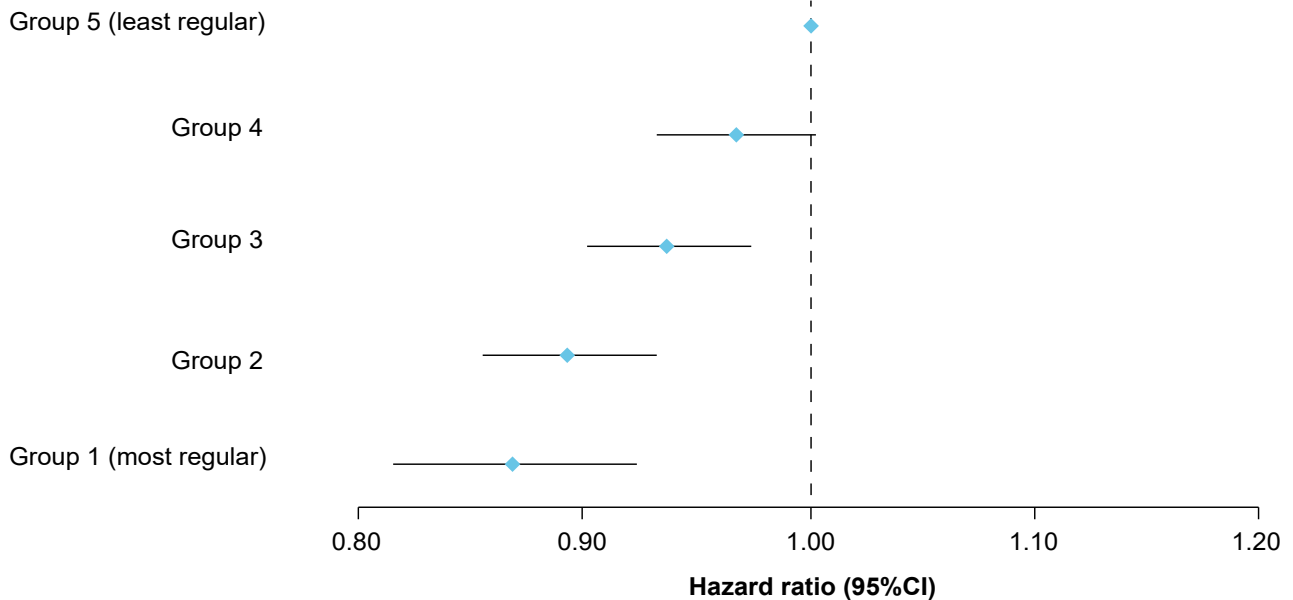
Regularity score of GP visits also increased with frequency of GP visits per month (Table B34). This may reflect the complex care needs for older people with multiple coexisting conditions. Therefore, frequency of GP attendance per month was also adjusted for in the model. After controlling for frequency of GP attendance per month in addition to the selected factors, the risk of an emergency CVD re-admission was 3%–13% lower in those who had evenly timed GP visits, compared with the group who had visits that were more sporadic. The group with the highest regularity scores had the lowest risk of emergency re-admission due to CVD (13% lower for Group 1 compared with Group 5; Figure 4.8; Table B27).

These findings were similar for men and women.



Figure 4.8: Hazard ratios of CHD patients having an emergency re-admission due to CVD within 2 years after discharge, by regularity of GP attendance, 2012–2015

Regularity of GP visits



Note: Hazard ratios were derived using a Cox proportional hazard model and adjusted for frequency of GP visits per month, in addition to age, sex, remoteness, socioeconomic group, type of CHD diagnosis and procedures at the index hospital stay and coexisting conditions at the index and previous hospitalisations. People with the least regular GP attendance (more sporadic visits) were used as the reference group in the model.

Source: AIHW analysis of National Data Linkage Demonstration Project database.

No significant differences in outcomes if seeing the same, or a different, GP

The continuity of GP attendance was assessed using the usual provider continuity index (UPI), which measures the concentration of a patient's attendances to the most common care provider or several providers (see Appendix A for more details). More than half (54%) of CHD patients who had at least 4 GP visits had good GP continuity (UPI ≥ 0.75) (Table B33):

- Good GP continuity increased with age.
- People with heart failure or kidney failure were more likely to have good GP continuity than people without these conditions.
- People living in the *Remote* or *Very remote* areas were less likely to have good GP continuity than people living in *Major cities*.

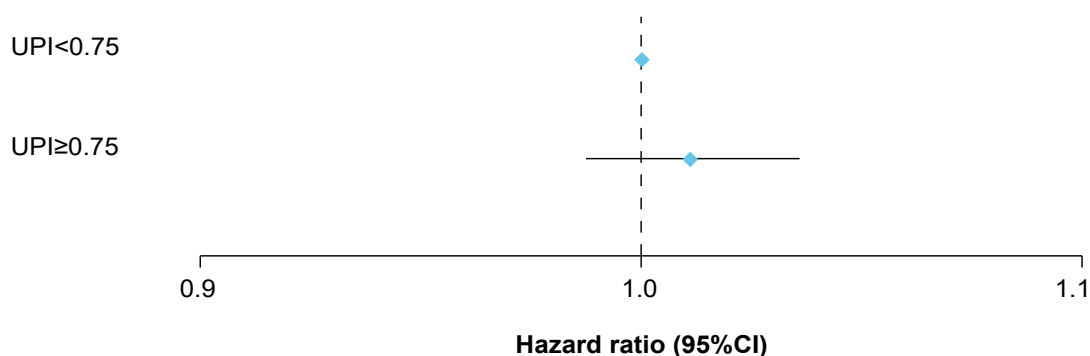


After adjusting for selected factors (age, sex, type of CHD diagnosis and procedure at the index hospital stay, coexisting conditions, socioeconomic group and remoteness), no significant difference was observed for the risk of having an emergency CVD re-admission by higher or lower continuity of GP attendance. The results were also similar after adjusting for frequency of GP attendance per month (Figure 4.9; Table B27).

These findings were similar for men and women (Table B29).

Figure 4.9: Hazard ratios of CHD patients having an emergency re-admission due to CVD within 2 years after discharge, by higher and lower continuity of GP attendance, 2012–2015

Continuity of GP visits



Note: Hazard ratios were derived using a Cox proportional hazard model and adjusted for frequency of GP visits per month, in addition to age, sex, remoteness, socioeconomic groups, CHD diagnosis and procedures at the index hospital stay and coexisting conditions at the index and previous hospitalisations. People with poor GP continuity were used as the reference group in the model.

Source: AIHW analysis of National Data Linkage Demonstration Project database.

5

What is next?





Timely, effective and appropriate secondary prevention following an acute hospitalisation for CHD has been shown to be associated with improved outcomes for individuals with CHD. This is one of the first studies of this kind in Australia. It uses the management of CHD as a case study to examine complex health care delivered by multiple providers across hospital and community-based care settings.

A strength of this study is that it links multiple health data sets covering the whole population in 2 states to enable exploration of the ways people interact with the health-care system: analysis that has previously not been possible using single data collections. This study has shown that timely and regular follow-up with a GP is associated with better health outcomes for people with CHD after hospitalisation.

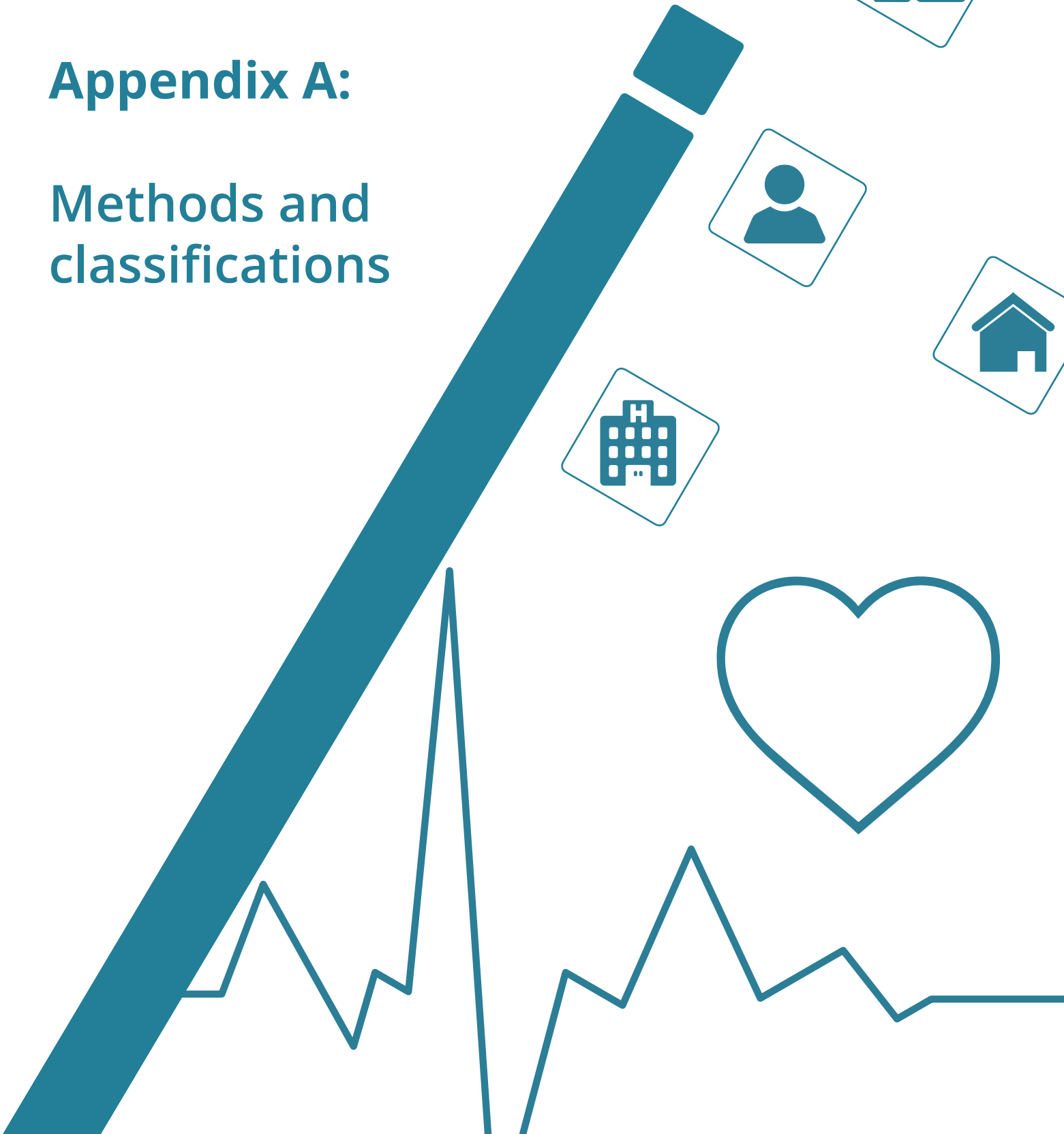
Following the creation of the National Data Linkage Demonstration Project in mid-2017, the AIHW has undertaken a range of work in relation to the integration of health services data. The National Integrated Health Services Information Analysis Asset (NIHSI AA) is under development and will contain: hospital data on admitted patient care services in public and private hospitals, and emergency department services and outpatient services in public hospitals, (where available), for all participating states and territories; MBS data; PBS and Repatriation Pharmaceutical Benefits Scheme data; Residential Aged Care Services data and NDI data from 2010-11 onwards. The NIHSI AA will greatly expand the existing work and enable studies to look at the pathways through the health and aged care systems. Findings from this type of analysis will support cross-sector and whole-of-life approaches to research and policy. Future studies could expand the analysis presented in this report in a number of ways, including:

- to explore patterns of community-based care before and after the index hospital stay and assess the association with health outcomes
- to explore different approaches in measuring continuity of care, such as calculating continuity score based on GP practice
- to further explore hospital data in the analysis, because the health outcomes are also influenced by quality of care at the hospital
- to explore the care pathway through the health and aged care systems for people with other chronic conditions
- to explore the patterns of cross-border health service use
- to identify approaches to improve regular primary health-care service use
- to explore pharmaceutical treatment patterns.

Using NIHSI AA, with both public and private hospital records available, most of the re-admissions, especially non-emergency re-admission could be identified.

Appendix A:

Methods and classifications





Data sources

National Data Linkage Demonstration Project database

This project presents data from a linked data set created by the AIHW that brings together public hospital admitted patient and emergency department data from 2 jurisdictions, New South Wales and Victoria, with MBS, PBS and NDI data from 2010–11 to 2014–15 <<https://www.aihw.gov.au/our-services/data-linkage/approved-aihw-linkage-projects>>. These de-identified data are available to selected analysts nominated by the New South Wales Ministry of Health, the Victorian Agency for Health Information, the Australian Government Department of Health and the AIHW.

The data are used for analyses related to topics such as:

- patterns of use of health-care services
- quality and safety of services provided
- chronic disease management—patterns of service provision
- risks to particular patient cohorts and patterns of health service use.

The linked database is comprised of records meeting one or more of the following criteria:

- Individuals who resided in New South Wales or Victoria at any point between July 2010 and June 2015, based on their Medicare records
- Individuals who received MBS or PBS services in New South Wales or Victoria between July 2010 and June 2015 (regardless of state or territory of residence)
- Individuals who received treatment in a public hospital in New South Wales or Victoria between July 2010 and June 2015 (regardless of state or territory of residence)—hospitals admissions and non-admitted emergency department episodes
- MBS and PBS services provided outside New South Wales and Victoria for New South Wales and Victorian residents
- MBS and PBS services for non-New South Wales and non-Victorian residents who have received public hospital services in New South Wales or Victoria.

New South Wales and Victorian hospital data

The New South Wales and Victorian hospital data include admitted patient care data and non-admitted patient emergency department care data. Admitted patient care data is a compilation of episode-level records from admitted patient morbidity data collection systems in New South Wales and Victorian public hospitals. The data include demographic, administrative and length of stay data, as well as data on the diagnoses of the patients, the procedures they underwent in hospital and external causes of injury and poisoning. The non-admitted patient emergency department care data holds information on the care provided (including waiting times for care) for non-admitted patients registered for care in emergency departments in selected in New South Wales and Victorian public hospitals. See Table A1 for specific analysis variables.



Medicare Benefits Scheme data

The MBS data collection contains information on services that qualify for a benefit under the *Health Insurance Act 1973* and for which a claim has been processed. The database comprises information about MBS claims (including benefits paid), patients and service providers. AIHW currently holds MBS claims data processed between 1 April 2010 and 30 June 2015. See Table A1 for specific analysis variables.

National Death Index

The NDI is maintained at the AIHW that contains records of all deaths occurring in Australia since 1980. The data are obtained from the Registrars of Births, Deaths and Marriages in each state and territory, the National Coronial Information System, and include cause of death coded by the Australian Bureau of Statistics (ABS). Cause of death information is derived from the National Mortality Database held at AIHW. The NDI contains the following variables for each deceased person: age at death; sex; date of death; cause of death; state or territory of registration; and registration number. See Table A1 for specific analysis variables.

The NDI data used for this report are based on year of occurrence of death using deaths registered from 2010 to the end of 2015. Causes of death data for deaths registered in 2013 and earlier are based on the final version of data; deaths registered in 2014 and 2015 are based on revised and preliminary data, respectively, and are subject to further revision by the ABS.

The Data Quality Statement underpinning the NDI can be found at <http://meteor.aihw.gov.au/content/index.phtml/itemId/480010>.

Index hospital stay

A hospital stay for an admitted patient is the period from admission into hospital to discharge from hospital, or death, with any number of transfers in between. In this report, hospital stay implies entry into the hospital system and discharge implies exit from the hospital system. The index hospital stay in this report refers to the first time between April 2012 and June 2013, in a series of hospital stays, that a patient was admitted to a public hospital for CHD.

An episode of care for an admitted patient can be:

- a total hospital stay—from admission to discharge, or
- a portion of a hospital stay beginning and/or ending in a change of type of care (for example, from acute care to rehabilitation), or
- a portion of a hospital stay beginning and/or ending in a transfer from/to another hospital.



Consequently, a hospital stay for an admitted patient can comprise a single hospital episode or a number of contiguous episodes of care. A hospital stay consisting of just 1 episode of care is said to be a single-episode stay; a hospital stay consisting of 2 or more episodes of care is said to be a multi-episode stay.

In a statistical separation a patient changes from one hospital episode care type to another (for example, from acute care to rehabilitation). The following episode is said to start with a statistical admission. A patient may also transfer from one hospital to another. In both cases the patients remains in the hospital system and these episodes were combined in one 'hospital stay'. The separation date of the last episode of an index hospital stay was used as the discharge date of the index hospital stay and the most severe diagnostic category of CHD was used as the diagnosis for analysis purposes.

Analysis variables

Four groups of analysis variables were used in this report:

- sociodemographic characteristics
- clinical information
- variables to measure community-based health care
- variables for CVD outcomes.

Descriptions of these variables are presented in Table A1.



Table A1: Analysis variables and descriptions

	Variable	Description
Sociodemographic characteristics	Age and sex	Based on the age and sex at the date of discharge from the index hospitalisation.
	Remoteness	Based on postcode of residence on the date of index hospital separation. Derived using the 5 remoteness area classes of the Australian Bureau of Statistics (ABS) Australian Statistical Geography Standard (ASGS): <i>Major cities, Inner regional, Outer regional, Remote</i> and <i>Very remote</i> .
	Socioeconomic group	Based on postcode of residence on the date of index hospital separation and derived using the 5 quintiles of the ABS Index of Relative Socioeconomic Disadvantage (SEIFA). Quintile 1 represents the most disadvantaged area and 5 the least disadvantaged area. Note this method is area-based and reflects the relative disadvantage of the population in an area, not necessarily of an individual.
Clinical information	Diagnosis for the index hospital stay	Most severe principal diagnosis during index hospitalisation—that is, the severity of CHD subtypes ranged from STEMI (most severe), NSTEMI, unstable angina and stable angina, to other CHD (least severe) (see Table A2 for further details). If different CHD types were recorded as the principal diagnosis across multiple episodes of hospital care within a hospital stay, the most severe type of CHD was used as the diagnosis for the index hospital stay.
	Cardiovascular procedures	Cardiovascular procedures received during index hospitalisation: percutaneous coronary intervention (PCI; ACHI code Block: 670, 671) and coronary artery bypass graft (CABG; ACHI code Block: 672–679). PCIs are used to restore blood flow to blocked coronary arteries. Two types of procedures are used: coronary angioplasty without stent and coronary stenting. CABG is a surgical procedure using blood vessel grafts to bypass blockages in the coronary arteries and restore adequate blood flow to the heart muscle. The surgery involves taking a blood vessel from a patient’s inner chest, arm or leg and attaching it to vessels on the outside of the heart to bypass a blocked artery.
	Pre-existing CHD	CHD events during the risk assessment period from 2010 up to the index hospitalisation, identified from hospital records, including previous hospitalisations with a principal or additional diagnosis of CHD or previous procedures (PCI and/ or CABG).
	Coexisting conditions	Coexisting conditions during the risk assessment period from 2010 up to the index hospitalisation were identified from hospital records, including previous hospitalisations with a principal or additional diagnosis of heart failure, diabetes, kidney failure, cancer, chronic obstructive pulmonary disease (COPD), hypertension or peripheral vascular disease (PVD)/cerebrovascular disease (see Table A3 for further details). Although coexisting conditions are not explicitly captured in the hospitalisation records, diagnoses that have an impact on treatment and care are recorded and were used as a proxy for medical history and coexisting conditions at the index and previous hospitalisations. Note not all coexisting conditions may be identified in the hospital records.

continued



Table A1 (continued): Analysis variables and descriptions

	Variable	Description
Community-based health care	MBS items for general attendance	GP attendances (see Table A4 for further details). After-hours GP attendances (see Table A4 for further details). Attendances of specialists/consultant physicians with cardiology specialty (see Table A4 for further details). Note cardiologist attendances in public hospital outpatient clinics that are not Medicare-subsidised are not included.
	GP care	Time from index hospital separation to first GP attendance Date of separation from hospital to date of first post-discharge relevant health service attendance.
		Average frequency of GP attendance Average frequency of GP attendance was derived by taking into account the difference in follow-up time for each person. Average frequency of GP attendance per month was calculated using the total GP visits during follow-up divided by duration of follow-up. Average frequency of cardiologist attendance per year was calculated using a similar approach.
		Continuity of GP care The concentration of a patient's attendances to the most common care provider or several care providers, measured using usual provider continuity index (UPI) (Warren et al. 2015). A UPI of 0.75 was used to define good GP continuity (Warren et al. 2015) (UPI <0.75 defined as not good continuity). All MBS claims for 'GP attendance' ('A1' and 'A2') were used to derive UPI. Only includes those who had 4 or more GP attendances.
		Regularity of GP care The regularity of GP attendance was measured by a regularity score (RS) that calculates the variation in time intervals between consecutive GP visits. The score ranged from 0 to 1—with 1 representing perfect regularity—and measured how regularly a person visited a GP (i.e. whether the time intervals between GP visits were usually of the same length). The RSs were categorised in quintiles. All MBS claims for 'GP attendance' ('A1' and 'A2') were used to derive the RS. Only includes those who had 3 or more GP attendances.
		MBS items for specific services <i>Chronic disease management plans (CDMPs)</i> The Medicare items for CDMPs are for GPs to prepare a plan for management of the health care of people with chronic or terminal medical conditions, including those requiring multidisciplinary, team-based care from a GP and at least 2 other health or care providers. A person who has a chronic or terminal medical condition (with or without multidisciplinary care needs) can have a GP Management Plan (GPMP) service. Those who require care from a multidisciplinary team, can have a GPMP and team care arrangements (TCAs) (see Table A4 for further details). <i>Medication management reviews</i> The goal of medication management reviews is to maximise an individual patient's benefit from their medication regimen, and prevent medication-related problems through a team approach, involving the patient's GP and preferred community pharmacy (see Table A4 for further details). It may also involve other relevant members of the health-care team, such as nurses in community practice or carers. <i>Health assessments</i> A medical practitioner may undertake a health assessment of an older person and claim health assessment MBS items (see Table A4 for further details). It provides a structured way of identifying health issues and conditions that are potentially preventable or amenable to interventions in order to improve health and/or quality of life.

continued



Table A1 (continued): Analysis variables and descriptions

	Variable	Description
Major CVD outcomes	Non-emergency hospital re-admission due to CVD within 2 years after index hospitalisation	The admission urgency status is an indicator assigned to an admission in the hospital data as to whether admission occurred on an emergency basis. Non-emergency admissions in this report include elective admissions and admissions with urgency status not assigned or unknown. An elective admission is an admission of a patient for care or treatment that, in the opinion of the treating clinician, is necessary and admission for which can be delayed for at least 24 hours. Non-emergency hospital re-admission due to CVD was based on the principal diagnoses (ICD-10-AM codes I00-I99).
	Emergency hospital re-admission due to CVD (within 2 years)	The admission urgency status is an indicator assigned to an admission in the hospitalisation database to determine whether admission occurred on an emergency basis. An emergency admission is an admission of a patient for care or treatment that, in the opinion of the treating clinician, is necessary and admission for which should occur within 24 hours. Emergency hospital re-admission due to CVD was based on the principal diagnoses at hospital separation: CVD (ICD-10-AM codes I00-I99) CHD (ICD-10-AM codes I20-I25) Heart failure (ICD-10-AM code I50).
	All-cause death and death due to CVD	All-cause death. CVD death: Death with an underlying cause ICD-10 codes I00-I99.

Classifications

The CHD diagnosis at the index hospitalisation have been classified based on ICD-10-AM codes. If multiple ICD-10-AM codes were recorded for the index hospitalisation, the most severe diagnostic category of CHD (explained in Chapter 1) was used as the diagnosis of the index hospital stay. The relevant codes are provided in Table A2.

Table A2: ICD-10-AM codes used to define CHD types

CHD types	ICD-10-AM codes (7th and 8th editions)
STEMI	I21.0–I21.3
NSTEMI	I21.4
Unspecified MI	I21.9
Unstable angina	I20.0
Stable angina	I20.1–I20.9
other CHD	I23-I25

Sources: NCCH 2010, NCCC 2012.



Coexisting conditions have been identified using all the principal and additional diagnoses of hospital records during the risk assessment period from 2010 up to the index hospitalisation, and classified based on ICD-10-AM codes. The relevant codes are provided in Table A3.

Table A3: Coexisting conditions included in the risk adjustment model

Coexisting conditions	ICD-10-AM codes (7th and 8th editions)
Congestive heart failure	I09.9, I11.0, I13.0, I13.2, I25.5, I42.0, I42.5-I42.9, I43, I50, P29.0
Hypertension	I10, I11-I13, I15
Peripheral vascular disorders	I70, I71, 173.1, 173.8, 173.9, 177.1, 179.0, 179.2, K55.1, K55.8, K55.9, Z95.8, Z95.9
Chronic obstructive pulmonary disease	J40-J47
Diabetes	E10-E14
Renal failure	I12.0, I13.1, N18, N19, N25.0, Z49.0-Z49.2, Z94.0, Z99.2
Cancer	C00-C97
Cerebrovascular disease	I60, I61, I62, I63, I64, I65, I66, I67, I69, G45

Sources: NCCH 2010, NCCC 2012.

The community health services were based on MBS claim records. The relevant MBS items are provided in Table A4.

Table A4: MBS item codes used to classify community-based health care

MBS service	MBS group	MBS Item number
Medical practitioner attendances		
General practitioner attendances	A1, A2	3-51, 52-65, 92-96
General practitioner after-hour attendance	A22	5000-5067
Specialist/consultant physician attendances	A3,A4	99,104,105,107,113,110,112,114,116,119,122,128,131,132,133
Health assessments	A14	701,703,705,707
Chronic disease management plans (CDMP)		
Prepare a GP management plan (GPMP)	A15	721
Coordination of team care arrangements (TCA)	A15	723
Review of a GPMP or TCA	A15	732
Contribute to multidisciplinary plans	A15	729, 731
Multidisciplinary case conferences (medical practitioners other than a specialist or consultant physician)	A15	735,739,743,747,750,758
Multidisciplinary case conferences (consultant physician)	A15	820-838
Domiciliary and residential medication management reviews	A17	900, 903
Allied health services		
Individual allied health services for chronic disease management	M3	10950-10970

Sources: Medicare Benefits Schedule, Australian Government Department of Health.



Glossary

acute coronary syndrome (ACS): An acute myocardial infarction (heart attack) and unstable angina when they first present as clinical emergencies with chest pain or other features.

acute myocardial infarction (AMI): Term commonly used to mean a heart attack, but more correctly refers only to those heart attacks that have caused some death of heart muscle.

additional diagnosis: A condition or complaint either coexisting with the principal diagnosis or arising during the episode of admitted patient care, episode of residential care or attendance at a health-care establishment, as represented by a code.

admission: An admission to hospital. In this report, the term hospitalisation is used to describe an episode of hospital care that starts with the formal admission process and ends with the formal separation process. In this report, the number of separations has been taken as the number of admissions; hence, admission rate is the same as separation rate.

allied health professionals: Professionals working in audiology, dietetics and nutrition, hospital pharmacy, occupational therapy, orthoptics, orthotics and prosthetics, physiotherapy, podiatry, psychology, radiography and speech pathology.

angina: Temporary chest pain or discomfort when the heart's own blood supply is inadequate to meet extra needs, as in exercise. See also **unstable angina** and **cardiovascular disease**.

angioplasty: A method of reducing a blockage in an artery by opening out a balloon placed inside the artery at the point of narrowing. If the artery is a coronary artery the procedure is technically known as percutaneous transluminal coronary angioplasty (PTCA).

atrial fibrillation: A condition marked by an irregular, rapid heartbeat. It arises because the heart's collecting chambers (atria) stop beating rhythmically and quiver uselessly (fibrillate).

Australian Statistical Geography Standard (ASGS): Common framework defined by the Australian Bureau of Statistics for collection and dissemination of geographically classified statistics. The ASGS replaced the Australian Standard Geographical Classification (ASGC) in July 2011.

cancer: A large range of diseases whose common feature is that some of the body's cells become defective, begin to multiply out of control, can invade and damage the area around them, and can also spread to other parts of the body to cause further damage.

cardiovascular disease: Any disease of the circulatory system, namely the heart (cardio) or blood vessels (vascular). Includes **heart attack**, **angina**, **stroke**, **heart failure** and **peripheral vascular disease**. Also known as circulatory disease.

cerebrovascular disease: Any disorder of the blood vessels supplying the brain or its covering membranes. A notable and major form of cerebrovascular disease is **stroke**.

chronic obstructive pulmonary disease (COPD): Serious, progressive and disabling long-term lung disease where damage to the lungs, usually because of both emphysema and chronic bronchitis, obstructs oxygen intake and causes increasing shortness of breath. By far the greatest cause is cigarette smoking.



cohort: A group of individuals being studied who have experienced the same event at a specified period in time; for example, in this report ‘study cohort’ refers to people who were hospitalised for CHD in New South Wales or Victoria between 2012 and 2013.

condition (health condition): A broad term that can be applied to any health problem, including symptoms, diseases and various risk factors, such as high blood cholesterol and obesity. Often used synonymously with disorder or problem.

continuity of care: Continuity of care refers to the situation where patients experience an episode of care as complete, or consistent, or seamless even if it is provided in a number of different consultations by different providers. It also refers to the continuing relationship between patients and their doctors, known as relational continuity.

coronary artery bypass graft (CABG): Surgical procedure using blood vessel grafts to bypass blockages in the coronary arteries and restore adequate blood flow to the heart muscle.

coronary heart disease: The most common form of CVD. There are 2 major clinical forms—heart attack and angina. Heart attack is a life-threatening event that occurs when a blood vessel supplying the heart itself is suddenly blocked, causing damage to the heart muscle and its functions. Angina is a chronic condition in which short episodes of chest pain can occur periodically when the heart has a temporary deficiency in its blood supply.

data linkage: The bringing together (linking) of information from 2 or more different data sources that relate to the same entity, such as the same individual. This can provide more information about the entity and in certain cases provide a time sequence, helping to ‘tell a story’, show ‘pathways’ and perhaps unravel cause and effect. The term is used synonymously with ‘record linkage’ and ‘data integration’.

diabetes (diabetes mellitus): A chronic condition in which the body cannot properly use its main energy source, the sugar glucose. This is due to a relative or absolute deficiency in insulin, a hormone that is produced by the pancreas and helps glucose enter the body’s cells from the bloodstream and then be processed by them. Diabetes is marked by an abnormal build-up of glucose in the blood, and it can have serious short- and long-term effects. There are 3 main types of diabetes: type 1 diabetes, type 2 diabetes and gestational diabetes.

heart failure: When the heart functions less effectively in pumping blood around the body. It can result from a wide variety of diseases and conditions that can impair or overload the heart, such as heart attack, other conditions that damage the heart muscle directly, **high blood pressure** or a damaged heart valve.

high blood pressure/hypertension: The definition of high blood pressure (also known as hypertension) can vary but a well-accepted one is from the World Health Organization: a systolic blood pressure of 140 mmHg or more or a diastolic blood pressure of 90 mmHg or more, or [the person is] receiving medication for high blood pressure.



hospitalisation: An episode of hospital care that starts with the formal admission process and ends with the formal separation process. An episode of care can be completed by the patients being discharged, transferred to another hospital or care facility, or dying, or by a portion of a hospital stay beginning or ending in a change of type of care (for example, from acute to rehabilitation). Synonymous with **admission** and **separation**.

International Classification of Diseases (ICD): The World Health Organization's internationally accepted statistical classification of disease and injury.

Medicare: A national, government-funded scheme that subsidises the cost of personal medical services for all Australians and aims to help them afford medical care. The Medicare Benefits Schedule is the listing of the Medicare services subsidised by the Australian Government. The schedule is part of the wider Medicare Benefits Scheme (Medicare).

peripheral vascular disease: Diseases of the arteries outside the heart and brain. It occurs when fatty deposits build up in the inner walls of these arteries and affect blood circulation to the arteries that supply blood to the body's peripheries, such as the legs and feet.

Pharmaceutical Benefits Scheme (PBS): A national, government-funded scheme that subsidises the cost of a wide range of pharmaceutical drugs for all Australians to help them afford standard medications. The Pharmaceutical Benefits Schedule (schedule) lists all the medicinal products available under the PBS and explains the uses for which they can be subsidised.

principal diagnosis: The diagnosis established after study to be chiefly responsible for occasioning an episode of admitted patient care, an episode of residential care or an attendance at the health-care establishment, as represented by a code.

private hospital: A privately owned and operated institution, catering for patients who are treated by a doctor of their own choice. Patients are charged fees for accommodation and other services provided by the hospital and relevant medical and allied health practitioners. The term includes private free-standing day hospital facilities.

procedure: A clinical intervention that is surgical in nature, carries a procedural risk, carries an anaesthetic risk, and requires specialist training and/or special facilities or equipment available only in the acute-care setting.

quintile: A group derived by ranking the population of people or elements according to specified criteria and dividing it into 5 equal parts. The term can also mean the cut-points that make these divisions—that is, the 20th, 40th, 60th and 80th percentiles—but the first use is the more common one.

risk: The probability of an event occurring during a specified period of time.

separation: The formal process where a hospital records the completion of an episode of treatment and/or care for an admitted patient. In this report, described by the term **hospitalisation**.

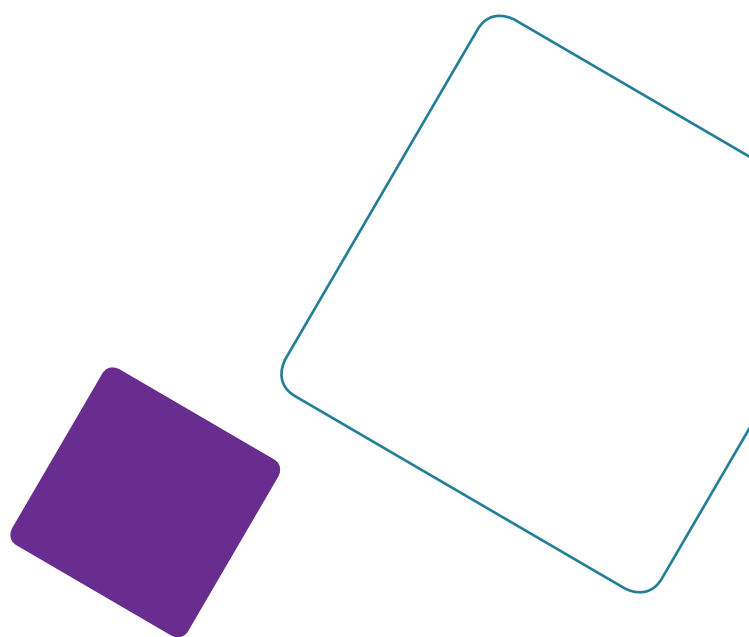


Index of Relative Socioeconomic Disadvantage: One of the set of Socio-Economic Indexes for Areas for ranking the average socioeconomic conditions of the population in an area. It summarises attributes of the population such as low income, low educational attainment, high unemployment and jobs in relatively unskilled occupations.

statistical significance: An indication from a statistical test that an observed difference or association may be significant or 'real' because it is unlikely to be due just to chance. A statistical result is usually said to be 'significant' if it would occur by chance less than once in 20 times.

unstable angina: A form of **angina** that is more dangerous than normal angina but less so than a **heart attack**. It is a form of ACS. It can feature chest pain that occurs at rest; in someone who already has angina it can be marked by new patterns of onset with exertion or by pain that comes on more easily, more often or for longer than previously.

underlying cause of death: The condition, disease or injury initiating the sequence of events leading directly to death; that is, the primary or main cause.





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This report examined the health services used by more than 37,300 people with coronary heart disease (CHD) who were discharged from a public hospital in New South Wales or Victoria between April 2012 and June 2013. The report analysed linked de-identified hospitalisation data to Medicare Benefits Schedule data and National Death Index data.

The report shows that the vast majority of CHD patients visited their General Practitioner (GP) within 30 days of being discharged from hospital and that they had, on average, 1 or 2 visits per month during a two year follow-up timeframe. Timely and regular contact with a GP were associated with lower risk of having an emergency re-admission to hospital for cardiovascular disease.



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