Coronary angioplasty in Australia 1996

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CARDIOVASCULAR DISEASE SERIES

Coronary angioplasty in Australia 1996

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September 1999

Australian Institute of Health and Welfare
and
National Heart Foundation of Australia
Canberra

AIHW cat. no. CVD 9

This publication is part of the Australian Institute of Health and Welfare's Cardiovascular Disease Series. A complete list of the Institute's publications is available from the Publications Unit, Australian Institute of Health and Welfare, GPO Box 570, Canberra ACT 2601, or via the Institute's web site (http://www.aihw.gov.au).

ISSN 1323-9236
ISBN 1 74024 025 1

Suggested citation

Senes S & Davies J 1999. Coronary angioplasty in Australia 1996. AIHW Cat. No. CVD 9. Canberra: AIHW & National Heart Foundation of Australia.

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Published by AIHW and National Heart Foundation of Australia

Printed by Elect Printing

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Preface

This is the twelfth national report on coronary angioplasty and presents information on all procedures performed in 1996. It is produced jointly by the Australian Institute of Health and Welfare and the National Heart Foundation of Australia. The National Heart Foundation has been compiling data and reporting on coronary angioplasty performed in Australia since 1980. An advisory committee appointed by the Foundation oversees the angioplasty register and the Institute is responsible for collating, analysing and reporting the data through its National Centre for Monitoring Cardiovascular Disease. The project is financed by the Foundation and the Institute, through funds it receives for the National Centre from the Commonwealth Department of Health and Aged Care.

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.

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

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Acknowledgements

This report was prepared by Ms Susana Senes-Ferrari and Ms Joanne Davies, who coordinate the register on behalf of the Angioplasty Committee, with valuable comments from Dr Stan Bennett and Dr Paul Magnus. The members of the committee are Dr Louis Bernstein (New South Wales), Dr Ian Meredith (Victoria) and Dr Constantine Aroney (Queensland). The cooperation of the staff of Interventional Cardiac Laboratories in Australia, who provided their results for 1996, is gratefully acknowledged. The assistance of Ms Narelle Grayson and Ms Amanda Nobbs is greatly appreciated.

List of abbreviations

AMI	acute myocardial infarction
CABG	coronary artery bypass grafting
CPR	cardiopulmonary resuscitation
Cx	circumflex artery
CK	creatinine kinase
GIT	gastro-intestinal tract
IABP	intra-aortic balloon pump
IMA	internal mammary artery
IMI	inferior myocardial infarction
LAD	left anterior descending artery
LBBB	left bundle branch block
LCx	left circumflex artery
LM	left main artery
LVF	left ventricular function
PTCA	percutaneous transluminal coronary angioplasty
RCA	right coronary artery
SAP	stable angina pectoris
SVG	saphenous vein graft
UAP	unstable angina pectoris
VF	ventricular fibrillation

Summary

This report was prepared within the National Centre for Monitoring Cardiovascular Disease at the Australian Institute of Health and Welfare. It aims to provide details of percutaneous transluminal coronary angioplasty (PTCA) as performed in Australia in 1996. The report 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 1996 there were an estimated 13,854 coronary angioplasty procedures performed in Australia, with an average of 330 procedures per unit.
- Coronary angioplasty procedures increased by 22% in 1996 compared with the previous year.
- The age-standardised average national PTCA rate was 726 per million population. This varies widely across States, from 472 per million population in Queensland to 875 per million population in Western Australia.
- Angioplasty is three times as common in males as it is in females.
- Patients undergoing angioplasty are most frequently between 60 and 79 years old.
- A total of 96 physicians were operating in 42 Interventional Cardiac Laboratories throughout the country.
- There were 13,518 hospitalisations involving PTCA procedures, with an average length of stay of 5.5 days.
- Twenty per cent of the procedures were repeats, and in 52% of such cases these repeats occurred within 12 months. In 69% of those cases which involved intervention more than once in 1996, repeat procedures were to the same lesion.
- The main indications for PTCA were stable angina pectoris (46%) and unstable angina pectoris (41%). Acute myocardial infarction (8%) is emerging as another significant indication.
- Thirteen per cent of procedures were done on patients with previous coronary artery bypass grafts.
- Thrombolytic therapy was used before angioplasty in 8% of procedures.
- Stents were inserted in 54% of PTCA patients in 1996. This represents a 106% increase over their use in the previous year.
- Complication rates associated with coronary angioplasty were as follows: need for coronary artery bypass graft 1.4%, myocardial infarction 1.4%, arterial complications 0.7%, mortality 0.5%.
- Coronary angioplasty achieved an adequate reduction in the lesion in 93% of lesions attempted.
- Eighty-six per cent of patients treated were discharged from hospital with a successful reduction of all lesions and no angina or complications.

Introduction

Heart disease is a major cause of morbidity and mortality, responsible for 30% of all deaths in Australia in 1997. 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 deposits of abnormal tissue known as plaques. There is a range of treatments 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 15 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 create 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 hence its use is increasing rapidly.

The aim of this report is to provide details of PTCA as performed in Australia in 1996. The report covers patterns and trends in the use of the technique, indications, complications and success rates, as well as monitoring the uptake of stenting and other adjunctive techniques.

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

Methods

This report summarises data on all coronary angioplasty performed in 1996 and includes aggregate figures from previous years. Units operating in 1996 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

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, 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 only, 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 1996 form sought additional details on procedures for restenosis in previously stented and non-stented lesions.

Units' responses are reviewed, data are checked for consistency and any discrepancies are referred to the relevant unit. The data are then entered into a dedicated database at the Australian Institute of Health and Welfare. Results are analysed and the annual report compiled and reviewed by members of the advisory committee before its publication.

Coverage

The register is believed to have full coverage of coronary angioplasty procedures done in Australia to the end of 1995. However, for 1996 procedures, several units did not provide their data:

State	Number of units not participating in the register
Queensland	1
South Australia	1
Victoria	4

To give a complete national picture of angioplasty performed in 1996 despite the above limitation, for this report, the data from the register have been complemented with information from the National Hospital Morbidity Database held by the Australian Institute of Health and Welfare. 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 Australian Institute of Health and Welfare. 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.

We found very good concordance between the data held in the National Hospital Morbidity Database and those reported directly to the register by participating units.

The total number of procedures nationally and for each State was estimated from this source. In addition, this database supplied information on the age and sex of patients, number of hospital separations and length of stay for coronary angioplasty. Records for separations with procedure codes for PTCA or stenting (ICD-9-CM 36.01, 36.02, 36.05, 36.06, 36.07) and with separation dates between 1 January and 31 December 1996 were included.

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 to that being stented. In this case both the angioplasty and the stent are coded separately (Australian Coding Standards, Volume 4, ICD-9-CM, Second Edition, 1996). Therefore, to count all PTCA procedures, episodes with a code for stenting (36.06 or 36.07) but no code for PTCA (36.01, 36.02, 36.05) 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 36.01, 36.02 and 36.05 are mutually exclusive. Thus, if any combination of these codes was reported for one record, more than one procedure was performed.
2. Codes 36.06 and 36.07 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 (36.01 or 36.02 or 36.05) and for stents (36.06 or 36.07), 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 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 which achieves an absolute reduction of 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 had 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 Australian Capital Territory population with New South Wales, and the Northern Territory population with South Australia, as those States are where the vast majority of ACT and NT residents are treated. Standardised rates, which take account of differences in the age structure of the populations, have been included to provide a valid comparison of procedure rates across States.

Number of units and procedures

There were an estimated 13,854 angioplasty procedures performed in Australia in 1996, by 96 physicians in 42 cardiology units. This was a 22.1% increase in procedures over 1995, re-affirming the continuing growth of angioplasty among the range of cardiological interventions. The average number of angioplasty procedures was 330 per unit, compared with 291 per unit in 1995. To the end of 1996 a total of 74,777 angioplasty procedures had been performed in Australia (Table 1). A list of all Interventional Cardiology Laboratories is presented in Appendix A.

Table 1: Number of procedures and units, 1980–96

			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

(a) AIHW analysis of data from the National Hospital Morbidity Database.

Angioplasty by age and sex

Angioplasty is done more frequently in males than females, at a ratio of 3.0:1. The difference in procedure rates between men and women is most marked in the age range 35–59 but it is evident across all adult ages (Table 2). Procedure rates peak at ages 60–74 among males and 65–79 among females.

Table 2: Coronary angioplasty procedures by age and sex, 1996

	Males		Females		
Age	Number	Age-specific rate per million	Number	Age-specific rate per million	Ratio male:female
20–24	1	1.4	0	0.0	—
25–29	13	18.2	7	9.9	1.8
30–34	48	67.0	14	19.4	3.4
35–39	249	344.3	27	37.1	9.3
40–44	551	823.4	86	127.9	6.4
45–49	1,076	1,642.6	191	298.0	5.5
50–54	1,430	2,744.9	273	545.5	5.0
55–59	1,581	3,730.7	386	943.1	4.0
60–64	1,621	4,623.0	530	1,507.7	3.1
65–69	1,652	4,911.5	717	2,019.7	2.4
70–74	1,311	4,736.7	670	2,057.2	2.3
75–79	612	3,406.4	413	1,673.3	2.0
80–84	168	1,571.5	158	893.5	1.8
85+	33	545.2	36	255.5	2.1
20+	**10,346**	**1,602.3**	**3,508**	**525.8**	**3.0**

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

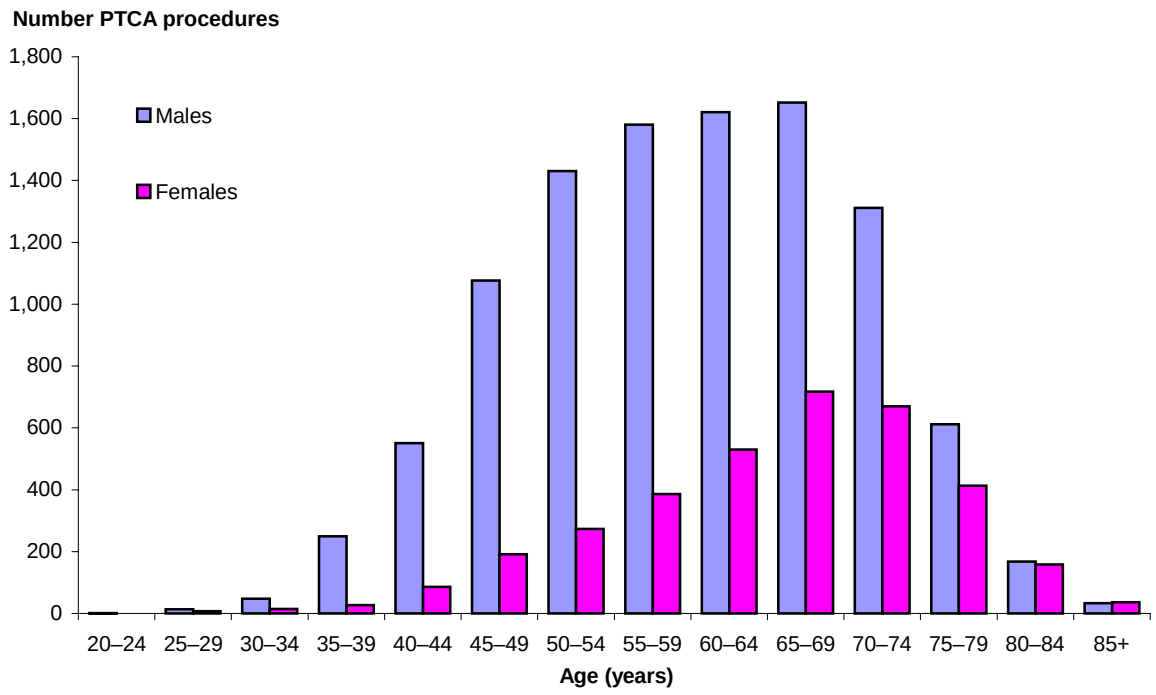


Figure 1: Coronary angioplasty procedures by age and sex, 1996

Hospital separations

In 1996 there were 13,518 separations involving coronary angioplasty procedures. The average length of stay in hospital was 5.5 days, with a median length of stay of 3.0 days. However, 14.6% (1,974) of these hospitalisations were overnight separations and 3.9% (538) were same-day separations.

Repeat procedures

Five of the units could not provide details on repeat procedures. For the 10,202 procedures done in the remaining units, 19.7% of the procedures were repeats; and of these, the patient had undergone previous angioplasty in 1996 in 52.3% of cases, and before 1996 in 47.7% of cases (Figure 2).

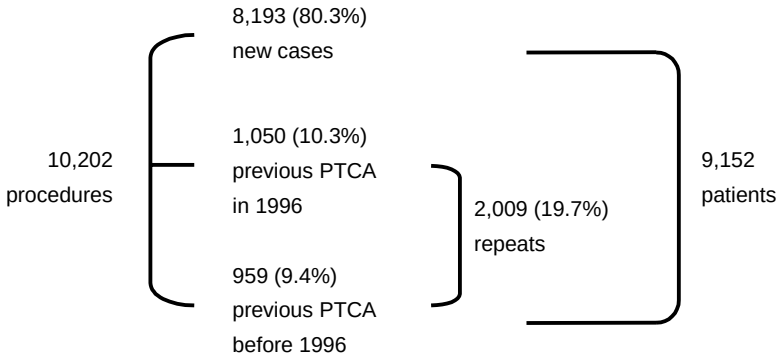


Figure 2: First and repeat procedures, 1996

Repeat procedures done within 12 months

Eight units could not provide information on the time interval between repeat procedures done in 1996. For the remaining 904 procedures, 9.3% of repeats were done less than 24 hours after the first procedure, 46.7% were between 24 hours and less than three months, 28.3% were between three months and less than six months, 10.6% were between six months and less than 12 months, and for 5.1% the time interval between procedures was not specified.

Nine units could not provide information on the reason for repeat procedures. For the remaining 918 procedures, 67.5% of repeats were to the same lesion, 3.9% were for a previous failure and 28.5% were not specified.

Of the repeat procedures done to the same lesion (620 procedures), 48.2% were to the same unstented lesion, 20.6% were to the same stented lesion and 31.1% were not specified.

Repeat procedures done more than 12 months apart

Nine units could not provide information on the time interval between repeat procedures done before 1996. For the remaining 727 procedures, 0.4% of repeat procedures were done less than 24 hours after the first procedure, 6.1% were between 24 hours and less than three months, 16.8% were between three months and less than six months, 17.2 % were between six months and less than 12 months, 53.0% were 12 months or more apart, and for 6.6% the time interval was not specified.

Ten units could not provide information on the reason for repeat procedures. For the remaining 808 procedures, 46.6% of repeats done more than 12 months apart were to the same lesion, 1.7% were for a previous failure and 51.7% were not specified.

Of the repeat procedures done to the same lesion (376 procedures), 55.1% were to the same unstented lesion, 18.6% were to the same stented lesion and 26.3% were not specified.

Trends in procedure type

The overwhelming majority of procedures are done on single coronary vessels only (Table 3). The proportion of double-vessel procedures increased between 1995 and 1996, from 8.3% to 9.3% of the total. In 1996, single-vessel angioplasty comprised 89.8% of the 9,756 procedures where the details on the number of vessels were supplied. Figure 3 illustrates trends in the number of single and multi-vessel procedures since 1980.

Table 3: Trends in procedure type, 1980–96

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)]	10,179	928	86	11,193
1996[(b)]	8,764	907	85	9,756

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

(b) Details of vessels were unavailable for 2,938 procedures performed in 1996.

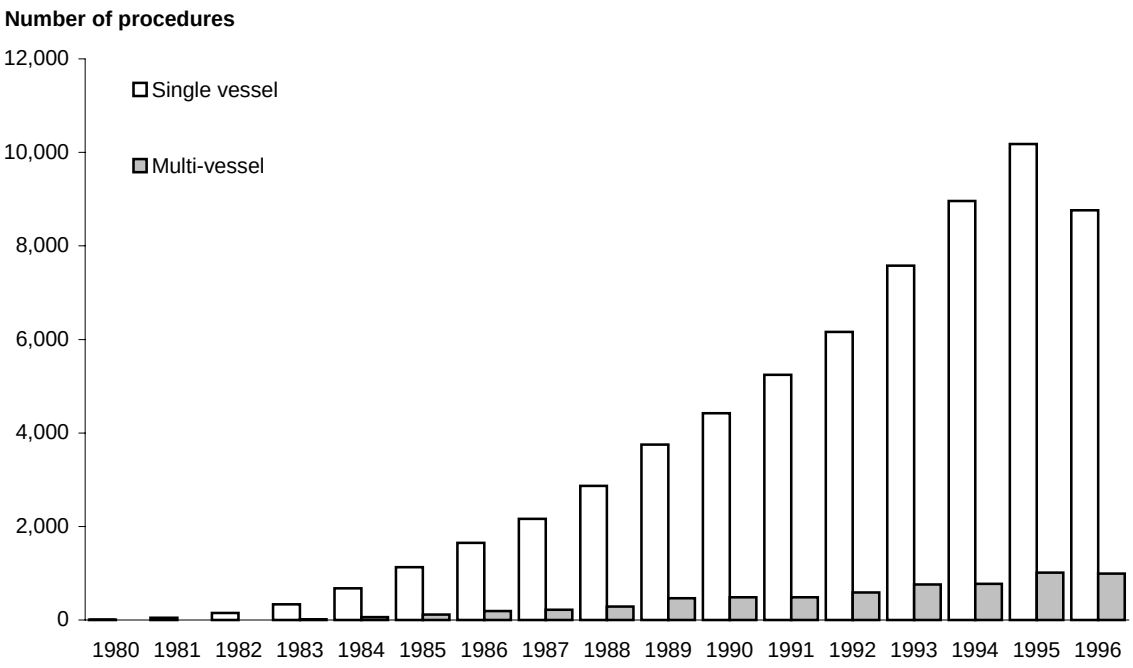


Figure 3: Number of procedures, 1980–96

State comparison of PTCA rates

The (age-standardised) national average rate for PTCA procedures is 726 per million population in 1996. There is a wide variation in rates across States ranging from 472.3 per million population in Queensland to 874.8 per million population in Western Australia (Figure 4). Differences in age-adjusted procedure rates may reflect underlying differences in the prevalence of the conditions being treated or differences in clinical practice between States but they do not necessarily imply that the rates are inappropriate.

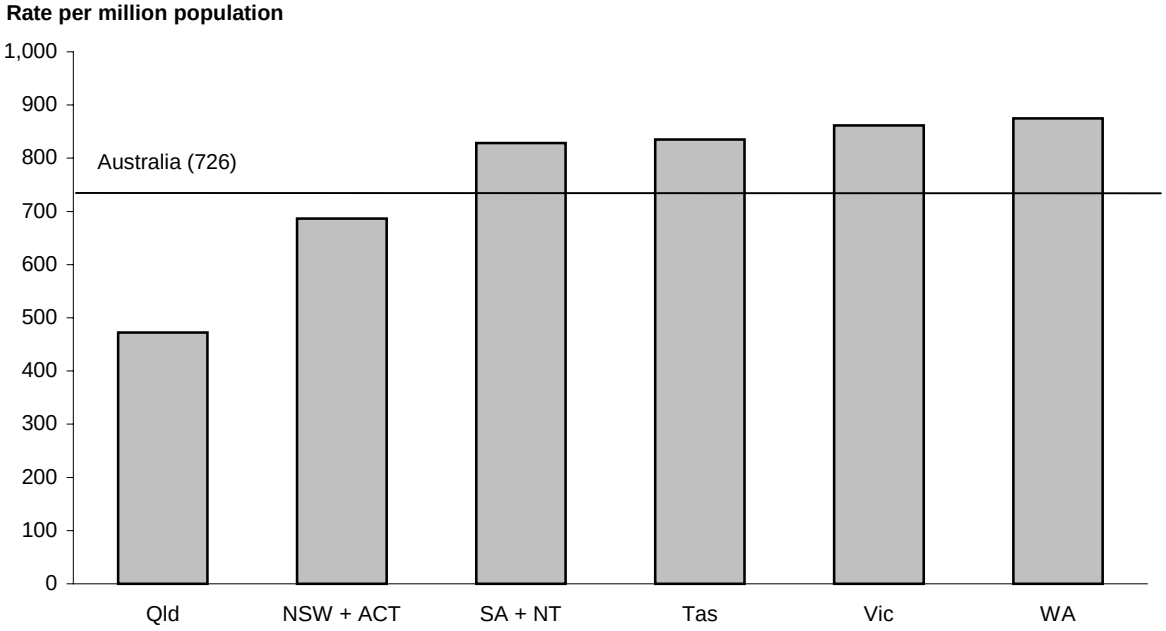
Table 4: Coronary angioplasty by State, 1996

	NSW + ACT	Vic	Qld	WA	SA + NT	Tas	Australia
Crude rate	726.9	915.5	475.3	841.8	882.8	891.6	757.4
Standardised rate[(a)]	686.3	858.3	472.3	874.8	828.4	835.2	726.2

(a) Age-standardised to the 1991 Australian population.

Note: Rates per million population. Rates have been calculated to include the ACT population with NSW and the NT population with SA since those are the States where the vast majority of ACT and NT residents are treated.

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



Note: Age-standardised to the 1991 Australian population.

Figure 4: Coronary angioplasty rate by State, 1996

Indications for angioplasty

Not all units could supply this information, but of the 10,381 procedures for which data were available, the indication in 4,795 (46.2%) was stable angina pectoris (SAP) and in 4,220 (40.7%) unstable angina pectoris (UAP). Angioplasty was performed for prognostic reasons in 1.6% of cases and for acute myocardial infarction (AMI) in 7.7% of procedures (Table 5). Angioplasty for AMI has remained at approximately the same level as in 1995.

Data were also requested about the use of angioplasty as either a primary or 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. PTCA was used as a primary procedure for AMI in 54.2% of AMI cases, as a rescue procedure for AMI in 24.9% of AMI cases, and no details were given in 20.9% of AMI cases.

On the 1996 collection form, additional data were sought about the time interval from AMI to primary or rescue PTCA (Table 5). For the cases where the information was available, most primary PTCA procedures were done within two hours of AMI, whereas rescue PTCA procedures were performed predominantly after 24 hours from AMI being diagnosed.

Table 5: Indications for angioplasty, 1996

Indication	Interval AMI to PTCA	Number of procedures	Per cent
SAP		4,795	46.2
UAP		4,220	40.7
AMI primary	0–<2 hrs	129	1.2
	2–<4 hrs	82	0.8
	4–<6 hrs	40	0.4
	6–<8 hrs	70	0.7
	Not specified	112	1.1
AMI primary subtotal		*433*	*4.2*
AMI rescue	0–<2 hrs	8	0.1
	2–<4 hrs	13	0.1
	4–<24 hrs	44	0.4
	After 24 hours	133	1.3
	Not specified	1	0.0
AMI rescue subtotal		*199*	*1.9*
AMI primary/rescue not specified		167	1.6
Subtotal AMI		*799*	*7.7*
Prognostic		167	1.6
Other indication		24	0.2
Not specified		376	3.6
Total		**10,381**	**100.0**

SAP stable angina pectoris

UAP unstable angina pectoris

AMI acute myocardial infarction

Previous coronary artery bypass grafts

All but five units could answer this question about the numbers of angioplasty patients with existing coronary artery bypass grafts (CABG). Of the 10,893 procedures performed by these 31 units, 1,378 (12.7%) were on patients with CABGs.

Approach for procedure

Not all the units could provide information on the approach for procedure. For the 10,546 procedures for which information was available in 1996, in nearly all the procedures (99.2%), the approach to the coronary arteries was made through the femoral artery, the remainder using the brachial (0.6%) and radial (0.2%) approaches. This was similar to the proportion in previous years.

Angioplasty after thrombolytic therapy

Nineteen of the 36 units could supply information on the number of patients who underwent angioplasty after having received thrombolytic therapy for acute myocardial infarction. Of the 7,291 procedures carried out by these units, 561 (7.7%) involved the use of angioplasty after thrombolytic therapy. This proportion was slightly higher than in 1995.

In 8.6% of procedures thrombolytic therapy was given less than 24 hours prior to PTCA, in 28.3% it was given between 24 and 48 hours prior to PTCA, in 50.8% it was given more than 48 hours prior to PTCA, and in 12.3% procedures the time was not known.

Stents, atherectomy, laser and other adjunctive techniques

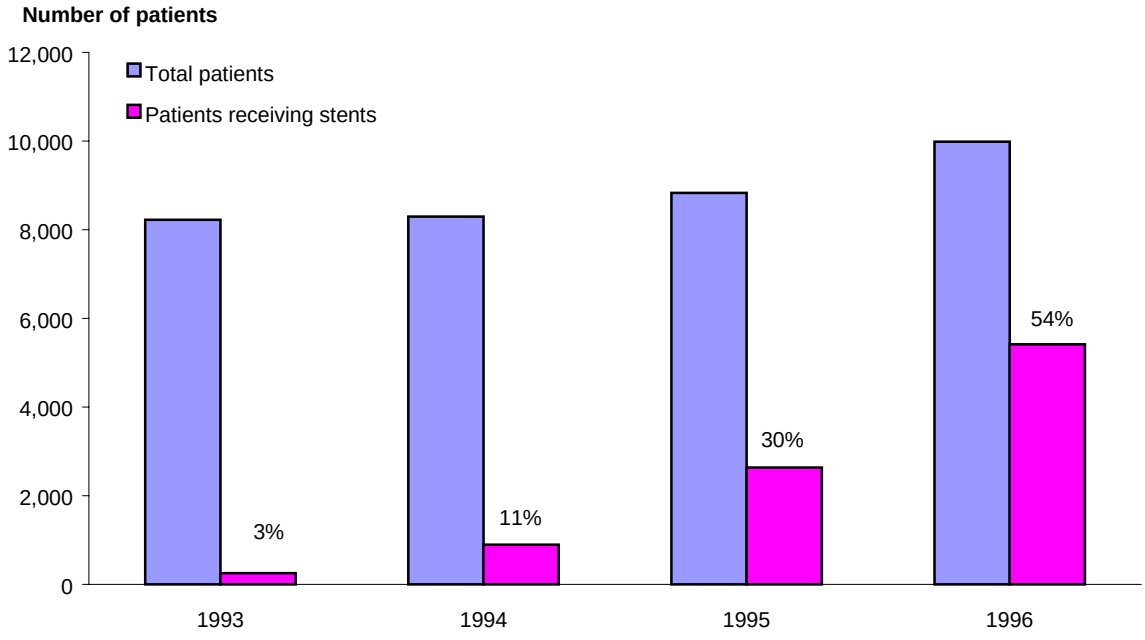
Not all units could provide information on the use of adjunctive techniques on angioplasty patients. For the 9,998 patients in the units supplying the information, 5,414 (54.2%) had stents inserted whereas atherectomies were performed on 153 patients: six directional (0.1%) and 147 rotablator (1.5%). There were no procedures in 1996 that involved the use of laser. Abciximab (ReoPro) was used in 436 (4.4%) patients in 1996. Intra-aortic balloon pump (IABP), ticlopidine, urokinase, calcium channel blocker, and cutting balloon were used in other procedures (Table 6). Since 1993 there has been a sharp increase in stenting as an adjunct to coronary angioplasty (Figure 5).

Table 6: Stents, atherectomy, laser and other adjunctive techniques, 1993–96

			Atherectomy									
	Stents		Directional		Rotablator		Laser		Abciximab		Other	
Year	Patients	%	Patients	%	Patients	%	Patients	%	Patients	%	Patients	%
1993	255	3.1	78	0.9	117	1.4	0	0.0	n.c.	—	n.c.	—
1994	896	10.8	88	1.1	167	2.0	0	0.0	n.c.	—	n.c.	—
1995	2,632	29.8	27	0.3	132	1.5	0	0.0	n.c.	—	n.c.	—
1996	5,414	54.2	6	0.1	147	1.5	0	0.0	436	4.4	82	0.8

n.c. Information not collected by the National Coronary Angioplasty Register prior to 1996.

Note: Excludes units where details of procedures were unavailable.



Note: Excludes patients where details of procedures were unavailable.

Figure 5: Coronary stenting trends, 1993–96

Stenting by age and sex

Stents were inserted in 6,146 (44.4%) coronary angioplasty procedures during 1996. Stenting rates are highest in males aged 60–74 years and females aged 65–79 (Table 7). There is a marked difference in the use of stents between the sexes, with males having over three times the rate of females. This corresponds with the difference in angioplasty rates seen between males and females.

State comparison of stenting rates

The (age-standardised) national average rate for coronary stenting procedures is 322.0 per million population in 1996. There is a wide variation in rates across States ranging from 253.1 per million population in South Australia (including the Northern Territory) to 508.5 per million population in Tasmania (Table 8 and Figure 6).

Table 7: Coronary stenting procedures by age and sex, 1996

	Males		Females		
Age	Number of procedures	Age-specific rate per million	Number of procedures	Age-specific rate per million	Ratio male:female
20–24	1	1.4	0	0.0	—
25–29	3	4.2	0	0.0	—
30–34	17	23.7	9	12.5	1.9
35–39	121	167.3	16	22.0	7.6
40–44	244	364.6	40	59.5	6.1
45–49	519	792.3	78	121.7	6.5
50–54	651	1,249.6	109	217.8	5.7
55–59	734	1,732.0	171	417.8	4.1
60–64	740	2,110.4	212	603.1	3.5
65–69	730	2,170.3	302	850.7	2.6
70–74	576	2,081.1	254	779.9	2.7
75–79	277	1,541.8	168	680.7	2.3
80–84	79	739.0	60	339.3	2.2
85+	17	280.9	18	127.7	2.2
20+	**4,709**	**729.3**	**1,437**	**215.4**	**3.4**

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

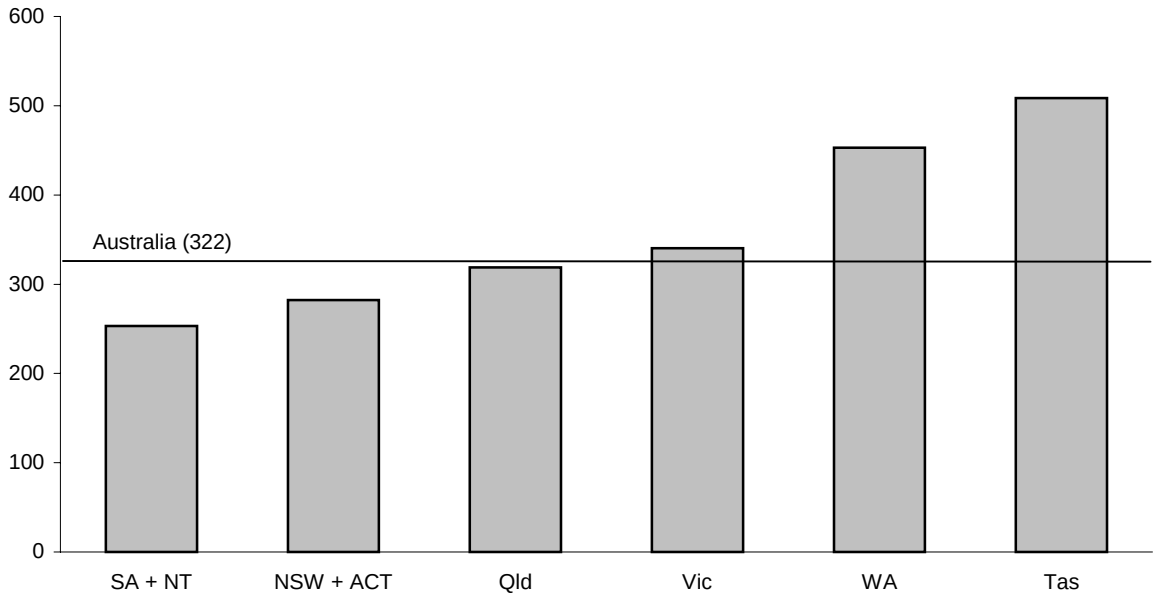
Table 8: Coronary stenting by State, 1996

	NSW + ACT	Vic	Qld	WA	SA + NT	Tas	Australia
Crude rate	299.4	361.0	321.4	437.3	270.5	543.8	335.7
Standardised rate[(a)]	282.4	340.4	318.8	453.0	253.1	508.5	322.0

(a) Age-standardised to the 1991 Australian population.

Note: Rates per million population. Rates have been calculated to include the ACT population with NSW and the NT population with SA since those are the States where the vast majority of ACT and NT residents are treated.

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



Note: Age-standardised to the 1991 Australian population.

Figure 6: Coronary stenting rate by State, 1996

Complications

As the use of angioplasty for primary or rescue AMI becomes more widespread, it is important to monitor outcomes in these cases separately from those in lower risk patients. Currently the register does not hold information to allow reporting of outcomes in such detail but data collection forms have been enhanced and, with the cooperation of units, we expect to be able to present a more in-depth analysis for procedures performed in 1998.

Coronary artery bypass grafts

Table 9 and Figure 7 show the number of patients requiring coronary artery bypass grafts (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 10,706 procedures performed by the units with these data, 145 angioplasty patients required CABG during the same hospital admission, a rate of 1.4%. Of these, 118 (81.4%) were within 24 hours of angioplasty, and were emergency operations for complications of the procedure. The remaining 27 patients had CABG later during their admission. Since 1990 the rate of CABG post-angioplasty has fluctuated around 2% but in 1996 it reached an all-time low.

Table 9: Coronary artery bypass grafting for angioplasty failure or complications, 1980–96

Year	Total number of procedures	CABG within 24 hours		CABG after 24 hours		CABG total	
		Number	Per cent	Number	Per cent	Number	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

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

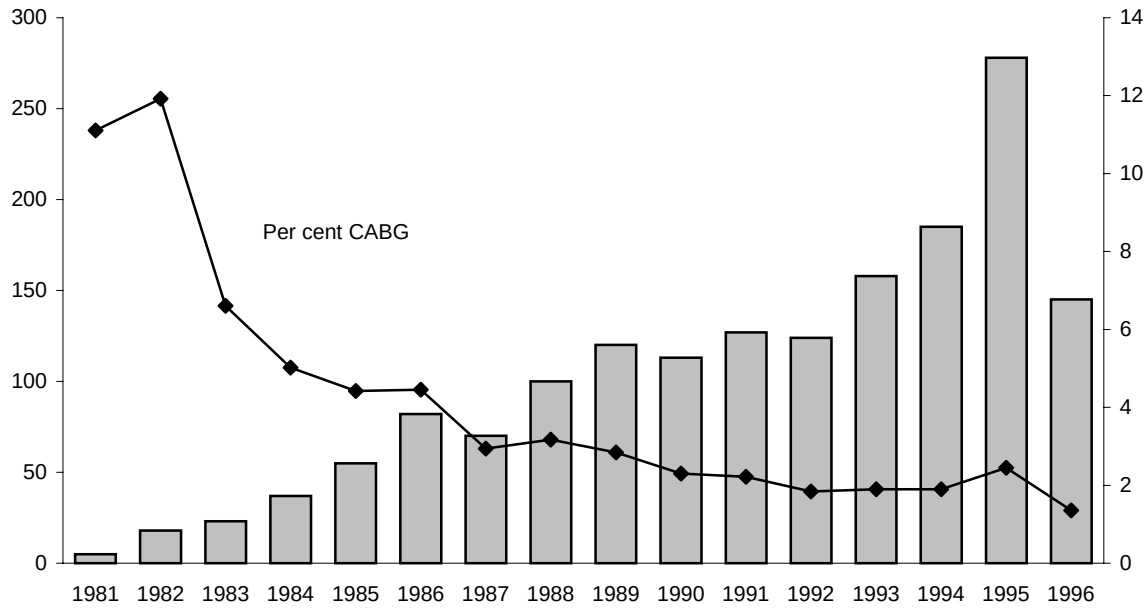


Figure 7: Coronary artery bypass grafting for angioplasty failure or complications, 1981–96

Associated myocardial infarction

Seven units could not supply the number of patients who suffered acute myocardial infarction after angioplasty but during the same hospital admission. In the remaining units, there were 152 such cases. This is equivalent to a rate of 1.4% for those units' 10,706 procedures over the year. The rate has been around 1–2% since 1984 (Table 10 and Figure 8).

Table 10: Angioplasty and associated myocardial infarction[a], 1980–96

Year	Procedures	Number of AMI	Per cent of AMI
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 [b]	85	2.1
1991	4,826 [b]	70	1.5
1992	5,603 [b]	74	1.3
1993	7,041 [b]	80	1.1
1994	8,231 [b]	112	1.4
1995	10,050 [b]	155	1.5
1996	10,706 [b]	152	1.4

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

Arterial complications prolonging hospital stay

Seven units could not supply information on the number of arterial complications prolonging hospital stay after angioplasty procedures. Among 10,706 procedures done by the units with these data, there were 78 such complications. This represents a rate of 0.7%.

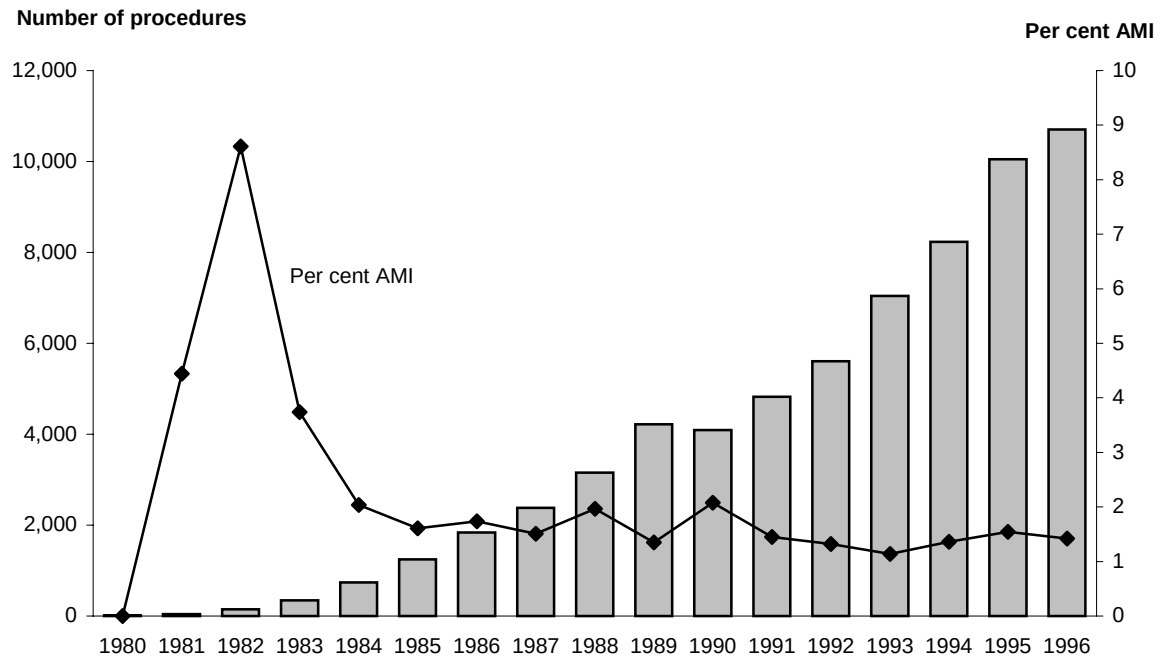


Figure 8: Acute myocardial infarction associated with angioplasty, 1980–96

Mortality

Only 29 units could provide information on deaths in 1996. Among 10,706 procedures for which information was available, there were 54 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 with either cardiogenic shock, poor left ventricular function or life-threatening ventricular arrhythmias pre-procedure. 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 29 deaths occurred within 24 hours of the procedure, 12 of which followed emergency CABG for complications of angioplasty. Eleven more deaths occurred after 24 hours but in the same hospital admission. This is a total rate of 0.5% for the year (Table 11 and Figure 9).

Table 11: Mortality associated with angioplasty, 1980–96

Year	Number of procedures	Number of deaths	Per cent of deaths
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 [(a)]	54	0.5

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

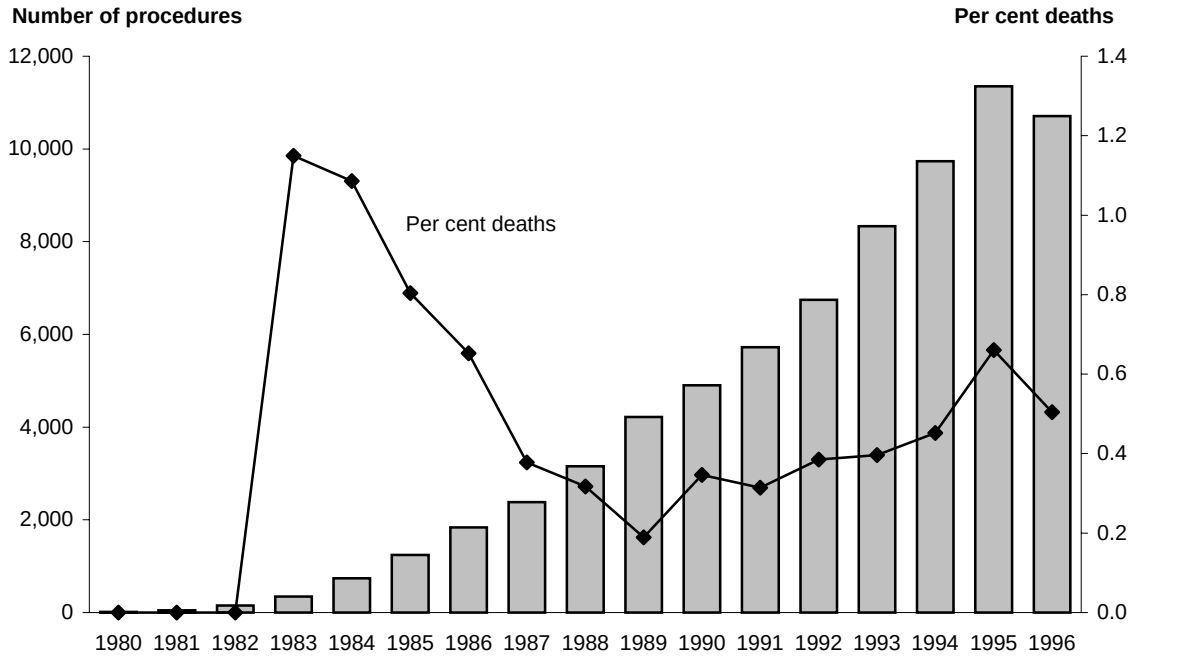


Figure 9: Mortality associated with angioplasty, 1980–96

The cause of death of most of the 54 patients who died in 1996 is listed below as supplied by each unit:

1. 45–49* year old male patient. Elective PTCA and stent to Cx for unstable angina. Acute occlusion, myocardial infarction, repeat PTCA, referred to emergency surgery. Patient died.
2. Elective PTCA to LAD for unstable angina. Patient died two weeks post-CABG.
3. 75–79 year old male patient with three-vessel disease and severely impaired LV. Primary PTCA for cardiogenic shock. Successful PTCA of RCA. Patient died within 24 hours.
4. 60–64 year old male patient with severe multi-system disease and not suitable for CABG. Limiting angina. Acute closure during PTCA of large Cx intermediate leading to VF and hypotension requiring CPR and IABP. Vessel successfully opened and stabilised but post-procedure retroperitoneal bleeding occurred which could not be stabilised mechanically. Lacerated liver found at emergency laparotomy presumably related to CPP. Patient died of post-operative multi-system failure in ICU.
5. Extensive dissection involving LAD, Cx and LM. Cardiac arrest, emergency CABG, side branch occlusion, CK peak 355, non-Q wave infarct.
6. 85–89 year old female patient. Recent myocardial infarction, multi-vessel disease, mitral regurgitation, LV dysfunctional, ventilation for pulmonary oedema, culprit Cx stenting. Reinfarction on day four, death.
7. 80–84 year old male patient. Primary stent to LM for AMI and cardiogenic shock. Death on day three from persistent shock.

* Patients' ages are shown in five-year age range for confidentiality reasons.

8. 70–74 year old male patient. Primary PTCA to LAD for AMI, LVF, 3°AV block, recent GIT bleeding. Death from shock on day one.
9. 54–59 year old female patient. Salvage PTCA to RCA for acute inferior infarction, 3°AV block. Death on day two from pericardial tamponade secondary to perforated temporary venous pacemaker.
10. 65–69 year old male patient. PTCA to intermediate artery for stable angina, death from coronary air embolism.
11. 55–59 year old male patient. Acute infarction with cardiogenic shock. Acute and chronic renal failure, acidosis, hypervolemia. Successful PTCA to RCA, IABP placed via right femoral artery after PTCA and stent to stenosis. Arrested and died post-procedure (< 2 hours).
12. Increased CK, CKMB. No procedures. Cause of death pulmonary oedema, MI.
13. 75–79 year old male patient with acute anterior MI, in cardiogenic shock. Successful PTCA to occluded LAD. Died one hour post-procedure with refractory shock.
14. 40–45 year old male patient with acute anterior MI. Rescue PTCA of occluded LAD unsuccessful. Died 26 hours post-procedure.
15. 65–69 year old female patient. Unstable angina pectoris post-IMI with severe amiodarone pulmonary toxicity. Successful PTCA to RCA. Died on day 11 with severe haematemesis.
16. PTCA and stent to LAD unsuccessful as stent became dislodged in left main. Deployed there and result seemed satisfactory. VF arrest four hours post-procedure with inability to resuscitate.
17. Patient with refractory unstable angina post-coronary bypass surgery. Incipient cardiogenic shock pre-procedure. PTCA of native LAD attempted through LIMA graft via left brachial cutdown. Balloon occlusion of LAD resulted in irreversible haemodynamic collapse and death.
18. 70–74 year old female patient with prior CABG. PTCA to Cx. Patient became unconscious at the end of procedure. Arterial trace suggested tamponade. Echo found loculated pericardial effusion which was not able to be drained percutaneously. Patient went to surgery but died. Late films demonstrated guide wire perforation to distal Cx.
19. Patient with MI <24 hrs, cardiogenic shock due to lateral extension of MI for primary PTCA. Artery opened. Cardiac arrest. Echo showed biventricular akinesis.
20. Patient with stable angina pectoris since PTCA to distal Cx. Pulmonary oedema in CCU. Unable to be resuscitated.
21. MI with cardiogenic shock prior to angioplasty.
22. MI with cardiogenic shock prior to angioplasty.
23. MI with cardiogenic shock prior to angioplasty.
24. Catheter induced dissection of RCA. Urgent CABG. Patient died on day three in ICU.
25. 60–64 year old female patient. Third LAD PTCA (small vessel) ruptured. Tamponade, revascularised, stented. CABG. Large anterior MI. Died one week later.
26. 75–79 year old male patient. Severe diffuse triple-vessel disease. Inoperable. Successful IMA PTCA. Dissected LCx graft. MI, later died.

27. 75–79 year old female patient. Severe triple-vessel disease (inoperable). Difficult anatomy—procedure from arm. Electro-mechanical dissociation during procedure and died.
28. 65–79 year old male patient. Nine months prior successful RCA PTCA and stent PTCA to LAD. Acute pulmonary oedema outside laboratory. Could not be resuscitated despite IABP.
29. 45–49 year old male patient. Long dissection of dominant RCA. Stented, reasonable result but semi-elective CABG same day. Did not come off pump.
30. 75–79 year old female patient. Diffuse LAD. Small rupture caused by high inflation pressure in very tough lesion. Small pericardial effusion. Sudden death next day. Possible tamponade.

Success rates in various vessel types

Definition of success

For the Angioplasty Register, a 'primary success' is defined as a procedure which achieves an absolute reduction of 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

Altogether 10,264 lesions were attempted in 1996, corresponding to an average of 1.2 lesions attempted per procedure. Of the total attempts, 9,561 were primary successes, giving an overall success rate of 93.2%. Eighty-five percent of procedures were on partial occlusions, and 14.9% on total occlusions. Figures 10 and 11 and Table 12 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 left anterior descending artery (LAD) or its diagonals. The right coronary artery (RCA) accounted for a further 33.4% of the lesions, and the left circumflex artery (LCx) including marginals and intermediate, 21.9%. This distribution is similar to that in 1995. Success rates were similar for all types of vessels, at around 93%.

Trends in success rates for partial and total occlusions are presented in Table 13. Overall success rates have remained consistent over the period 1994 to 1996.

There were 658 angioplasty procedures performed on bypass graft vessels, 575 on saphenous vein grafts (SVG, 535 successful), and 18 on internal mammary artery grafts (IMA, 17 successful). There were 58 procedures on left main arteries (LMA), 51 of which were successful. There were seven procedures on other bypass graft vessels, all of which were successful.

The proportion of patients defined as early clinical successes was 85.8%; that is, they had a successful reduction of all lesions, and no angina or complications pre-discharge.

Table 12: Types of vessels and success rates, 1996

	Partial occlusion		Total occlusion		Overall	
Lesions	**Number attempted**	**Per cent successful**	**Number attempted**	**Per cent successful**	**Number attempted**	**Per cent successful**
LAD	2,991	96.3	496	82.1	3,487	94.3
Diagonals	400	90.3	45	80.0	445	89.2
RCA	2,838	95.9	592	74.8	3,430	92.3
LCx	1,287	96.1	237	81.0	1,524	93.8
Marginals & intermediate	642	95.5	78	76.9	720	93.5
Subtotal	*8,158*	*95.8*	*1,448*	*78.6*	*9,606*	*93.2*
SVG	499	94.8	76	81.6	575	93.0
IMA	18	94.4	0	—	18	94.4
LM	54	90.7	4	50.0	58	87.9
Other	6	100.0	1	100.0	7	100.0
Total	**8,735**	**95.7**	**1,529**	**78.7**	**10,264**	**93.2**

Table 13: Success rates, 1994–96

	Partial occlusion			Total occlusion			Overall		
Lesions	**1994**	**1995**	**1996**	**1994**	**1995**	**1996**	**1994**	**1995**	**1996**
LAD & diagonals	93.3	91.6	95.6	82.0	79.9	81.9	92.0	90.1	93.7
RCA	93.1	90.2	95.9	71.8	75.7	74.8	89.9	88.0	92.3
LCx & marginals & intermediate	91.5	90.3	95.9	74.5	78.5	80.0	89.4	88.6	93.7
Total	*92.8*	*90.8*	*95.8*	*76.2*	*78.0*	*78.6*	*90.7*	*89.0*	*93.2*
Total (including SVG, IMA & LM)	**92.7**	**90.8**	**95.7**	**75.8**	**77.6**	**78.7**	**90.6**	**89.0**	**93.2**

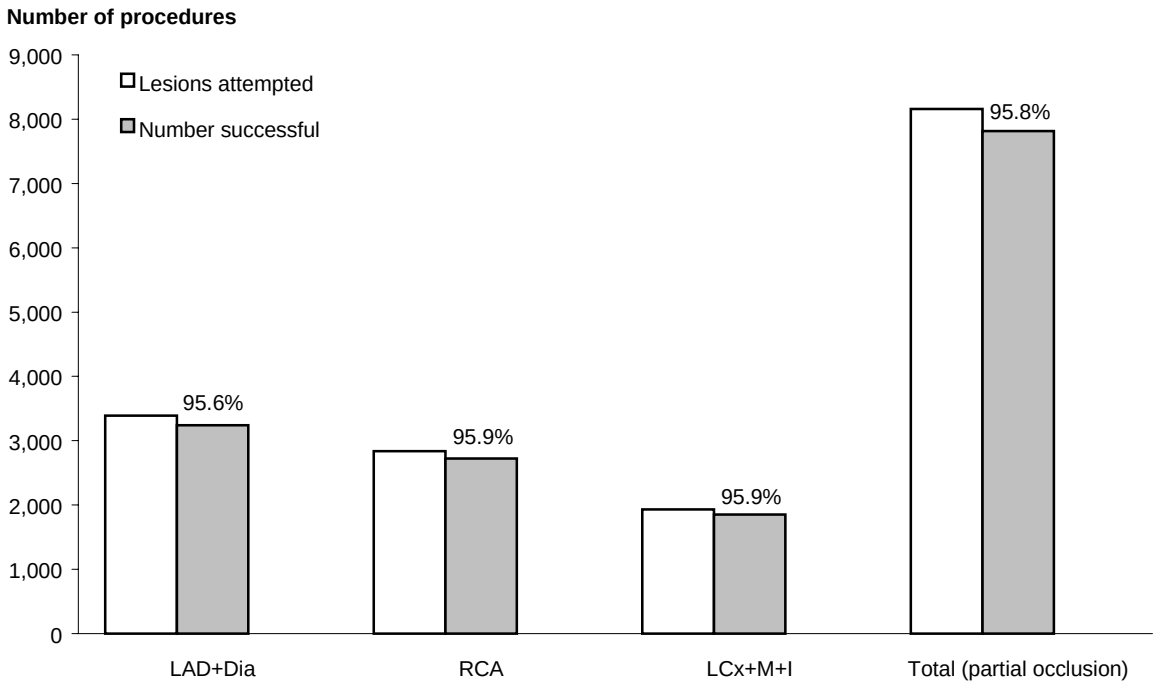


Figure 10: Number of lesions and success rates for partial occlusions, 1996

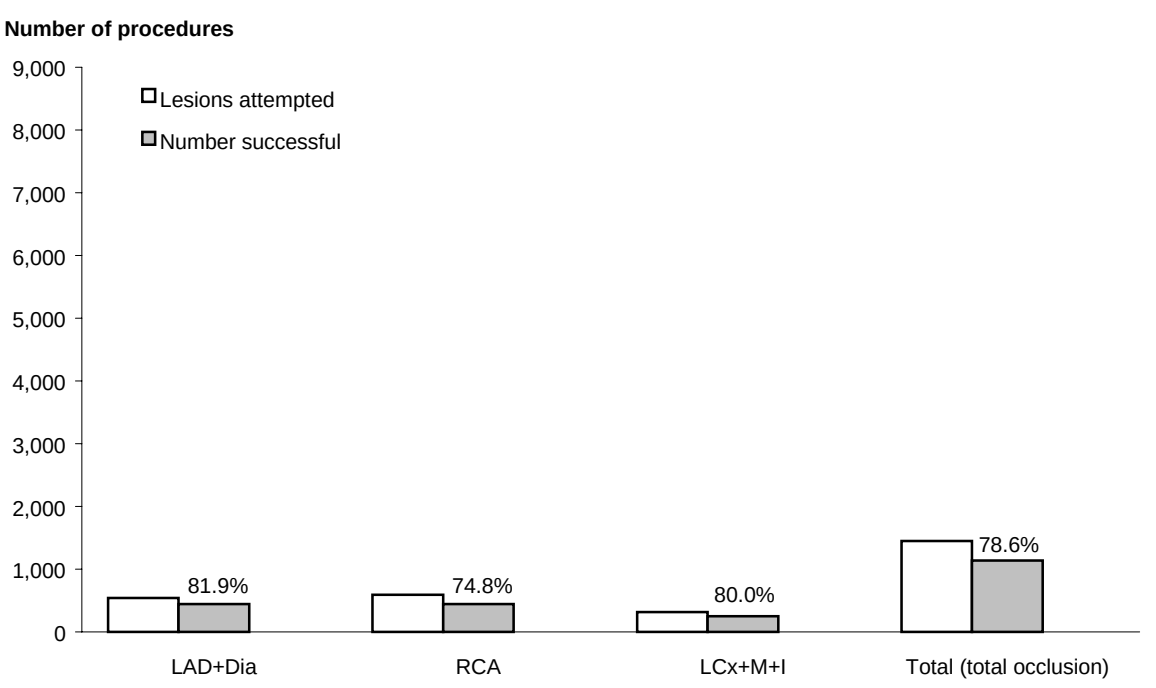


Figure 11: Number of lesions and success rates for total occlusions, 1996

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 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 through 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 for producing alternating inflation and deflation during diastole and systole, respectively.

Intra-coronary stenting: use of a prosthetic metal 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 bundle branch block (LBBB): an ECG change marked by an intraventricular conduction delay affecting the left ventricular wall and septum. Acute occurrences most commonly result from myocardial ischaemia.

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 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: pharmacologic 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 1996

State	Unit
New South Wales	Charles Wentworth Private Hospital
	Eastern Heart Clinic
	John Hunter Hospital
	Lake Macquarie Hospital
	Royal North Shore Hospital
	Royal Prince Alfred Hospital
	St Vincent's Hospital
	Strathfield Private Hospital
	Sydney Adventist Hospital
	The Hills Private Hospital
	The St George Hospital
	The St George Private Hospital
	Westmead Hospital
Queensland	Mater Misericordiae Private Hospital
	St Andrew's Hospital
	The John Flynn Hospital
	The Prince Charles Hospital
	The Wesley Hospital
	Townsville General Hospital
South Australia	Ashford Community Hospital
	Flinders Medical Centre
	Royal Adelaide Hospital
	The Queen Elizabeth Hospital
	Wakefield Hospital
Tasmania	Calvary Hospital
	Royal Hobart Hospital
Victoria	Austin Repatriation Medical Centre
	Box Hill Hospital
	Cabrini Medical Centre
	Epworth Hospital
	Knox Private Hospital
	Melbourne Private Hospital
	Monash Medical Centre
	St Vincent's Hospital
	St Vincent's Private Hospital
	The Alfred Hospital
	The Royal Melbourne Hospital
	Warringal Private Hospital

(continued)

State	Unit
Western Australia	Fremantle Hospital
	Mount Hospital
	Royal Perth Hospital
	Sir Charles Gairdner Hospital

Appendix B: Data collection form

Calendar year in which information collected: 1996

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 1996 _____

2.

   (a) No. of patients having repeat PTCA in 1996 who had a previous PTCA in 1996 _____

   (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 1996 whose previous PTCA was before 1996 _____

   (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 1996 _____

(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:

a) *primary* b) *rescue*

(please show number of patients in cardiogenic shock in brackets)

time since AMI:	time since AMI:
0-<2 hours	0-<2 hours .....
2-<4 hours	2-<4 hours .....
4-<6 hours	4-<24 hours .....
6-<8 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)			

***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) Rotablator atherectomy _____

    (c) Reopro _____

    (d) Other viz _____

19. Subsequent procedures and complications:

(WITH PARTICULAR REFERENCE TO HAEMODYNAMIC STATUS AT ONSET)

(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**

_____

_____

_____

_____

_____

_____

Related publications

Australian Institute of Health and Welfare (AIHW) 1998. Australian hospital statistics 1996–97. AIHW Cat. No. HSE 5 (Health Services Series No. 11). Canberra: AIHW.

Australian Institute of Health and Welfare (AIHW) 1998. Australia's health 1998: the sixth biennial health report of the Australian Institute of Health and Welfare. AIHW Cat. No. AUS 10. Canberra: AIHW.

Australian Institute of Health and Welfare (AIHW) 1999. Heart, stroke and vascular diseases, Australian facts. AIHW Cat. No. CVD 7 (Cardiovascular Disease Series No. 10). Canberra: AIHW and Heart Foundation of Australia.

Senes-Ferrari S 1999. Cardiac surgery in Australia 1994. AIHW Cat. No. CVD 6 (Cardiovascular Disease Series No. 9). Canberra: AIHW.

Senes-Ferrari S 1999. Coronary angioplasty in Australia 1995. AIHW Cat. No. CVD 5 (Cardiovascular Disease Series No. 8). Canberra: AIHW.

Senes-Ferrari S & Davies J 1999. Cardiac surgery in Australia 1995. AIHW Cat. No. CVD 8 (Cardiovascular Disease Series No. 11). Canberra: AIHW.

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