

# 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 <sup>(a)</sup>	Deaths	Number of operations	% of total <sup>(a)</sup>	Deaths	Number of operations	% of total <sup>(a)</sup>	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
<b>Subtotal</b>	<b>n.a.</b>	<b>n.a.</b>	<b>n.a.</b>	<b>n.a.</b>	<b>n.a.</b>	<b>n.a.</b>	<b>14,907</b>	<b>100.0</b>	<b>320</b>	<b>14,263</b>	<b>100.0</b>	<b>329</b>
Estimate from NHMD <sup>(b)</sup>	17,759	..	n.a.	17,377	..	n.a.	2,541	..	n.a.	3,058	..	n.a.
<b>Total</b>	<b>17,759</b>	..	..	<b>17,377</b>	..	..	<b>17,448</b>	..	..	<b>17,321</b>	..	..
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 <sup>(c)</sup>	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)	
<b>Total with grafts</b>	<b>12,408 (227)</b>	<b>1,534 (75)</b>	<b>70 (4)</b>	<b>18 (8)</b>	<b>233 (15)</b>	<b>14,263 (329)</b>	
Without grafts	—	—	10 (3)	16 (2)	9 (4)	35 (9)	
TMLR	—	—	—	—	—	—	
<b>Overall total</b>						<b>14,298 (338)</b>	
Reoperations	741 (49)	97 (10)	5 (1)	—	7 (0)	850 (60)	
Newer CABG modalities <sup>(a)</sup>	—	—	—	—	—	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).

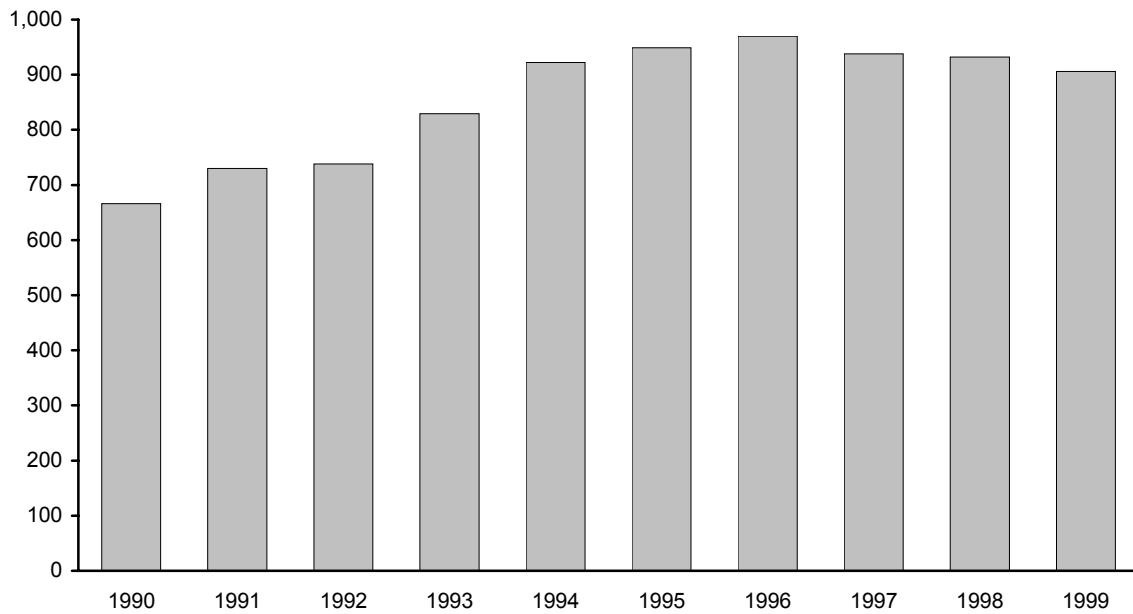
**Table 8: Rates for coronary artery bypass graft operations (including operations with concomitant procedures), Australia, 1990–99<sup>(a)</sup>**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
<b>Number of operations per million population</b>										
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.

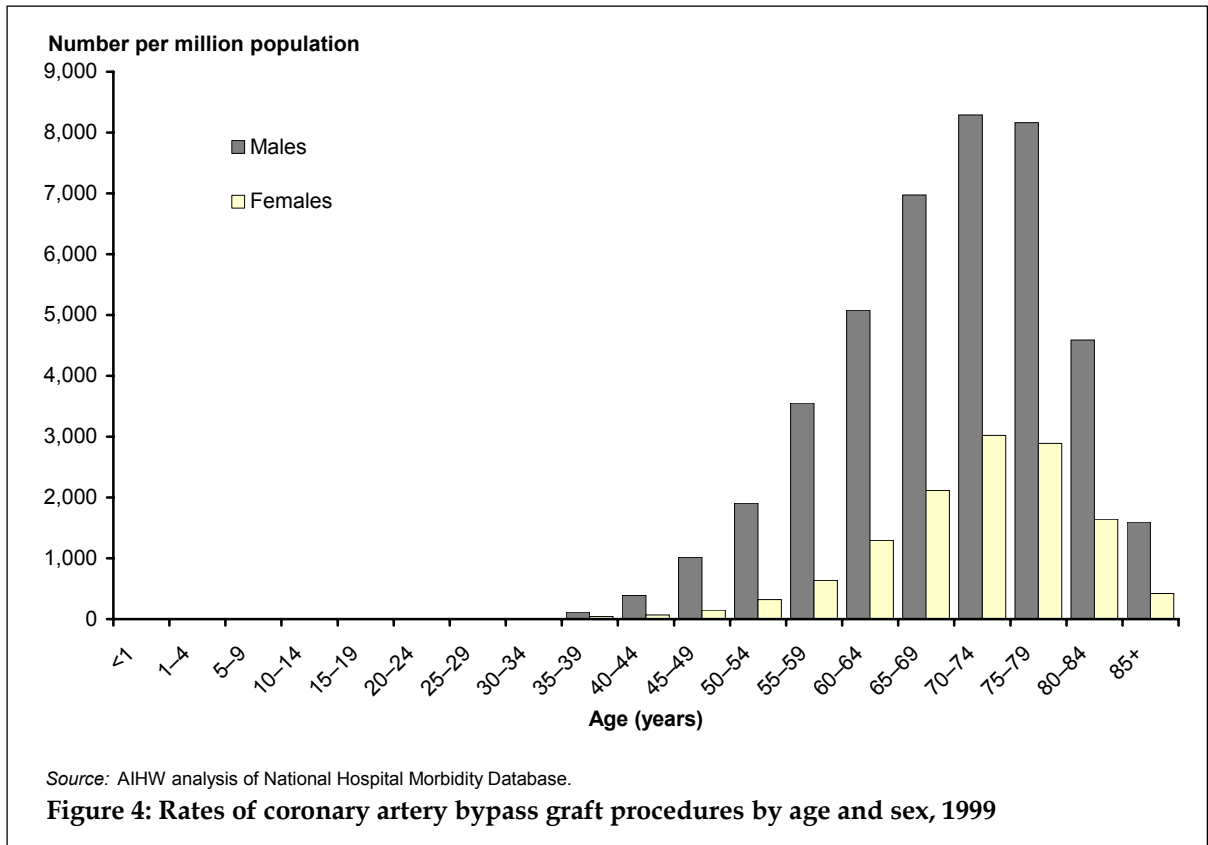
**Table 9: Coronary artery bypass graft procedures by age and sex, 1999**

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
<b>All ages</b>	<b>13,170</b>	<b>100.0</b>	<b>1,389.3</b>	<b>4,150</b>	<b>100.0</b>	<b>430.9</b>	<b>3.2</b>

... 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
	<b>Rate (per million population)</b>						
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.

