

2 Methods

2.1 Overview

The data presented in this report are obtained from administrative data collections, cardiac procedure registers and national surveys. Australia does not have a national heart disease register, so it is a complex task to estimate the incidence and prevalence of CHD and the number of people receiving cardiac procedures. Australia is, however, fortunate to have national hospital morbidity data, which provide valuable information on treatment in Australian hospitals.

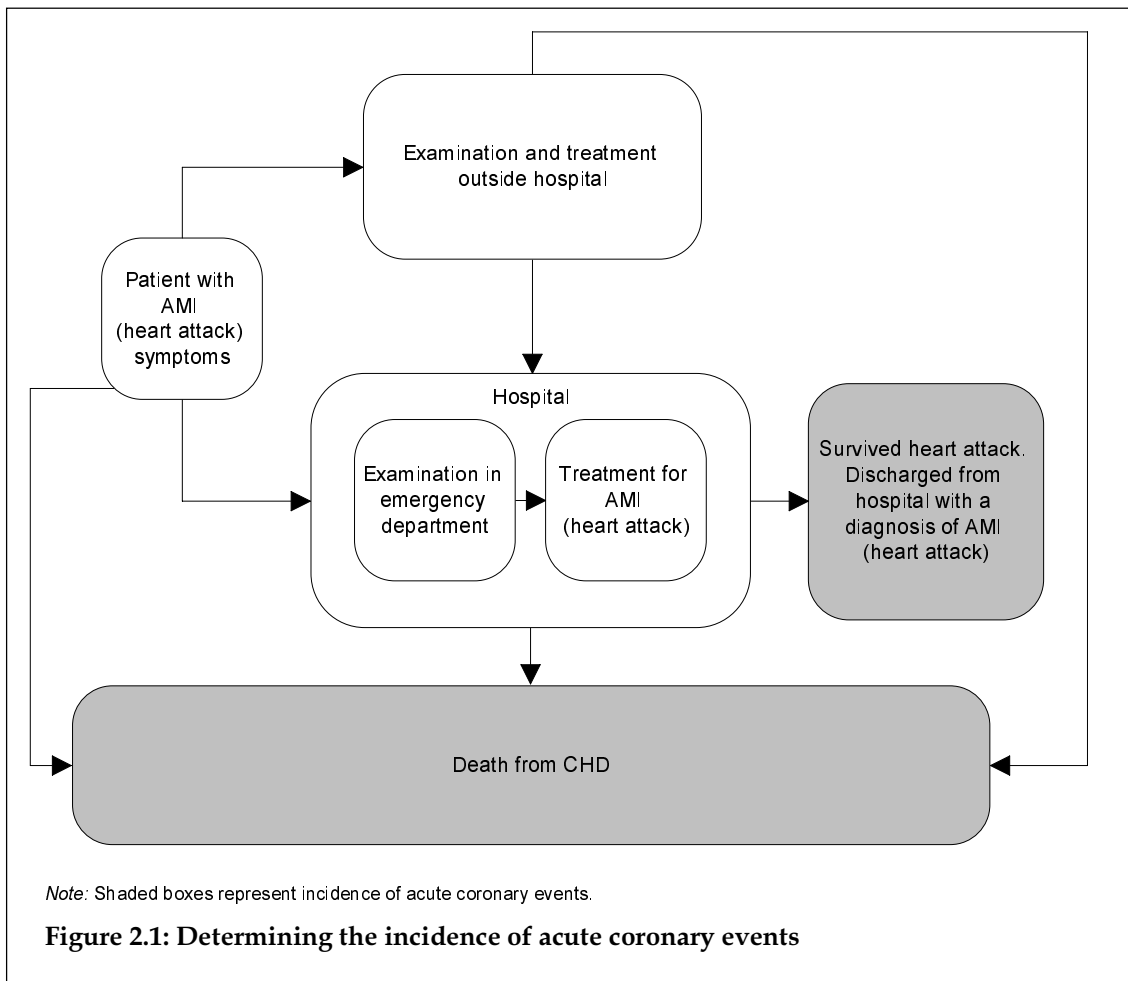
This chapter provides an overview of data sources used in the report, explains the methodology for estimating incidence and counting the number of patients receiving cardiac procedures, and details the coding classification presented in the report.

2.2 Incidence of acute coronary events

Incidence is defined as the number of new cases of a condition or disease, in this report CHD, occurring in a population within a specified time period. However, measuring the overall incidence of CHD is far from straightforward. For example, it would be very difficult to measure the incidence of angina. Its onset is not always clear-cut, people may delay visiting a doctor, new cases will often be treated in general practice, and there is no system of required notification.

For these reasons it is only practicable to measure the incidence of what can be termed major acute coronary events – those events that result either in an acute admission to hospital or in death. This effectively amounts to estimating the incidence of heart attack. The admissions are recorded in routinely collected hospital data (see Section 2.3) and the deaths are drawn from death certificates (see Section 2.4).

Incidence is estimated as the sum of the number of non-fatal hospital admissions for heart attack (recorded as AMI) and the number of deaths recorded as CHD deaths (Figure 2.1). As it is not possible to know whether the non-fatal hospital admissions are new cases or recurrent events in people with previous CHD, the definition of incidence used here does not specifically refer to new cases and so is an overestimate of the true incidence.



2.3 Hospital admissions

Data on hospital admissions have been obtained from the National Hospital Morbidity Database. This database, held at the AIHW, contains the most comprehensive national data on hospital admissions in Australia. The data supplied for the National Hospital Morbidity Database are based on the National Minimum Data Set for Admitted Patient Care and are provided to the AIHW by State and Territory health authorities. Data relating to admitted patients in almost all hospitals are included: public and private acute hospitals, public and private psychiatric hospitals, and private free-standing day hospital facilities. Information is available on demographic, diagnostic and procedural (principal and associated), administrative and length of stay information on episodes of care for patients admitted to hospital.

However, a major limitation with the database is that data are event-based rather than person-based. As a result individual patients cannot be tracked following discharge. For example, a single individual who is admitted for AMI, receives treatment during the initial episode and is readmitted for scheduled follow-up treatment involving hospitalisation may be counted as two people. To minimise this double-counting, only those admissions with a principal diagnosis of AMI are included. The data exclude false AMIs (i.e. patients who are admitted for less than 3 days but are released from hospital, are not transferred to another

hospital and did not die) as these patients were unlikely to have suffered a heart attack. This method has been shown to produce a more accurate estimate of AMIs in the population than using all admissions coded as AMI (AIHW: Jamrozik et al. 2001). Given the acute nature of AMI and the need for hospitalisation, it is easier to use hospital admission data to measure AMIs specifically as opposed to measuring all CHD admissions, which may include hospitalisation for less severe disease.

In this report the terms AMI admissions and AMI patients actually refer to what is technically known as an episode of care, or hospital separation for AMI. Data in the National Hospital Morbidity Database are based on financial years, reflecting how the data are supplied to the AIHW.

2.4 Mortality

Mortality data are obtained from Australian death certificates. Registration of deaths in Australia is the responsibility of the State and Territory Registrars of Births, Deaths and Marriages. Registrars provide the deaths data to the Australian Bureau of Statistics (ABS) for coding of cause of death and compilation into aggregate statistics. The AIHW also holds these data in a National Mortality Database. The data in this report have been extracted from the National Mortality Database.

Both demographic and cause of death information are recorded on Australian death certificates. Since 1997 all morbid conditions, diseases and injuries listed on the death certificate were recorded and coded, enabling identification of both the underlying cause (the disease or injury initiating the sequence of events leading to death) plus any associated causes of death. Associated causes include conditions leading directly to death, excluding the underlying cause, and conditions that contribute to death but do not lead directly to death. However, as CHD is predominantly recorded as the underlying cause of death (in 74% of cases where it appears on a death certificate) and because information on multiple causes of death has only been available since 1997, this report focuses on mortality data where CHD is the underlying cause of death.

Studies examining the reliability of coding of AMI and CHD on death certificates have shown that while CHD is coded accurately and reliably on Australian death certificates, subclassifications within this category, such as AMI, are too unreliable for useful analysis (Dobson et al. 1983). As a result, this report, in relation to death certificate data, focuses on the broader category of CHD rather than the more specific category of AMI. It is highly likely that most deaths coded as CHD are in fact deaths due to AMI.

2.5 Prevalence of heart disease

Prevalence data provide a measure of the number of people with a characteristic (for example CHD) at a particular point in time. Prevalence data, however, are difficult to obtain at a national level and surveys are the main source of such information. In Australia there have been a number of Australia-wide surveys that have collected self-reported information on the prevalence of heart disease – ABS National Health Surveys (1989–90, 1995) and the capital city-based National Heart Foundation Risk Factor Prevalence Surveys (1980, 1983, 1989). Self-reported data on diseases may be unreliable as they can be subject to misinterpretation by survey respondents and be influenced by changing perceptions of the disease over time. Although there are limitations with prevalence data in Australia, the

information is still important as it provides some indication of the number of people with heart disease in the community.

In the Risk Factor Prevalence Surveys (1980, 1983 and 1989), participants reported whether they had been diagnosed with angina or heart attack. However, in the National Health Surveys (1989–90 and 1995) CHD was not separately identified as a condition in the reporting but was grouped into a broader heart disease category. This category therefore included several other forms of heart disease as well as CHD (rheumatic fever with heart involvement, diseases of the mitral valve, other rheumatic heart disease, CHD, diseases of pulmonary circulation, other forms of heart disease). The 1995 heart disease prevalence estimates presented in this report are therefore an overestimate of the prevalence of CHD in Australia. Given the difference in the heart disease definitions in the National Health Surveys and the Risk Factor Prevalence Surveys, the trend data in this report are based on the 1989–90 and 1995 National Health Surveys.

2.6 Risk factor prevalence

Over the last two decades several national surveys have collected information on self-reported and measured CHD risk factors. The risk factor data in this report are drawn from some of these major surveys – 1999–2000 Australian Diabetes, Obesity and Lifestyle Study (AusDiab); 2001 National Drug Strategy Household Survey; 1995 National Nutrition Survey; National Physical Activity Survey (1997–2000); and Risk Factor Prevalence Studies (1980, 1983 and 1989). Further information on these surveys can be found in *Heart, Stroke and Vascular Diseases – Australian Facts 2001* (AIHW 2001).

In interpreting results from the AusDiab Survey it should be noted that approximately 50% of eligible households participated in the household interview, and 55% of eligible adults in these households took part in the physical examination. The effect of any non-response bias on estimates from AusDiab is yet to be determined (AIHW 2002a).

2.7 Drug treatment

Data on drug use have been obtained from the Drug Utilization Sub-committee Database, which is held at the Commonwealth Department of Health and Ageing. The database monitors the community (i.e. non-public hospital) use of prescription medicines in Australia, combining information on prescriptions subsidised by the Pharmaceutical Benefits Scheme and the Repatriation Pharmaceutical Benefits Scheme with an estimate, from the Pharmacy Guild Survey, of those prescriptions that are not subsidised. Not included in this database is information on drugs prescribed in public hospitals and highly specialised drugs available for outpatients through public hospital pharmacies.

Drug use is expressed in terms of volume, defined as daily doses (DDDs) per 1,000 population per day (DDD/1,000/day), following the unit of measurement approved by the World Health Organization (WHO). This is based on the assumed average dose per day of a drug used for its main indication in adults. The DDD enables valid comparisons between drugs independent of differences in price, preparation and quantity per prescription (AIHW 2001).

Drug treatment information in this report has also been obtained from the MONICA Project, a WHO study MONItoring trends and determinants of CARDiovascular disease. Forty well-

defined populations from 25 countries were involved in the study from the mid-1980s to the mid-1990s. Australia participated in the project with two centres, one in Perth, Western Australia, and the other in Newcastle, New South Wales. Each centre collected standardised data on CHD mortality, AMI incidence, the main risk factors for cardiovascular disease and medical care of patients with AMI. Drugs used by individual patients before admission to hospital, during the stay in hospital and on discharge were also collected.

2.8 Cardiac procedures

Data on cardiac procedures have been obtained primarily from the National Hospital Morbidity Database. Information on cardiac procedures relates mostly to AMI treatment, although a greater number of hospital admissions are for angina than for AMI. Given that revascularisation procedures, such as PCI and CABG, have been shown to be very effective treatments for relieving angina and more recently for AMI, the procedure analysis in this report should ideally be undertaken separately for both AMI and angina. As already noted, it is too difficult to count the number of people admitted to hospital for angina adequately, due to the high rate of hospital readmissions for angina within the observation period. This leads to a high risk of multiple counting of patients for the same coronary event. On the other hand, counting people admitted for AMI can be reliably obtained from hospital records by selecting only those admissions with a principal diagnosis of AMI and length of stay greater than 2 days (and those that died within 2 days of admission). This definition of AMI patients reduces the risk of counting patients more than once for the same coronary event. For this reason procedure information in this report relates mostly to AMI patients.

In some sections of the report, cardiac procedure data have been drawn from the National Coronary Angioplasty and National Cardiac Surgery Registers so that long-term trends and total number of procedures for PCI and CABG can be presented (AIHW: Davies & Senes 2001; AIHW: Davies & Senes 2002). Since 1980 the National Heart Foundation has been collecting data on coronary angioplasty procedures, indications, associated complications, lesion location, success rates and adjunctive techniques such as stenting. Since the 1960s the National Heart Foundation has also been collecting information on a range of heart surgery procedures and associated deaths. The data are supplied annually to the AIHW by coronary angioplasty units and cardiac surgery units. The registers are not patient-based and so demographic information on patients undergoing these procedures is not available.

2.9 Expenditure

Information on aggregate expenditure on CHD has been obtained from the Disease Costs and Impact Study undertaken by the AIHW. This study takes known aggregate expenditures on health care and apportions these to disease categories using Australian data – hospital morbidity data, casemix data, the national survey of morbidity and treatment in general practice, and the 1989–90 National Health Survey. Total recurrent expenditure is divided into five dimensions: disease (defined by ICD-9 codes), sector (hospital inpatient, non-patient, medical, pharmaceuticals), program (treatment, prevention), sex and age. For further details on this method see *Health System Costs of Cardiovascular Diseases and Diabetes in Australia 1993–94* (AIHW: Mathers & Penm 1999). The most recent data for health system costs for CHD are for the financial year 1993–94.

2.10 Classifications

Australia has recently moved to a new classification system for coding cause of death and hospital admission, the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10). In this report mortality data before 1998 have been coded to ICD-9 (International Classification of Diseases, Ninth Revision) and thereafter to ICD-10. Table 2.1 lists the ICD-9 and ICD-10 codes used in this report. The introduction of ICD-10 and the move from manual coding to automation of cause of death coding has resulted in a break in the mortality time series. To overcome this difficulty the ABS coded the 1997 deaths data using both ICD-9 (manual coding) and ICD-10 (automatic coding), which allowed comparability factors between ICD-9 and ICD-10 to be derived. For CHD, mortality data for 1997 and earlier have been multiplied by 1.01.

For hospital diagnosis and procedures these international classifications (ICD-9 and ICD-10) have been modified for Australia. Hospital data before 1998–99 were coded using ICD-9-CM (International Classification of Diseases, Ninth Revision, Clinical Modification) and thereafter using ICD-10-AM (International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification).

Table 2.1: Diagnosis and procedure codes for acute coronary events

Diagnosis and procedures	ICD-9 and ICD-9-CM codes	ICD-10 and ICD-10-AM codes
Acute myocardial infarction (AMI)	410	I21
Coronary heart disease (CHD)	410–414	I20–I25
Cardiac catheterisation	37.22, 37.23, 88.53–88.57	38203–00, 38206–00, 38215–00, 38218–00, 38218–02, 59900–00, 59900–02 (Blocks: 667–668, 607)
Percutaneous coronary interventions (PCI)	36.01, 36.02, 36.05–36.07	35304–00, 35305–00, 35310 (Blocks: 670, 671)
Coronary artery bypass grafting (CABG)	36.1	38497, 38500, 38503, 90201 (Blocks: 672–679)