Coronary angioplasty in Australia 1999

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Coronary angioplasty in Australia 1999

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Contents

List of tables

List of figures

List of abbreviations

AIHW	Australian Institute of Health and Welfare
AMI	acute myocardial infarction
APO	acute pulmonary oedema
ARF	acute renal failure
CABG	coronary artery bypass grafting
CPR	cardiopulmonary resuscitation
Cx	circumflex artery
DC	direct current
ECG	electrocardiogram
ECMO	extra-corporeal membrane oxygenation
EMD	electro-mechanical dissociation
GIT	gastro-intestinal tract
IABP	intra-aortic balloon pump
ICD-10-AM	International Classification of Diseases, Tenth Revision, Australian Modification
IMA	internal mammary artery
LAD	left anterior descending artery
LCx	left circumflex artery
LM	left main artery
NHF	National Heart Foundation of Australia
PCI	percutaneous coronary intervention
PTCA	percutaneous transluminal coronary angioplasty
RCA	right coronary artery
SAP	stable angina pectoris
SVG	saphenous vein graft
UAP	unstable angina pectoris

Preface

This is the twentieth national coronary angioplasty report and presents information on all procedures performed in 1999. The report is produced jointly by the Australian Institute of Health and Welfare and the National Heart Foundation of Australia. The National Heart Foundation began compiling data and reporting on coronary angioplasty procedures performed in Australia in 1980.

An advisory committee appointed by the Foundation oversees the angioplasty register and the Institute collects, collates, analyses and reports the data through its National Centre for Monitoring Cardiovascular Disease. The project is financed by the Foundation and the Institute, with assistance 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 that is required to operate the coronary angioplasty register and protect the data confidentiality interests of the participating units and their patients.

Members of the Cardiac Society of Australia and New Zealand supply data for the coronary angioplasty register and are participating in the development of improved registers for cardiac procedures.

This report is intended primarily for professionals 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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Acknowledgments

The authors gratefully acknowledge comment and advice on the report from Dr Stan Bennett, Dr Paul Magnus and the Coronary Angioplasty Advisory Committee, National Heart Foundation. The members of the Committee are Dr Louis Bernstein (New South Wales), Associate Professor Ian Meredith (Victoria) and Dr Constantine Aroney (Queensland). Thanks also to Ms Toni Hunt and Ms Kathryn Webbie who coordinate the register on behalf of the committee. The assistance of Ms Amanda Nobbs in the publication process is greatly appreciated.

The Australian Institute of Health and Welfare and the Coronary Angioplasty Advisory Committee are very grateful to the staff of interventional cardiology units in Australia, and members of the Cardiac Society of Australia and New Zealand for giving their time to the register and ensuring that it retains its national coverage.

Summary

This report provides details of percutaneous transluminal coronary angioplasty (PTCA) performed in Australia in 1999. It covers patterns and trends in the use of the technique, as well as in its indications, complications and success rates.

The main findings of the report are:

- During 1999 there were 19,444 coronary angioplasty procedures performed in Australia, with an average of 341 procedures per interventional cardiology unit.
- Coronary angioplasty procedures in 1999 increased by 7% from 1998. This compares with 14% increase between 1997 and 1998 and 15% increase between 1996 and 1997.
- The age-standardised national average PTCA rate in 1999 was 946 per million population. This varied across the Australian States, from 760 per million population in Queensland to 1,147 per million population in Victoria.
- Angioplasty procedures are nearly three times as common in males than females. This is consistent with difference in rates of coronary heart disease between males and females.
- Patients undergoing angioplasty are likely to be between 50 and 79 years old (82%).
- A total of 122 physicians were operating in 57 interventional cardiology units throughout the country in 1999, an increase of 14% and 24%, respectively from 1998.
- There were 19,197 hospitalisations involving PTCA procedures, with an average length of stay of 3.8 days.
- Twenty per cent of the procedures were repeats, and in 45% of such cases these repeats occurred within 12 months.
- The main indications for PTCA were stable angina pectoris (42%) and unstable angina pectoris (42%). Acute myocardial infarction (9%) is becoming a significant indication.
- Thirteen per cent of procedures were done on patients with previous coronary artery bypass grafts.
- Thrombolytic therapy was used before angioplasty in 11% of procedures.
- Stents were inserted in 92% of PTCA patients in 1999.
- Complication rates associated with coronary angioplasty were: need for coronary artery bypass graft 1.0%, myocardial infarction 1.2%, arterial complications 0.7%, death 0.8%.
- Coronary angioplasty achieved an adequate reduction in the lesion in 95% of lesions attempted.
- Ninety-six per cent of patients treated were discharged from hospital with a successful reduction of lesions and no angina or complications.

Introduction

Heart disease is a major cause of morbidity and mortality in Australia, responsible for 29% of all deaths in 1999. The most common form of heart disease affecting Australians is coronary heart disease. This involves blockages in the heart's own arteries, the coronary arteries, by abnormal deposits known as plaques. There is a range of treatment for coronary heart disease, one of which is percutaneous transluminal coronary angioplasty (PTCA). The use of this minimally invasive technique has grown dramatically over the past 20 years.

PTCA involves inserting a catheter, carrying a balloon near its tip, into a major artery reached via the skin (percutaneously). The catheter is threaded through the circulation back towards the heart and into the coronary arteries to the area of the vessel obstruction. The balloon is then inflated to disrupt the plaque and restore a wider passage for blood flow.

PTCA avoids the major trauma of coronary artery bypass graft (CABG) surgery because it does not require opening the patient's chest. However, the technique can only be used to treat certain types of coronary vessel obstruction. Generally, it is used where lesions are suitable or in patients in whom CABG is contraindicated.

While initial PTCA success rates are high, there is a risk of early acute closure of the coronary artery and a high rate of recurrence of the obstruction (restenosis). This has led to the development of other catheter-based techniques, including atherectomy (cutting or grinding through obstructions with mechanical devices), stenting (expanding prosthetic devices within the artery to form a tubular supporting structure) and laser angioplasty (cutting through obstructions with a laser beam). The most successful of these newer techniques is stenting, which reduces acute closure and restenosis, and its use has increased rapidly.

Over the last few years, there has been a change in terminology. The newer term PCI (percutaneous coronary intervention) has been developed to encompass all forms of percutaneous revascularisation, including PTCA and stenting. However, in this report PTCA is generically used to cover any form of percutaneous revascularisation.

The aim of this report is to provide details of PTCA as performed in Australia in 1999. The report covers patterns and trends in the use of the technique, indications, complications and success rates, and monitors the uptake of stenting and other adjunctive techniques.

Methods

This report summarises data on all coronary angioplasty performed in 1999 in Australia, and includes aggregate figures from previous years. Coronary angioplasty 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 register and submit their data.

Data collection and reporting from units

Generally, data collection forms are sent to all 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 concerned agrees in writing.

Data were collected for coronary angioplasty, via a collection form presented here in Appendix B. This form is reviewed and updated by the Coronary Angioplasty Advisory Committee each year to reflect changes in practice. The form used from 1980 to 1985 was updated in 1986 to collect additional data of interest to angioplasty practitioners and the wider medical community. In 1989 questions were added about the use of stents, lasers and atherectomy in angioplasty procedures. Questions on the use of thrombolytics were incorporated more recently. Details on the use of angioplasty to treat acute myocardial infarction were introduced in 1995. The 1998 form sought detail on subsequent procedures and complications for non-primary or non-rescue PTCA and on primary or rescue PTCA.

Within the Australian Institute of Health and Welfare (AIHW), hospital units' responses are reviewed, data are checked for consistency and any discrepancies are referred to the relevant unit. These data are then entered into a dedicated database, from which results are analysed. The annual report is compiled and reviewed by members of the advisory committee before its publication.

Coverage

The register is believed to have almost full coverage of coronary angioplasty procedures done in Australia from 1980 to the end of 1996. For 1997, details are too incomplete to allow analysis, so that only totals (obtained from the National Hospital Morbidity Database) are included in this report for that year.

In 1999, 10 of the 57 hospitals performing procedures did not provide their data. Of the units not participating in the register, two units are new and are yet to supply data to the register, two units have previously supplied data to the register but are unable to do so for 1999 and the remaining six units have been operating for some time but have never supplied data to the register.

State	Number of units not participating in the register in 1999
New South Wales	3
Victoria	3
South Australia	3
Tasmania	1

To give a complete national picture of angioplasty performed in 1999 that compensates for non-response, the data from the register have been complemented with information from the National Hospital Morbidity Database held by the AIHW. This was also done for the reports for 1996 and 1998. 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 held in the National Hospital Morbidity Database were found to correspond well with those reported directly to the register by participating units. In 1999, the total number of coronary angioplasty procedures reported by participating units to the National Coronary Angioplasty Register was 16,480. Based on data from the National Hospital Morbidity Database, there were 19,444 angioplasty procedures. Procedures done by units not participating in the Register was estimated at 2,964.

The total number of PTCA and stenting procedures nationally and for each State/Territory were obtained from the National Hospital Morbidity Database. In addition, the database supplied information on the age and sex of patients undergoing PTCA and stenting, the number of hospital separations and length of stay for PTCA.

Records for separations with procedure codes for PTCA or stenting using the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM) (see Table 1 below) as principal or additional procedure and with separation dates between 1 January and 31 December 1999 were included.

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

Procedure	ICD-10-AM	
Percutaneous transluminal coronary angioplasty	Block 670 codes:	35304-00 35305-00
Stenting	Block 671 codes:	35310-00 to 35310-10

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

The coding standards state that only the code for the stent is required in operations where the placement of the stent is done in conjunction with an angioplasty. The exception to this rule is if, during the operation, an angioplasty is performed on a different vessel from that being stented. In this case both the angioplasty and the stent are coded separately (Australian Coding Standards, Volume 5, ICD-10-AM, Second Edition, 2000). Therefore, to count all PTCA procedures, episodes with a code for stenting but no code for PTCA were included in the

analysis, as the stent code assumes that an angioplasty has also been performed, but the angioplasty is not recorded. Other assumptions made were:

1. Codes 35304-00 and 35305-00 are mutually exclusive. Thus, if any combination of these codes was reported for one record, more than one procedure was performed.
2. Codes 35310-00 to 35310-10 are mutually exclusive. Thus, if any combination of these codes was reported for one record, more than one procedure was performed.
3. If a record contains codes for PTCA (ICD-10-AM block 670 codes 35304-00, 35305-00) and for stents (ICD-10-AM block 671 codes 35310-00 to 35310-10), according to the coding standards the PTCA and stent procedures were performed on different vessels in the same operation, so they were counted as one procedure. Assumptions 1 and 2 still apply in this case.

Definitions

In the treatment of acute myocardial infarction (AMI), a 'primary procedure' is when angioplasty is used for AMI as soon as possible, with or without thrombolysis as a preprocedure. A 'rescue procedure' is when angioplasty is used for AMI for failed thrombolysis.

Complication rates are given as percentages of those having the procedure. Complications refer to those occurring during the same hospital admission.

A 'primary success' is defined as a procedure that achieves an absolute reduction of the initial degree of luminal diameter stenosis of at least 20% at the time of the procedure, and a residual diameter stenosis of less than 50%.

An 'early clinical success' is defined as a patient who has an adequate reduction of all lesions (primary success), and no angina or complications before discharge.

Procedure rates are calculated as the number per million people in the Australian population. The rates have been calculated to include the Northern Territory with South Australia, since it is known from hospital morbidity data that this State is where the vast majority of Northern Territory residents are treated.

In this report, the Australian Capital Territory rates are not combined with New South Wales rates as residents are now being treated in the ACT. However, the ACT rates are not presented in the State comparison tables as these data are currently under revision. Australian procedure rates include procedures from all States and Territories.

Standardised rates, using the direct standardisation method, which take account of differences in the age structure of the populations, have been included to provide a valid comparison of procedure rates among States.

Number of units and procedures

There were 19,444 angioplasty procedures[1] performed in Australia in 1999, by 122 physicians in 57 cardiology units. This was a 7% increase in procedures over 1998, continuing the growth of angioplasty among the range of cardiological interventions, although the growth has slowed in recent years. The average number of angioplasty procedures in 1999 was 341 per unit, compared with 393 per unit in 1998. To the end of 1999 a total of 128,229 angioplasty procedures had been performed in Australia (Table 2). A list of all interventional cardiology units is given in Appendix A. Figure 1 presents the distribution of coronary angioplasty procedures by units based on data from the National Coronary Angioplasty Register.

Table 2: Number of procedures and units, 1980–99

			Procedures/unit	
Year	**Number of procedures**	**Number of units**	**Average number**	**Range**
1980	11	2	6	5–6
1981	45	6	8	3–18
1982	151	9	17	1–38
1983	348	10	35	4–80
1984	737	10	74	8–230
1985	1,244	13	96	13–396
1986	1,840	15	123	7–403
1987	2,383	16	149	17–491
1988	3,153	19	166	51–506
1989	4,219	20	211	46–654
1990	4,904	20	245	61–660
1991	5,726	20	286	11–656
1992	6,748	27	250	14–703
1993	8,334	30	278	10–1,004
1994	9,732	38	256	2–897
1995	11,348	39	291	12–1,016
1996	13,854 (a)	42	330	37–1,100
1997	15,914 (a)	43	370	n.a.
1998	18,094 (a)	46	393	6–897
1999	19,444 (a)	57	341	17–863
Total 1980–99	**128,229**			

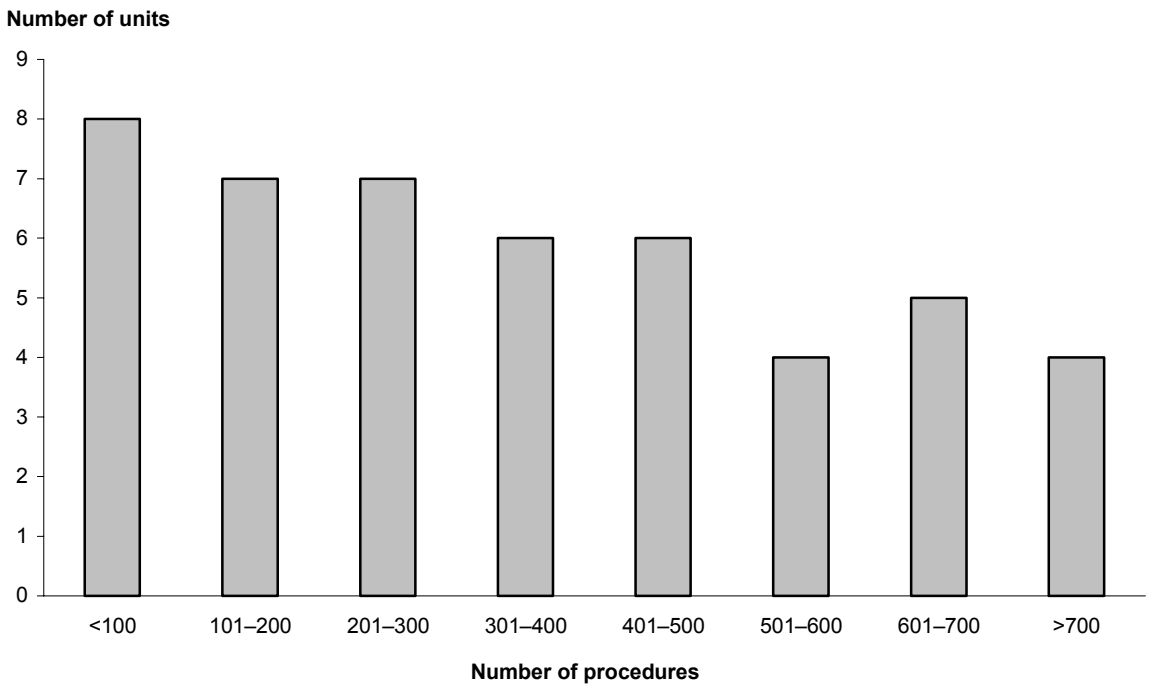
n.a. not available.

(a) The number of procedures for all interventional cardiology units in Australia, based on data from the National Hospital Morbidity Database.

(b) The number of procedures reported to the AIHW/NHF National Coronary Angioplasty Register was 16,480.

Sources: AIHW/NHF Coronary Angioplasty Register and AIHW National Hospital Morbidity Database.

1 The number of procedures for all interventional cardiology units in Australia, based on data from the AIHW National Hospital Morbidity Database.



Source: AIHW/NHF National Coronary Angioplasty Register.

Figure 1: Distribution of coronary angioplasty procedures, 1999

Angioplasty by age and sex

More angioplasty procedures are performed in males than females, a ratio of around 2.6:1. This is consistent with difference in rates of coronary heart disease between males and females.

The difference in procedure rates between men and women is most marked in the age range 25–49, but it is evident across all adult ages (Table 3 and Figure 2). Age-specific procedure rates peak at ages 70–74 among males and 75–79 among females.

Table 3: Coronary angioplasty procedures by age and sex, 1999

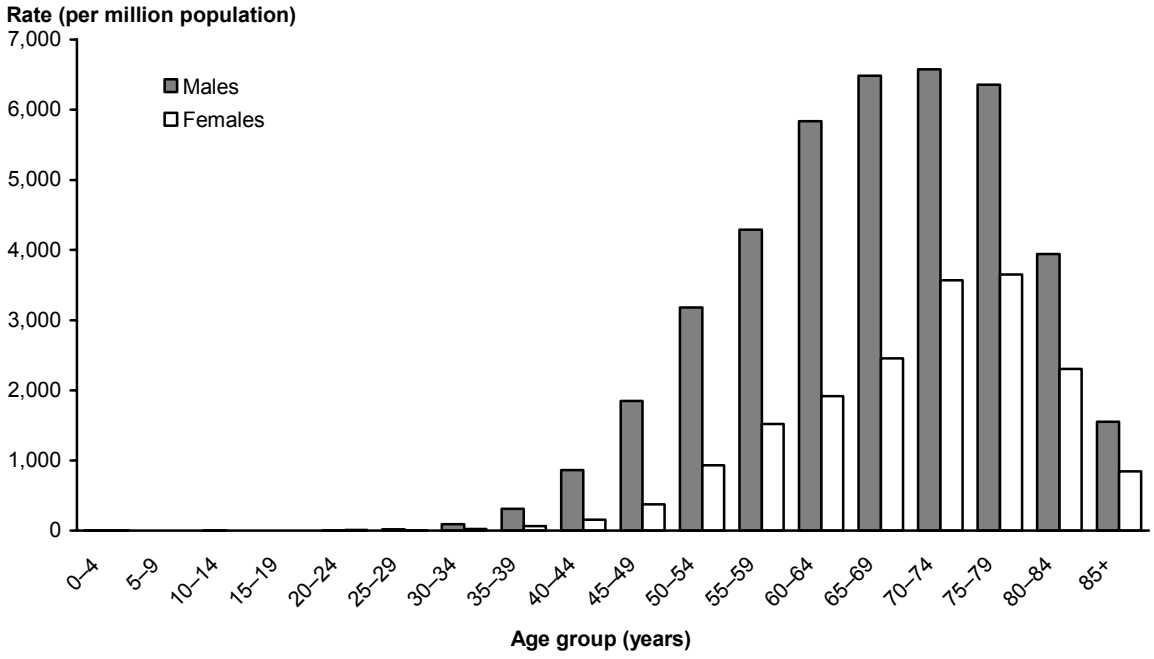
	Males			Females			Rate ratio
Age (years)	Number	Per cent	Rate[(a)]	Number	Per cent	Rate[(a)]	male:female
0–4	4	—	6.1	3	0.1	4.8	1.3
5–9	—	—	. .	—	—	. .	. .
10–14	3	—	4.5	1	—	1.6	2.8
15–19	—	—	. .	—	—	. .	. .
20–24	2	—	2.9	6	0.1	8.6	0.3
25–29	14	0.1	18.9	3	0.1	4.3	4.4
30–34	63	0.4	89.7	15	0.3	20.9	4.3
35–39	232	1.6	309.1	44	0.9	65.6	4.7
40–44	609	4.3	860.6	98	1.9	153.0	5.6
45–49	1,230	8.6	1,850.9	195	3.8	374.6	4.9
50–54	1,946	13.6	3,180.4	390	7.5	931.3	3.4
55–59	1,999	14.0	4,287.2	550	10.6	1,516.2	2.8
60–64	2,210	15.5	5,836.7	705	13.6	1,917.6	3.0
65–69	2,157	15.1	6,482.8	865	16.7	2,456.7	2.6
70–74	1,907	13.4	6,574.0	1,025	19.8	3,567.6	1.8
75–79	1,351	9.5	6,359.3	829	16.0	3,649.1	1.7
80–84	438	3.1	3,943.1	342	6.6	2,305.2	1.7
85+	113	0.8	1,550.0	95	1.8	841.8	1.8
Total	**14,278**	**100.0**	**1,514.9**	**5,166**	**100.0**	**592.2**	**2.6**

— nil.

. . not applicable.

(a) Rate per million population.

Source: AIHW analysis of data from the AIHW National Hospital Morbidity Database.



Source: AIHW analysis of data from the AIHW National Hospital Morbidity Database.

Figure 2: Coronary angioplasty procedure rates by age and sex, 1999

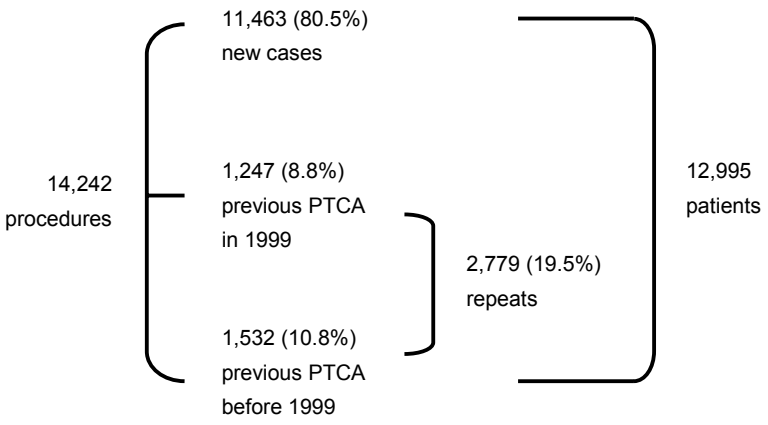
Hospital separations

In 1999 there were 19,197 separations involving coronary angioplasty procedures. The average length of stay in hospital was 3.8 days, with a median length of stay of 2.0 days. Of these hospitalisations, 30.4% (5,830) were overnight separations and 5.4% (1,033) were same-day separations. This was similar to previous years.

Repeat procedures

The Coronary Angioplasty Register provided details on most of the repeat procedures in 1999.

For the 14,242 procedures where information was available, 19.5% of the procedures were repeats; and, of these the patient had undergone previous angioplasty in 1999 in 44.9% of cases, and before 1999 in the remainder (Figure 3).



Source: AIHW/NHF National Coronary Angioplasty Register.

Figure 3: First and repeat procedures, 1999

Repeat procedures done in 1999

For the 971 repeat procedures done in 1999 where information was available, 5.8% were done less than 24 hours after the first procedure, 55.2% were between 24 hours and less than three months, 26.7% were between three months and less than six months and 12.4% were between six months and less than 12 months.

The reason for repeat procedures was provided for 550 procedures: 90.4% of repeats were to the same lesion, 8.4% were for a previous failure and 1.3% were for a new lesion.

Of the repeat procedures done to the same lesion (497 procedures), 16.9% were to an unstented lesion, 71.6% were to a stented lesion and 11.5% were not specified.

Repeat procedures done before 1999

Not all units could provide information on the interval between repeat procedures done before 1999. For the 1,321 procedures where information was available, 0.1% of repeat procedures were done less than 24 hours after the first procedure, 5.8% were between 24 hours and less than three months, 10.0% were between three months and less than six months, 16.7% were between six months and less than 12 months, and 67.4% were 12 months or more apart.

The reason for repeat procedures was provided for 582 procedures: 85.9% of repeats done more than 12 months apart were to the same lesion, 2.4% were for a previous failure and 11.7% were for a new lesion.

Of the repeat procedures done to the same lesion (500 procedures), 32.2% were to an unstented lesion, 62.0% were to a stented lesion and 5.8% were not specified.

Trends in procedure type

The overwhelming majority of procedures are done on single coronary vessels only (Table 4). In 1999, single-vessel angioplasty comprised 87.7% of the 19,444 procedures. Figure 4 illustrates trends in the number of single- and multi-vessel procedures since 1980.

Table 4: Trends in procedure type, 1980–99

Year	1 vessel	2 vessels	>2 vessels	Total
1980	10	1	0	11
1981	45	0	0	45
1982	148	3	0	151
1983	336	11	1	348
1984	678	47	12	737
1985	1,127	102	15	1,244
1986	1,651	183	6	1,840
1987	2,163	193	27	2,383
1988	2,865	271	17	3,153
1989	3,753	429	37	4,219
1990	4,420	454	30	4,904
1991	5,243	464	19	5,726
1992	6,162	527	59	6,748
1993	7,577	711	46	8,334
1994	8,961	732	39	9,732
1995[(a)]	10,320	941	87	11,348
1996[(b)]	12,444	1,288	122	13,854
1997[(c)]	n.a.	n.a.	n.a.	n.a.
1998[(d)]	16,262	1,694	138	18,094
1999[(e)]	17,059	2,144	241	19,444

(a) Details of vessels were estimated for 155 procedures performed in 1995.

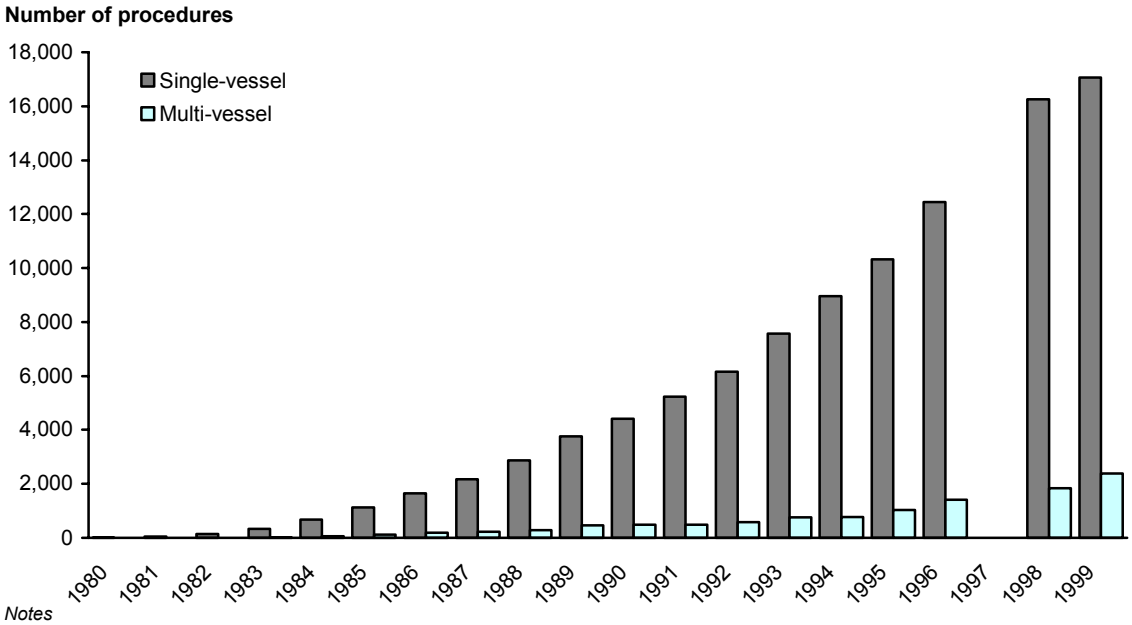
(b) Details of vessels were estimated for 4,098 procedures performed in 1996.

(c) Details for 1997 are unavailable.

(d) Details of vessels were estimated for 4,853 procedures performed in 1998.

(e) Details of vessels were estimated for 5,478 procedures performed in 1999.

Sources: AIHW/NHF National Coronary Angioplasty Register and National Hospital Morbidity Database.



Notes

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4. Details of vessels were estimated for 4,853 procedures in 1998.
5. Details of vessels were estimated for 5,478 procedures in 1999.

Source: AIHW/NHF National Coronary Angioplasty Register and National Hospital Morbidity Database.

Figure 4: Number of procedures, 1980–99

State comparison of PTCA rates

The (age-standardised) national average rate for PTCA procedures in 1999 was 946 per million population. There is two-fold variation in rates across the States and Territories, ranging from 579 per million population in the ACT to 1,147 per million population in Victoria (Table 5 and Figure 5). The differences in age-adjusted procedure rates may be influenced by under-reporting from private hospitals, underlying differences in the prevalence of the conditions being treated or differences in clinical practice between States.

Table 5: Coronary angioplasty by State, 1999

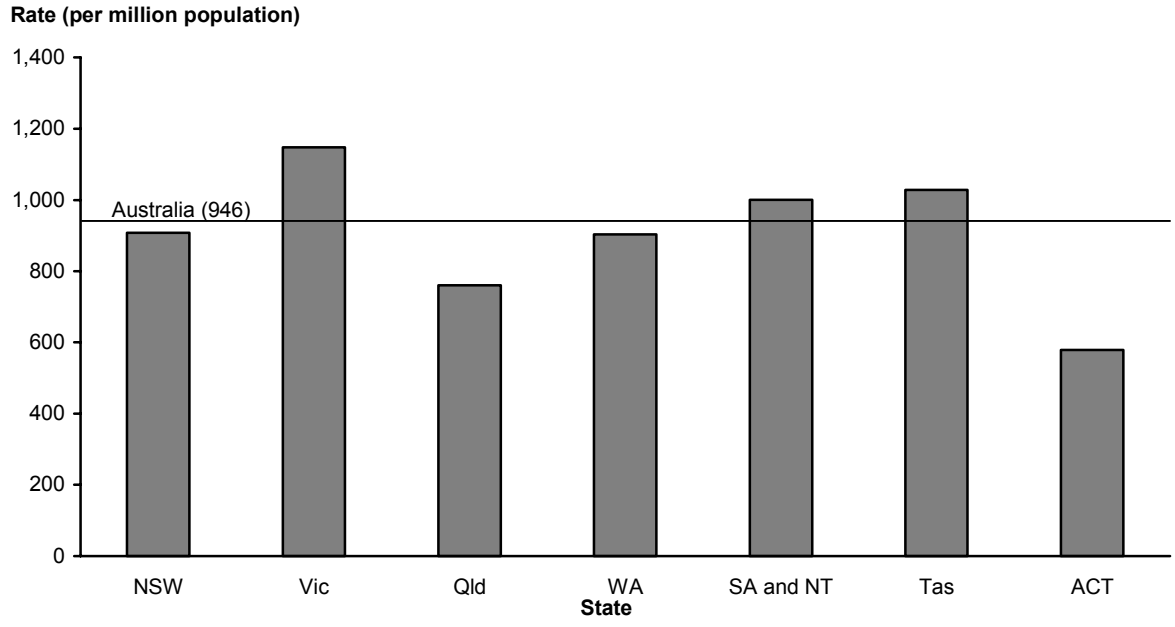
Measure	NSW	Vic	Qld	WA	SA and NT	Tas	ACT	Australia
				Rate (per million population)				
Crude rate	965	1,243	819	988	1,085	1,160	703	1,021
Standardised rate[(a)]	907	1,147	760	902	1,000	1,028	579	946

(a) Age-standardised to the Australian population as at 30 June 1991.

Notes

1. Rates have been calculated to include the Northern Territory population with South Australia since that is where the vast majority of Northern Territory residents are treated. No angioplasty procedures are performed in the Northern Territory.
2. Approximately 5.7% of separations from private hospitals were not reported to the National Hospital Morbidity Database so the rates presented are likely to be an underestimate of the actual rates (see http://www.aihw.gov.au/publications/hse/ahs99-00/index.html#s03).

Source: AIHW analysis of data from AIHW National Hospital Morbidity Database.



Notes

1. Age-standardised to the Australian population as at 30 June 1991.
2. Rates have been calculated to include the Northern Territory population with South Australia since that is where the vast majority of NT residents are treated.
3. Approximately 5.7% of separations from private hospitals were not reported to the National Hospital Morbidity Database so the rates presented are likely to be an underestimate of the actual rates (see http://www.aihw.gov.au/publications/hse/ahs99-00/index.html#s03).

Source: AIHW analysis of data from AIHW National Hospital Morbidity Database.

Figure 5: Coronary angioplasty rate by State, 1999

Indications for angioplasty

Not all units could supply this information, but of the 11,432 procedures for which data were available, the indication in 4,780 (41.8%) was stable angina pectoris (SAP) and in 4,847 (42.4%) was unstable angina pectoris (UAP). Angioplasty was performed for prognostic reasons in 3.8% of cases and for acute myocardial infarction (AMI) in 9.1% of cases (Table 6). Between 1998 and 1999, angioplasty for AMI has increased from 6.8% to 9.1%.

Angioplasty can be used as either a primary or a rescue method for AMI. In this context, a primary procedure is when angioplasty is used for AMI as soon as possible with or without thrombolysis preprocedure. A rescue procedure is when angioplasty is used for AMI for failed thrombolysis.

Where PTCA was used because of AMI, it was used as a primary procedure in 74.5% of the cases and as a rescue procedure in 25.5% of cases.

The interval from AMI to primary or rescue PTCA is also presented in Table 6. For the cases where the information was available, most primary PTCA procedures were done within 4 hours of AMI, whereas rescue PTCA procedures were performed predominantly after 4 hours from the time AMI was diagnosed.

Table 6: Indications for angioplasty, 1999

Indication	Interval AMI to PTCA	Number of procedures	Per cent
SAP		4,780	41.8
UAP		4,847	42.4
AMI primary	0–<2 hrs	106	0.9
	2–<4 hrs	163	1.4
	4–<6 hrs	82	0.7
	6–<8 hrs	81	0.7
	Not specified	178	1.6
AMI primary subtotal		*610*	*5.3*
AMI rescue	0–<2 hrs	18	0.2
	2–<4 hrs	18	0.2
	4–<24 hrs	54	0.5
	After 24 hours	103	0.9
	Not specified	16	0.1
AMI rescue subtotal		*209*	*1.8*
AMI primary/rescue not specified		224	2.0
Subtotal AMI		*1,043*	*9.1*
Prognostic		439	3.8
Other indication		190	1.7
Not specified		133	1.2
Total		**11,432**	**100.0**

AMI = acute myocardial infarction; SAP = stable angina pectoris; UAP = unstable angina pectoris.

Source: AIHW/NHF National Coronary Angioplasty Register.

Previous coronary artery bypass grafts

Not all units could answer the question about the number of angioplasty patients with existing coronary artery bypass grafts (CABG). For the 13,233 procedures where information was available, 1,638 (12.4%) were on patients with CABGs.

Approach for procedure

Not all units could provide information on the approach used for procedures. For the 13,644 procedures for which information was available in 1999, in nearly all the procedures (99.1%) the approach to the coronary arteries was made through the femoral artery, the remainder using the radial (0.5%) and brachial (0.4%) approaches. This was similar to previous years.

Angioplasty after thrombolytic therapy

Not all units could supply information on the number of patients who underwent angioplasty after having received thrombolytic therapy for AMI. Of the 10,729 procedures where information was available, 1,125 (10.5%) involved the use of angioplasty after thrombolytic therapy. This proportion is twice that of 1998 (5.2%).

In 40.4% of such procedures thrombolytic therapy was given less than 24 hours before PTCA, in 27.3% it was given between 24 and 48 hours before PTCA and in 32.3% it was given more than 48 hours before PTCA.

Stents, atherectomy, laser and other adjunctive techniques

For the 12,995 patients where information was available on the use of adjunctive techniques, 11,968 (92.1%) had stents inserted whereas atherectomies were performed on 272 patients: three directional (0.0%), 260 rotoblator (2.0%) and nine extraction (0.1%). There were no procedures in 1999 that involved the use of laser. Abciximab (ReoPro) was used in 2,849 (21.9%) patients in 1999. This is a marked increase over the previous year when it was used in 14.3% of patients. Intra-aortic balloon pumps (IABP) and brachytherapy were used more frequently in 1999 (2.0% and 0.7% respectively). Clopidogrel, ticlopidine, urokinase, calcium channel blockers and cutting balloons were among other drugs and adjunctive techniques used (Table 7).

Since 1993 there has been a sharp increase in stenting as an adjunct to coronary angioplasty (Figure 6).

Table 7: Stents, atherectomy, laser and other adjunctive techniques, 1998 and 1999

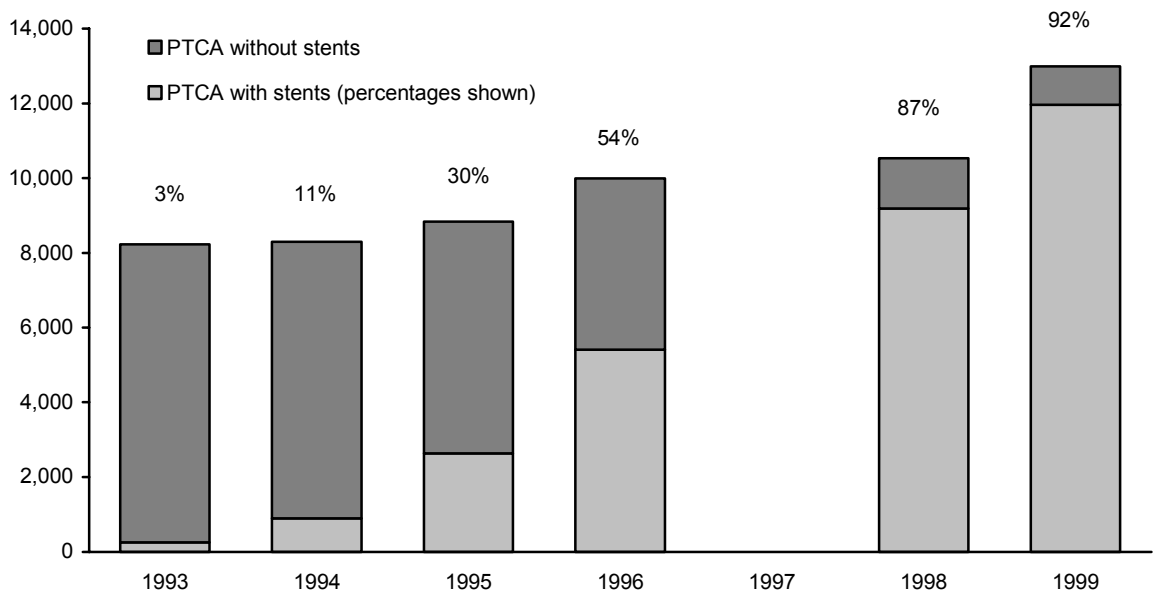
		1998		1999	
		No. of patients	Per cent of patients	No. of patients	Per cent of patients
Stents		9,188	87.3	11,968	92.1
Abciximab (ReoPro)		1,505	14.3	2,849	21.9
Atherectomy	Rotoblator	358	3.4	260	2.0
	Extraction	5	0.0	9	0.1
	Directional	2	0.0	3	0.0
Laser		0	0.0	0	0.0
Other	IABP	39	0.4	258	2.0
	Clopidogrel	n.c.	n.c.	130	1.0
	Brachytherapy	45	0.4	89	0.7
	IVUS	84	0.8	59	0.5
	Ticlopidine	n.c.	n.c.	29	0.2
	Thrombectomy	15	0.1	16	0.1
	Doppler	n.c.	n.c.	10	0.1
	Tirofiban	n.c.	n.c.	4	0.0
	Percusurge	n.c.	n.c.	1	0.0
	Accolysis	4	0.0	1	0.0
	Perclose	4	0.0	0	0.0
	Urokinase	6	0.1	0	0.0
	Not specified	90	0.9	12	0.1

n.c. not collected in 1998.

IABP = intra-aortic balloon pump; IVUS = intra-vascular ultrasound.

Note: Excludes units where details of procedures were unavailable.

Source: AIHW/NHF National Coronary Angioplasty Register.



Note: Excludes patients where details of procedures were unavailable. Data for 1997 not available.
Source: AIHW/NHF National Coronary Angioplasty Register.

Figure 6: Coronary stenting trends, 1993–99

Stenting by age and sex

Stents were inserted in 16,626 (85.5%) of coronary angioplasty procedures (cf. Table 3) during 1999, an increase of 3% from 1998. Stenting rates are highest in males aged 65–79 and females aged 70–79 (Table 8). Reflecting PTCA patterns, there is a marked difference in stenting rates between the sexes, with males having almost three times the rate of females.

Table 8: Coronary stenting procedures by age and sex, 1999

	Males			Females			
	Procedures with stents inserted			Procedures with stents inserted			
Age (years)	Number	Per cent[(a)]	Rate[(b)]	Number	Per cent[(a)]	Rate[(b)]	Rate ratio male:female
0–4	1	25.0	1.5	1	33.3	1.6	1
4–9	—	—	. .	—	—	. .	. .
10–14	—	—	. .	—	—	. .	. .
15–19	—	—	. .	—	—	. .	. .
20–24	2	100.0	2.9	5	83.3	7.5	0.4
25–29	12	85.7	16.2	1	33.3	1.4	11.9
30–34	53	84.1	74.9	12	80.0	16.9	4.4
35–39	199	85.8	265.5	39	88.6	51.9	5.1
40–44	527	86.5	737.0	79	80.6	110.1	6.7
45–49	1,071	87.1	1,603.4	161	82.6	241.1	6.6
50–54	1,684	86.5	2,707.8	344	88.2	570.3	4.7
55–59	1,725	86.3	3,618.8	466	84.7	1,010.2	3.6
60–64	1,917	86.7	4,973.3	599	85.0	1,560.4	3.2
65–69	1,837	85.2	5,537.7	721	83.4	2,083.4	2.7
70–74	1,612	84.5	5,519.2	852	83.1	2,581.5	2.1
75–79	1,144	84.7	5,324.8	709	85.5	2,496.2	2.1
80–84	378	86.3	3,305.0	284	83.0	1,559.8	2.1
85+	106	93.8	1,417.5	85	89.5	506.0	2.8
Total	**12,268**	**85.9**	**1,293.6**	**4,358**	**84.4**	**455.4**	**2.8**

— nil.

. . not applicable.

(a) Percentage of total procedures (Table 3).

(b) Rate per million population.

Source: AIHW analysis of data from the National Hospital Morbidity Database.

State comparison of stenting rates

The age-standardised national average rate for coronary stenting procedures in 1999 was 809 per million population. There was variation in rates across States, ranging from 489 per million population in the ACT to 1,011 per million population in Victoria (Table 9 and Figure 7). The differences in age-adjusted procedure rates may be influenced by under-reporting from private hospitals, underlying differences in the prevalence of the conditions being treated or differences in clinical practice between States.

Table 9: Coronary stenting by State, 1999

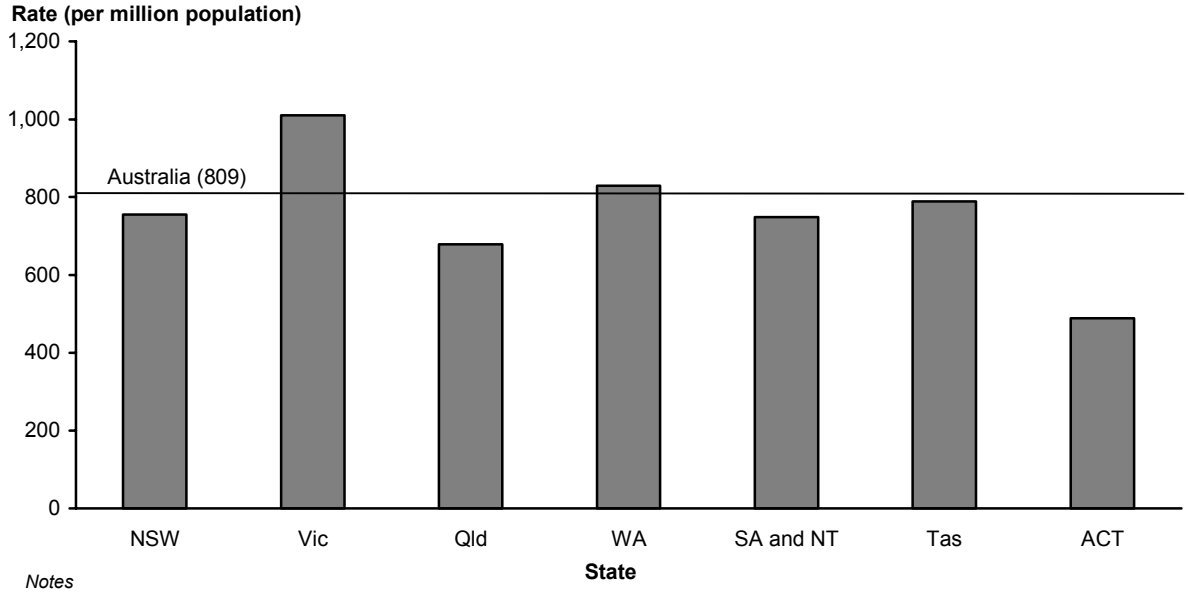
Measure	NSW	Vic	Qld	WA	SA and NT	Tas	ACT	Australia
				Rate (per million population)				
Crude rate	804	1,096	731	909	813	888	594	873
Standardised rate[(a)]	755	1,011	678	829	749	789	489	809

(a) Age-standardised to the Australian population as at 30 June 1991.

Notes

1. Rates have been calculated to include the Northern Territory population with South Australia since that is where the vast majority of NT residents are treated.
2. Approximately 5.7% of separations from private hospitals were not reported to the National Hospital Morbidity Database so the rates presented are likely to be an underestimate of the actual rates (see http://www.aihw.gov.au/publications/hse/ahs99-00/index.html#s03).

Source: AIHW analysis of data from the AIHW National Hospital Morbidity Database.



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Source: AIHW analysis of data from National Hospital Morbidity Database.

Figure 7: Coronary stenting rate by State, 1999

Complications

Primary and non-primary PTCA

This section of the report was introduced in 1998, however response rates in 1999 for this section were considered too poor to analyse further than what is presented below.

For the 13,948 procedures where information is available, 20.4% of all complications for PTCA occurred in primary PTCA cases.

There were 100 patients (9.6% of primary PTCA patients) undergoing primary or rescue PTCA who suffered complications in 1999. In contrast, there were 316 patients (3.0% of non-primary PTCA patients) undergoing non-primary PTCA who suffered complications in 1999.

Coronary artery bypass grafts (CABG)

Table 10 and Figure 8 show the number of patients requiring CABG after angioplasty during the same hospital admission, either as an emergency CABG for complications of angioplasty, or as CABG for a failed but uncomplicated procedure.

Not all units could provide information on the number of angioplasty patients that required CABG during the same hospital admission. Of the 13,948 procedures where information was available, 136 (1.0%) angioplasty patients required CABG during the same hospital admission. Of these, 70 (51.5%) had the surgery within 24 hours of angioplasty, and were emergency operations for complications of the procedure. The remaining 66 patients had CABG later during their admission. Since 1990 the rate of CABG post-angioplasty has fluctuated around 2% but in 1998 and 1999 it dropped to 1%. This is probably due to the increased use of stents and Abciximab.

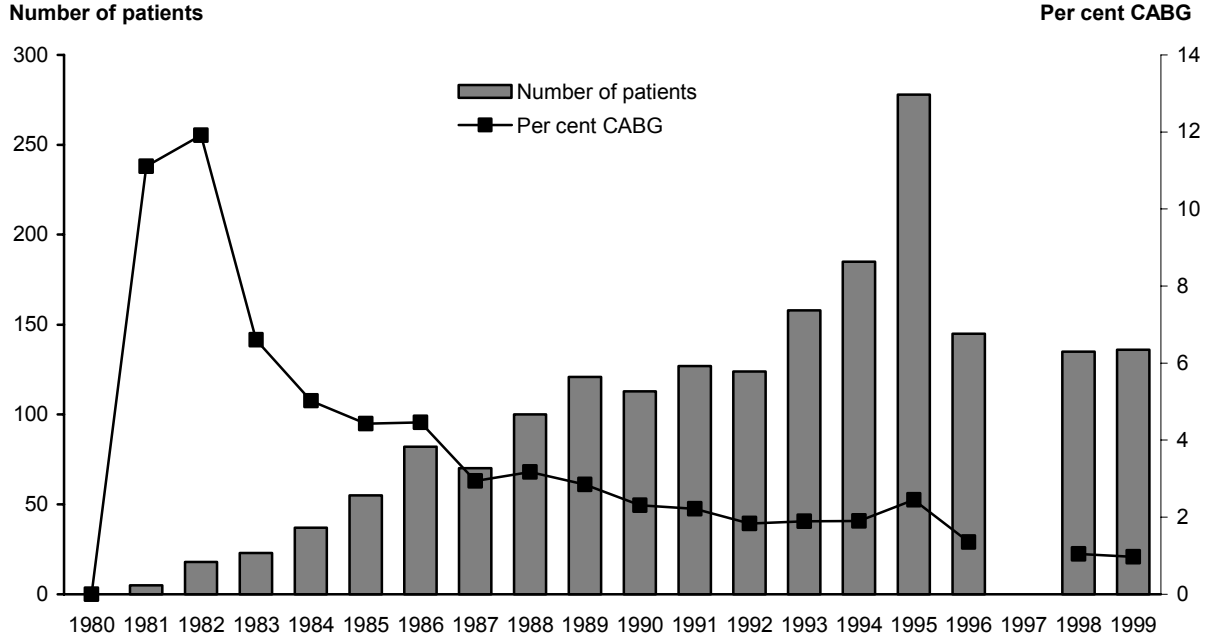
Table 10: Coronary artery bypass grafting for angioplasty failure or complications, 1980–99

Year	Total number of angioplasty procedures	CABG within 24 hours		CABG after 24 hours		CABG total	
		Number of patients	Per cent	Number of patients	Per cent	Number of patients	Per cent
1980	11	0	0	0	0	0	0
1981	45	3	6.7	2	4.4	5	11.1
1982	151	16	10.6	2	1.3	18	11.9
1983	348	16	4.6	7	2.0	23	6.6
1984	737	29	3.9	8	1.1	37	5.0
1985	1,244	45	3.6	10	0.8	55	4.4
1986	1,840	69	3.8	13	0.7	82	4.5
1987	2,383	52	2.2	18	0.8	70	2.9
1988	3,153	70	2.2	33	1.0	100	3.2
1989	4,219	86	2.0	35	0.8	121	2.9
1990	4,904	77	1.5	36	0.7	113	2.3
1991	5,726	92	1.6	35	0.6	127	2.2
1992	6,748	90	1.3	34	0.5	124	1.8
1993	8,334 [(a)]	118	1.6	24	0.3	158	1.9
1994	9,732	137	1.4	35	0.3	185	1.9
1995	11,130 [(a)]	222	2.0	56	0.5	278	2.5
1996	10,706 [(a)]	118	1.1	27	0.3	145	1.4
1997	n.a. [(b)]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1998	14,133 [(a)]	77	0.5	58	0.4	135	1.0
1999	13,948 [(a)]	70	0.5	66	0.5	136	1.0

(a) Excluding procedures performed by the units that could not supply information about this complication.

(b) Data for 1997 not available.

Source: AIHW/NHF National Coronary Angioplasty Register.



Note: Data for 1997 not available.
Source: AIHW/NHF National Coronary Angioplasty Register.

Figure 8: Coronary artery bypass grafting for angioplasty failure or complications, 1980–99

Associated myocardial infarction

Not all units could supply the number of patients who suffered AMI after angioplasty but during the same hospital admission. For the 13,948 procedures where information was available, there were 173 such cases. This is equivalent to a rate of 1.2% for those units' procedures over the year. The rate has been around 1–2% since 1984 (Table 11 and Figure 9).

Table 11: Angioplasty and associated myocardial infarction,[a] 1980–1999[b]

		AMI	
Year	Procedures	Number	Per cent
1980	11	0	0
1981	45	2	4.4
1982	151	13	8.6
1983	348	13	3.7
1984	737	15	2.0
1985	1,244	20	1.6
1986	1,840	32	1.7
1987	2,383	36	1.5
1988	3,153	62	2.0
1989	4,219	57	1.3
1990	4,089[c]	85	2.1
1991	4,826[c]	70	1.5
1992	5,603[c]	74	1.3
1993	7,041[c]	80	1.1
1994	8,231[c]	112	1.4
1995	10,050[c]	155	1.5
1996	10,706[c]	152	1.4
1997	n.a.[b]	n.a.	n.a.
1998	12,933[c]	161	1.2
1999	13,948[c]	173	1.2

(a) Acute myocardial infarction (AMI) is defined in this report as the appearance of new Q waves or T wave changes with enzymes twice the upper limit of normal.

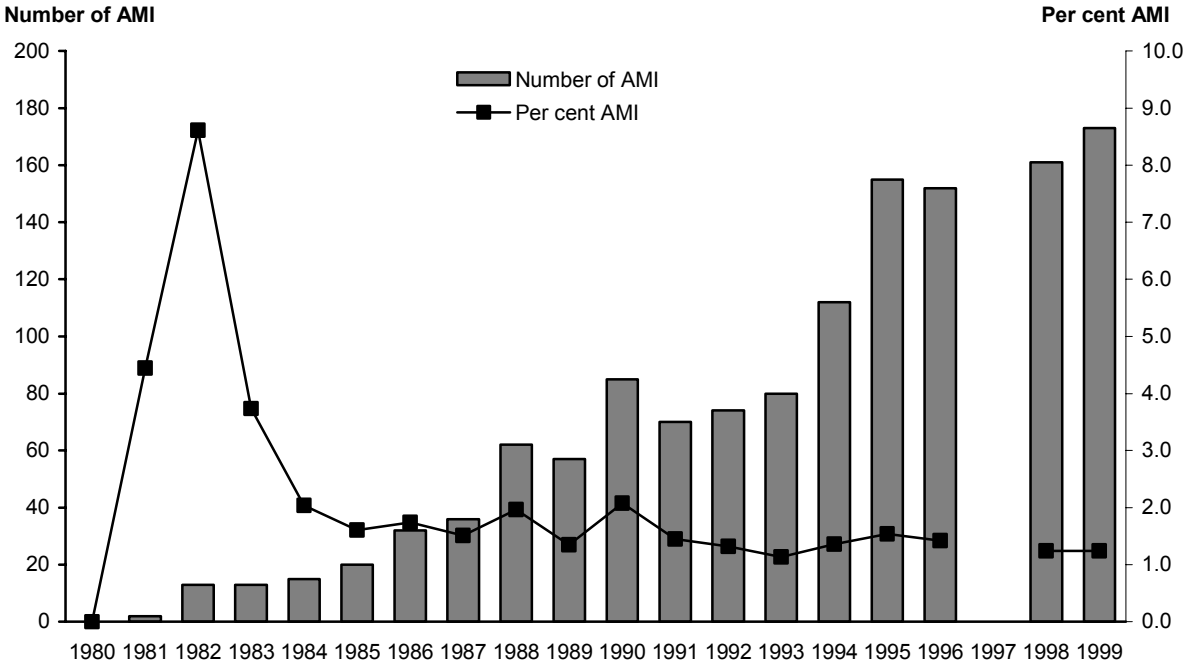
(b) Data for 1997 not available.

(c) Excluding procedures performed by the units that could not supply information about this complication.

Source: AIHW/NHF National Coronary Angioplasty Register.

Arterial complications prolonging hospital stay

Not all units could supply information on the number of arterial complications that prolonged hospital stay after angioplasty procedures. Among 13,948 procedures where information was available, there were 91 (0.7%) such complications.



Note: Data for 1997 not available.
Source: AIHW/NHF National Coronary Angioplasty Register.

Figure 9: Acute myocardial infarction associated with angioplasty, 1980–99

Mortality

In 1999, not all units could supply information on deaths associated with angioplasty. Among 13,948 procedures for which this information was available, there were 114 deaths during the same admission in which angioplasty was performed. Details of the cause of death indicate that many of the cases were extremely high-risk pre-procedure with either cardiogenic shock, poor left ventricular function or life-threatening ventricular arrhythmias. The increasing use of angioplasty to try to rescue these patients will continue to have an adverse impact on mortality rates associated with angioplasty.

At least 49 deaths occurred within 24 hours of the procedure, 12 of which followed emergency CABG for complications of angioplasty. Fifty-seven more deaths occurred after 24 hours but in the same hospital admission giving a total rate of 0.8% for the year (Table 12 and Figure 10).

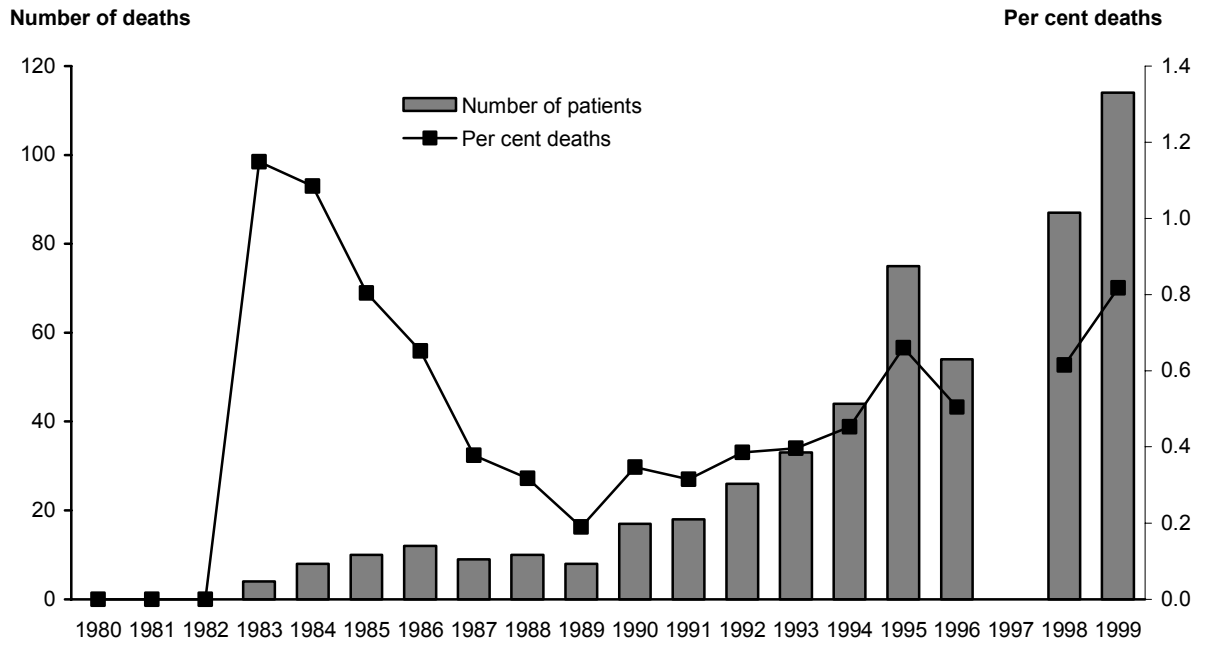
Table 12: Mortality associated with angioplasty, 1980–99[a]

		Deaths	
Year	Number of procedures	Number	Per cent
1980	11	0	0
1981	45	0	0
1982	151	0	0
1983	348	4	1.1
1984	737	8	1.1
1985	1,244	10	0.8
1986	1,840	12	0.7
1987	2,383	9	0.4
1988	3,153	10	0.3
1989	4,219	8	0.2
1990	4,904	17	0.4
1991	5,726	18	0.3
1992	6,748	26	0.4
1993	8,334	33	0.4
1994	9,732	44	0.5
1995	11,348	75	0.7
1996	10,706[b]	54	0.5
1997	n.a.[a]	n.a.	n.a.
1998	14,133[b]	87	0.6
1999	13,948[b]	114	0.8

(a) Data for 1997 not available.

(b) Excluding procedures performed by units that could not supply information about deaths.

Source: AIHW/NHF National Coronary Angioplasty Register.



Note: Data for 1997 not available.
Source: AIHW/NHF National Coronary Angioplasty Register.

Figure 10: Mortality associated with angioplasty, 1980–99

Cause of death

The cause of death of 91 of the 114 patients who died in 1999 is listed below as supplied by each unit. Patients' ages are shown in five-year age ranges for confidentiality reasons.

1. 75–79 year old female patient. Acute anterior myocardial infarction, gastrointestinal tract bleeding and shock. PTCA to right coronary artery (RCA). Died within hours from persistent shock.
2. 50–54 year old male patient. Acute anterior myocardial infarction, ventricular fibrillation out of hospital, cerebral hypoxia, primary PTCA to left descending artery (LAD). Died on day three from persistent brain injury.
3. 75–79 year old male patient. Acute inferior myocardial infarction, shock, ventilation. Triple-vessel stent implantation. Died on day four from pneumonia and acute renal failure.
4. 85–89 year old patient. History of two successful valvuloplasties and CABG, severe triple-vessel disease. PTCA to vein graft circumflex artery (Cx). Died within two hours of PTCA.
5. Patient with acute myocardial infarction after hemicotectomy for cancer. Procedural success. Died four days after PTCA from metabolic acidosis and renal failure.
6. Patient with acute myocardial infarction after hip replacement. Known chronic renal failure. Acute renal failure and significant gastrointestinal tract bleeding. Died three days later.

7. Patient admitted with cardiogenic shock. Severe left ventricular fibrillation. Occluded LAD, left circumflex artery (LCx) and RCA. PTCA to LAD attempted. Lesion crossed and balloon dilation. No flow.
8. PTCA to RCA ostial lesion. Cerebrovascular accident occurred less than 24 hours after procedure. Patient died from cerebral infarction four days after PTCA.
9. 70–74 year old female patient. Transferred from a regional hospital following 10 hours of chest pain. Medical history: cardiovascular disease and end-stage renal failure. Elevated enzymes. Severe lesions demonstrated in proximal and mid-LAD proximal and mid-RCA. Angiogram poorly tolerated and further chest pain during subsequent dialysis. Successful angioplasty and stenting. Asystolic arrest and was unresponsive to resuscitation. Died 17 hours after procedure.
10. 65–69 year old male patient. Presented with sudden chest pain. Electrocardiogram (ECG) showed anterior changes. Mild chest pain relieved by anginine. Pulmonary oedema, hypotension, pericarditis and deteriorating renal function. Inotropes and diuretics given. Severe ventricular dysfunction. Successful PTCA and stenting of LAD. Sudden arrhythmia and death on day five.
11. Salvage primary PTCA with shock. Death within 24 hours of PTCA.
12. No reflow in RCA following primary PTCA. Respiratory arrest and non-capture right ventricle pacemaker 12 hours after PTCA.
13. 75–79 year old female patient. Unstable angina pectoris. PTCA to proximal LAD lesion. Successful stent deployment. Profuse thrombus formation in mid-LAD, developed an anterior acute myocardial infarction. IABP inserted. Emergency CABG. Cardiogenic shock and successful resuscitation after cardiac arrest. Poor renal function and decreasing cardiac output despite treatment. Died three days later.
14. 55–59 year old male patient. High risk PTCA to tortuous 90% lesion in native RCA resulting in bi-directional dissection. IABP used. Temporary pacing, emergency CABG. Developed ventricular tachycardia, initially responding DC reversion, not sustained. Died within an hour of procedure.
15. 75–79 year old male patient. Presented with chest pain within a week of undergoing abdominal surgery for bowel obstruction. Diagnosed with non-Q myocardial infarction. PTCA to occluded proximal MI complicated by thrombosis and haemodynamic instability. IABP used. Cardiopulmonary resuscitation (CPR)/DC reversion/emergency CABG and mitral valve replacement. Died the following day.
16. 85–89 year old male patient. Previous RCA and LCx stenting, cardiomyopathy and renal failure. Admitted for repeat catheterisation in view of limiting angina-type symptoms. Following stent deployment became hypotensive and bradycardic, then arrested. CPR, intubation, insertion of IABP and dobutamine infusion. Patient stabilised. IABP removed after two days, but condition deteriorated. Developed cardiogenic shock and died the following day.
17. 80–84 year old male patient. Unstable angina pectoris. Enzyme rise six hours after admission. PTCA following day to three lesions in LAD/D1 successful, but developed acute pulmonary oedema (APO). ReoPro commenced. Two days later, embolisation of distal stent shown angiographically. Restented and IABP used. Intubated and given inotropic support for two days. Remained unstable and died on day nine.
18. 75–79 year old female patient. Presented within four hours of onset of chest pain with acute myocardial infarction. Developed asystole. PTCA to occluded LCx. LAD and RCA also severely diseased. Resuscitation unsuccessful.

19. 65–69 year old female patient. Presented within two hours of onset of chest pain, N and V with acute myocardial infarction, cardiogenic shock and intermittent ventricular tachycardia. Emergency PTCA to occluded LCx and 80% LAD (also occluded RCA). ReoPro given, IABP used, and inotropes given. Continued deterioration including acute renal failure (ARF), APO and bilateral femoral artery bleeding. Died 18 hours after admission.
20. 65–69 year old female. Patient had asystolic arrest during an elective laparoscopic cholecystectomy. Transferred from regional hospital within four hours in cardiogenic shock. Emergency PTCA to occluded LAD complicated by clot embolisation down LCx. IABP for 'no flow' and pacing for electro-mechanical dissociation (EMD). Died within 24 hours.
21. 70–74 year old female patient. Presented with infero-post-lateral acute myocardial infarction with right ventricle involvement. Streptokinase complications and ventricular tachycardia, temporary pacing and successful PTCA to RCA. Cardiogenic shock and ARF. Unresponsive to inotropes. Died 24 hours after admission.
22. 75–79 year old female patient. Recent history of loop transverse colostomy for colonic pseudo-obstruction. Presented within 12 hours of an anterior acute myocardial infarction in cardiogenic shock. Severe triple-vessel disease. Emergency PTCA to occluded proximal LAD. LAD reopened but hypotension and bradycardia persisted. Developed EMD and died.
23. 50–55 year old male patient. History of redo CABG three weeks prior—right ventricle adherent to sternum. Presented with inferior acute myocardial infarction and treated with tPA. On day two there was a sudden onset of abdominal pain. Arrested during computed tomography. Emergency PTCA to occluded distal RCA (saphenous vein graft (SVG) to RCA blocked, other grafts patent). Poor flow and thrombus after stenting. ReoPro, CPR, extra corporeal membrane oxygenation (ECMO) and inotropes given. Intubated. Died 48 hours after PTCA when ECMO discontinued.
24. 75–79 year old female patient. Presented two hours after onset of chest pain with acute myocardial infarction. Cardiogenic shock and several episodes of ventricular tachycardia. Given streptokinase and inotropes. PTCA to occluded RCA. IABP used and temporary pacing. Complicated with per rectum (PR) bleeding and ischaemic colitis. Died four days after admission.
25. 65–69 year old male patient. Acute myocardial infarction, APO, cardiogenic shock and ARF. Treated with streptokinase and inotropes. Rescue PTCA to 80% LM extending into LAD. Poor flow to distal LAD and LCx. IABP used. Condition continued to deteriorate, pharmacological support thereafter. Died 28 hours after procedure.
26. 80–84 year old male patient. Acute myocardial infarction. Emergency PTCA to occluded LAD. Inotrope support for cardiogenic shock. Severe left ventricular dysfunction with totally occluded RCA and 80% LCx lesions. Frontal lobe meningioma. Patient not intubated for asystole 48 hours following admission and subsequently died.
27. 85–89 year old male patient. History of RCA and LCx stenting, cardiomyopathy and renal failure. Admitted for repeat catheterisation in view of limiting anginal symptoms. After stent deployment the patient rapidly became hypotensive and bradycardic then arrested. CPR was initiated with subsequent intubation, insertion of IABP and dobutamine infusion. IABP removed after two days. Developed cardiogenic shock and died the following day.
28. 75–79 year old female patient. Unstable angina pectoris. PTCA to proximal LAD lesion. After successful stent deployment there was profuse thrombus formation in the mid-LAD and patient developed an anterior acute myocardial infarction. IABP inserted. Emergency CABG. Deteriorated into cardiogenic shock. Resuscitated after a cardiac

arrest. Poor renal function and decreasing cardiac output despite treatment. Died three days after PTCA.

29. 80–84 year old male patient. Acute anterior myocardial infarction. Late reperfusion. Successful PCI to LAD. Persistent left ventricle dysfunction and sudden death on day seven.
30. 50–54 year old female patient. Cardiac arrest. LM total occlusion. IABP used and LM opened. Medically refractory cardiac arrest and death in catheter lab.
31. 55–59 year old male patient. Large anterior myocardial infarction. Severe diffuse multi-vessel disease and in cardiogenic shock. Rescue PTCA to LAD. Progressive pump failure despite open vessel. IABP used and inotrope support. Died less than 24 hours later.
32. 75–79 year old female patient. Cardiogenic shock after nephrectomy for renal cell carcinoma. Successful multi-vessel PCI (LAD<RCA) with stabilisation of hemodynamics. Prolonged hospitalisation with major gastrointestinal tract bleeding. Sudden death on day 20.
33. 75–79 year old female patient. Anterior myocardial infarction. LAD opened. Medically refractory heart failure. Died on day seven.
34. 60–65 year old male patient. Cirrhosis with bleeding varices and acute myocardial infarction with shock. Died in lab: medically refractory shock despite RCA patency.
35. 85–89 year old female patient. Recurrent ischaemic pulmonary oedema. Procedurally successful LAD stent. Subsequent acute renal failure and death on day four.
36. 65–69 year old male patient. Unsuitable for CABG due to multiple co-morbidities. Stented spiral dissection of calcified RCA. Acute stent thrombosis at 72 hours. Unable to stent distal vessel. Died three days later from cardiogenic shock.
37. 50–54 year old male patient. Cardiac arrest outside hospital. Intubated on arrival. Acute inferior myocardial infarction. Successful stent to RCA. Brain dead.
38. 60–64 year old female patient. Cardiac arrest outside hospital. Extensive anterior myocardial infarction. Cardiogenic shock. IABP and stent to LAD. Died after 48 hours from cardiogenic shock.
39. 75–79 year old male patient transferred from regional hospital in cardiogenic shock. Complete heart block three days after inferior myocardial infarction. Temporary pacemaker inserted and stent to RCA. Cardiac arrest three days later.
40. Primary PTCA. Patient died from cardiogenic shock more than 24 hours after the procedure.
41. Primary PTCA. Patient died from multi-organ failure and sepsis more than 24 hours after the procedure.
42. 80–84 year old female patient. Severe SVG stenosis. After the non-primary angioplasty, the patient had distal embolisation which led to severe myocardial infarction and heart failure. Died three weeks later in hospital.
43. 75–79 year old male patient. Six hours after anterior myocardial infarction. Four hours after thrombolytic therapy. Underwent successful angioplasty and stent insertion at the proximal LAD. Died from cardiogenic shock 24 hours after the procedure.
44. 65–69 year old male patient. Indication: acute anterior myocardial infarction. Occluded segment of LAD at ostium. Successful PTCA to LAD. Reperfusion was associated with an increase in the patient's chest pain and hypotension. Successful stent deployment. Became hypotensive; aramine and atropine given. Repeat angiography showed patent LAD and Cx but sluggish flow in all vessels. Inotropic support and artificial respiration.

Acute anterior myocardial infarction complicated by cardiogenic shock following successful reperfusion.

45. 80–84 year old female patient. Cardiogenic shock. Complete occlusion of the proximal LAD and Cx and tight distal RCA stenosis. Angiographic appearances suggested recent occlusion of the Cx. Successful balloon dilation of the vessel resulted in good flow in the distal Cx. The vessel re-occluded and profound hypotension resulted. Attempted dilation of the distal RCA. Cardiogenic shock. Died one hour later.
46. 75–79 year old female patient. Presented with non-Q myocardial infarction. LAD instent restenosis. Successful PTCA rotoblator. Abrupt closure within six hours. Repeat PTCA and stent. ReoPro given. Further chest pain, pulmonary oedema three days later. Repeat PTCA to LAD next day unsuccessful. Cardiac arrest 24 hours later and resuscitation unsuccessful.
47. 80–84 year old female patient with unstable angina pectoris and two-vessel disease. PTCA to Cx. Heparin and ReoPro given. PTCA successful but diminished conscious state at the end of the procedure. CT scan revealed massive intracranial haemorrhage.
48. 70–74 year old male patient with unstable angina pectoris and two-vessel disease. PTCA to Cx. No reflow after first inflation, complicated by ventricular fibrillation/asystolic arrest. Resuscitated successfully. Angiogram inconclusive. Further ventricular fibrillation/asystole and failed prolonged resuscitation.
49. 75–79 year old male patient. Presented with cardiogenic shock (secondary to anterior myocardial infarction) with recurrent ventricular tachycardia/ventricular fibrillation. Severe triple-vessel disease with thrombotic occlusion of LAD. Successful PTCA and stent. ReoPro given and intubated. Intracranial haemorrhage and subdural haemorrhage within 24 hours of presentation. Died two days after PTCA.
50. 80–84 year old female patient. Unstable angina pectoris. PTCA and stent to LAD. Unsuccessful emergency PTCA due to arterial calcification. Anterior infarction resulted. Patient unsuitable for CABG (recognised before PTCA). Died five days later with arrhythmia.
51. Patient presented with chest pain. Occluded LAD, Cx and RCA. Primary PTCA and stent to LAD. Dissection, myocardial ischaemia, hypotension. Dopamine given. IABP not placed due to vessel tortuosity. Cardiac arrest. Intubated, unresponsive to inotropes and in cardiogenic shock. EMD.
52. Patient transferred from peripheral hospital with acute anterior myocardial infarction, cardiogenic shock, trifascicular block and pulmonary oedema. Angioplasty and stent to LAD and OM. Hypotensive and poor TIMI flow. IABP inserted and inotropes commenced. Temporary pacing wire inserted due to trifascicular block. Recurrent ventricular tachycardia and ventricular fibrillation during procedure. Sustained ventricular tachycardia and Cheyne-Stokes respiration. Died within 24 hours of procedure.
53. Presented to peripheral hospital with acute anterior myocardial infarction and in cardiogenic shock. Unresponsive to thrombolytic therapy. Transferred for urgent angiogram and PTCA. Patient intubated, ventilated, haemodynamically unstable, hypotensive and responding to adrenalin. PTCA and stent to LM. On maximum inotropic support and IABP. Died five hours after procedure.
54. Massive subarachnoid haemorrhage 12 hours after procedure. ReoPro and heparin given during procedure. Died after three days from cerebrovascular accident.

55. 75–79 year old female patient. History of cardiomyopathy and chronic obstructive airway disease. Investigated because of recurrent ischaemic chest pain with lateral ST segment depression on the ECG. Severe LAD stenosis which was dilated and stent inserted. Intracranial haemorrhage of uncertain basis caused death two days later. There was a concern that clopidogrel hydrogen sulphate (antithrombotic agent) may have been a contributing factor.
56. 75–79 year old male patient. Anterior myocardial infarction treated at regional hospital with tPA and developed cardiogenic shock. Transferred for urgent angiogram which showed old occlusion of RCA plus recent occlusion of LAD. Stenosis of Cx also noted. Stents to both LAD and Cx. Cardiogenic shock continued and died on the sixth day.
57. 60–64 year old female patient. Old myocardial infarction, referred with increasing angina on effort. Severe stenosis of Cx. Technical problems with extensive dissection involving Cx, LAD, LM and adjacent aorta. Unsuccessful attempt to open the LM and urgent CABG was performed. Cardiogenic shock beginning at the time of the LM narrowing persisted and death occurred within 24 hours.
58. 80–84 year old female patient. Referred in shock following anterior myocardial infarction. LAD occlusion, Cx trunk and anterior marginal branch separately severely narrowed. PTCA and stents to the three vessels. Cardiogenic shock continued and the patient died after 24 hours.
59. Patient died of cardiogenic shock, despite PTCA.
60. Angioplasty performed for cardiogenic shock. The patient died 48 hours after the procedure.
61. Middle-aged man brought in (within two hours of onset) with large anterior myocardial infarction and in cardiogenic shock. Ventilated and placed on high inotropic support. Repeated DC versions for ventricular fibrillation. Angiogram showed triple-vessel disease, occluded proximal LAD. One inflation. Died in catheter lab.
62. Patient in cardiogenic shock at presentation; had mechanical ventilation and proximal LAD occlusion. Angioplasty established antegrade flow. Died in intensive care unit more than 24 hours after procedure.
63. Patient in cardiogenic shock at presentation; had mechanical ventilation and proximal LAD occlusion. Angioplasty established antegrade flow. Died in intensive care unit more than 24 hours after procedure.
64. Patient in cardiogenic shock at presentation; had mechanical ventilation and proximal LAD occlusion. Angioplasty established antegrade flow. Died in intensive care unit more than 24 hours after procedure.
65. Patient in cardiogenic shock at presentation; had mechanical ventilation and SVG/LG. Angioplasty established antegrade flow. Died in intensive care unit more than 24 hours after procedure.
66. Patient in cardiogenic shock at presentation; had mechanical ventilation and RCA occlusion. Angioplasty established antegrade flow. Died in intensive care unit more than 24 hours after procedure.
67. Patient in cardiogenic shock at presentation; had mechanical ventilation. Angioplasty established antegrade flow. Died in intensive care unit more than 24 hours after procedure.
68. Patient with insulin-dependent diabetes. In cardiogenic shock for two days. Acute pulmonary oedema, recurrent asystole, extensive myocardial infarction and coronary

artery disease. PTCA to LAD. Ventricular pacing, insertion of IABP. Hypotension, dobutamine and adenosine infusions in situ. Asystole. Died five hours after PTCA.

69. 65–69 year old male patient. Ventricular fibrillation at home. Inferolateral myocardial infarction. Streptokinase. Progressed to cardiogenic shock with complete heart block. Angiogram showed severe triple-vessel coronary artery disease. IABP and temporary pacemaker inserted. Rescue angioplasty and stent to RCA with success. Died of multiple arrhythmias within first 24 hours.
70. 55–59 year old male patient. Anteroseptal myocardial infarction. Transferred from peripheral hospital after tPA. Single-vessel LAD occlusion. Rescue angioplasty and stent with primary success. Acute stent occlusion within first 24 hours resulting in cardiogenic shock. Repeat angiogram showed proximal extension of thrombus into left main coronary artery. Unable to recannulate.
71. 50–54 year old male patient. History of anterior myocardial infarction with cardiogenic shock. Presented with recurrent anterior myocardial infarction and cardiogenic shock. LAD stent occlusion. Stent opened with success, balloon angioplasty to RCA and LCx. IABP used and ReoPro given. Developed profound thrombocytopenia and heart failure. Inferior myocardial infarction one week later and returned to catheter lab in cardiogenic shock. Occlusion of RCA opened with balloon angioplasty but distal clot apparent and patient died of asystole.
72. 70–74 year old male patient. Previous CABGs. Acute inferior myocardial infarction. Streptokinase given. Developed cardiogenic shock and complete heart block. Angiogram showed triple-vessel coronary artery disease with diseased sequential SVG. Rescue angioplasty to SVG created no reflow. Died on the same day.
73. 40–44 year old male patient. Elective case. Total occlusion of dominant RCA. Difficult long case with primary success and three stents placed. Thrombus noted and ReoPro given. Patient went for urgent CABG. Significant post-operative bleeding. Developed acute renal failure and right heart failure. Died on day three.
74. 60–64 year old male patient. Acute inferior myocardial infarction. Cardiogenic shock. Total occlusion of RCA and LAD. IABP used. Failed PTCA to RCA. Urgent CABG. Haemopericardium noted. Died of arrhythmias in the immediate perioperative period.
75. 65–69 year old male patient. Cardiac arrest outside hospital. Arrived intubated and in cardiogenic shock. Acute anterior myocardial infarction. IABP used. Successful PTCA to LAD. ReoPro given. Never regained consciousness. Died on day three from cerebral anoxia.
76. 60–64 year old male patient. Acute inferior lateral myocardial infarction. Two-vessel coronary artery disease to LCx branch and LAD. Unsuccessful angioplasty to LCx branch. Died on day three from an anterior septal myocardial infarction, complicated cardiogenic shock and arrhythmias.
77. 70–74 year old female patient. Primary angioplasty for acute inferior myocardial infarction. Single-vessel coronary artery disease with total occlusion of RCA. Angioplasty to RCA successful but difficult due to tortuosity of right iliofemoral system. IABP inserted via left femoral artery. ReoPro given. Significant bleeding requiring surgical repair of right femoral artery. Died two weeks after procedure from acute renal failure, coagulopathy and possible gastrointestinal tract infarction.
78. 65–69 year old female patient. Severely impaired left ventricle with triple-vessel coronary artery disease, awaiting CABG. Presented with unstable angina pectoris and developed into an inferior and right ventricular myocardial infarction. Cardiogenic shock. Salvage

PTCA to RCA and LCx successful. Ventricular arrhythmias during LCx dilation. Good primary result. IABP used. ReoPro and inotropes given. Died day seven from multiple ventricular arrhythmias and cardiac failure.

79. Patient with previous CABG and unstable angina pectoris. Successful PTCA and stent. Abrupt closure. Dissection successfully restented. Unstable after PTCA, posterior cardiac tamponade with compromised left ventricle and left atrium. Unsuitable for surgery, unable to stabilise despite adrenaline, atropine, aramine CPR and IABP. Peak troponin I=1.2.
80. Patient with acute myocardial infarction and pulmonary haemorrhage. On multiple inotropes, cardiogenic shock. IABP used and PTCA to Cx. Long-term ventilation, tracheostomy, suffered sepsis. Cardiorespiratory arrest. Died three weeks later.
81. Patient with acute myocardial infarction, cardiogenic shock and ventricular fibrillation, moderate left ventricle dysfunction and moderate mitral regurgitation, papillary muscle dysfunction. IABP used and inotropes given. Successful PTCA to RCA. Died on day seven from multi-organ failure.
82. Patient with ventricular fibrillation arrest outside hospital and no CPR given for six minutes. Anterior ST elevation. Troponin I=64.6. Ventilated. Successful PTCA to LAD. Died three days after procedure from hypoxic brain injury.
83. Past history of rheumatoid arthritis on non-steriodal anti-inflammatory drugs, methotrexate and steroids. Anterolateral acute myocardial infarction, hypotension and rhythm instability. Inotropes and IABP used. PTCA. Spontaneous LAD dissection. ReoPro given. Urgent CABG, tamponade, haemoglobin dropped from 12 to 5. To operating room in haemorrhagic shock. Thrombocytopaenia, coagulopathy and sepsis. Died 25 days later.
84. Patient with acute infarction and cardiogenic shock, arrested before attempting PTCA.
85. Left main dissection during PTCA to LAD.
86. Non-primary PTCA. Died following pulmonary oedema after CABG.
87. Non-primary PTCA. Had pulmonary oedema during PTCA. Died two days later.
88. Non-primary PTCA. Left main dissection during PTCA. Died the next day.
89. Primary PTCA. Cardiogenic shock. Died following opening of artery.
90. Primary PTCA. Cardiogenic shock. IABP. Died despite open artery.
91. Primary PTCA. Cardiogenic shock. Died despite successful PTCA.

Success rates in various vessel types

Definition of success

For the Coronary Angioplasty Register, a 'primary success' is defined as a procedure that achieves an absolute reduction of the initial degree of luminal diameter stenosis of at least 20% at the time of the procedure, and a residual diameter stenosis of less than 50%.

Success rates

Not all units gave information on success rates. Of those that did, 12,061 procedures were performed and 14,834 lesions were attempted in 1999, corresponding to an average of 1.2 lesions attempted per procedure. Of the total attempts, 14,096 (95.0%) were primary successes. Procedures on partial occlusions accounted for 84.3% and 15.7% were on total occlusions. Figures 11 and 12 and Table 13 show the number of lesions and success rates for individual vessel types. Attempts on partial occlusions are clearly much more successful than those on total occlusions.

Thirty-eight per cent of the lesions attempted were in the LAD or its diagonals. The RCA accounted for a further 33.8% of the lesions, and the LCx including marginals and intermediate, accounted for 21.9%. This distribution is similar to that of 1998. Success rates were similar for all types of vessels, at around 95.0%.

Trends in success rates for partial and total occlusions are presented in Table 14. Overall success rates have remained consistent over the period 1996–99.

There were 890 angioplasty procedures performed on bypass graft vessels: 738 on SVG (701 successful) and 25 on internal mammary artery (IMA) (22 successful). There were 107 procedures on LM, 98 of which were successful. There were 20 procedures on other bypass graft vessels, 15 of which were successful.

The proportion of patients defined as early clinical successes was 96.2%; that is, they had a successful reduction of all lesions, and no angina or complications pre-discharge.

Table 13: Types of vessels and success rates, 1999

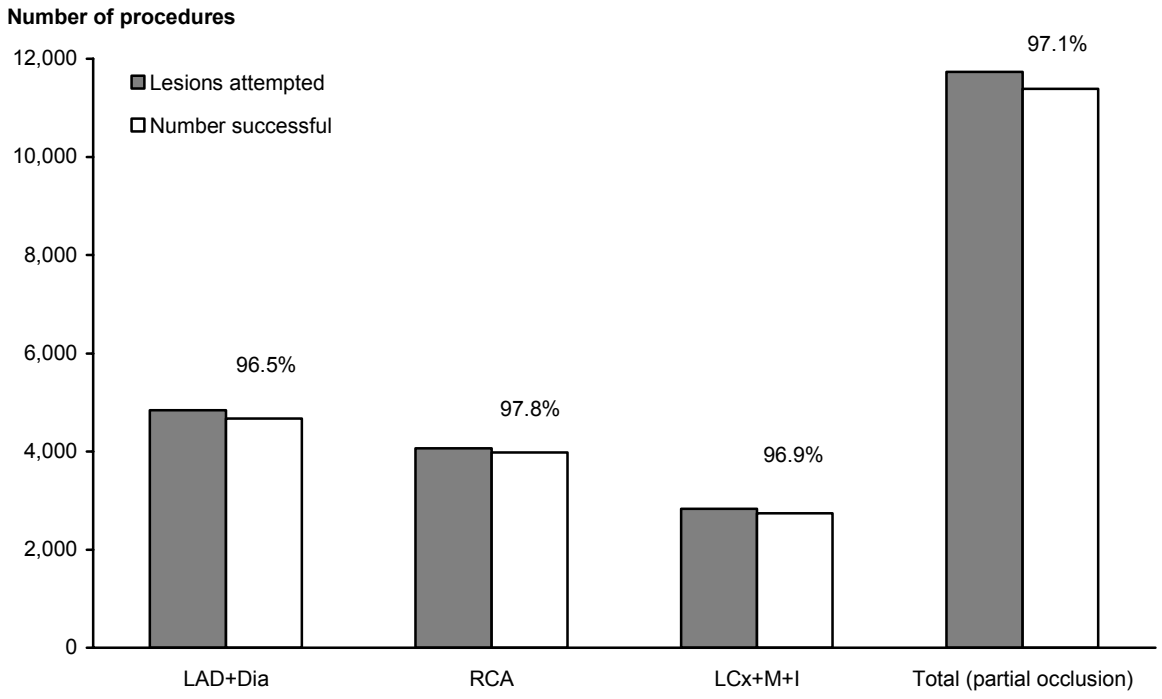
	Partial occlusion		Total occlusion		Overall	
Lesions	**Number attempted**	**Per cent successful**	**Number attempted**	**Per cent successful**	**Number attempted**	**Per cent successful**
LAD	4,300	96.9	781	87.2	5,081	95.4
Diagonals	535	93.6	66	78.8	601	92.0
RCA	4,065	97.8	942	84.6	5,007	95.3
LCx	2,132	97.0	323	79.6	2,455	94.7
Marginals and intermediate	699	96.9	101	83.2	800	95.1
Subtotal	*11,731*	*97.1*	*2,213*	*84.5*	*13,944*	*95.1*
SVG	634	97.5	104	79.8	738	95.0
IMA	22	86.4	3	100.0	25	88.0
LM	97	94.8	10	60.0	107	91.6
Other	14	85.7	6	50.0	20	75.0
Total	**12,498**	**97.1**	**2,336**	**84.2**	**14,834**	**95.0**

Source: AIHW/NHF National Coronary Angioplasty Register.

Table 14: Success rates (per cent), 1998 and 1999

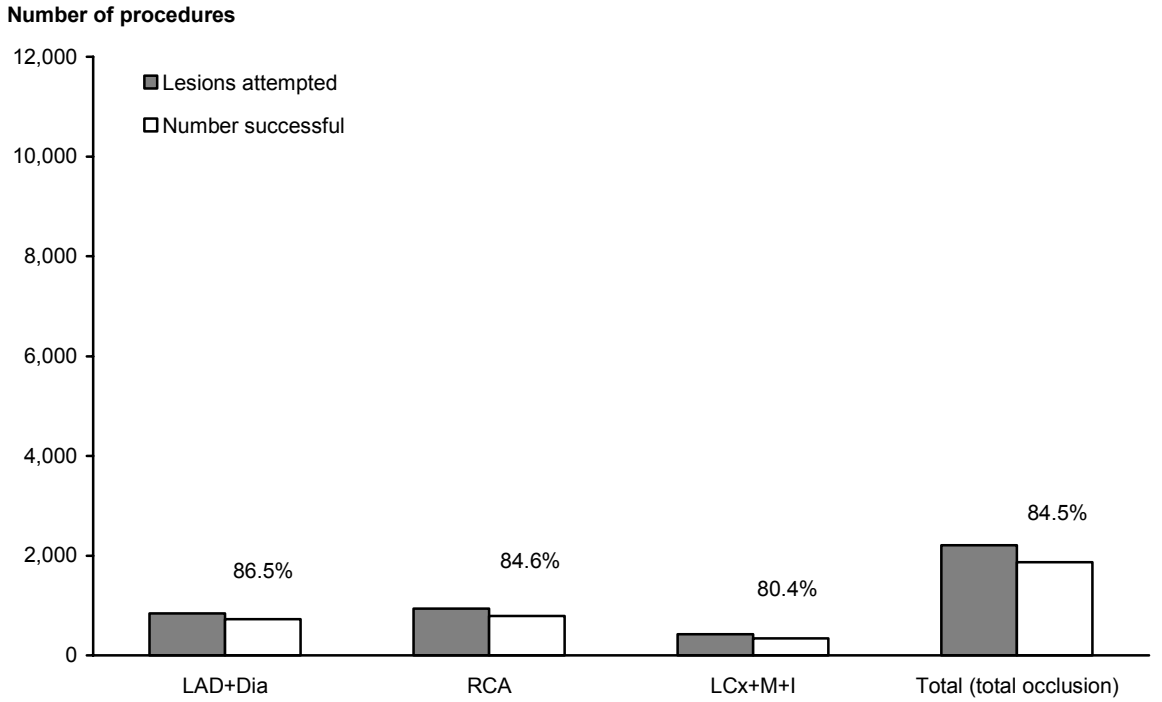
	Partial occlusion		Total occlusion		Overall	
Lesions	**1998**	**1999**	**1998**	**1999**	**1998**	**1999**
LAD and diagonals	97.2	96.5	87.2	86.5	95.9	95.1
RCA	96.9	97.8	82.3	84.6	94.4	95.3
LCx and marginals and intermediate	96.8	96.9	81.2	80.4	94.8	94.8
Subtotal	*97.0*	*97.1*	*84.0*	*84.5*	*95.1*	*95.1*
Total (including SVG, IMA & LM)	**97.0**	**97.1**	**83.3**	**84.2**	**95.0**	**95.0**

Source: AIHW/NHF National Coronary Angioplasty Register.



Source: AIHW/NHF National Coronary Angioplasty Register.

Figure 11: Number of lesions and success rates for partial occlusions, 1999



Source: AIHW/NHF National Coronary Angioplasty Register.

Figure 12: Number of lesions and success rates for total occlusions, 1999

Glossary

Abciximab (ReoPro): drug that stops platelets sticking together to block the coronary arteries. It is given to patients at higher risk of developing complications of undergoing PTCA or atherectomy.

Acute myocardial infarction (AMI): an acute episode of myocardial ischaemia (see below) of sufficient severity and duration to cause permanent damage to some heart muscle. The ischaemia is caused by the occlusion of one or more coronary arteries.

Angina pectoris: a clinical syndrome marked by deep, unlocalised discomfort or pain in the chest or arm which is associated with physical exertion or emotional stress, and is relieved promptly by rest or sublingual nitroglycerine. Patients with unstable angina have episodes of discomfort which are more severe and prolonged, and which may occur at rest irrespective of exertion or stress. In most, but not all, angina, these symptoms reflect myocardial ischaemia resulting from significant underlying coronary artery disease.

Atherectomy: a dilatation technique, where mechanical devices attached to the insertion catheter cut or grind out obstructions in arteries.

Cardiogenic shock: a condition caused by inadequate cardiac output which fails to maintain blood supply to the tissues.

Coronary artery bypass grafting (CABG): vein or artery grafted surgically to permit blood to travel from the aorta to a branch of the coronary artery at a point past an obstruction.

Coronary stenosis: narrowing or constriction of a coronary artery.

Hypotension: decrease of systolic and diastolic blood pressure below normal.

Intra-aortic balloon pump (IABP): a balloon attached to a catheter inserted through the femoral artery into the descending thoracic aorta to produce alternating inflation and deflation during diastole and systole, respectively.

Intra-coronary stenting: use of a metal prosthetic device to provide a supporting structure and maintain an enlarged coronary lumen at the site of an obstructive atherosclerotic plaque.

Laser angioplasty: use of a laser beam to cut through obstructions in the coronary arteries.

Left ventricular function: the function of the main pumping chamber of the heart that receives blood from the left atrium and pumps it out into the general circulation through the aortic valve.

Myocardial ischaemia: a condition in which oxygen and nutrient delivery to and waste removal from the heart muscle fall below normal levels, and oxygen demand exceeds supply. The metabolism of heart muscle cells is impaired, leading to various degrees of systolic and diastolic dysfunction.

Myocardium: the muscular wall of the heart located between the inner endocardial layer and the outer epicardial layer.

Percutaneous coronary intervention (PCI): a term used to encompass all forms of percutaneous revascularisation, including balloon angioplasty, 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.

Revascularisation: restoration or improvement of normal blood flow to the myocardium by bypassing or removing obstructions in coronary arteries, as occurs when CABG or PTCA is performed.

Saphenous vein: a blood vessel from the leg, which is the most commonly used conduit 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 type of care.

Stenosis: narrowing or blockage.

Stent: see *intra-coronary stenting*.

Thrombolytic therapy: treatment with a drug that can break up blood clots and restore blood flow to the myocardium.

Unstable angina: angina is termed unstable when chest pain occurs at rest, there is new onset of pain with exertion, or pain is more frequent, longer in duration or lower in threshold.

Ventricular fibrillation: rapid, uncoordinated beating of the heart which is unable to expel its contents.

Appendix A: Units operating in 1999

Table A1: List of units operating in 1999

State	Unit
New South Wales	Charles Wentworth Private Hospital
	Concord Repatriation General Hospital
	Eastern Heart Clinic
	John Hunter Hospital
	Lake Macquarie Private Hospital
	Liverpool Hospital
	Mater Misericordiae Hospital North Sydney
	NSW Private Hospital
	Royal North Shore Hospital
	Royal Prince Alfred Hospital
	St Vincent's Public Hospital
	St Vincent's Private Hospital
	Strathfield Private Hospital
	Sydney Adventist Hospital
	The Hills Private Hospital
	The St George Hospital
	The St George Private Hospital
	Westmead Hospital
Queensland	Allamanda Private Hospital
	Greenslopes Private Hospital
	John Flynn Hospital
	Mater Misericordiae Hospital
	Princess Alexandra Hospital
	Royal Brisbane Hospital
	St Andrews Hospital
	The Prince Charles Hospital
	The Wesley Hospital
	Townsville General Hospital

Continued

Table A1 (continued): List of units operating in 1999

State	Unit
South Australia	Ashford Community Hospital
	Flinders Medical Centre
	Flinders Private Hospital
	Royal Adelaide Hospital
	The Queen Elizabeth Hospital
	Wakefield Hospital
Victoria	Austin Repatriation Medical Centre
	Box Hill Hospital
	Cabrini Medical Centre
	Epworth Hospital
	Geelong Hospital
	Knox Private Hospital
	Melbourne Private Hospital
	Monash Medical Centre
	St Vincent's Hospital
	St Vincent's and Mercy Private Hospital
	The Alfred Hospital
	The Royal Melbourne Hospital
	Warringal Private Hospital
Western Australia	Fremantle Hospital
	Mount Hospital
	Royal Perth Hospital
	Sir Charles Gairdner Hospital
	St John of God (Subiaco)
	St John of God (Murdoch)
Tasmania	Calvary Hospital
	Royal Hobart Hospital
Australian Capital Territory	The Canberra Hospital
	National Capital Private Hospital

Appendix B: Data collection form

Calendar year in which information collected:

Hospital/Unit_____

Date form completed_____

Form completed by _____

Names of doctors doing procedures (not assistants) _____

_____

No. of patients

1. No. of patients having first PTCA in 1999 _____

2. (a) No. of patients having repeat PTCA in 1999 who had a previous PTCA in 1999 _____

   (b) Interval between procedures:

   less than 24 hours _____

   24 hours to less than 3 months _____

   3 to less than 6 months _____

   6 to less than 12 months _____

   (c) No. where repeat PTCA was to the same unstented lesion _____

   (d) No. where repeat PTCA was to the same stented lesion _____

   (e) No. where repeat PTCA was for previous failure _____

3. (a) No. of patients having repeat PTCA in 1999 whose previous PTCA was before 1999 _____

   (b) Interval between procedures:

   less than 24 hours _____

   24 hours to less than 3 months _____

   3 to less than 6 months _____

   6 to less than 12 months _____

   12 months or greater _____

   (c) No. where repeat PTCA was to the same unstented lesion _____

   (d) No. where repeat PTCA was to the same stented lesion _____

   (e) No. where repeat PTCA was for previous failure _____

4. (a) Total number of patients having PTCA (sum of 1 and 3(a) above) _____

(b) Total number of PTCA procedures in 1999 (sum of 1, 2(a) and 3(a) above) _____

5. No. of single vessel PTCA procedures _____

6. No. of two vessel PTCA procedures _____

7. No. of three vessel PTCA procedures _____

8. No. of four or more vessel PTCA procedures _____

Note: **A vessel is defined as a single arterial trunk e.g. LAD + LADD = 1 vessel; LCX + marginal or intermediate = 1 vessel; LM = 1 vessel; LAD + SVG or IMA = 2 vessels; SVG = 1 vessel; IMA = 1 vessel.**

No. of procedures

9. Approach during procedures:

Femoral _____

Brachial _____

Radial _____

10. No. of procedures for patients with previous CABG _____

11. Indication for PTCA:

Stable angina pectoris _____

Unstable angina pectoris _____

Prognostic (asymptomatic) _____

Acute myocardial infarction:
(please show number of patients in cardiogenic shock in brackets)

(a) primary

time since AMI:

0–<2 hours .....

2–<4 hours .....

4–<6 hours .....

6–<8 hours .....

(b) rescue

time since AMI:

0–<2 hours _____

2–<4 hours _____

4–<24 hours _____

after 24 hours _____

Other indication (please specify details) _____

12. Total no. of procedures where thrombolytic therapy was given before PTCA:

<24 hours _____

24–48 hours _____

>48 hours but during same admission _____

13. Lesions

		No. of lesions	No. of primary angiographic successes*
LAD	Partial occlusion		
	Total occlusion		
Diagonals	Partial occlusion		
	Total occlusion		
RCA including posterior descendens	Partial occlusion		
	Total occlusion		
LCX	Partial occlusion		
	Total occlusion		
Marginals including intermediate	Partial occlusion		
	Total occlusion		
Saphenous vein grafts	Partial occlusion		
	Total occlusion		
Internal mammary grafts	Partial occlusion		
	Total occlusion		
Left main	Partial occlusion		
	Total occlusion		
Other (please list)	Partial occlusion		
	Total occlusion		

***Note: Primary angiographic success is success at time of procedure characterised by absolute reduction of initial degree of luminal diameter stenosis by at least 20% plus a residual diameter stenosis of less than 50%.**

14. Average no. of lesions attempted per procedure
(total lesions/total procedures (from 4b)) _____

15. Number of patients defined as early clinical successes
(successful reduction of all lesions, and no angina or complications pre-discharge) _____

16. No. of patients where procedure included insertion of a stent(s) _____

17. No. of patients where procedure included use of laser _____

18. No. of patients where procedure included use of:

(a) Directional atherectomy _____

(b) Rotoblator atherectomy _____

(c) Extraction atherectomy _____

(d) ReoPro _____

(e) Brachytherapy _____

(f) Other viz _____

19. Subsequent procedures and complications for PTCA **not done as primary or rescue procedure for AMI.** Please include patients having primary or rescue PTCA for AMI in Question 20 (with particular reference to haemodynamic status at onset of PTCA).

(a) Subsequent CABG during same admission

CABG within 24 hours for failed PTCA or for complications of PTCA	No. survived_____	No. died** __
CABG after 24 hours for failed PTCA or for complications of PTCA	No. survived_____	No. died** __

(b) Acute myocardial infarction during same admission*	**Number**
<24 hours after PTCA	_____
>=24 hours after PTCA	_____
Total	_____
Survived	_____
Died**	_____

(c) Other deaths (excluding (a) and (b))

~ within 24 hours of PTCA**	_____
~ after 24 hours following PTCA, during same admission**	_____

(d) Arterial complications prolonging hospital stay _____

* **AMI = new Q waves or T wave changes with enzymes twice upper limit of normal**

** **Please provide brief details including time interval after PTCA, indications, procedures and circumstances**

_____

_____

_____

_____

_____

_____

_____

_____

_____

20. Subsequent procedures and complications for PTCA **done as a primary or rescue procedure for AMI** (with particular reference to haemodynamic status at onset of PTCA).

(a) Subsequent CABG during same admission

CABG within 24 hours for failed PTCA or for complications of PTCA — No. survived_____ No. died** __

CABG after 24 hours for failed PTCA or for complications of PTCA — No. survived_____ No. died** __

	Number
(b) Other deaths (excluding (a) and (b))	
~ within 24 hours of PTCA**	_____
~ after 24 hours following PTCA, during same admission**	_____
(c) Arterial complications prolonging hospital stay	_____

**** Please provide brief details including time interval after PTCA, indications, procedures and circumstances**

_____

_____

_____

_____

_____

_____

_____

_____

_____

Related publications

Australian Institute of Health and Welfare (AIHW) 2000. Australia's health 2000: the seventh biennial health report of the Australian Institute of Health and Welfare. AIHW Cat. No. AUS 19. Canberra: AIHW.

Australian Institute of Health and Welfare (AIHW) 2001. Australian hospital statistics 1999–00. Health Services Series No. 17. AIHW Cat. No. HSE 14. Canberra: AIHW.

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Australian Institute of Health and Welfare (AIHW) 2001. Heart, stroke and vascular diseases, Australian facts 2001. Canberra: AIHW, National Heart Foundation of Australia, 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 & National Heart Foundation of Australia.

Davies J & Senes S 2001. Coronary angioplasty in Australia 1998. (Cardiovascular Disease Series No. 15). AIHW Cat. No. CVD 14. Canberra: AIHW & National Heart Foundation of Australia.

Waters A-M, Armstrong T & Senes-Ferrari S 1998. Medical care of cardiovascular disease in Australia. Cardiovascular Disease Series No. 7. AIHW Cat. No. CVD 4. 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