

Cardiac surgery in Australia 1999

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Preface

This report aims to present information on cardiac surgery procedures for acquired conditions performed in 1999. It is produced jointly by the Australian Institute of Health and Welfare and the National Heart Foundation of Australia. An advisory committee appointed by the Foundation oversees the National Cardiac Surgery Register, and the Institute collates, analyses and reports these data through its National Centre for Monitoring Cardiovascular Disease. The project is financed by the Foundation and by the Institute, through funds it receives for the National Centre from the Commonwealth Department of Health and Ageing.

Under its Act, the *Australian Institute of Health and Welfare Act 1987*, the Institute is able to provide the legislative protection for operating the register and protecting the data confidentiality interests of the participating cardiac surgery units and their patients.

This report is intended primarily for workers in the field so it uses technical terms widely. However, to make the contents more accessible to other interested readers, a brief explanatory introduction and a glossary have been included.

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The Australian Institute of Health and Welfare and the Cardiac Surgery Advisory Committee are very grateful to all participating units and members of the Australasian Society of Cardiac and Thoracic Surgeons for giving their time to the National Cardiac Surgery Register and ensuring that it retains its national coverage.

Summary

This report aims to provide details of cardiac surgery for acquired conditions performed in Australia in 1999. It covers patterns and trends in the use of cardiac surgery procedures for acquired conditions, and associated mortality.

The main findings of the report are:

- During 1999 there were an estimated 20,791 cardiac surgery procedures for acquired conditions performed in Australia, with an average case load of 473 patients per cardiac surgery unit. This is an increase of 1% from the previous year.
- The estimated national cardiac surgery rate for acquired conditions was 1,088 per million population, with a 30-day mortality rate of 2.9%.
- There were 74 cardiac surgeons operating in 52 hospitals throughout the country.
- Valvular heart defects accounted for an estimated 4,892 procedures. Eighty procedures were reoperations for bioprosthetic tissue valve failures, 69 procedures were reoperations for mechanical valve failures and 24 procedures were reoperations for allograft tissue valve failures.
- Valve surgery was done most frequently for the aortic and mitral valves, 56% and 35% respectively. Surgery involved a replacement in 75% of cases. Repairs were done in 18% of cases.
- There were an estimated 17,321 operations involving coronary artery bypass grafts (CABG), with a 30-day mortality rate of 2.3%. Six per cent of coronary artery bypass graft procedures were reoperations.
- The average number of bypass grafts was three per patient. Internal mammary artery grafts and saphenous vein grafts were the main types used in bypass graft operations, at 86% and 69% of patients respectively.
- The age-standardised national average rate for coronary artery bypass grafting surgery was 839 per million population. The rate varied considerably across states, ranging from 613 per million population in South Australia (including the Northern Territory) to 922 per million population in New South Wales (including the Australian Capital Territory).
- Coronary artery bypass graft surgery is done three times more frequently in males than females. The difference in procedure rates between men and women is most marked in the age range 40–59 but is evident across all adult ages.
- There were 65 heart transplants, 58 lung transplants and two combined heart–lung transplants done in 1999.

Introduction

Coronary heart disease is a major cause of morbidity and mortality, causing 22% of all deaths in Australia in 1999. The most common forms of heart disease affecting Australians are coronary heart disease, acquired valve disease, conduction defects, congestive heart failure and congenital heart defects. There is a wide range of treatments for heart disease, among which are cardiac surgery and electrophysiological treatments.

Coronary artery bypass grafting (CABG) was developed in the 1960s and is now a well-established procedure. Vessel grafts are used to construct new conduits from major arteries to points beyond obstructions in the coronary arteries to restore adequate blood supply to the heart muscle (myocardium). The procedure usually requires the chest to be opened and the circulation to be diverted from the heart and lungs to a cardiopulmonary bypass machine with a pump oxygenator. In most cases the graft material is obtained from the patient's internal mammary artery in the chest or the saphenous vein in the leg, or both. Less invasive techniques for performing the procedure are now being introduced.

CABG is a treatment and not a cure for coronary artery disease, and there is a risk of recurrent disease. Reoperations are uncommon within the first five years but become more frequent later. Although coronary angioplasty has replaced some CABG procedures following its introduction in the early 1980s, the techniques are regarded as complementary. The growth in the rate of CABG has flattened out in more recent years.

Valve surgery involves repairing or replacing the mitral, aortic, tricuspid or pulmonary valves. It usually requires cardiopulmonary bypass. Valve disease may be congenital, a result of disease such as rheumatic fever, or age-related. Most valve procedures done in Australia consist of replacing the damaged valve with a mechanical prosthesis, a bioprosthesis or a human graft. Reconstruction of the damaged valve by suturing techniques is less common. Simpler valve procedures can be undertaken with catheter-based techniques.

Electrophysiology surgery involves removing sections of heart muscle tissue responsible for abnormal heart rhythms (arrhythmias) such as ventricular and supraventricular tachycardias, which can be serious or even life-threatening.

Other cardiac procedures include operations on the aorta, surgery for cardiac tumours and trauma, transplants and pericardiectomy.

Information on transmyocardial laser revascularisation procedures was collected for the first time in 1998. This is a new technique where small holes or channels are drilled through the myocardium using laser energy to improve blood supply to the heart in cases unsuitable for CABG or percutaneous transluminal coronary angioplasty.

This report differs from previous editions as it is restricted to details of acquired cardiac surgery. Coverage of congenital cardiac surgery was considered too poor in 1999 to present a representative national picture of this surgery so data are not presented (see *Methods* for further details). From previous years data, congenital surgery constituted around 7% of all cardiac surgery (around 1,600 operations). The report covers patterns and trends in the use of cardiac surgery procedures for acquired conditions, and associated mortality.

This report is available on the Internet at the Institute's web site: <http://www.aihw.gov.au>

Methods

This report summarises all cardiac surgery for acquired conditions performed in 1999. Statistics from previous years (for acquired conditions) are also included, because changes over time in the numbers, rates and associated mortality of operations are of interest. Information about the rate of reoperations for coronary artery bypass grafts and valve surgery is also presented. Cardiac surgery units operating in 1999 are listed in Appendix A. The list of units is reviewed each year, and new units are invited to join the National Cardiac Surgery Register and submit their data.

Data collection and reporting

Generally, data collection forms are sent to all cardiac surgery units at the beginning of each year for procedures done in the previous calendar year. Units are asked to complete the forms with aggregate results (i.e. not individual patient details) and submit them within eight weeks. Reports are provided by each unit under the condition that results will be presented in aggregate form only, and that results from individual units will not be released unless the head of the unit agrees in writing.

Data are collected via a form presented here in Appendix B. This form is reviewed and updated by the Cardiac Surgery Advisory Committee each year to reflect changes in practice. Units' responses are reviewed, data are checked for consistency, any discrepancies are referred to the relevant unit, and data are then entered into a dedicated database at the Australian Institute of Health and Welfare (AIHW). Results are analysed and the annual report compiled and reviewed by members of the Advisory Committee before its publication.

Coverage

There were 52 cardiac surgery units operating in Australia in 1999; however, 6 units did not supply data to the Register for inclusion in this report (table below). Of the missing units, 5 units do mostly cardiac surgery for acquired conditions and the remaining unit does congenital cardiac surgery. Based on previous years data the missing congenital unit's procedures accounted for nearly 25% of the total congenital data. Thus, in the interests of presenting representative data the congenital section of this report has been omitted.

The Register has details from 44 units that were doing cardiac surgery for acquired conditions and their data are presented here.

State	Number of units not contributing to the register in 1999
Australian Capital Territory	1
New South Wales	4
Queensland	1

To provide a better national picture of cardiac surgery performed in 1999 (despite the above limitation), these data from the Register have been complemented with information from the National Hospital Morbidity Database held by the AIHW. This database contains demographic, diagnostic, procedural and duration-of-stay information on episodes of care for patients admitted to hospital. The collection is based on data on hospitalisations compiled by state and territory health authorities and supplied to the AIHW. A record is included for each separation, not for each patient, so patients who were hospitalised more than once in the year have more than one record in the database.

Data from the National Hospital Morbidity Database were found to correspond well with those reported directly to the Register by participating units.

Estimates for the total number of CABG procedures nationally and for each state, as well as the age and sex of patients undergoing CABG, were obtained from the National Hospital Morbidity Database. The premise is that this procedure is generally done to treat coronary artery disease which is an acquired condition, so where patient’s ages were reported as less than 20 years they were included, as it was assumed they had an acquired condition. Records included were those for separations with procedure codes for CABG (Table 1) as principal or additional procedure, and with separation dates between 1 January and 31 December 1999. For the vast majority of CABG procedures, the Register supplied detailed information on associated mortality, number of anastomoses, the type of graft used, concomitant procedures, and reoperations.

The total number of operations for acquired valvular heart defects nationally was estimated from National Hospital Morbidity Database records for separations with certain procedure codes (Table 1) as principal or additional procedure, and with separation dates between 1 January and 31 December 1999. For most of these operations, the Register provided details on the type of valve operated on, the type of surgical procedure performed, associated mortality, and reoperations.

The Register has full coverage of surgical procedures for transplants for 1999 as all the hospitals identified as dedicated transplant units send data to the Register so it was not necessary to access information from the National Hospital Morbidity Database.

For operations on the aorta and for miscellaneous acquired heart conditions, the information presented in this report is incomplete. However, as there are relatively few such operations performed each year, the missing data would have only a small effect on overall surgery totals and mortality rates.

To allow a more accurate estimate of trends for acquired cardiac surgery than that possible from information held in the Register alone, figures for previous years were revised using data from the National Hospital Morbidity Database and similar methods to those described above.

Table 1: International Classification of Diseases codes used in this report

Procedure	ICD-10-AM code
Coronary artery bypass graft	Blocks [672–679]: codes 38497, 38500, 38503, 90201
Valvular heart defects	Blocks [621–23, 625–26, 628, 631–32, 634, 637]: codes 38456-01, 38456-10, 38456-11, 38480-00, 38480-01, 38480-02, 38481-00, 38481-01, 38481-02, 38487-00, 38488-00, 38488-01, 38488-02, 38488-03, 38488-04, 38488-05, 38488-06, 38488-07, 38489-00, 38489-01, 38489-02, 38489-03, 38489-04, 38489-05

ICD-10-AM = International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification.

Definitions

Acquired heart condition refers to disease that is neither genetic nor present at birth.

Congenital heart defect refers to heart disorder present at birth.

'Mortality' refers throughout the report to death during the post-operative period (that is, death within 30 days of the operation).

Surgery rates are calculated as the number of operations per million people in the Australian population. Death rates are given as percentages of those receiving the surgery.

The rates for bypass graft surgery have been calculated to include the Australian Capital Territory (ACT) population with that of New South Wales (NSW), and the Northern Territory (NT) population with that of South Australia (SA). It is known from hospital morbidity data that the vast majority of NT residents are treated in SA and that nearly half of those treated in the ACT are NSW residents.

Age-standardised rates, which take account of differences in the age structure of populations being compared, have been included to provide a valid comparison of procedure rates across the states.

Total operations

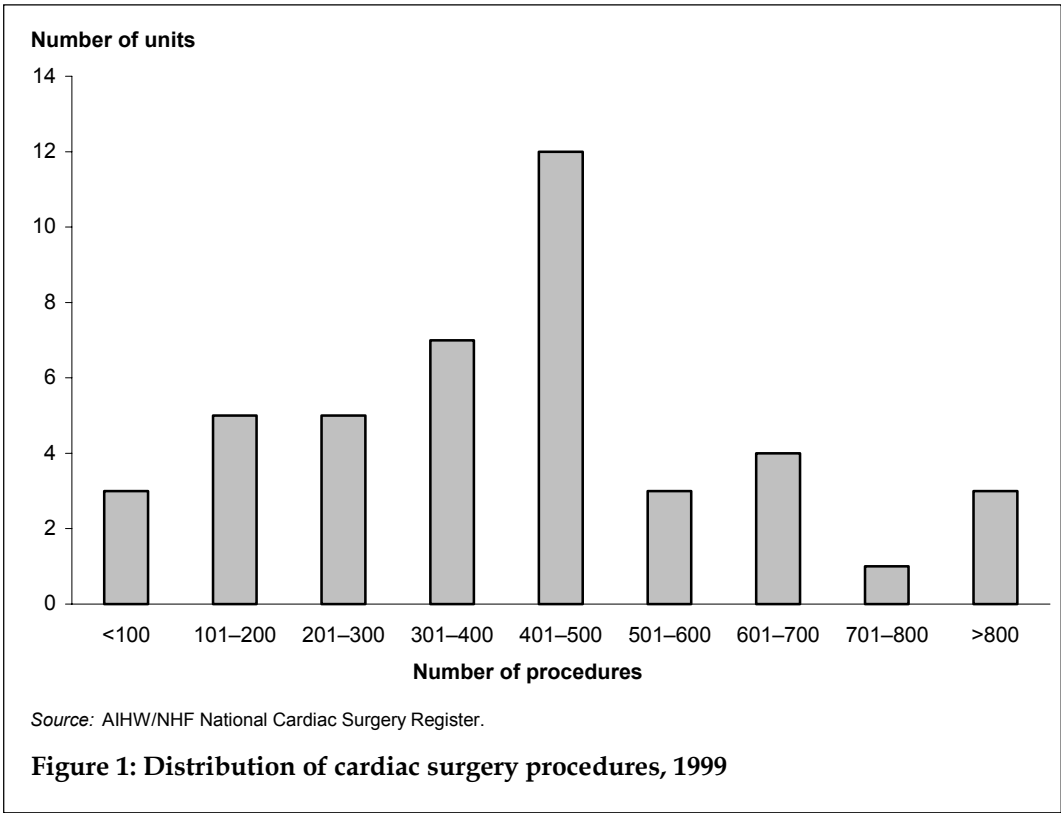
Cardiac surgery units and surgeons

In 1999 there were 74 cardiac surgeons operating in Australia. There were also 11 overseas registrars, 4 service registrars and 26 trainees, 20 of whom were from other countries, operating in Australia.

There were 52 cardiac surgery units operating in Australia in 1999; however, 6 units did not supply data to the Register for inclusion in this report. Of the missing units, 5 units do mostly cardiac surgery for acquired conditions and the remaining unit does congenital cardiac surgery. Based on previous years data the missing congenital unit's procedures accounted for nearly 25% of the total congenital data (around 1,600 procedures). Thus, in the interests of presenting representative data the congenital section of this report has been omitted.

The Register has details from 44 units that were doing cardiac surgery for acquired conditions and their data are presented here.

Figure 1 presents the distribution of cardiac surgery procedures by units based on data from the National Cardiac Surgery Register.



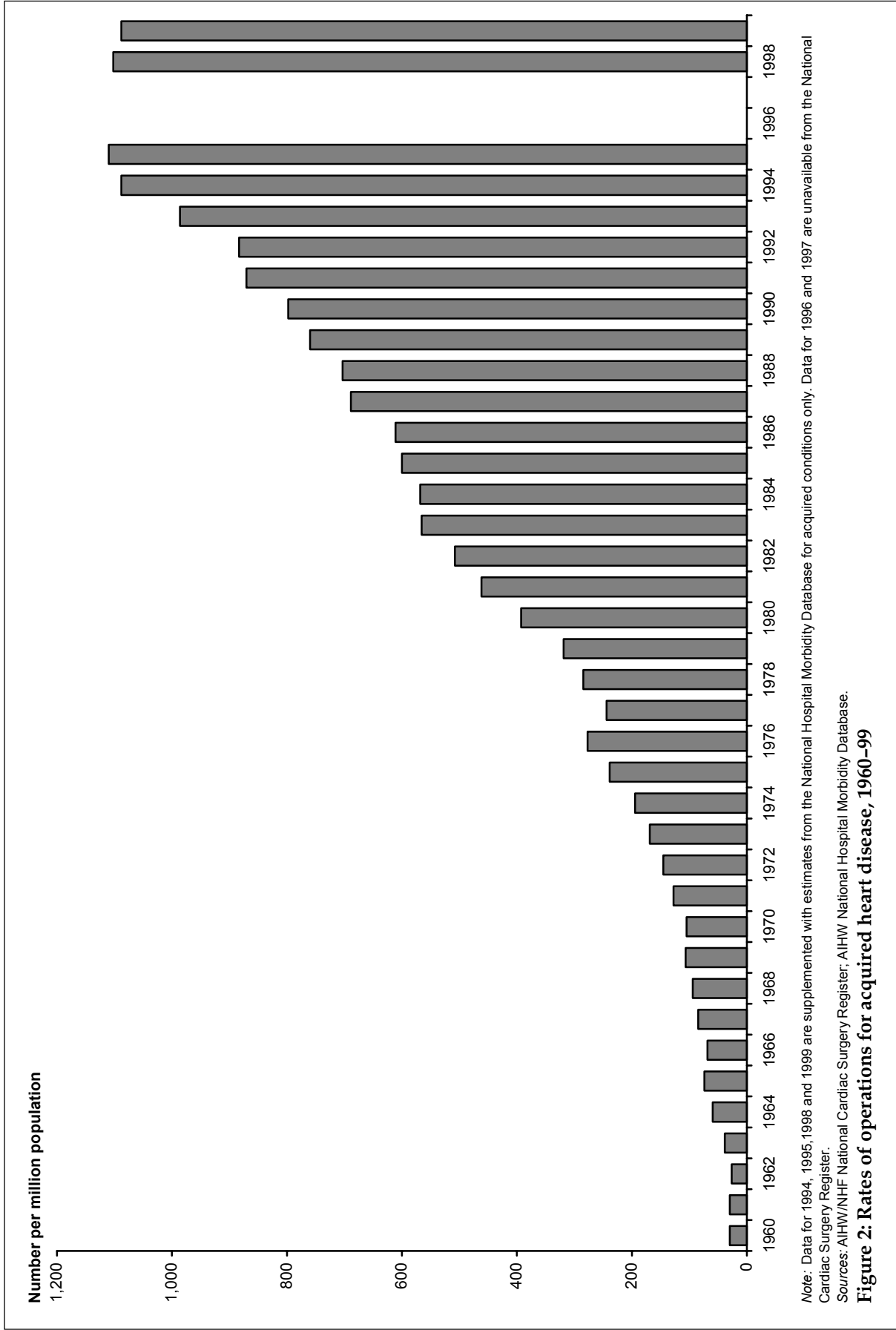
Operations for acquired conditions

An estimated¹ 20,791 cardiac surgery procedures for acquired conditions were performed in 1999. In 1999 there was an average case load of 473 patients per unit, with a range of 34 to 2,014. The estimated national cardiac surgery rate was 1,088 per million population.

The National Cardiac Surgery Register provides details for 17,734 operations for which information was available for acquired conditions in 1999; overall mortality was 2.9%. Mortality has stabilised at just below 3% in the past few years, even though surgery is now performed on a wider range of patients, including some previously considered unsuitable for surgery.

Figure 2 illustrates trends in the rates of acquired operations since 1960. Rates of surgery for acquired heart disease increased dramatically until 1995, and have remained fairly stable since.

¹ Estimated number of operations for all units doing cardiac surgery for acquired conditions in Australia, based on data from the AIHW National Hospital Morbidity Database.



Surgery for valvular heart defects

From the National Hospital Morbidity Database it is estimated that there were 4,892 operations for acquired valvular heart defects in 1999. Details of 4,590 such operations are held in the National Cardiac Surgery Register and they are shown in this section.

Table 2 presents information about valve surgery performed from 1990 to 1999, and Table 4 gives more detailed figures for 1999 alone. Between 1990 and 1999, there has been an 85% increase in the number of operations for valve defects.

In 1999, most valve surgery was done on the aortic and mitral valves, 56% and 35% respectively. The vast majority of surgery was for replacement procedures (75%). For mitral valve surgery, repair of the valve was performed in 44% of cases. For aortic valve replacement, mechanical prostheses were used in 53%, bioprostheses in 44%, allografts in 2.5% and autografts in 1%. Of the bioprostheses 22% were stentless valves.

Between 1998 and 1999, repair and replacement procedures increased by 28% and 9% respectively. The increase in replacement procedures is due to increases in xenografts (heterograft) (29%). Replacement using prostheses remained steady over this period. The increase in repair procedures is mainly due to mitral valve repair (Table 4).

The reasons for valve reoperations are given in Table 3. In 1999 there were 69 reoperations for mechanical valve failures, with 2 deaths; 80 bioprosthetic tissue valve failures, with 4 deaths; and 24 reoperations for allograft tissue valve failures, with 3 deaths. These figures indicate there is a much higher valve failure rate for tissue valves, as over the last 10 years about 150 mechanical, 500 bioprosthetic and 150 allograft valves have been inserted each year.

Degeneration was the most frequent cause of reoperations to tissue valves, accounting for around 76% of all allograft replacements and bioprosthetic replacements. For mechanical valves, reoperations were performed for mechanical failure (54% of cases), endocarditis (32%) and paravalvular leak (14%) (Table 3).

Table 2: Number of operations for acquired valve defects by type of valve and procedure, 1994–99

	1994	1995	1996	1997	1998	1999
Valve						
Mitral	1,367	1,299	n.a.	n.a.	1,488	1,720
Aortic	2,153	2,183	n.a.	n.a.	2,405	2,716
Tricuspid	77	78	n.a.	n.a.	138	139
Pulmonary	3	3	n.a.	n.a.	7	15
Estimate from NHMD ^(a)	..	220	4,038	4,447	408	302
Total	3,600	3,783	4,038	4,447	4,446	4,892
Type of surgery						
Repair ^(b)	548	591	n.a.	n.a.	705	905
Replacement						
Mechanical prosthesis	2,338	2,127	n.a.	n.a.	2,153	2,206
Allograft ^(c)	129	113	n.a.	n.a.	124	113
Xenograft ^(d)	585	732	n.a.	n.a.	1,056	1,366
<i>Total replacement</i>	3052	2,972	n.a.	n.a.	3,334	3,685
Estimate from NHMD ^(a)	..	220	4,038	4,447	408	302
Total	3,600	3,783	4,038	4,447	4446	4,892
Reoperations^(e)						
Tissue valve						
Allograft	130	12	n.a.	n.a.	26	24
Bioprosthetic	..	136	n.a.	n.a.	65	80
Autograft valve	..	..	n.a.	n.a.	1	—
Not specified	..	..	n.a.	n.a.	..	..
Mechanical valve	59	39	n.a.	n.a.	59	69
Total	189	187	n.a.	n.a.	151	173

.. not applicable.

n.a. not available.

(a) From 1995, estimates were made from the National Hospital Morbidity Database (NHMD).

(b) Repair = valvotomy and reconstruction, as in Table 4.

(c) Allograft = homograft.

(d) Xenograft = heterograft.

(e) Not all units gave details on valve reoperations.

Source: AIHW/NHF National Cardiac Surgery Register.

Table 3: Reasons for reoperations^(a) for valve replacement, 1999

Reason for reoperation	Mechanical valves	Tissue valves	
		Bioprosthetic	Allograft
		Number (deaths)	
Degeneration	..	63 (2)	16 (0)
Endocarditis	22 (2)	7 (1)	3 (1)
Mechanical failure	37 (0)	..	..
Paravalvular leak	10 (0)	10 (1)	5 (2)
Total	69 (2)	80 (4)	24 (3)

.. not applicable.

(a) Not all units gave details on valve reoperations.

Source: AIHW/NHF National Cardiac Surgery Register.

Table 4: Operations for valve defects for acquired conditions by type of valve and procedure, 1999

Valve	Procedure	Single	Double	Triple	Total
		Number (deaths)			
Mitral	Valvotomy	6 (0)	3 (0)	0	9 (0)
	Reconstruction				
	with support ring	559 (9)	51 (2)	2 (1)	612 (12)
	without ring	121 (3)	12 (2)	2 (0)	135 (5)
	repair paravalvular leak	1 (0)	0	0	1 (0)
	Replacement				
	xenograft	137 (8)	43 (5)	4 (0)	184 (13)
	mechanical prosthesis	574 (18)	180 (7)	17 (1)	771 (26)
	mitral allograft	0	8 (0)	0	8 (0)
Aortic	Reconstruction				
	valvotomy	0	1 (0)	1 (0)	2 (0)
	decalcification	6 (0)	2 (1)	0	8 (1)
	for regurgitation	5 (0)	5 (2)	0	10 (2)
	other/unstated	8 (0)	1 (0)	1 (0)	10 (0)
	repair paravalvular leak	4 (0)	0	0	4 (0)
	Replacement				
	classical allograft	23 (2)	2 (0)	1 (0)	26 (2)
	'mini root' allograft	32 (1)	2 (0)	0	34 (1)
	'total root' allograft	7 (1)	1 (0)	0	8 (1)
	'mini root' xenograft	0	1 (0)	0	1 (0)
	stent-mounted xenograft	865 (30)	43 (5)	5 (1)	913 (36)
	stentless xenograft	246 (12)	8 (0)	0	254 (12)
	xenograft not specified	0	1 (0)	0	1 (0)
	pulmonary autograft	31 (0)	0	0	31 (0)
	mechanical prosthesis	1,234 (44)	163 (6)	17 (1)	1,414 (51)
Tricuspid	Reconstruction				
	with support ring	16 (1)	41 (0)	11 (2)	68 (3)
	without ring	12 (2)	17 (2)	9 (0)	38 (4)
	Replacement				
	xenograft	8 (0)	2 (1)	2 (0)	12 (1)
	mechanical prosthesis	9 (1)	9 (1)	3 (0)	21 (2)
Pulmonary	Reconstruction	7 (0)	0	0	7 (0)
	Replacement				
	allograft	7 (0)	0	0	7 (0)
	xenograft	1 (0)	0	0	1 (0)
	Estimate from NHMD ^(a)	..	..	..	302
	Total valves^(b)	3,919	596	75	4,892
	Total patients^(c)	3,919 (132)	298 (17)	25 (2)	4,242 (151)

.. not applicable.

Allograft = homograft.

Xenograft = heterograft.

(a) For non-contributing units, estimates were made from the National Hospital Morbidity Database.

(b) Based on data from the AIHW/NHF National Cardiac Surgery Register and National Hospital Morbidity Database.

(c) Based on AIHW/NHF National Cardiac Surgery Register data only.

Sources: AIHW/NHF National Cardiac Surgery Register and National Hospital Morbidity Database.

Surgery for coronary artery disease

From the National Hospital Morbidity Database it is estimated that 17,321 coronary artery bypass graft operations were performed in 1999. As noted previously, 6 out of 52 units did not provide information for 1999 so the National Cardiac Surgery Register contains details of only 14,263 bypass graft operations; they are presented in this section. The Register covers 14,298 operations for coronary artery disease in 1999: 14,263 with bypass grafts and 35 without. Mortality associated with bypass graft surgery was 2.4%. The average number of grafts per patient was 3.1. The results over the last decade indicate that this average number of grafts has stabilised at around 3 per patient.

Information on the number of procedures for transmyocardial laser revascularisation (TMLR) was collected for the first time in 1998. This is a new technique where laser energy is used to drill small holes or channels through the heart muscle (myocardium) in an attempt to improve blood supply to the heart in cases unsuitable for CABG or percutaneous transluminal coronary angioplasty (PTCA). There were no TMLR procedures in 1999.

Mortality for isolated single coronary artery bypass graft was 2.5% compared with 1.5% for bypass involving three grafts.

Operations for infarct complications were uncommon. There were 80 aneurysms resected and 34 infarct ventricular septal defects. The mortality for VSD repair was 29%.

In 1999, 6% of coronary artery bypass operations were reoperations. The mortality rate for these reoperations was 7.1%, more than double the mortality rate of CABG surgery overall.

Tables 5 and 6 show numbers of operations with and without concomitant procedures, according to the number of distal anastomoses.

Nearly 6% of CABG procedures involved newer modalities in 1999. These CABG modalities include procedures without cardiopulmonary bypass, CABG via thoracotomy and minimally invasive techniques.

Table 5: Coronary artery bypass graft operations (including operations with concomitant procedures), 1996–99

Number of distal anastomoses	1996			1997			1998			1999		
	Number of operations	% of total	Deaths	Number of operations	% of total ^(a)	Deaths	Number of operations	% of total ^(a)	Deaths	Number of operations	% of total ^(a)	Deaths
1	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,111	7.5	25	1,130	7.9	47
2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2,908	19.5	81	2,718	19.1	55
3	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	5,003	33.6	102	4,840	33.9	89
4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	3,720	25.0	62	3,337	23.4	85
5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,249	8.4	22	974	6.8	24
6	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	207	1.4	5	161	1.1	5
7	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	17	0.1	2	15	0.1	0
8	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2	0.0	0	2	0.0	0
9	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0	0.0	0	—	—	—
Not specified	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	690	4.6	21	1,086	7.6	24
Subtotal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	14,907	100.0	320	14,263	100.0	329
Estimate from NHMD ^(b)	17,759	..	n.a.	17,377	..	n.a.	2,541	..	n.a.	3,058	..	n.a.
Total	17,759	..	..	17,377	..	..	17,448	..	..	17,321	..	..
Average number of grafts per patient	n.a.			n.a.			3.1			3.1		
Overall mortality	n.a.			n.a.			2.1%			2.3%		
Reoperations	n.a.			n.a.			5.9%			6.0%		
Newer CABG modalities ^(c)	n.a.			n.a.			2.7%			5.8%		

.. not applicable.

n.a. not available.

(a) Calculated as a proportion of those procedures for which details are available.

(b) Estimates were made (for non-responding units) from the National Hospital Morbidity Database (NHMD).

(c) Newer CABG modalities include procedures without cardiopulmonary bypass, CABG via thoracotomy and minimally invasive techniques.

Sources: AIHW/NHF National Cardiac Surgery Register and AIHW National Hospital Morbidity Database.

Table 6: Operations for coronary artery disease, 1999

Number of distal anastomoses	Concomitant procedures						Total
	None	Valve surgery	Excision of infarct or aneurysm	Ventricular septal defect	Other		
1	599 (15)	490 (25)	2 (0)	8 (4)	31 (3)	1,130 (47)	
2	2,282 (33)	378 (14)	15 (2)	6 (3)	37 (3)	2,718 (55)	
3	4,421 (69)	333 (17)	29 (1)	2 (1)	55 (1)	4,840 (89)	
4	3,136 (74)	147 (9)	14 (1)	—	40 (1)	3,337 (85)	
5	941 (24)	17 (0)	7 (0)	—	9 (0)	974 (24)	
6	151 (4)	7 (1)	1 (0)	1 (0)	1 (0)	161 (5)	
7	14 (0)	—	—	—	1 (0)	15 (0)	
8	2 (0)	—	—	—	—	2 (0)	
9	—	—	—	—	—	—	
Unspecified	862 (8)	162 (9)	2 (0)	1 (0)	59 (7)	1,086 (24)	
Total with grafts	12,408 (227)	1,534 (75)	70 (4)	18 (8)	233 (15)	14,263 (329)	
Without grafts	—	—	10 (3)	16 (2)	9 (4)	35 (9)	
TMLR	—	—	—	—	—	—	
Overall total						14,298 (338)	
Reoperations	741 (49)	97 (10)	5 (1)	—	7 (0)	850 (60)	
Newer CABG modalities ^(a)	—	—	—	—	—	243	

CABG = coronary artery bypass grafting; TMLR = transmyocardial laser revascularisation.

.. not applicable.

(a) Newer CABG modalities include procedures without cardiopulmonary bypass, CABG via thoracotomy and minimally invasive techniques.

Note: This table shows details only of those procedures for which there is information available. It is estimated that there are an additional 3,058 coronary artery bypass graft operations not included in this table, making the estimated total of coronary artery operations with grafts 17,321.

Source: AIHW/NHF National Cardiac Surgery Register.

Table 7 presents information on the types of graft used in these operations in 1999. Not all units could supply the information, so results have been calculated as percentages of bypass graft operations that involved the use of at least one of the types of graft. The table shows that nearly all bypass graft operations used at least one internal mammary artery graft (86%), with saphenous vein graft the next major type at 69% and radial artery graft 32%.

Table 7: Types of grafts used, 1998 and 1999

Type of graft	1998		1999	
	Number of patients	Per cent of patients	Number of patients	Per cent of patients
Saphenous vein	9,127	68.2	8,846	69.2
Internal mammary artery	10,934	81.8	11,033	86.3
Cephalic vein	50	0.4	23	0.2
Radial artery	4,320	32.3	4,146	32.4
Gastro-epiploic artery	4	0.0	4	0.0
Prosthetic or bioprosthetic	4	0.0	2	0.0

Notes

1. Not all units could supply this information, so results have been calculated as percentages of bypass graft operations which involved the use of at least one of the types of graft.
2. Each patient can have more than one type of graft.

Source: AIHW/NHF National Cardiac Surgery Register.

There was a steady increase in the rate of bypass graft surgery in Australia to 1996, with the rate remaining fairly stable since then (Table 8 and Figure 3).

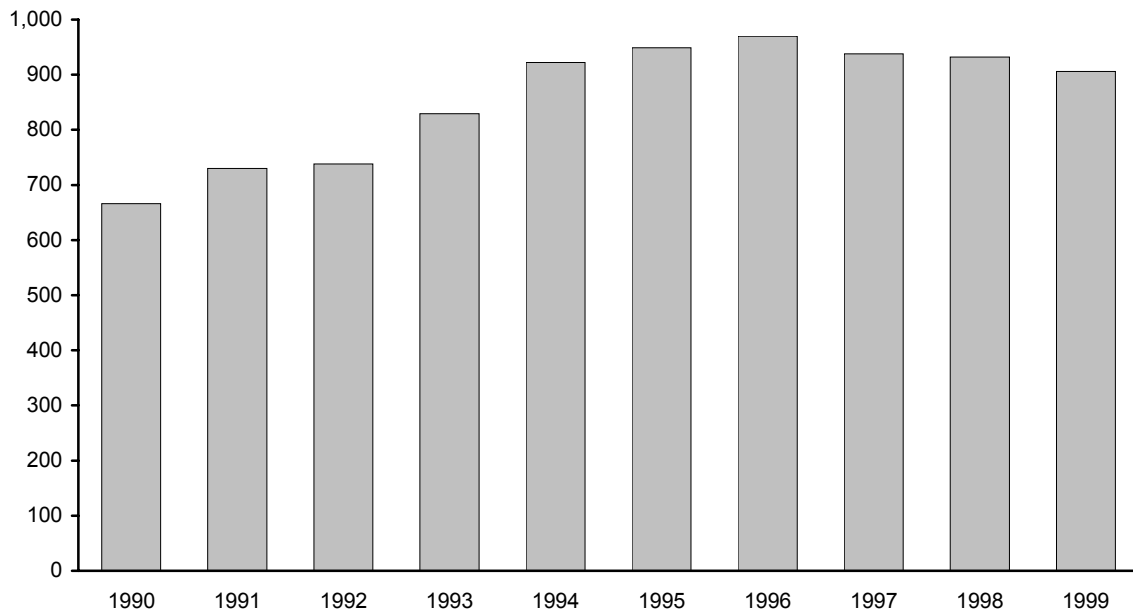
Table 8: Rates for coronary artery bypass graft operations (including operations with concomitant procedures), Australia, 1990–99^(a)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Number of operations per million population										
Crude rate	666	730	738	829	922	949	970	938	932	906

(a) Data for 1995 to 1999 are from the National Hospital Morbidity Database to provide complete coverage of units nationally.

Source: AIHW National Hospital Morbidity Database.

Number per million population



Note: Data for 1995 to 1999 are based on estimates from the AIHW National Hospital Morbidity Database to provide complete coverage of units nationally.

Source: AIHW National Hospital Morbidity Database.

Figure 3: Rates for coronary artery bypass graft operations (including operations with concomitant procedures), Australia, 1990-99

CABG by age and sex

CABG in Australia is done more frequently in males than females, at a ratio of about 3:1. The difference in procedure rates between men and women is most marked in the age range 40–59 but is evident across all adult ages (Table 9 and Figure 4). Procedure rates peak at ages 70–74 among both males and females.

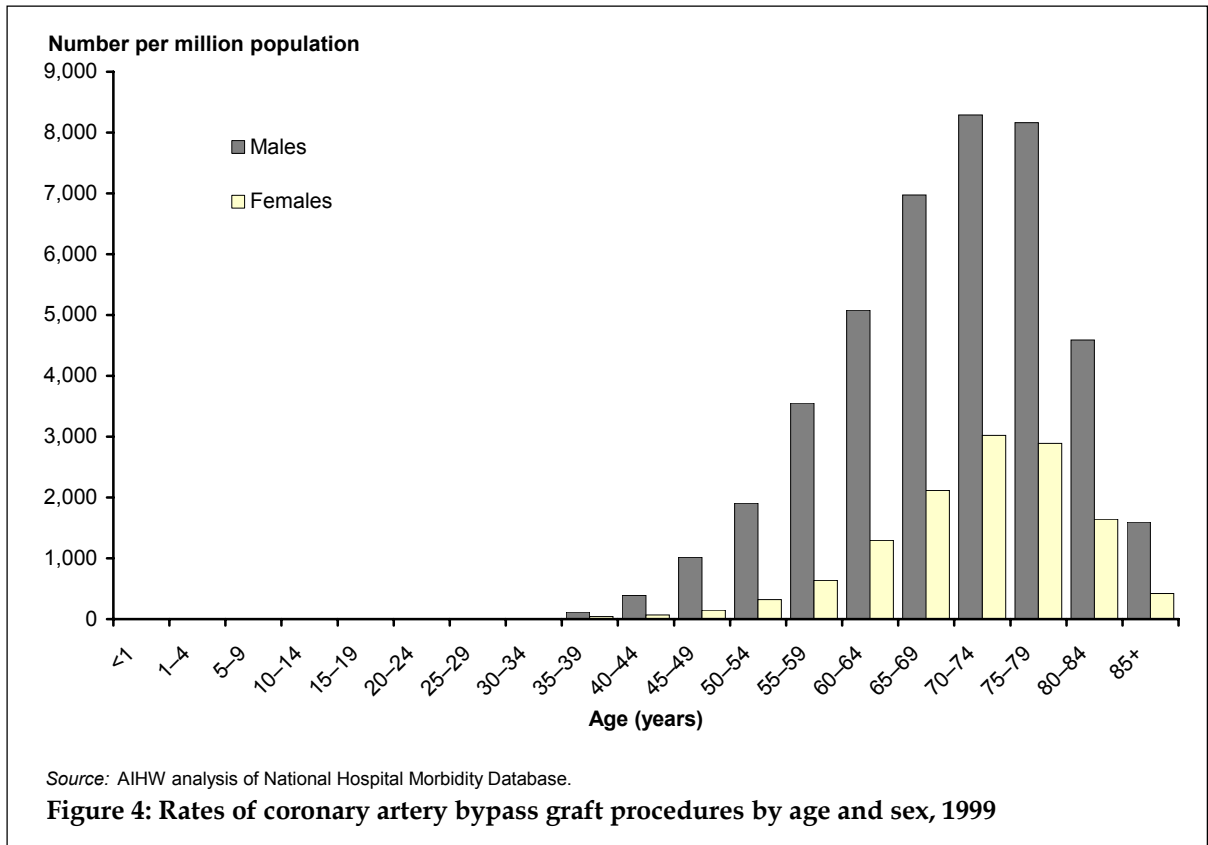
Table 9: Coronary artery bypass graft procedures by age and sex, 1999

Age group (years)	Males			Females			Ratio male:female
	Number	Per cent	Age-specific rate per million	Number	Per cent	Age-specific rate per million	
<1	0	0.0	0.0	2	0.0	16.2	0.0
1–4	0	0.0	0.0	1	0.0	2.0	0.0
5–9	4	0.0	5.8	1	0.0	1.5	3.8
10–14	1	0.0	1.5	1	0.0	1.5	1.0
15–19	1	0.0	1.5	4	0.1	6.2	0.2
20–24	2	0.0	3.0	7	0.2	11.0	0.3
25–29	1	0.0	1.4	2	0.0	2.7	0.5
30–34	11	0.1	15.5	10	0.2	13.9	1.1
35–39	86	0.7	114.4	31	0.7	40.7	2.8
40–44	280	2.1	391.6	48	1.2	66.1	5.9
45–49	677	5.1	1,013.6	98	2.4	145.6	7.0
50–54	1,193	9.1	1,907.6	196	4.7	320.2	6.0
55–59	1,705	12.9	3,554.5	298	7.2	637.6	5.6
60–64	1,993	15.1	5,077.8	509	12.3	1,295.1	3.9
65–69	2,327	17.7	6,974.4	732	17.6	2,113.5	3.3
70–74	2,476	18.8	8,289.3	1,009	24.3	3,022.0	2.7
75–79	1,763	13.4	8,165.2	823	19.8	2,889.9	2.8
80–84	532	4.0	4,590.1	307	7.4	1,641.3	2.8
85+	118	0.9	1,593.2	71	1.7	420.0	3.8
All ages	13,170	100.0	1,389.3	4,150	100.0	430.9	3.2

... not applicable.

Note: There was one patient whose sex was not recorded.

Source: AIHW analysis of the National Hospital Morbidity Database.



Regional rates for CABG

The (age-standardised) national rate for CABG surgery is 839 per million population. This rate varies across States, from 613 per million population in South Australia (including Northern Territory) to 922 per million population in New South Wales (including the Australian Capital Territory) (Table 10 and Figure 5).

Table 10: Rates for CABG by State, 1999

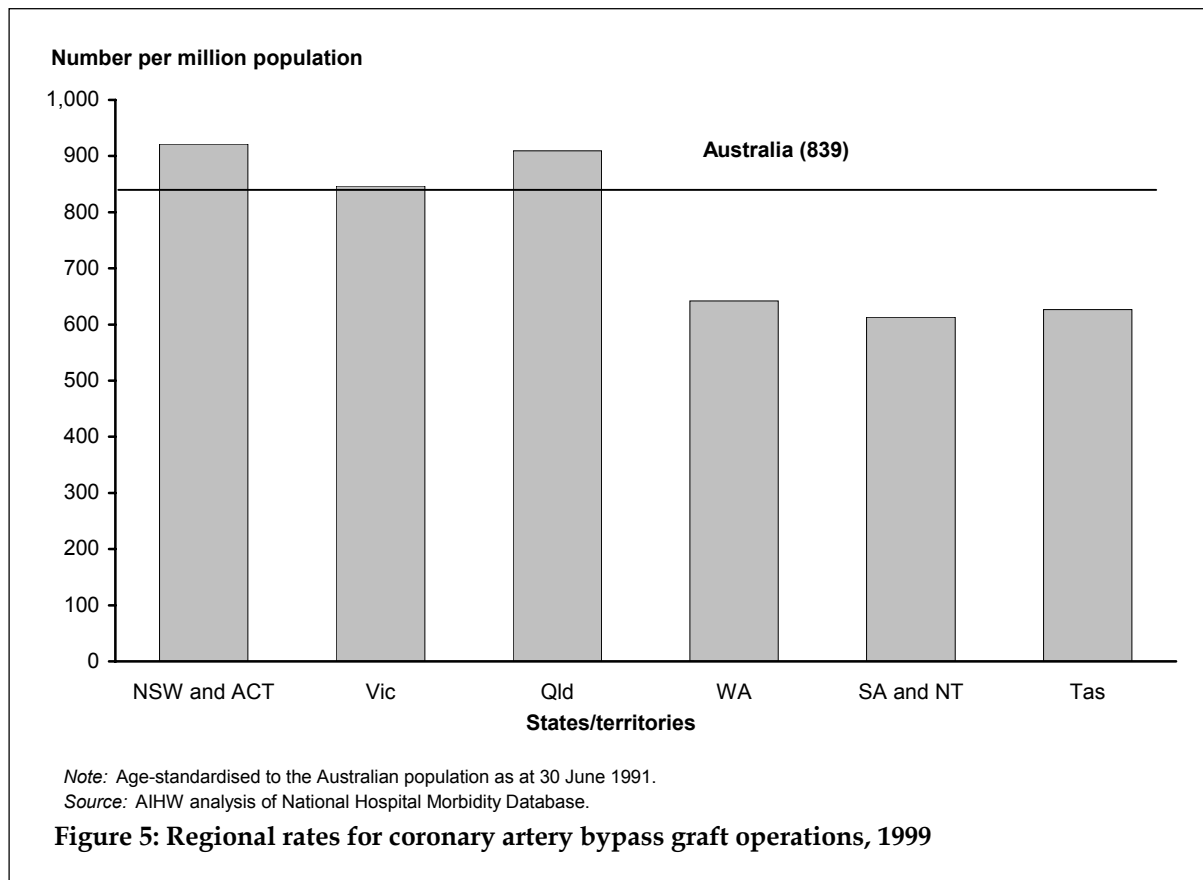
	NSW and ACT	Vic	Qld	WA	SA and NT	Tas	Australia
	Rate (per million population)						
Crude rate	1014	935	935	636	688	720	906
Age-standardised rate	922	847	909	642	613	627	839

CABG = coronary artery bypass grafting.

Notes

- (a) Age-standardised to the Australian population as at 30 June 1991.
- (b) The rates for bypass graft surgery have been calculated to include the Australian Capital Territory (ACT) population with that of New South Wales (NSW), and the Northern Territory (NT) population with that of South Australia (SA). It is known from hospital morbidity data that the vast majority of NT residents are treated in SA and that nearly half of those treated in the ACT are NSW residents.

Source: AIHW analysis of the National Hospital Morbidity Database.



Transplants

Table 11 shows information on heart, lung and heart–lung transplants performed from 1994 to 1999. Between 1994 and 1999, the number of heart transplants and heart–lung transplants has decreased while the number of lung transplants declined from 1998 to 1999.

Table 11: Transplantation – operations and deaths, 1994–99

	1994	1995	1996	1997	1998	1999
	Number (deaths)					
Heart transplants						
Cardiomyopathy	51 (0)	52 (4)	51 (10)	40 (3)	42 (7)	30 (2)
Ischaemia	33 (4)	41 (4)	24 (1)	31 (3)	23 (2)	22 (4)
Other/unstated	9 (4)	7 (1)	16 (2)	19 (2)	7 (1)	13 (2)
Total	93 (8)	100 (9)	91 (13)	90 (8)	72 (10)	65 (8)
Heart–lung transplants						
Congenital	9 (0)	11 (1)	6 (1)	2 (0)	3 (0)	0
Other	5 (0)	2 (0)	1 (0)	2 (0)	1 (0)	2 (1)
Total	14 (0)	13 (1)	7 (1)	4 (0)	4 (0)	2 (1)
Lung transplants						
Whole	41 (4)	69 (7)	66 (10)	79 (7)	66 (13)	26 (9)
Lobe	0	0	0	3 (0)	17 (5)	32 (2)
Total	41 (4)	69 (7)	66 (10)	82 (7)	83 (18)	58 (11)

Source: AIHW/NHF National Cardiac Surgery Register.

Operations on the aorta

Operations on the aorta during 1999 are presented in Table 12.

Table 12: Operations on the aorta, 1999

	Acute (dissection)	Chronic (for aneurysm or dissection)	Total
	Number (deaths)		
Repair or replacement of ascending aorta			
Aortic repair			
without valve resuspension	25 (5)	36 (4)	
with valve resuspension	7 (2)	7 (0)	
Composite graft replacing aortic valve and ascending aorta	23 (7)	141 (8)	
Allograft replacement of aortic valve and ascending aorta	1 (0)	19 (0)	
Separate aorta and valve replacement	8 (1)	25 (2)	
Total	64 (15)	228 (14)	292 (29)
	For aneurysm	For dissection	
Replacement of descending thoracic aorta	41 (7)	18 (5)	59 (12)
Replacement of aortic arch	27 (5)	7 (0)	34 (5)
Total aortic operations			385 (46)

Source: AIHW/NHF National Cardiac Surgery Register.

Other acquired heart conditions

Information is presented in Table 13 for operations and deaths for other acquired heart conditions such as electrophysiological surgery, pulmonary embolectomies, pericardiectomies, cardiac tumours and cardiac trauma.

Table 13: Operations for other acquired heart conditions, 1999

Procedures		Number (deaths)
Electrophysiological surgery for:		
Supraventricular tachycardias	Wolff–Parkinson–White syndrome	0
	AV junction	0
	Atrial fibrillation or flutter	0
	AV node ablation	0
Ventricular tachycardias	Recurrent ventricular tachycardia	1 (0)
	Aneurysmectomy	0
	Myocardial incision	0
	Automatic defibrillator	190 (0)
Total electrophysiological surgery		191 (0)
Cardiac tumour/cardiomyopathy	Myxoma	24 (0)
	Other cardiac tumour	9 (2)
	IHSS	9 (0)
Total cardiac tumour/cardiomyopathy		42 (2)
Cardiac trauma	Atrium	0
	Ventricle	4 (2)
	Valves	1 (0)
	Ascending aorta	3 (0)
	Descending aorta	8 (1)
	Other	4 (1)
Total cardiac trauma		20 (4)
Pulmonary embolectomy		8 (3)
Pericardectomy for:	Idiopathic	5 (1)
	Non-specific infections	7 (1)
	Tumour	4 (0)
	Other	7 (2)
Total pericardectomy		23 (4)
Other conditions		43 (11)

Source: AIHW/NHF National Cardiac Surgery Register.

Glossary

Allograft valve (homograft): a human valve used for transplantation.

Acquired valve disease: valve disease that is neither genetic nor present at birth.

Anastomosis: connection between blood vessels.

Angioplasty: (see *percutaneous transluminal coronary angioplasty*)

Aortic valve: valve between the left ventricle and the aorta.

Arrhythmia: any abnormality in the heartbeat, making it beat too fast, too slow or irregularly.

Bioprosthetic valves: either specially-treated pig heart valves or from the sac tissue around a cow's heart (pericardium) so their function closely approximates that of a normal human valve.

Cardiomyopathy: a disease of the heart muscle.

Cardiopulmonary bypass: diversion of the blood circulation from the heart and lungs and the pumping of blood through a heart-lung machine to provide oxygen while the heart is stopped during surgery.

Congenital heart defect: heart disorder present at birth.

Coronary artery bypass grafting (CABG): grafting of blood vessel(s) to bypass obstructions in coronary arteries and improve the supply of blood to the heart.

Coronary artery disease: any disease of the coronary arteries, particularly atherosclerosis, that reduces the flow of blood and hence the oxygen supply to the heart muscle.

Fibrillation: rapid, uncoordinated quivering of the muscle fibres of the heart instead of beating, so it cannot pump.

Heterograft valve (xenograft): an animal valve used for transplantation.

Homograft valve (allograft): a human valve used for transplantation.

Internal mammary artery: an artery in the chest commonly used as a conduit in coronary artery bypass grafting; that is, it is used as a graft.

Ischaemic heart disease: heart disease caused by inadequate flow of blood to the heart. Manifestations include angina and heart attack. Also known as coronary heart disease.

Mechanical valves: made of high-technology materials such as titanium and pyrolytic carbon. They require lifelong use of anticoagulants (blood thinners) to prevent the adherence of blood clots to the valve mechanism.

Mitral valve: valve between the left atrium and the left ventricle.

Myocardial infarction: death of part of the heart muscle deprived of an adequate blood supply by an acute coronary artery blockage (heart attack).

Myocardium: the muscular wall of the heart.

Newer CABG modalities: alternative procedures to the standard techniques for coronary artery bypass grafting. They include operations done while the heart is beating (that is, without cardiopulmonary bypass) and minimally invasive techniques such as port-access coronary artery surgery. The latter involves making small cuts (ports) in the patient's chest

through which surgical instruments are passed to do the coronary bypasses, rather than opening the chest.

Percutaneous coronary intervention (PCI): a term used to encompass all forms of revascularisation where entry to the vessel is via the skin (percutaneous), including balloon angioplasty, coronary stenting etc.

Percutaneous transluminal coronary angioplasty (PTCA): a method of treating localised coronary artery narrowing, using a special catheter with a balloon that can be inflated to dilate the narrowed vessel. Usually referred to as coronary angioplasty.

Pulmonary valve: valve between the right ventricle and the pulmonary artery.

Saphenous vein: a blood vessel in the leg; commonly used as a supply of conduits for coronary artery bypass grafting.

Separation: refers to the episode of care in hospital. It also means the process by which an admitted patient completes an episode of care by being discharged, dying, transferring to another hospital or changing the type of care.

Stenosis: narrowing, such as occurs inside a blood vessel or to the opening of a valve.

Supraventricular tachycardia: episodes of abnormally fast heart rate. These are caused by fast spontaneous impulses, arising in the upper chambers of the heart, that override the natural pacemaker.

Tachycardia: a rapid heart rate.

Transmyocardial laser revascularisation (TMLR): a new technique where laser energy is used to drill small holes or channels through the myocardium using laser energy in an attempt to improve blood supply to the heart in cases unsuitable for coronary artery bypass grafting or coronary angioplasty.

Tricuspid valve: valve between the right atrium and the right ventricle.

Valvotomy: a procedure that opens up a stenosed (unnaturally narrow) heart valve and allows it to function properly.

Xenograft valve (heterograft): an animal valve used for transplantation.

Appendix A: Cardiac surgery units

Table A1: Cardiac surgery units operating in 1999

State	Unit
New South Wales	John Hunter Hospital
	Lake Macquarie Private Hospital
	Liverpool Hospital
	New Children's Hospital
	NSW Private Hospital
	Royal North Shore Hospital
	Royal Prince Alfred Hospital
	St George Hospital
	St Vincent's Hospital
	St Vincent's Private Hospital
	Strathfield Private Hospital
	Sydney Adventist Hospital
	Sydney Children's Hospital
	Sydney South West Private Hospital
	The Hills Private Hospital
	The Prince of Wales Hospital
	The Prince of Wales Private Hospital
	Westmead Hospital
Victoria	Austin Repatriation Medical Centre
	Cabrini Hospital
	Epworth Hospital
	Knox Private Hospital
	Melbourne Private Hospital
	Monash Medical Centre
	Royal Children's Hospital
	Royal Melbourne Hospital
	St Vincent's and Mercy Private Hospital
	St Vincent's Public Hospital
	The Alfred Hospital
	The Geelong Private Hospital
Warringal Private Hospital	

(continued)

Table A1 (continued): Cardiac surgery units operating in 1999

State	Unit
Queensland	Allamanda Private Hospital
	Greenslopes Private Hospital
	Mater Misericordiae Private Hospital
	Prince Charles Hospital
	Princess Alexandra Hospital
	St Andrews War Memorial Hospital
	Townsville General Hospital
	The John Flynn Hospital
	The Wesley Hospital
Western Australia	Fremantle Hospital
	Mount Hospital
	Royal Perth Hospital
	Sir Charles Gairdner Hospital
South Australia	Ashford Community Hospital
	Flinders Medical Centre
	Royal Adelaide Hospital
	Wakefield Hospital
	Women's and Children's Hospital
Tasmania	Royal Hobart Hospital
Australian Capital Territory	National Capital Private Hospital
	The Canberra Hospital

Appendix B: Data collection form

AUSTRALIAN INSTITUTE OF HEALTH AND WELFARE

CARDIAC SURGERY REGISTER

Annual report form for the year ending December 1999

To be completed by.....

	Page
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ACQUIRED DISEASE	
VALVE SURGERY—SINGLE.....	30
VALVE SURGERY—DOUBLE	31
VALVE SURGERY—TRIPLE	32
VALVE SURGERY RE-OPERATIONS	33
SURGERY FOR CORONARY HEART DISEASE.....	34
GREAT VESSEL SURGERY	36
OTHER CONDITIONS.....	37
CONGENITAL DISEASE	
VALVE SURGERY	39
OTHER COMMON CONDITIONS	40
LESS COMMON CONDITIONS	42

CARDIAC SURGEONS

Name of hospital	
Calendar year in which data collected	1999
Name of surgeon responsible for report	
Name of Head of department	
Names of surgeons	
Names of trainees and status (i.e. R.A.C.S. approved trainee, service registrar, overseas registrar)*	
Names of Australians training overseas	

* Please indicate if a foreign national visiting Australia for training.

MISCELLANEOUS PROCEDURES

List here all procedures not readily fitting into any other section

Only enter here cases that do not fit into the specific categories used on subsequent pages. Please provide as much information as possible on these miscellaneous cases, such as the age of the patients, if the case involves a congenital defect, the number of grafts involved, if it includes coronary artery surgery, and the type of valve used if it is a valve case. If it is not obvious, please indicate whether cardiopulmonary bypass was used or not.

ACQUIRED DISEASE

Procedure	No.	D.

CONGENITAL DEFECTS

Procedure	No.	D.

Note: Throughout the form, the column heading 'No.' refers to the total number of operations in the particular category, not only the survivors of the operation. The column heading 'D.' refers to the number of deaths resulting from this total number of operations.

ACQUIRED DISEASE: VALVE SURGERY—SINGLE

SINGLE VALVE PROCEDURE			Without coronary artery graft		With coronary artery graft	
			No.	D.	No.	D.
MITRAL	Valvotomy					
	Reconstruction	<i>with support ring</i>				
		<i>without ring</i>				
	Replacement	<i>mitral homograft</i>				
		<i>heterograft</i>				
		<i>prosthesis</i>				
AORTIC	Valvotomy					
	Reconstruction	<i>decalcification</i>				
		<i>for regurgitation</i>				
		<i>other/unstated</i>				
	Replacement	<i>pulmonary autograft</i>				
		<i>classical homograft</i>				
		<i>'mini root' homograft</i>				
		<i>'total root' homograft</i>				
		<i>stent mounted heterograft</i>				
		<i>stentless heterograft</i>				
		<i>prosthesis</i>				
TRICUSPID		Reconstruction	<i>with support ring</i>			
	<i>without ring</i>					
	Replacement	<i>heterograft</i>				
		<i>prosthesis</i>				
PULMONARY	Reconstruction					
	Replacement*	<i>homograft</i>				
		<i>heterograft</i>				
		<i>prosthesis</i>				
TOTAL NUMBER OF PATIENTS						

* In case of valve replacement using pulmonary autograft, please indicate the pulmonary replacement as an attached note. This will not be included as a double valve.

Please note that we are no longer making a distinction between open and closed procedures so this form has changed slightly from previous years

ACQUIRED DISEASE: VALVE SURGERY—DOUBLE

DOUBLE VALVE PROCEDURE			Without coronary artery graft		With coronary artery graft		
			No.	D.	No.	D.	
MITRAL	Valvotomy						
	Reconstruction	<i>with support ring</i>					
		<i>without ring</i>					
	Replacement	<i>mitral homograft</i>					
		<i>heterograft prosthesis</i>					
AORTIC	Valvotomy						
	Reconstruction	<i>decalcification</i>					
		<i>for regurgitation</i>					
		<i>other/unstated</i>					
	Replacement	<i>pulmonary autograft</i>					
		<i>classical homograft</i>					
		<i>'mini root' homograft</i>					
		<i>'total root' homograft</i>					
		<i>stent mounted heterograft</i>					
		<i>stentless heterograft prosthesis</i>					
	TRICUSPID	Reconstruction	<i>with support ring</i>				
			<i>without ring</i>				
Replacement		<i>heterograft prosthesis</i>					
TOTAL NUMBER OF VALVES*							
TOTAL NUMBER OF PATIENTS							

* By individual valves. As each patient has operations on two valves, the total number and total deaths must each add up to twice the number shown for total patients.

ACQUIRED DISEASE: VALVE SURGERY—TRIPLE

TRIPLE VALVE PROCEDURE			Without coronary artery graft		With coronary artery graft		
			No.	D.	No.	D.	
MITRAL	Valvotomy						
	Reconstruction	<i>With support ring</i>					
		<i>Without ring</i>					
	Replacement	<i>Mitral homograft</i>					
		<i>Heterograft Prosthesis</i>					
AORTIC	Valvotomy						
	Reconstruction	<i>Decalcification for regurgitation</i>					
		<i>Other/unstated</i>					
		Replacement	<i>Pulmonary autograft</i>				
		<i>Classical homograft</i>					
		<i>'mini root' homograft</i>					
		<i>'total root' homograft</i>					
		<i>stent mounted heterograft</i>					
		<i>stentless heterograft</i>					
		<i>prosthesis</i>					
	TRICUSPID	Reconstruction	<i>with support ring</i>				
			<i>without ring</i>				
Replacement		<i>heterograft prosthesis</i>					
TOTAL NUMBER OF VALVES*							
TOTAL NUMBER OF PATIENTS							

* By individual valves. As each patient has operations on three valves, the total number and total deaths must each add up to three times the number shown for total patients.

ACQUIRED DISEASE: VALVE SURGERY RE-OPERATIONS

Some of the valve patients reported on pages 30, 31 and 32 will be having their second valve replacement. Please indicate the number of valves (not patients) replaced for:		No.	D.
MECHANICAL VALVES	Mechanical failure		
	Endocarditis		
	Paravalvular leak		
BIOPROSTHETIC VALVES	Degeneration		
	Endocarditis		
	Paravalvular leak		
ALLOGRAFT VALVES	Degeneration		
	Endocarditis		
	Paravalvular leak		

SURGERY FOR ACQUIRED CORONARY HEART DISEASE

WITH GRAFTS

Number of distal anastomoses	No other procedure		With valve surgery		With myocardial resection or plication		With repair of VSD		With other procedures		Total	
	No.	D.	No.	D.	No.	D.	No.	D.	No.	D.	No.	D.
1.												
2.												
3.												
4.												
5.												
6.												
7.												
8.												
9.												
TOTAL			**									
Re-operations for coronary artery disease*												

* Please make sure that the re-operations are also included in the main part of the table.

** Please check that this total is the same as the total number of patients reported on pages 30, 31 & 32 as having coronary artery grafts as well as valve surgery.

SURGERY FOR ACQUIRED CORONARY HEART DISEASE (cont.)

TYPE OF GRAFT

Please enter here how many of your patients had one of the following used as at least one of their grafts, so that we can calculate the use of each. Please report the number of *patients*, not grafts.

	No. of patients
Saphenous vein	
Internal mammary artery	
Inferior epigastric artery	
Gastroepiploic artery	
Cephalic vein	
Radial artery	
Prosthetic or bioprosthetic	

SURGERY FOR ACQUIRED CORONARY HEART DISEASE WITHOUT GRAFTS

	Myocardial resection or plication		Closure of VSD		Other		Total	
	No.	D.	No.	D.	No.	D.	No.	D.
Without grafts								

NON-CONVENTIONAL CABG

Some of the procedures already reported on pages 34 and 35 may have been done without CPB or using other non-conventional techniques. Please indicate here their number.

	No. of procedures
Without CPB	
Minimally invasive techniques	
CABG via full thoracotomy	

ACQUIRED DISEASE: GREAT VESSEL SURGERY

			Without coronary artery graft		With coronary artery graft	
			No.	D.	No.	D.
REPAIR OR REPLACEMENT OF ASCENDING AORTA						
Acute (dissection)	aortic repair	without valve resuspension				
	aortic repair	with valve resuspension				
	*composite graft replacing aortic valve and ascending aorta					
	*homograft replacement of aortic valve and ascending aorta					
	*separate aorta and valve replacement					
Chronic (for aneurysm or dissection)	aortic repair	without valve resuspension				
	aortic repair	with valve resuspension				
	*composite graft replacing aortic valve and ascending aorta					
	*homograft replacement of aortic valve and ascending aorta					
	*separate aorta and valve replacement					
REPLACEMENT OF AORTIC ARCH						
Complete	for aneurysm					
	for dissection					
Hemiarch replacement	for aneurysm					
	for dissection					
REPLACEMENT OF DESCENDING THORACIC AORTA						
		for aneurysm				
		for dissection				
TOTAL						

* These cases should *not* be included under valve surgery.

If hemiarch replacement is part of any of the above procedures, please indicate this in a footnote or attachment.

ACQUIRED DISEASE: OTHER CONDITIONS

TRANSPLANTATION		No.	D.
Cardiac	cardiomyopathy		
	ischaemia		
	other/unstated		
Heart–lung	congenital		
	other/unstated		
Lung	whole		
	lobe		
	bilateral		

		Without coronary artery graft		With coronary artery graft	
		No.	D.	No.	D.
ELECTROPHYSIOLOGICAL SURGERY					
SUPRAVENTRICULAR TACHYCARDIAS	Wolff-Parkinson White Syndrome				
	AV-Junction				
	Atrial fibrillation or flutter				
	AV node ablation				
VENTRICULAR TACHYCARDIAS	Recurrent ventricular tachycardia				
	–aneurysmectomy				
	–myocardial incision				
CARDIAC TUMOUR/ CARDIOMYOPATHY	myxoma				
	other cardiac tumour				
	IHSS				
TOTAL					

		Without coronary artery graft		With coronary artery graft	
		No.	D.	No.	D.
AUTOMATIC DEFIBRILLATOR	Patches				
	Transvenous				

ACQUIRED DISEASE: OTHER CONDITIONS (cont.)

		No.	D.
CARDIAC TRAUMA	atrium		
	ventricle		
	*valves		
	ascending aorta		
	descending aorta		
	other		
	PULMONARY EMBOLECTOMY		
PERICARDIECTOMY FOR	tuberculosis		
	non-specific infection		
	uraemia		
	idiopathic		
	tumour (include pericardial windows)		
	other		
OTHER CONDITIONS	please list		
TOTAL			

* These cases should not be included under valve surgery.

TOTAL PATIENTS: ACQUIRED DISEASE	WITHOUT GRAFTS		WITH GRAFTS	
	No.	D.	No.	D.

CONGENITAL DEFECTS: VALVE SURGERY

SINGLE VALVE PROCEDURE		Under 1 month		1–6 months		Over 6 months	
		No.	D.	No.	D.	No.	D.
MITRAL	Valvotomy						
	Reconstruction						
	Replacement	<i>heterograft</i>					
		<i>prosthesis</i>					
AORTIC	Valvotomy						
	Reconstruction						
	Replacement	<i>Homograft</i>					
		<i>Pulmonary autograft</i>					
		<i>heterograft</i>					
		<i>prosthesis</i>					
TRICUSPID	Valvotomy						
	Reconstruction						
	Replacement	<i>heterograft</i>					
		<i>prosthesis</i>					
PULMONARY	Valvotomy						
	Reconstruction						
	Replacement	<i>homograft</i>					
		<i>heterograft</i>					
	<i>prosthesis</i>						
TOTAL NUMBER OF PATIENTS							

Please note that we are no longer making a distinction between open and closed procedures so this form has changed slightly from previous years

CONGENITAL DEFECTS: OTHER COMMON CONDITIONS

	Under 1 month		1-6 months		Over 6 months	
	No.	D.	No.	D.	No.	D.
PERSISTENT DUCTUS ARTERIOSUS						
COARCTATION OF AORTA						
Simple						
Complicated						
ATRIAL SEPTAL DEFECT						
VENTRICULAR SEPTAL DEFECT						
Uncomplicated <i>palliative</i>						
<i>corrective</i>						
With PS <i>palliative</i>						
<i>corrective</i>						
With pulmonary <i>palliative</i>						
atresia <i>corrective</i>						
TETRALOGY OF FALLOT						
Simple <i>palliative</i>						
<i>corrective</i>						
Complicated <i>palliative</i>						
<i>corrective</i>						
Acquired pulmonary <i>palliative</i>						
atresia <i>corrective</i>						
TOTALS (this page)						

CONGENITAL DEFECTS: OTHER COMMON CONDITIONS (cont.)

	Under 1 month		1-6 months		Over 6 months	
	No.	D.	No.	D.	No.	D.
TRANSPOSITION OF GREAT VESSELS						
With intact ventricular septum						
<i>palliative</i>						
<i>corrective</i>						
With VSD						
<i>palliative</i>						
<i>corrective</i>						
With other significant anomaly						
<i>palliative</i>						
<i>corrective</i>						
With inversion of ventricles*						
<i>palliative</i>						
<i>corrective</i>						
Corrected transposition & other significant anomaly						
<i>palliative</i>						
<i>corrective</i>						
TOTALS (this page)						

* Formerly 'corrected transposition with VSD'.

CONGENITAL DEFECTS: LESS COMMON CONDITIONS

	Under 1 month		1-6 months		Over 6 months	
	No.	D.	No.	D.	No.	D.
EXTRA-CARDIAC LESIONS						
A-P window						
Interrupted aortic arch						
Vascular ring						
CORONARY ARTERY DEFECTS						
MISCELLANEOUS						
Total anomalous pulmonary venous return <i>palliative</i>						
<i>corrective</i>						
Asplenia syndrome <i>palliative</i>						
<i>corrective</i>						
Exploration only						
Surgical procedures for other conditions (please specify)						
TOTALS (this page)						

CONGENITAL DEFECTS: LESS COMMON CONDITIONS (cont.)

	Under 1 month		1-6 months		Over 6 months	
	No.	D.	No.	D.	No.	D.
RIGHT SIDED LESIONS						
Ebstein's anomaly <i>palliative</i>						
<i>corrective</i>						
Tricuspid atresia <i>palliative</i>						
<i>corrective</i>						
Pulmonary atresia (with intact septum) <i>palliative</i>						
<i>corrective</i>						
LEFT SIDED LESIONS						
Cor triatrium <i>palliative</i>						
<i>corrective</i>						
Mitral atresia						
Hypoplastic left heart syndrome						
Sub-aortic stenosis						
Supra valvular stenosis						
TOTALS (this page)						

CONGENITAL DEFECTS: LESS COMMON CONDITIONS (cont.)

	Under 1 month		1-6 months		Over 6 months	
	No.	D.	No.	D.	No.	D.
DEFECTS OF PARTITIONING						
AV Canal-partial <i>palliative</i>						
<i>corrective</i>						
AV Canal-total <i>palliative</i>						
<i>corrective</i>						
Double outlet RV <i>palliative</i>						
<i>corrective</i>						
Truncus arteriosus <i>palliative</i>						
<i>corrective</i>						
Other (please specify)						
TOTALS (this page)						
TOTAL PATIENTS : CONGENITAL DEFECTS (pages 39 to 44)						

Related publications

Australian Institute of Health and Welfare (AIHW) 2002. Australia's health 2002: the eighth biennial report of the Australian Institute of Health and Welfare. AIHW Cat. No. AUS 25. Canberra: AIHW.

AIHW 2001. Australian hospital statistics 1999-00. Health Services Series No. 17. AIHW Cat. No. HSE 14. Canberra: AIHW.

AIHW 2000. Australian hospital statistics 1998-99. Health Services Series No. 15. AIHW Cat. No. HSE 11. Canberra: AIHW.

AIHW 2001. Heart, stroke and vascular diseases – Australian facts 2001. Canberra: AIHW, National Heart Foundation of Australia (NHFA), National Stroke Foundation.

Davies J & Senes S 2001. Cardiac surgery in Australia 1998. Cardiovascular Disease Series No. 16. AIHW Cat. No. CVD 15. Canberra: AIHW & NHFA.

Davies J & Senes S 2002. Coronary angioplasty in Australia 1999. Cardiovascular Disease Series No. 19. AIHW Cat. No. 19. Canberra: AIHW & NHFA.

Mathur S 2002. Epidemic of coronary heart disease and its treatment in Australia. Cardiovascular Disease Series No. 20. AIHW Cat. No. CVD 21. Canberra: AIHW.

AIHW web site

Information relating to cardiovascular disease, its treatment and risk factors can be found on the Cardiovascular Health Portal and the National Cardiovascular Disease Database, both located on the Institute's web site <http://www.aihw.gov.au>