

Cardiac surgery in Australia 1994

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Cardiac surgery in Australia 1994

Susana Senes-Ferrari

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and
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Preface

This is the thirty-second national cardiac surgery report and presents information on all procedures performed in 1994. It is the first in the series to be produced jointly by the National Heart Foundation and the Australian Institute of Health and Welfare. The National Heart Foundation has been compiling data and reporting on cardiac surgery performed in Australia since 1962. For this and future reports, a standing Advisory Committee appointed by the Foundation will oversee the cardiac surgery register as in the past and the Institute will be 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 cardiac surgery register and protect the data confidentiality interests of the participating units and their patients. The Act protects provider interests by specifying that information may only be released under circumstances that are not contrary to the written terms and conditions under which it was supplied to the Institute. It protects confidentiality of units and patients by a requirement that the release of any identifiable information to researchers is subject to the approval of the Institute's Health Ethics Committee.

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.

Reports covering procedures done in 1995, 1996 and 1997 are in preparation and will be issued as soon as the data are made available by all participating units.

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Chairman
Cardiac Surgery Advisory Committee

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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 cardiac surgery as performed in Australia in 1994. The report covers patterns and trends in the use of cardiac surgery procedures for acquired and congenital conditions, and associated mortality.

The main findings of the report are:

- During 1994 there were 19,409 cardiac surgery procedures performed in Australia, with an average case load of 571 patients per unit.
- Cardiac surgery procedures increased by 2.5% compared with the previous year.
- The national cardiac surgery rate was 1,088 per million population, with a mortality rate of 2.8%.
- There were 70 cardiac surgeons operating in 37 units throughout the country, compared with 33 units in 1993.
- There were 1,520 operations for congenital heart defects, with a mortality rate of 3.4%. These figures are comparable to those for 1993. Septal defects were the main reasons for congenital heart surgery.
- Among congenital defects, compared with the previous year, the number of operations for valve defects, atrial septal defects and persistent ductus arteriosus increased, whereas those for coarctation of the aorta, Tetralogy of Fallot and ventricular septal defects fell, and those for transposition of great vessels remained constant.
- Valvular heart defects accounted for 3,686 procedures, which is a slight increase from the previous year total, with a mortality rate of 3.9%. Fifty-nine procedures were reoperations for mechanical valve failures and 130 procedures were reoperations for tissue valve failures.
- Surgery was done most frequently for the aortic and mitral valves, and involved replacing the valve with a prosthesis in 63.9% of cases. Repairs were done in 16.3% of cases.
- There were 14,994 operations for coronary artery disease. Of these, 14,941 involved bypass grafts, with a mortality rate of 2.5%. Eight per cent of coronary artery bypass graft procedures were reoperations.
- The average number of bypass grafts was 3 per patient. Saphenous vein and internal mammary artery grafts were the main types used in bypass graft operations, at 91.5% and 77.8% respectively.
- The national average rate for coronary artery bypass graft surgery was 837 per million population. The rate varied across States, ranging from 707 per million population in Tasmania to 1,010 per million population in South Australia.
- There were 93 heart transplants, 41 lung transplants and 14 combined heart/lung transplants done in 1994.

Introduction

Heart disease is a major cause of morbidity and mortality, causing 30% of all deaths in Australia in 1996. The most common forms of heart disease affecting Australians are coronary heart disease, acquired valve disease, conduction defects, congestive heart failure and congenital heart defects. Cardiac services offer a range of interventions to treat heart disease, among which are cardiac surgery and electrophysiological treatments.

Coronary artery bypass grafting (CABG) was developed in the 1960s and is now a well-established procedure. Vessel grafts are used to construct new conduits from major arteries to points beyond obstructions in the coronary arteries to restore adequate blood supply to the heart muscle (myocardium). The procedure usually requires the chest to be opened and the circulation to be diverted from the heart and lungs to a cardiopulmonary bypass machine with a pump oxygenator. In most cases the graft material is obtained from the patient's saphenous vein in the leg or the internal mammary artery, or both. Less invasive techniques for performing the procedure are now being introduced. CABG is a treatment and not a cure for coronary artery disease, and there is a risk of recurrent disease. Reoperations are uncommon within the first five years but become more frequent later. Although coronary angioplasty has replaced some CABG procedures since it was introduced in the early 1980s, the techniques are regarded as complementary and the rate of CABG is still increasing.

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

Congenital conditions include abnormalities of the heart or heart valves, defects of the great vessels, such as the aorta and pulmonary artery, or combinations of defects. Most children with congenital defects are treated with open surgery, usually in infancy or early childhood.

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

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

The aim of this report is to provide details of cardiac surgery performed in Australia in 1994. The report covers patterns and trends in the use of cardiac surgery procedures for acquired and congenital conditions, and associated mortality.

This report is also available on the Internet at the Institute's web site:

<http://www.aihw.gov.au>

Methods

This report summarises all cardiac surgery performed in 1994 using information supplied by 34 of the 37 cardiac surgery units operating in Australia. Three of the units could not supply the information in time for inclusion in this report. A list of participating units is presented in Appendix A. The list of units is reviewed each year and new units are invited to join the register and submit their data.

Statistics from previous years are also included, as changes over time in the numbers, rates, and associated mortality of operations are of interest. Information about the rate of reoperations for coronary artery bypass grafts and valve surgery is also presented.

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

'Mortality' refers throughout the report to death within 30 days of the operation, or during the post-operative period in hospital.

The terms 'closed' and 'open' surgery are used in this report to indicate those operations performed without and with cardiopulmonary bypass support respectively. They do not allude to the use of catheter-based techniques, which will be reported for procedures done from 1995 onwards in future issues of this collection.

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

The rates for bypass graft surgery have been calculated to include the Australian Capital Territory population with New South Wales, and the Northern Territory population with South Australia, since those are the States where the vast majority of Australian Capital Territory and Northern Territory residents are treated. Up to 1991 half the Tasmanian population was included with Victoria and half with South Australia. This is because, until 1991, Tasmanian patients travelled to either State for open heart surgery, in approximately equal numbers. The precise distribution of patients from Tasmania is not known, so rates for Victoria and South Australia may not be exact for that period. However, they should reflect the general trend in coronary artery bypass grafts in these States. In 1991 open heart surgery began in Tasmania.

Cardiac surgery units and surgeons

In 1994 there were 70 cardiac surgeons operating in Australia as well as 14 overseas registrars and 26 trainees, 6 of whom were from other countries. One Australian was in training overseas. There were 37 hospitals at which cardiac surgery was performed but 3 units could not supply data in time for inclusion in this report and have been excluded from the analysis.

Total operations

A total of 19,409 operations was performed in 1994, an increase of 2.5% over 1993. In 1994 there was an average case load of 571 patients per unit, with a range of 53 to 2,160.

Overall mortality rose slightly between 1993 and 1994, from 2.5% to 2.8%. Mortality has stabilised at just below 3% in the past few years even though surgery is now performed on a wider range of patients, including some previously considered unsuitable for surgery.

There was an increase of 5.6% in the total number of closed and open operations in children under six months old. In patients aged over six months, there was also a rise in open and closed surgery of 2.4% overall.

Table 1 presents a summary of all operations, both open and closed, performed from 1985 to 1994, with associated mortality figures. The constant increase in the rate of operations performed and the variable decrease in mortality since 1953 are illustrated in Figure 1. This increase in rate has been entirely due to open heart surgery, closed heart surgery rates having remained fairly constant over the period. Mortality rates for open heart surgery fell markedly between the late 1950s and the 1980s, and have remained fairly constant since then.

Table 1: Total heart operations and mortality rates (%), by age group, 1985–94

| Year | Closed operations | | | | | | Open operations | | | | | | Total operations | | | | | |
|------|-------------------|------|------------|------|--------------|------|-----------------|------|------------|------|--------------|------|------------------|------|------------|------|---------------|------------|
| | ≤ 6 months | | > 6 months | | <i>Total</i> | | ≤ 6 months | | > 6 months | | <i>Total</i> | | ≤ 6 months | | > 6 months | | <i>Total</i> | |
| | No. | Dths | No. | Dths | No. | Dths | No. | Dths | No. | Dths | No. | Dths | No. | Dths | No. | Dths | No. | Dths |
| 1985 | 239 | 8.8 | 333 | 3.9 | 572 | 5.9 | 180 | 12.8 | 10,077 | 2.9 | 10,257 | 3.1 | 419 | 10.5 | 10,410 | 3.0 | 10,829 | 3.3 |
| 1986 | 239 | 4.6 | 340 | 2.4 | 579 | 3.3 | 163 | 12.3 | 10,331 | 3.2 | 10,494 | 3.3 | 402 | 7.7 | 10,671 | 3.1 | 11,073 | 3.3 |
| 1987 | 261 | 6.1 | 389 | 3.3 | 650 | 4.5 | 226 | 9.7 | 11,788 | 2.7 | 12,014 | 2.8 | 487 | 7.8 | 12,177 | 2.7 | 12,664 | 2.9 |
| 1988 | 240 | 5.4 | 322 | 3.7 | 562 | 4.4 | 236 | 11.9 | 12,355 | 3.0 | 12,591 | 3.2 | 476 | 8.6 | 12,677 | 3.0 | 13,153 | 3.2 |
| 1989 | 306 | 3.3 | 355 | 3.1 | 661 | 3.2 | 230 | 9.6 | 13,466 | 2.4 | 13,696 | 2.6 | 536 | 6.0 | 13,821 | 2.5 | 14,357 | 2.6 |
| 1990 | 249 | 3.6 | 287 | 2.1 | 536 | 2.8 | 277 | 7.9 | 14,313 | 2.6 | 14,590 | 2.7 | 526 | 5.9 | 14,600 | 2.6 | 15,126 | 2.7 |
| 1991 | 269 | 1.9 | 313 | 4.8 | 582 | 3.4 | 257 | 6.2 | 15,849 | 2.5 | 16,106 | 2.6 | 526 | 4.0 | 16,162 | 2.6 | 16,688 | 2.6 |
| 1992 | 249 | 7.2 | 300 | 3.0 | 549 | 4.9 | 291 | 6.2 | 16,260 | 2.7 | 16,551 | 2.8 | 540 | 6.7 | 16,560 | 2.7 | 17,100 | 2.9 |
| 1993 | 246 | 2.8 | 292 | 2.4 | 538 | 2.6 | 269 | 9.3 | 18,129 | 2.4 | 18,398 | 2.5 | 515 | 6.2 | 18,421 | 2.4 | 18,936 | 2.5 |
| 1994 | 291 | 2.4 | 388 | 5.2 | 679 | 4.0 | 253 | 9.5 | 18,477 | 2.7 | 18,730 | 2.8 | 544 | 5.7 | 18,865 | 2.8 | 19,409 | 2.8 |

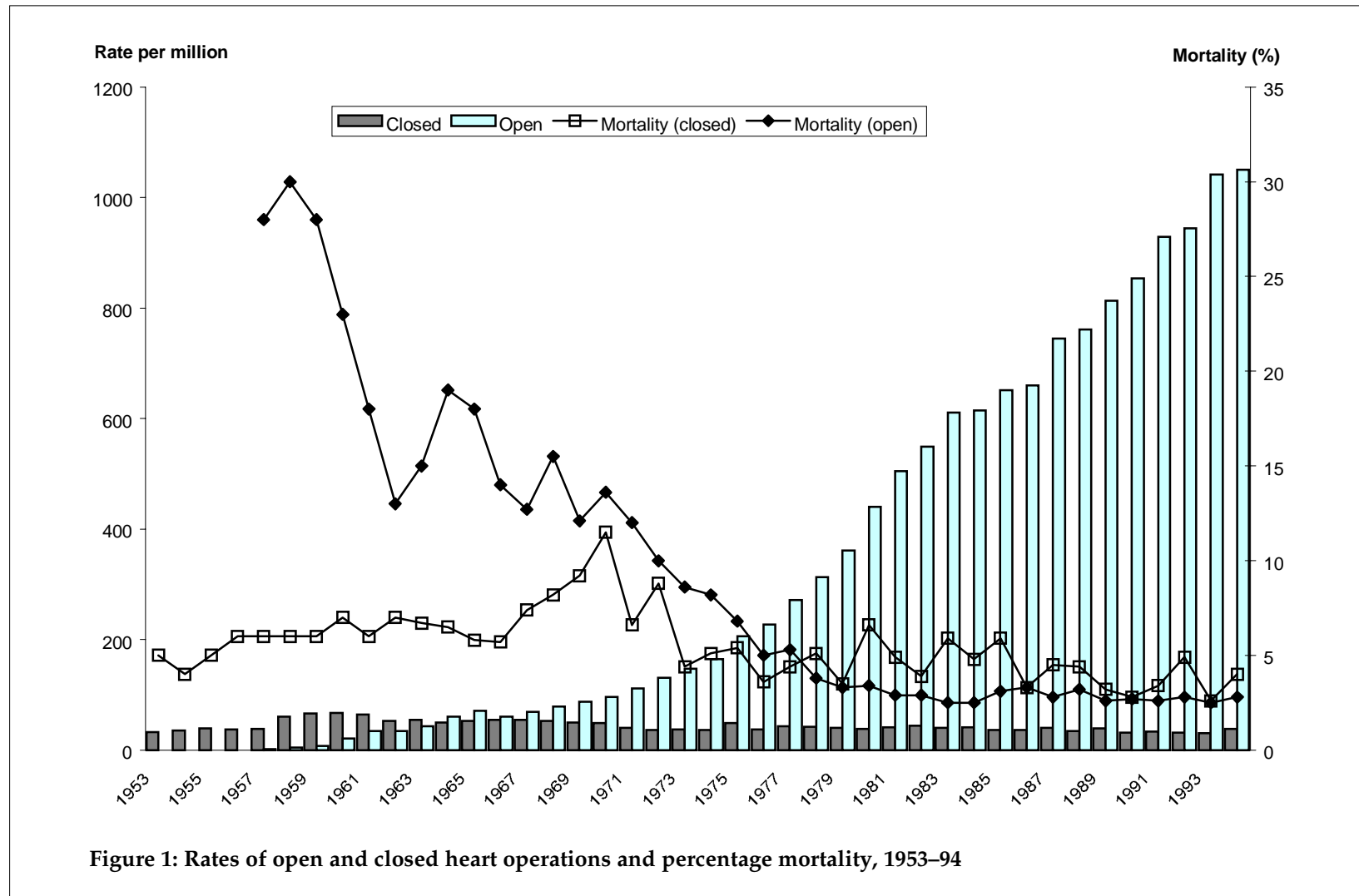


Table 2 summarises the distribution of operations for congenital and acquired defects in 1994. Operations for congenital conditions represent only 7.8% of the total and most are performed as open heart procedures.

Table 2: Distribution of operations for congenital and acquired defects in 1994

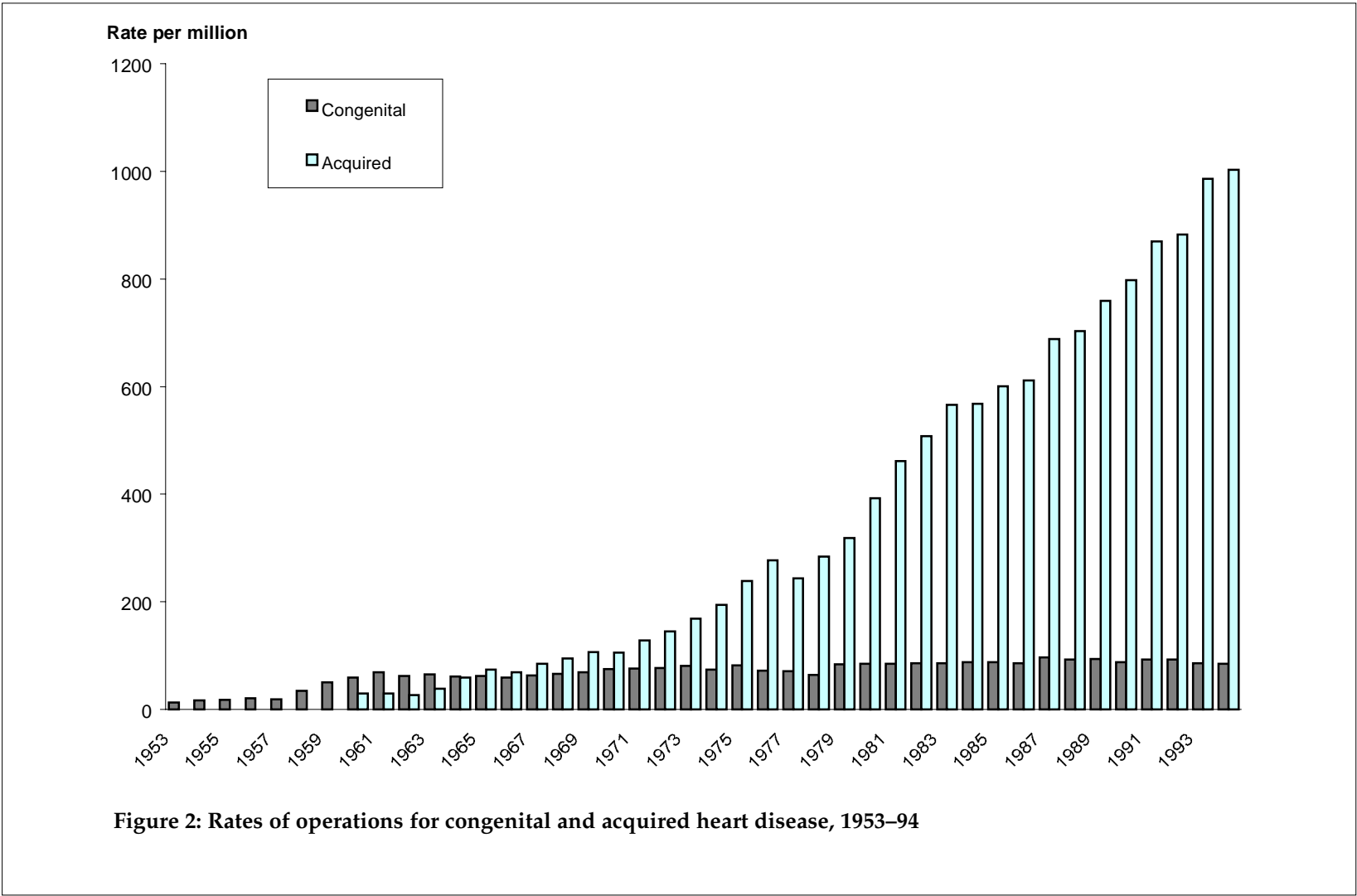
| | Closed (%) | Open (%) | Total (%) |
|--------------------------|--------------|--------------|--------------|
| Congenital heart disease | | | |
| Under 1 month | 20.9 | 0.6 | 1.3 |
| 1–6 months | 21.9 | 0.7 | 1.5 |
| Over 6 months | 30.5 | 4.1 | 5.0 |
| Acquired heart disease | 26.7 | 94.6 | 92.2 |
| Total | 100.0 | 100.0 | 100.0 |

Table 3 shows a more detailed summary of all operations performed in 1994 compared with figures for 1993. The total number of operations for congenital defects rose marginally, from 1,518 in 1993 to 1,520 in 1994. Mortality fell from 4.8% to 3.2% for open congenital operations, and rose from 1.8% to 3.6% for closed congenital operations. The total number of operations for acquired heart disease rose by 2.7% from 17,418 in 1993 to 17,889 in 1994. Mortality rose slightly, from 2.4% to 2.8%.

Table 3: Total heart operations, 1993 and 1994

| | | Closed operations | | Open operations | | Total | |
|-----------------------|-----------------|---------------------|-----------------|---------------------|---------------------|---------------------------|---------------------------|
| | | 1993 | 1994 | 1993 | 1994 | 1993 | 1994 |
| Congenital conditions | | No. (deaths) | | | | | |
| Age | Under 1 month | 141 (7) | 142 (3) | 105 (19) | 115 (18) | 246 (26) | 257 (21) |
| | 1–6 months | 105 (0) | 149 (4) | 164 (6) | 138 (6) | 269 (6) | 287 (10) |
| | Over 6 months | 199 (1) | 207 (11) | 804 (27) | 769 (9) | 1,003 (28) | 976 (20) |
| | <i>Subtotal</i> | <i>445 (8)</i> | <i>498 (18)</i> | <i>1,073 (52)</i> | <i>1,022 (33)</i> | <i>1,518 (60)</i> | <i>1,520 (51)</i> |
| Acquired conditions | | 93 (6) | 181 (9) | 17,325 (414) | 17,708 (493) | 17,418 (420) | 17,889 (502) |
| Total | | 538 (14) | 679 (27) | 18,398 (466) | 18,730 (526) | 18,936 (480) | 19,409 (553) |

Figure 2 illustrates trends in the rates of congenital and acquired operations since 1953. It can be seen that rates for acquired heart disease have increased dramatically over the period, while those for congenital heart disease have increased only slightly.



Surgery for congenital heart defects

Table 4 presents figures for a number of major congenital heart conditions, from 1985 to 1994. There were 1,520 operations for congenital defects in 1994, with a mortality rate of 3.4%. Compared with 1993, there was an increase in the number of operations for valve defects (38.7% increase), atrial septal defects (13.2%) and persistent ductus arteriosus (7.6%). Operations for coarctation of the aorta fell by 19.5%, Tetralogy of Fallot by 13.6%, ventricular septal defect by 3.7% and other conditions by 1.6%. The number of operations for the transposition of great vessels remained fairly steady.

Table 4: Operations for congenital conditions by major heart defect, 1985–94

| Congenital heart defect | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|--------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | (Number) | | | | | | | | | |
| Persistent ductus arteriosus | 165 | 162 | 196 | 195 | 288 | 164 | 165 | 127 | 131 | 141 |
| Valve defects | 110 | 68 | 66 | 67 | 51 | 72 | 81 | 60 | 62 | 86 |
| Coarctation of aorta | 135 | 142 | 162 | 99 | 126 | 103 | 109 | 102 | 128 | 103 |
| Atrial septal defect | 179 | 201 | 209 | 266 | 232 | 245 | 249 | 265 | 228 | 258 |
| Ventricular septal defect | 213 | 209 | 257 | 234 | 218 | 231 | 252 | 254 | 270 | 260 |
| Tetralogy of Fallot | 141 | 116 | 169 | 156 | 140 | 116 | 144 | 169 | 154 | 133 |
| Transposition of great vessels | 113 | 91 | 104 | 123 | 98 | 108 | 108 | 93 | 107 | 108 |
| Other conditions | 320 | 367 | 386 | 385 | 472 | 455 | 496 | 549 | 438 | 431 |
| Total | 1,376 | 1,356 | 1,549 | 1,525 | 1,565 | 1,494 | 1,604 | 1,619 | 1,518 | 1,520 |

Figure 3 shows the proportion of total operations for congenital heart defects accounted for by a number of major conditions, in 1982–84 compared with 1992–94. Ventricular septal defect and atrial septal defect are the primary reasons for congenital heart surgery. In 1982–84 operations for persistent ductus arteriosus and coarctation of the aorta were more common than in 1992–94. The higher proportion in the group ‘all other conditions’ illustrates the increase in the scope and range of operations performed over the past decade. Table 5 gives detailed figures on closed and open operations, and associated deaths, for congenital heart conditions.

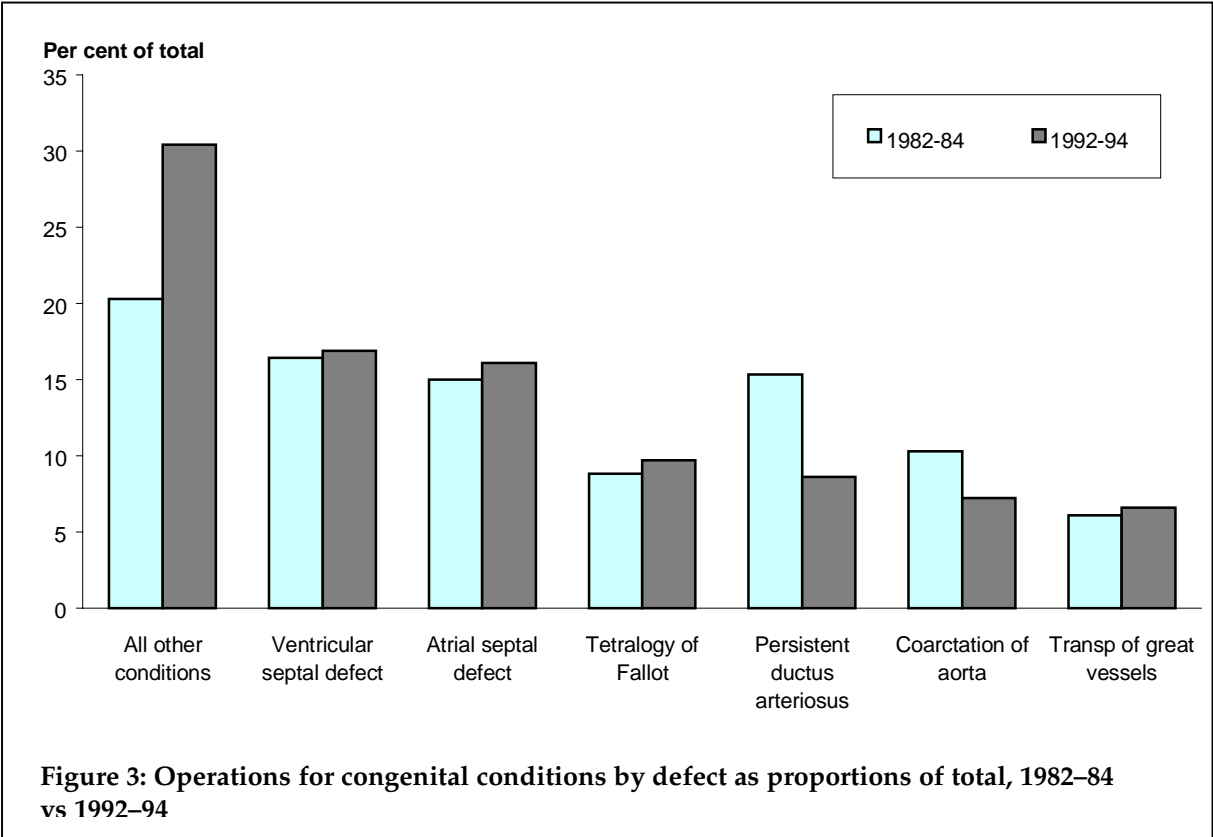


Table 5: Closed and open heart operations for congenital defects, by age group, 1994

| Heart operation | Closed operations | | | | Open operations | | | | Overall total | | |
|--|----------------------------|----------------|----------------|-----------------|-----------------|-----------------|----------------|----------------|-------------------|-------------------|----------|
| | ≤1 mths | 1–6 mths | ≥6 mths | Total | ≤1 mths | 1–6 mths | ≥6 mths | Total | | | |
| | No. (deaths) | | | | | | | | | | |
| Persistent ductus arteriosus | 39 (0) | 32 (0) | 69 (0) | 140 (0) | — | — | 1 (0) | 1 (0) | 141 (0) | | |
| Valve defect | 2 (0) | — | — | 2 (0) | 8 (1) | 5 (0) | 71 (2) | 84 (3) | 86 (3) | | |
| Coarctation of aorta | 39 (1) | 17 (0) | 39 (0) | 95 (1) | 4 (0) | — | 4 (0) | 8 (0) | 103 (1) | | |
| Atrial septal defect | — | — | 1 (0) | 1 (0) | 2 (0) | 4 (0) | 251 (0) | 257 (0) | 258 (0) | | |
| Ventricular septal defect | palliative | 17 (1) | 17 (0) | 19 (2) | 53 (3) | 1 (0) | 1 (1) | 6 (0) | 8 (1) | 61 (4) | |
| | corrective | — | 20 (1) | — | 20 (1) | 3 (0) | 51 (0) | 125 (0) | 179 (0) | 199 (1) | |
| Tetralogy of Fallot | simple | palliative | 4 (0) | 13 (0) | 1 (0) | 18 (0) | 1 (0) | 1 (0) | 25 (0) | 27 (0) | 45 (0) |
| | | corrective | — | — | — | — | — | 6 (0) | 45 (0) | 51 (0) | 51 (0) |
| | complex | palliative | 1 (0) | 4 (0) | 12 (0) | 17 (0) | 2 (1) | — | 1 (0) | 3 (1) | 20 (1) |
| | | corrective | — | — | — | — | — | 1 (0) | 14 (0) | 15 (0) | 15 (0) |
| | acquired pulmonary atresia | palliative | — | — | 2 (0) | 2 (0) | — | — | — | 2 (0) | |
| 10 Transposition of great vessels | | | 1 (0) | 7 (0) | 8 (0) | 16 (0) | 58 (7) | 11 (3) | 23 (1) | 92 (11) | 108 (11) |
| Extra cardiac lesions | A-P window | | — | — | — | — | — | 1 (0) | 1 (0) | 2 (0) | 2 (0) |
| | interrupted aortic arch | | 6 (0) | 3 (1) | 1 (0) | 10 (1) | 7 (1) | — | — | 7 (1) | 17 (2) |
| | vascular ring | | 1 (0) | 4 (0) | 7 (0) | 12 (0) | — | — | 1 (0) | 1 (0) | 13 (0) |
| Coronary artery defects | | — | — | — | — | — | 1 (0) | 3 (0) | 4 (0) | 4 (0) | |
| Total anomalous pulmonary venous return | | 1 (0) | — | — | 1 (0) | 10 (1) | 6 (0) | 10 (0) | 26 (1) | 27 (1) | |
| Right sided lesions | Ebstein's anomaly | | 1 (0) | — | — | 1 (0) | 1 (1) | — | 1 (0) | 2 (1) | 3 (1) |
| | pulmonary atresia | | 6 (0) | 2 (0) | 3 (1) | 11 (1) | 6 (1) | — | 6 (1) | 12 (2) | 23 (3) |
| | tricuspid atresia | | 4 (0) | 9 (1) | 3 (0) | 16 (1) | — | 2 (0) | 19 (1) | 21 (1) | 37 (2) |
| Left sided lesions (includes cor triatrium, hypoplastic left heart syndrome, mitral atresia, sub aortic stenosis, supra valvular stenosis) | | 1 (0) | — | — | 1 (0) | 6 (4) | 3 (0) | 40 (0) | 49 (4) | 50 (4) | |
| Defects of partitioning (includes AV canal, double outlet RV, truncus arteriosus and other) | | 11 (1) | 17 (1) | 7 (1) | 35 (3) | 3 (1) | 43(2) | 70 (2) | 116 (5) | 151 (8) | |
| Other | | 8 (0) | 4 (0) | 35 (7) | 47 (7) | 3 (0) | 2 (0) | 52 (2) | 57 (2) | 104 (9) | |
| Total | | 142 (3) | 149 (4) | 207 (11) | 498 (18) | 115 (18) | 138 (6) | 769 (9) | 1,022 (33) | 1,520 (51) | |

Surgery for valvular heart defects

Table 6 presents information about valve surgery performed from 1985 to 1994, and Table 7 gives more detailed figures for 1994 alone. There was a slight increase of 3.8% in operations for valve defects between 1993 and 1994. This was due to an increase in surgery to the aortic valve (5.3% increase) and the mitral valve (3.3% increase). Surgery to the tricuspid valve fell (21.7% decrease) and surgery to the pulmonary valve remained steady. Of the various procedures used, the number of valve repairs decreased by 8.9%. Numbers of valve replacements by prosthesis and homograft rose by 10.3% and 41.2% respectively, and those by heterograft fell by 10.4%.

In 1994 there were 59 reoperations for mechanical valve failures, with 4 deaths, and 130 reoperations for tissue valve failures, with 8 deaths.

Figures 4 and 5 illustrate the trends in valve surgery over time. Most valve surgery is done on the aortic and mitral valves, with a marked increase in the number of procedures over the last decade. There has been a significant rise in the number of procedures involving replacing the damaged valve with a prosthesis, but other types of valve procedures have only increased modestly.

Table 6: Operations for valve defects by type of valve and procedure, 1985–94

| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---------------------------------|-----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Valve | (Number) | | | | | | | | | |
| Mitral | 812 | 843 | 928 | 932 | 987 | 963 | 1,075 | 1,188 | 1,346 | 1,391 |
| Aortic | 1,083 | 1,143 | 1,270 | 1,371 | 1,489 | 1,589 | 1,772 | 1,873 | 2,075 | 2,186 |
| Tricuspid | 52 | 51 | 46 | 46 | 67 | 62 | 51 | 73 | 106 | 83 |
| Pulmonary | 27 | 32 | 20 | 33 | 19 | 25 | 21 | 25 | 25 | 26 |
| Total | 1,974 | 2,069 | 2,264 | 2,382 | 2,562 | 2,639 | 2,919 | 3,159 | 3,552 | 3,686 |
| Type of surgery | | | | | | | | | | |
| Repair ^a | 398 | 355 | 362 | 371 | 405 | 461 | 477 | 590 | 661 | 602 |
| Replacement | | | | | | | | | | |
| Prosthesis | 1,067 | 1,182 | 1,370 | 1,378 | 1,523 | 1,534 | 1,778 | 1,861 | 2,136 | 2,355 |
| Homograft | 20 | 19 | 42 | 76 | 83 | 132 | 111 | 108 | 102 | 144 |
| Heterograft | 489 | 513 | 490 | 557 | 551 | 512 | 553 | 600 | 653 | 585 |
| <i>Total replacement</i> | <i>1,576</i> | <i>1,714</i> | <i>1,902</i> | <i>2,012</i> | <i>2,157</i> | <i>2,178</i> | <i>2,442</i> | <i>2,569</i> | <i>2,891</i> | <i>3,084</i> |
| Reoperations^b | | | | | | | | | | |
| Tissue valve | 38 | 57 | 92 | 105 | 111 | 101 | 151 | 191 | 111 | 130 |
| Mechanical valve | 9 | 27 | 31 | 33 | 39 | 32 | 34 | 44 | 37 | 59 |

^a Repair = valvotomy and reconstruction, as in Table 7.

^b Not all units gave details on valve reoperations.

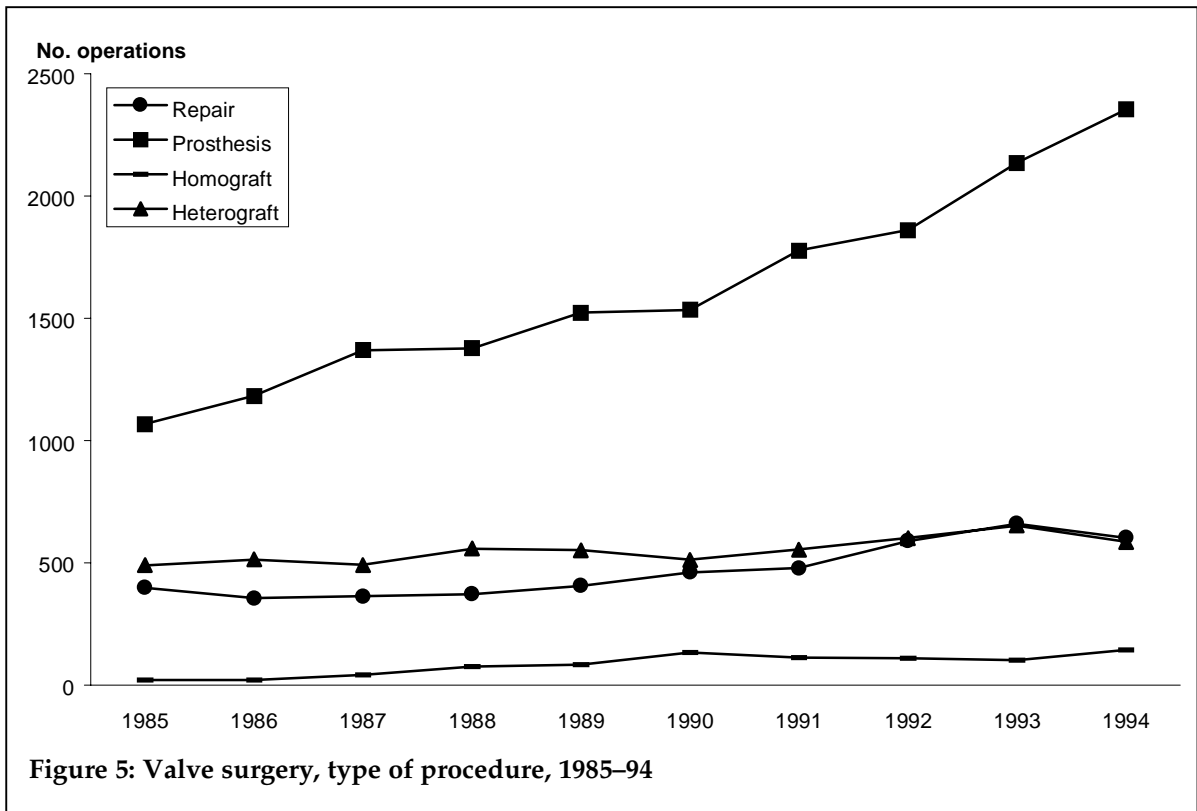
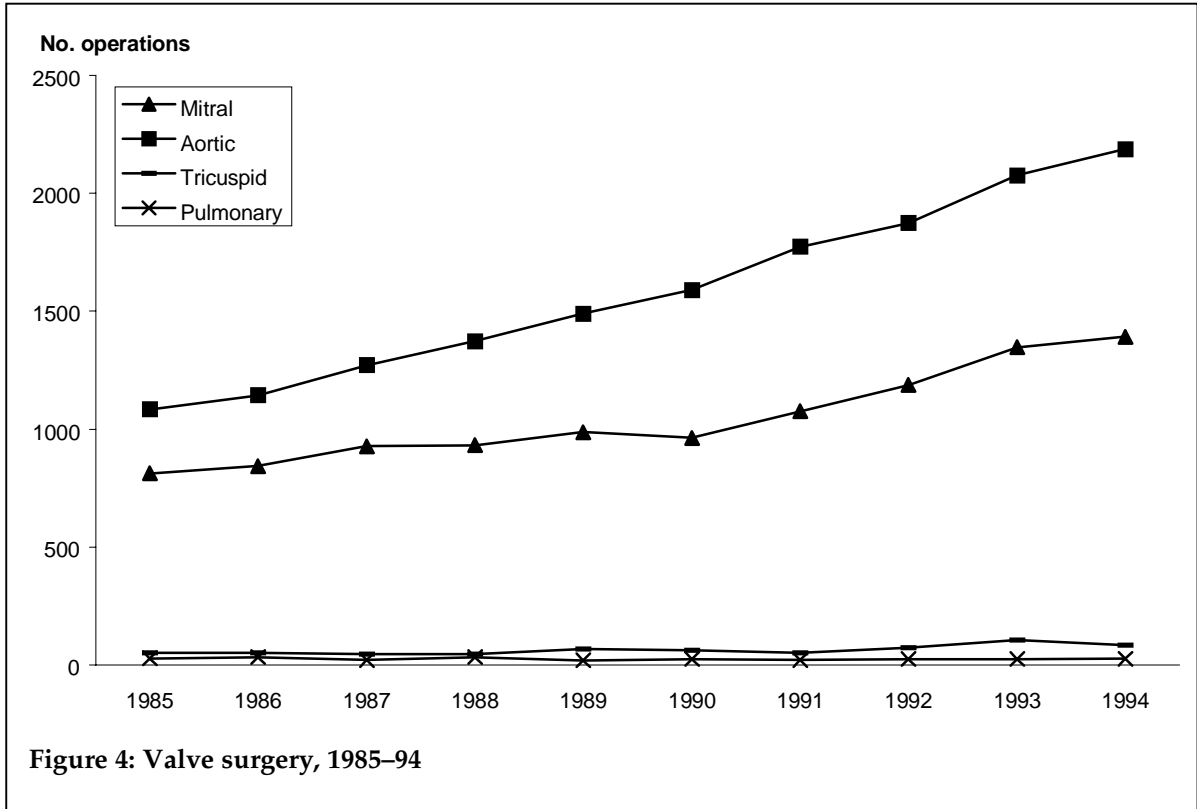
Table 7: Operations for valve defects by type of valve and procedure, 1994

| Valve | Procedure | Congenital | | | | Acquired | | | | | | Overall total | |
|--------|---------------------------|------------|------|--------|------|----------|------|--------|------|-------|------|---------------|------|
| | | Single | | Single | | Double | | Triple | | Total | | | |
| | | No. | Dths | No. | Dths | No. | Dths | No. | Dths | No. | Dths | No. | Dths |
| Mitral | Valvotomy | 2 | 0 | 18 | 0 | 8 | 2 | — | — | 26 | 2 | 28 | 2 |
| | Reconstruction | | | | | | | | | | | | |
| | with support ring | — | — | 286 | 7 | 11 | 1 | 1 | 0 | 298 | 8 | 298 | 8 |
| | without ring | — | — | 141 | 4 | 10 | 0 | — | — | 151 | 4 | 151 | 4 |
| | not specified | 13 | 0 | — | — | — | — | — | — | — | — | 13 | 0 |
| | Replacement | | | | | | | | | | | | |
| | heterograft | — | — | 57 | 7 | 14 | 3 | 1 | 0 | 72 | 10 | 72 | 10 |
| | prosthesis | 9 | 0 | 613 | 28 | 189 | 11 | 6 | 0 | 808 | 39 | 817 | 39 |
| | mitral homograft | — | — | 7 | 2 | 4 | 0 | — | — | 11 | 0 | 11 | 2 |
| Aortic | Reconstruction | | | | | | | | | | | | |
| | valvotomy | 13 | 1 | 3 | 0 | 2 | 0 | — | — | 5 | 0 | 18 | 1 |
| | decalcification | — | — | 4 | 0 | 2 | 0 | — | — | 6 | 0 | 6 | 0 |
| | for regurgitation | — | — | 5 | 0 | 2 | 0 | — | — | 7 | 0 | 7 | 0 |
| | other/unstated | 6 | 0 | 2 | 0 | 1 | 0 | — | — | 3 | 0 | 9 | 0 |
| | Replacement | | | | | | | | | | | | |
| | homograft not specified | 7 | 1 | — | — | — | — | — | — | — | — | 7 | 1 |
| | classical homograft | — | — | 78 | 1 | 1 | 0 | — | — | 79 | 1 | 79 | 1 |
| | 'mini root' homograft | — | — | 24 | 0 | 2 | 0 | — | — | 26 | 0 | 26 | 0 |
| | 'mini root' heterograft | — | — | 44 | 2 | 4 | 0 | — | — | 48 | 2 | 48 | 2 |
| | stent mounted heterograft | — | — | 441 | 18 | 16 | 2 | 2 | 0 | 459 | 20 | 459 | 20 |
| | pulmonary autograft | — | — | 5 | 0 | — | — | — | — | 5 | 0 | 5 | 0 |
| | prosthesis | 7 | 0 | 1,340 | 51 | 169 | 11 | 6 | 0 | 1,515 | 62 | 1,522 | 62 |

(continued)

Table 7 (continued): Operations for valve defects by type of valve and procedure, 1994

| Valve | Procedure | Congenital | | | | Acquired | | | | | | Overall total | | |
|-----------|-----------------------|-------------------|----------|--------------|------------|------------|-----------|-----------|----------|--------------|------------|---------------|------------|-------|
| | | Single | | No. | Dths | No. | Dths | No. | Dths | No. | Dths | | | Total |
| | | No. | Dths | | | | | | | | | No. | Dths | No. |
| Tricuspid | Reconstruction | with support ring | — | — | 6 | 0 | 5 | 0 | 2 | 0 | 13 | 0 | 13 | 0 |
| | | without ring | — | — | 8 | 1 | 26 | 0 | 5 | 0 | 39 | 1 | 39 | 1 |
| | | not specified | 5 | 0 | — | — | — | — | — | — | — | — | 5 | 0 |
| | Replacement | heterograft | — | — | 3 | 0 | 3 | 1 | — | — | 6 | 1 | 6 | 1 |
| | | homograft | — | — | 4 | 0 | — | — | — | — | 4 | — | 4 | 0 |
| | | prosthesis | 1 | 0 | 6 | 1 | 8 | 3 | 1 | 0 | 15 | 4 | 16 | 4 |
| Pulmonary | Valvotomy | 13 | 0 | — | — | — | — | — | — | — | — | 13 | 0 | |
| | Reconstruction | 2 | 0 | — | — | — | — | — | — | — | — | 2 | 0 | |
| | Replacement | 8 | 1 | 3 | 0 | — | — | — | — | 3 | 0 | 12 | 1 | |
| | Total valves | 86 | | 3,098 | | 478 | | 24 | | 3,600 | | 3,686 | | |
| | Total patients | 86 | 3 | 3,098 | 122 | 239 | 17 | 8 | 0 | 3,345 | 139 | 3,431 | 142 | |



Surgery for coronary artery disease

Overall, there were 14,994 operations for coronary artery disease in 1994: 14,941 with bypass grafts and 53 without. This was an increase of 2.1% in the total number of bypass graft operations performed compared with 1993, with mortality rising slightly to 2.5%. The average number of grafts per patient remained at 3.1. The results over the last 7 years indicate that this average number of grafts has stabilised at just over 3 per patient.

In 1994, 8.5% of coronary artery bypass operations were reoperations. The mortality rate for these reoperations was 5.9%.

Tables 8 and 9 show numbers of operations with and without concomitant procedures, according to the number of distal anastomoses.

Table 8: Coronary artery bypass graft operations (including operations with concomitant procedures), 1991–94

| No. of distal anastomoses | 1991 | | | 1992 | | | 1993 | | | 1994 | | |
|-----------------------------------|-------------------|------------|------------|-----------------|------------|------------|-----------------|------------|------------|-----------------|------------|------------|
| | No. of patients | % of total | Dths | No. of patients | % of total | Dths | No. of patients | % of total | Dths | No. of patients | % of total | Dths |
| 1 | 1,150 | 9.1 | 32 | 1,247 | 9.6 | 38 | 1,471 | 10.0 | 37 | 1,252 | 8.4 | 55 |
| 2 | 2,842 | 22.5 | 63 | 2,831 | 21.9 | 69 | 3,242 | 22.1 | 59 | 3,292 | 22.0 | 78 |
| 3 | 4,134 | 32.7 | 72 | 4,279 | 33.1 | 82 | 4,794 | 32.7 | 93 | 4,998 | 33.5 | 101 |
| 4 | 3,113 | 24.6 | 64 | 3,153 | 24.4 | 64 | 3,526 | 24.1 | 60 | 3,792 | 25.4 | 101 |
| 5 | 1,106 | 8.7 | 19 | 1,140 | 8.8 | 29 | 1,298 | 8.9 | 23 | 1,322 | 8.8 | 30 |
| 6 | 255 | 2.0 | 4 | 237 | 1.8 | 5 | 259 | 1.8 | 7 | 248 | 1.7 | 6 |
| 7 | 44 | 0.3 | 0 | 46 | 0.3 | 0 | 46 | 0.3 | 2 | 32 | 0.2 | 4 |
| 8 | 5 | 0.0 | 0 | 2 | 0.0 | 0 | 1 | 0.0 | 0 | 4 | 0.0 | 0 |
| 9 | — | — | — | — | — | — | 1 | 0.0 | 1 | 1 | 0.0 | 0 |
| Total | 12,649 | 100 | 254 | 12,935 | 100 | 287 | 14,638 | 100 | 282 | 14,941 | 100 | 375 |
| Average no. of grafts per patient | 3.1 | | | 3.1 | | | 3.1 | | | 3.1 | | |
| Overall mortality | 2.0% | | | 2.2% | | | 1.9% | | | 2.5% | | |
| Reoperations | 7.1% ^a | | | 7.8% | | | 7.7% | | | 8.5% | | |

^a One unit could not provide information on reoperations; the total percentage of reoperations given here is calculated from a denominator minus that unit's total (with grafts) operations.

Table 9: Operations for coronary artery disease, 1994

| No. of distal anastomoses | Concomitant procedures | | | | | | | | | | | |
|---------------------------|------------------------|------------|---------------|-----------|---------------------------------|----------|---------------------------|-----------|------------|-----------|---------------|------------|
| | None | | Valve surgery | | Excision of infarct or aneurysm | | Ventricular septal defect | | Other | | Total | |
| | No. | Deaths | No. | Deaths | No. | Deaths | No. | Deaths | No. | Deaths | No. | Deaths |
| 1 | 829 | 22 | 371 | 27 | 11 | 0 | 4 | 1 | 37 | 5 | 1,252 | 55 |
| 2 | 2,915 | 58 | 299 | 12 | 30 | 1 | 4 | 2 | 44 | 5 | 3,292 | 78 |
| 3 | 4,677 | 71 | 229 | 23 | 36 | 1 | 2 | 1 | 54 | 5 | 4,998 | 101 |
| 4 | 3,612 | 83 | 122 | 10 | 12 | 2 | 0 | 0 | 46 | 6 | 3,792 | 101 |
| 5 | 1,254 | 25 | 29 | 2 | 6 | 0 | 1 | 0 | 32 | 3 | 1,322 | 30 |
| 6 | 243 | 6 | 1 | 0 | 1 | 0 | 0 | 0 | 3 | 0 | 248 | 6 |
| 7 | 30 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 32 | 4 |
| 8 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| <i>Total with grafts</i> | <i>13,564</i> | <i>267</i> | <i>1,052</i> | <i>75</i> | <i>96</i> | <i>4</i> | <i>11</i> | <i>4</i> | <i>218</i> | <i>25</i> | <i>14,941</i> | <i>375</i> |
| Without grafts | 0 | 0 | 0 | 0 | 18 | 1 | 21 | 7 | 14 | 0 | 53 | 8 |
| Overall total | 13,564 | 267 | 1,052 | 75 | 114 | 5 | 32 | 11 | 232 | 25 | 14,994 | 383 |
| Reoperations | 1,166 | 59 | 75 | 10 | 4 | 0 | 0 | 0 | 18 | 3 | 1,263 | 72 |

Table 10 presents information on the types of graft used in these operations in 1994. Not all units could supply the information, so results have been calculated as percentages of bypass graft operations that involved the use of at least one of the types of graft. The table shows that nearly all (91.5%) bypass graft operations used at least one saphenous vein graft, with internal mammary artery graft the next major type at 77.8%. Other, more recently introduced types of graft were much less common.

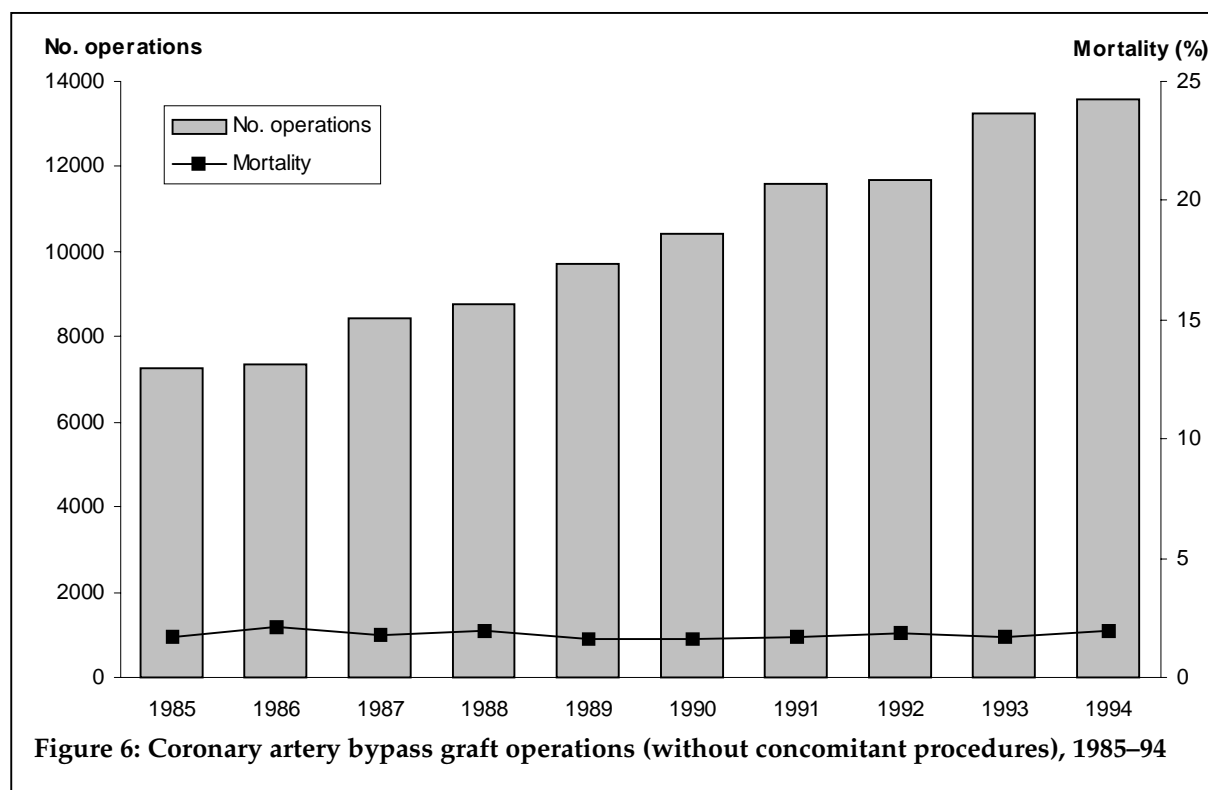
Table 10: Types of grafts used, 1994

| Type of graft | No. of patients having type of graft | % of patients having type of graft |
|-------------------------|--------------------------------------|------------------------------------|
| Saphenous vein | 12,893 | 91.5 |
| Internal mammary artery | 10,962 | 77.8 |
| Cephalic vein | 108 | 0.8 |
| Radial artery | 22 | 0.2 |
| Gastro-epiploic artery | 9 | 0.0 |
| Prosthetic | 3 | 0.0 |

Notes:

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

Figure 6 illustrates the marked increase in the number of bypass operations without concomitant procedures since 1985.



Regional rates for bypass graft surgery

The national average rate for coronary artery bypass graft surgery is 837 per million population. This rate varies across States, from 707 per million population in Tasmania to 1,010 per million population in South Australia (Table 11). It is important to note that two units in New South Wales and one unit in Queensland could not supply information for 1994. This would account for the fall in CABG rate from the previous year in those States. CABG rate trends over the last decade are illustrated in Figure 7. Between 1985 and 1994 there has been at least a 70% increase in the rate of bypass graft surgery in Australia. This marked rise is only partly explained by changes in the size and age structure of the population over that period.

Table 11: Regional^a rates for coronary artery bypass graft operations (including operations with concomitant procedures), 1985–94

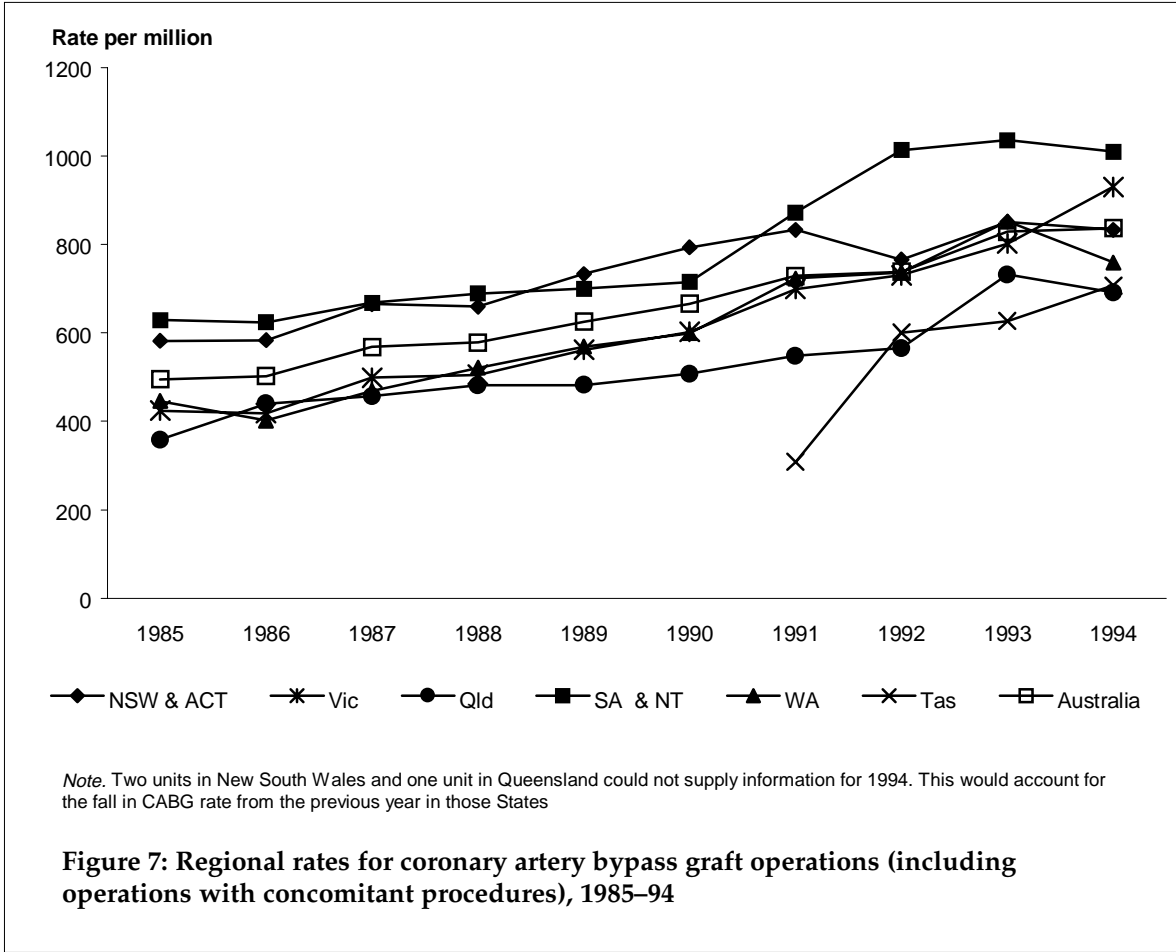
| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|------------------|---|------------|------------|------------|------------|------------|------------|------------|------------|------------------|
| | (No. operations per million population) | | | | | | | | | |
| NSW and ACT | 582 | 583 | 665 | 659 | 733 | 793 | 834 | 766 | 851 | 832 ^b |
| Vic | 424 | 418 | 499 | 505 | 562 | 602 | 699 | 730 | 802 | 930 |
| Qld | 358 | 440 | 457 | 481 | 482 | 507 | 548 | 565 | 732 | 691 ^b |
| SA and NT | 629 | 624 | 668 | 689 | 700 | 716 | 872 | 1,013 | 1,036 | 1,010 |
| WA | 446 | 402 | 469 | 521 | 569 | 599 | 723 | 737 | 852 | 759 |
| Tas | — | — | — | — | — | — | 308 | 601 | 627 | 707 |
| Australia | 495 | 502 | 568 | 578 | 625 | 666 | 730 | 738 | 829 | 837 |

^a Regional category refers to the location of the hospital where the procedure was performed.

^b Two units in New South Wales and one unit in Queensland could not supply information for 1994. This would account for the fall in CABG rate from the previous year in those States.

Notes:

1. Concomitant procedures have been included in calculations for regional rates. Therefore, figures are different from those of some previous reports, in which concomitant procedures were not included in this table.
2. The rate is defined as the number of operations per million population for the year in question. Population data are provided by the Australian Bureau of Statistics, June quarter, Catalogue No. 3101.0.
3. Rates have been calculated to include the Australian Capital Territory population with New South Wales and the Northern Territory population with South Australia since those are the States where the vast majority of Australian Capital Territory and Northern Territory residents are treated.
4. Rates for all years up to 1991 have been calculated to include half the Tasmanian population with Victoria and half with South Australia. This approximates the distribution of patients from Tasmania. The precise distribution is not known, so rates for Victoria and South Australia may not be exact over that period. However, they should reflect the general trend in CABGs in these States. In 1991 an open heart surgery unit began operating in Tasmania.



Transplants

Table 12 shows information on heart, lung and heart-lung transplants performed in 1994, compared with figures for 1992 and 1993. Overall, the number of heart transplants decreased by 9.7%, while the number of lung transplants and combined heart-lung transplants increased by 27.3% and 5.1% respectively.

Table 12: Transplantation—operations and mortality, 1992–94

| | 1992 | | 1993 | | 1994 | |
|-------------------------------|------------|----------|------------|----------|------------|----------|
| | Operations | Deaths | Operations | Deaths | Operations | Deaths |
| Heart transplants | | | | | | |
| Cardiomyopathy | 18 | 1 | 38 | 4 | 51 | 0 |
| Ischaemia | 57 | 3 | 37 | 1 | 33 | 4 |
| Other/unstated | 21 | 4 | 28 | 0 | 9 | 4 |
| Total | 96 | 8 | 103 | 5 | 93 | 8 |
| Heart–lung transplants | | | | | | |
| Congenital | 5 | 3 | 7 | 0 | 9 | 0 |
| Other | 13 | 4 | 4 | 0 | 5 | 0 |
| Total | 18 | 7 | 11 | 0 | 14 | 0 |
| Lung transplants | | | | | | |
| Whole | 19 | 3 | 29 | 2 | 41 | 4 |
| Lobe | 0 | 0 | 10 | 2 | — | — |
| Total | 19 | 3 | 39 | 4 | 41 | 4 |

Operations on the aorta

Operations on the aorta during 1994 are presented in Table 13.

Table 13: Operations on the aorta, 1994

| | Acute (dissection) | Chronic (for aneurysm or dissection) | Total |
|--|-----------------------|--|-----------------|
| | No. (deaths) | | |
| Repair or replacement of ascending aorta | | | |
| Aortic repair | | | |
| without valve resuspension | 21 (6) | 20 (0) | |
| with valve resuspension | 24 (4) | 25 (0) | |
| Composite graft replacing aortic valve and ascending aorta | 12 (2) | 40 (1) | |
| Homograft replacement of aortic valve and ascending aorta | 6 (0) | 46 (0) | |
| Separate aorta and valve replacement | 2 (0) | 17 (2) | |
| Total | 65 (12) | 148 (3) | 213 (15) |
| | For aneurysm | For dissection | Total |
| Replacement of descending thoracic aorta | 24 (3) | 11 (6) | 35 (9) |
| Replacement of aortic arch | 12 (2) | 9 (4) | 21 (6) |
| Total aortic operations | | | 269 (30) |

Operations for miscellaneous acquired heart conditions

Information on operations and mortality for other acquired heart conditions such as electrophysiological surgery, pulmonary embolectomies, pericardiectomies, cardiac tumours and cardiac trauma is presented in Table 14.

Table 14: Operations for miscellaneous acquired heart conditions, 1994

| Procedures | Operations | Deaths |
|--|------------|----------|
| Electrophysiological surgery for: | | |
| Supraventricular tachycardias | | |
| Wolff-Parkinson-White Syndrome | 2 | 0 |
| AV junction | 0 | 0 |
| Atrial fibrillation or flutter | 1 | 0 |
| AV node ablation | 0 | 0 |
| Ventricular tachycardias | | |
| Aneurysmectomy | 7 | 0 |
| Myocardial incision | 1 | 0 |
| Automatic defibrillator | 64 | 0 |
| Total electrophysiological surgery | 75 | 0 |
| Cardiac tumour/cardiomyopathy | | |
| Myxoma | 29 | 1 |
| Other cardiac tumour | 4 | 0 |
| IHSS | 4 | 0 |
| Total cardiac tumour/cardiomyopathy | 37 | 1 |
| Cardiac trauma | | |
| Atrium | 2 | 0 |
| Ventricle | 6 | 3 |
| Valves | 0 | 0 |
| Ascending aorta | 6 | 0 |
| Descending aorta | 14 | 1 |
| Other | 3 | 1 |
| Total cardiac trauma | 31 | 5 |
| Pulmonary embolectomy | 11 | 3 |
| Pericardiectomy for: | | |
| Tuberculosis | 1 | 0 |
| Non-specific infections | 10 | 0 |
| Uraemia | 0 | 0 |
| Other | 49 | 3 |
| Total pericardiectomy | 60 | 3 |
| Other conditions | 29 | 5 |

Glossary

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

Anastomosis: Connection between blood vessels.

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

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

Atresia: Absence or closure of a normal orifice.

Atrial septal defect: A hole in the wall (septum) between the upper two chambers of the heart (the atria).

Cardiomyopathy: A disease of heart muscle.

Coarctation of aorta: Congenital narrowing of a short section of the aorta.

Congenital heart defect: A range of heart disorders of varying severity, present at birth.

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

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

Ductus arteriosus: Special blood vessel in the foetus which allows blood to bypass the lungs.

Ebstein's anomaly: Congenital malformation of the tricuspid valve of the heart.

Fibrillation: Rapid, uncoordinated, chaotic activity of the muscle fibres of the heart, so it cannot pump.

Homograft valve: A human valve used for transplantation.

Heterograft valve: An animal valve used for transplantation.

Internal mammary artery: An artery in the chest commonly used as a conduit during coronary artery bypass grafting.

Ischaemic heart disease: Heart disease caused by inadequate flow of blood to the heart. Manifestations include angina and heart attack.

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

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

Myocardium: The muscular wall of the heart.

Patent ductus arteriosus (persistent ductus arteriosus): A congenital heart defect in which the ductus arteriosus, which during foetal life allows the blood to bypass the lungs, fails to close at or soon after birth.

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

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

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

Supraventricular tachycardia: Episodes of abnormally fast heart rate. This is caused by fast spontaneous impulses, arising in the upper chambers of the heart, that override the natural pacemaker.

Tachycardia: A rapid heart rate.

Tetralogy of Fallot: A common congenital heart disease consisting of four defects: narrowing of the main artery to the lungs (pulmonary artery); a hole in the wall between the two lower chambers of the heart; defective positioning of the aorta; and thickening of the right ventricle of the heart.

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

Truncus arteriosus: A congenital defect where one artery replaces the aortic and pulmonary arteries.

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

Valvuloplasty: Procedure to repair an abnormal valve of the heart.

Ventricular septal defect: A hole in the wall (septum) between the lower two chambers of the heart (the ventricles).

Appendix A: List of participating units

| State | Unit |
|----------------------------|---|
| New South Wales | Prince Henry Hospital |
| | Prince of Wales Children's Hospital |
| | The New Children's Hospital (Royal Alexandra Hospital for Children) |
| | Royal North Shore Hospital |
| | Royal Prince Alfred Hospital |
| | St George Hospital |
| | St Vincent's Private Hospital |
| | St Vincent's Public Hospital |
| | Strathfield Private Hospital |
| Sydney Adventist Hospital | |
| Queensland | Mater Misericordiae Hospital |
| | Prince Charles Hospital |
| | St Andrews War Memorial Hospital |
| | Townsville General Hospital |
| South Australia | Ashford Community Hospital |
| | Flinders Medical Centre |
| | Royal Adelaide Hospital |
| | Wakefield Hospital |
| | Women's and Children's Hospital |
| Tasmania | Royal Hobart Hospital |
| Victoria | Cabrini Medical Centre |
| | Epworth Hospital |
| | Monash Medical Centre |
| | Royal Children's Hospital |
| | Royal Melbourne Hospital |
| | St Vincent's Hospital |
| | St Vincent's Private Hospital |
| | The Alfred Hospital |
| | The Austin Hospital |
| Warringal Private Hospital | |
| Western Australia | Princess Margaret Hospital for Children |
| | Royal Perth Hospital |
| | Sir Charles Gairdner Hospital |
| | The Mount Hospital |

Appendix B: Data collection form

AUSTRALIAN INSTITUTE OF HEALTH AND WELFARE

CARDIAC SURGERY REGISTER

Annual report form for year ending December 1994

To be completed by

| | |
|-------------------------------------|------------|
| CARDIAC SURGEONS | Page 28 |
| MISCELLANEOUS PROCEDURES | Page 29 |
| ACQUIRED DISEASE | |
| Valve surgery – single | Page 30 |
| Valve surgery - double | Page 31 |
| Valve surgery - triple | Page 32 |
| Surgery for coronary artery disease | Page 33–34 |
| Great vessel surgery | Page 35 |
| Other conditions | Page 36–37 |
| CONGENITAL DISEASE | |
| Valve surgery | Page 38 |
| Other common conditions | Page 39–40 |
| Less common conditions | Page 41–43 |

**CARDIAC SURGERY REGISTER REPORT FORM
FOR OPERATIONS PERFORMED IN 1994**

NAME OF UNIT:

UNIT NUMBER:

CARDIAC SURGEONS IN YOUR UNIT

| | 1994 | |
|---|--------------------------|---|
| SURGEONS | Names of surgeons | Head of department |
| | | Surgeon responsible for this report |
| | | |
| SURGEONS IN TRAINING IN AUSTRALIA* | Names of trainees | Status (i.e. R.A.C.S. approved trainee, service registrar, overseas registrar) |
| | | |
| AUSTRALIANS TRAINING OVERSEAS | | |

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

MISCELLANEOUS PROCEDURES

List here all procedures not readily fitting into any other section

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

for ACQUIRED DISEASE

| PROCEDURE | CLOSED | | OPEN | |
|-----------|--------|----|------|----|
| | No. | D. | No. | D. |
| | | | | |

for CONGENITAL DEFECTS

| PROCEDURE | CLOSED | | OPEN | |
|-----------|--------|----|------|----|
| | No. | D. | No. | D. |
| | | | | |

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

ACQUIRED DISEASE : VALVE SURGERY - SINGLE

| | | |
|---------------------------|---------------|-----------|
| MITRAL - Valvotomy | CLOSED | |
| | No. | D. |
| | | |

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

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

ACQUIRED DISEASE : VALVE SURGERY - DOUBLE

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

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

ACQUIRED DISEASE : VALVE SURGERY - TRIPLE

| TRIPLE VALVE PROCEDURE | | | OPEN | | | |
|---------------------------------|----------------|--------------------------------------|--|-----|----------------------------|----|
| | | | Without coronary artery graft | | With coronary artery graft | |
| | | | No. | D. | No. | D. |
| MITRAL | Valvotomy | | | | | |
| | Reconstruction | <i>with support ring</i> | | | | |
| | | <i>without ring</i> | | | | |
| | Replacement | <i>mitral homograft</i> | | | | |
| | | <i>heterograft</i> | | | | |
| | | <i>prosthesis</i> | | | | |
| AORTIC | Valvotomy | | | | | |
| | Reconstruction | <i>decalcification</i> | | | | |
| | | <i>for regurgitation</i> | | | | |
| | | <i>other/unstated</i> | | | | |
| | Replacement | <i>pulmonary autograft</i> | | | | |
| | | <i>classical homograft</i> | | | | |
| | | <i>"mini root" homograft</i> | | | | |
| | | <i>"mini root" valve replacement</i> | | | | |
| | | <i>stent mounted heterograft</i> | | | | |
| | | <i>"mini root" heterograft</i> | | | | |
| | | <i>prosthesis</i> | | | | |
| TRICUSPID | Reconstruction | <i>with support ring</i> | | | | |
| | | <i>without ring</i> | | | | |
| | Replacement | <i>heterograft</i> | | | | |
| | | <i>prosthesis</i> | | | | |
| TOTAL NUMBER OF VALVES* | | | | | | |
| TOTAL NUMBER OF PATIENTS | | | | | | |
| | | | Some of the valve patients reported on pages 3, 4 & 5 will be having their second valve replacement. Please indicate the number of valve replaced for: | | | |
| | | | | No. | D. | |
| 1. Mechanical valve failures | | | | | | |
| 2. Tissue valve failures | | | | | | |

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

SURGERY FOR ACQUIRED CORONARY HEART DISEASE

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

* *Please make sure that the reoperations are also included in the main part of the table.*

** *Please check that this total is the same as the total number of patients reported on pages 3, 4 & 5 as having coronary artery grafts as well as valve surgery.*

SURGERY FOR ACQUIRED CORONARY HEART DISEASE (Cont)

TYPE OF GRAFT

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

| | No. of Patients |
|------------------------------|-----------------|
| Saphenous vein | |
| Internal mammary artery | |
| Inferior epigastric artery | |
| Gastroepiploic artery | |
| Cephalic vein | |
| Radial artery | |
| Prosthetic or bio prosthetic | |

SURGERY FOR ACQUIRED CORONARY HEART DISEASE WITHOUT GRAFTS

| Open | Myocardial resection or plication | | Closure of VSD | | Other | | Total | |
|----------------|-----------------------------------|----|----------------|----|-------|----|-------|----|
| | No. | D. | No. | D. | No. | D. | No. | D. |
| Without Grafts | | | | | | | | |

OTHER PROCEDURES FOR CORONARY HEART DISEASE

ACQUIRED DISEASE : GREAT VESSEL SURGERY

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

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

| REPLACEMENT OF AORTIC ARCH | | OPEN | | | |
|-----------------------------------|----------------|--------------------------------------|-----------|-----------------------------------|-----------|
| | | Without coronary artery graft | | With coronary artery graft | |
| | | No. | D. | No. | D. |
| | for aneurysm | | | | |
| | for dissection | | | | |
| TOTAL | | | | | |

| REPLACEMENT OF DESCENDING THORACIC AORTA | | CLOSED | | OPEN | |
|---|----------------|---------------|-----------|-------------|-----------|
| | | No. | D. | No. | D. |
| | for aneurysm | | | | |
| | for dissection | | | | |
| TOTAL | | | | | |

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

ACQUIRED DISEASE : OTHER CONDITIONS

| TRANSPLANTATION | | NO. | DEATHS |
|------------------------|----------------|------------|---------------|
| Cardiac | cardiomyopathy | | |
| | ischaemia | | |
| | other/unstated | | |
| Heart-Lung | congenital | | |
| | other/unstated | | |
| Lung | whole | | |
| | lobe | | |

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

ACQUIRED DISEASE : OTHER CONDITIONS (Cont)

| | | CLOSED | | OPEN without grafts | |
|-------------------------------|------------------------|--------|----|------------------------|----|
| | | No. | D. | No. | D. |
| CARDIAC TRAUMA | atrium | | | | |
| | ventricle | | | | |
| | *valves | | | | |
| | ascending aorta | | | | |
| | descending aorta | | | | |
| | other | | | | |
| PULMONARY EMBOLLECTOMY | | | | | |
| PERICARDIECTOMY FOR | tuberculosis | | | | |
| | non-specific infection | | | | |
| | uraemia | | | | |
| | other | | | | |
| OTHER CONDITIONS | please list | | | | |
| TOTAL | | | | | |

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

| TOTAL PATIENTS : ACQUIRED DISEASE | OPEN | | | | CLOSED | |
|--|----------------|----|-------------|----|--------|----|
| | WITHOUT GRAFTS | | WITH GRAFTS | | | |
| | No. | D. | No. | D. | No. | D. |
| | | | | | | |

CONGENITAL DEFECTS : VALVE SURGERY

| | CLOSED | | |
|-----------------------|--------|----|-----|
| | No. | D. | Age |
| MITRAL - valvotomy | | | |
| PULMONARY - valvotomy | | | |

| SINGLE VALVE PROCEDURE | Under 1 Month | | 1-6 Months | | Over 6 Months | |
|---------------------------------|---------------|----|------------|----|---------------|----|
| | No. | D. | No. | D. | No. | D. |
| OPEN | | | | | | |
| MITRAL Valvotomy | | | | | | |
| Reconstruction | | | | | | |
| Replacement <i>heterograft</i> | | | | | | |
| <i>prosthesis</i> | | | | | | |
| AORTIC Valvotomy | | | | | | |
| Reconstruction | | | | | | |
| Replacement <i>homograft</i> | | | | | | |
| <i>heterograft</i> | | | | | | |
| <i>prosthesis</i> | | | | | | |
| TRICUSPID Valvotomy | | | | | | |
| Reconstruction | | | | | | |
| Replacement <i>heterograft</i> | | | | | | |
| <i>prosthesis</i> | | | | | | |
| PULMONARY Valvotomy | | | | | | |
| Reconstruction | | | | | | |
| Replacement <i>homograft</i> | | | | | | |
| <i>heterograft</i> | | | | | | |
| <i>prosthesis</i> | | | | | | |
| TOTAL NUMBER OF PATIENTS | | | | | | |

CONGENITAL DEFECTS : OTHER COMMON CONDITIONS

| | Under 1 Month | | | | 1-6 Months | | | | Over 6 Months | | | |
|--|---------------|----|------|----|------------|----|------|----|---------------|----|------|----|
| | Closed | | Open | | Closed | | Open | | Closed | | Open | |
| | No. | D. | No. | D. | No. | D. | No. | D. | No. | D. | No. | D. |
| Persistent ductus arteriosus | | | | | | | | | | | | |
| Coarctation of aorta | | | | | | | | | | | | |
| Simple | | | | | | | | | | | | |
| Complicated | | | | | | | | | | | | |
| Atrial septal defect | | | | | | | | | | | | |
| Ventricular septal defect | | | | | | | | | | | | |
| Uncomplicated <i>palliative</i> | | | | | | | | | | | | |
| <i>corrective</i> | | | | | | | | | | | | |
| With PS <i>palliative</i> | | | | | | | | | | | | |
| <i>corrective</i> | | | | | | | | | | | | |
| With pulmonary atresia <i>palliative</i> | | | | | | | | | | | | |
| <i>corrective</i> | | | | | | | | | | | | |
| Tetralogy of Fallot | | | | | | | | | | | | |
| Simple <i>palliative</i> | | | | | | | | | | | | |
| <i>corrective</i> | | | | | | | | | | | | |
| Complicated <i>palliative</i> | | | | | | | | | | | | |
| <i>corrective</i> | | | | | | | | | | | | |
| Acquired pulmonary atresia <i>palliative</i> | | | | | | | | | | | | |
| <i>corrective</i> | | | | | | | | | | | | |
| TOTALS (this page) | | | | | | | | | | | | |

Please note: Please be careful to put the cases in the correct columns, indicating whether they were done using the open or closed technique.

CONGENITAL DEFECTS : OTHER COMMON CONDITIONS (Cont)

| | Under 1 Month | | | | 1-6 Months | | | | Over 6 Months | | | |
|---|---------------|----|------|----|------------|----|------|----|---------------|----|------|----|
| | Closed | | Open | | Closed | | Open | | Closed | | Open | |
| | No. | D. | No. | D. | No. | D. | No. | D. | No. | D. | No. | D. |
| Transposition of great vessels | | | | | | | | | | | | |
| With intact ventricular septum | | | | | | | | | | | | |
| <i>palliative</i> | | | | | | | | | | | | |
| <i>corrective</i> | | | | | | | | | | | | |
| With VSD | | | | | | | | | | | | |
| <i>palliative</i> | | | | | | | | | | | | |
| <i>corrective</i> | | | | | | | | | | | | |
| With other significant anomaly | | | | | | | | | | | | |
| <i>palliative</i> | | | | | | | | | | | | |
| <i>corrective</i> | | | | | | | | | | | | |
| With inversion of ventricles* | | | | | | | | | | | | |
| <i>palliative</i> | | | | | | | | | | | | |
| <i>corrective</i> | | | | | | | | | | | | |
| Corrected transposition & other significant anomaly | | | | | | | | | | | | |
| <i>palliative</i> | | | | | | | | | | | | |
| <i>corrective</i> | | | | | | | | | | | | |
| TOTALS (this page) | | | | | | | | | | | | |

* Formerly 'corrected transposition with VSD'.

Please note: Please be careful to put the cases in the correct columns, indicating whether they were done using the open or closed technique.

CONGENITAL DEFECTS : LESS COMMON CONDITIONS

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

Please note: Please be careful to put the cases in the correct columns, indicating whether they were done using the open or closed technique.

CONGENITAL DEFECTS : LESS COMMON CONDITIONS (Cont)

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

Please note: *Please be careful to put the cases in the correct columns, indicating whether they were done using the open or closed technique.*

CONGENITAL DEFECTS : LESS COMMON CONDITIONS (Cont)

| | Under 1 Month | | | | 1-6 Months | | | | Over 6 Months | | | |
|---|---------------|----|------|----|------------|----|------|----|---------------|----|------|----|
| | Closed | | Open | | Closed | | Open | | Closed | | Open | |
| | No. | D. | No. | D. | No. | D. | No. | D. | No. | D. | No. | D. |
| DEFECTS OF PARTITIONING | | | | | | | | | | | | |
| AV Canal - partial <i>palliative</i> | | | | | | | | | | | | |
| <i>corrective</i> | | | | | | | | | | | | |
| AV Canal - total <i>palliative</i> | | | | | | | | | | | | |
| <i>corrective</i> | | | | | | | | | | | | |
| Double outlet RV <i>palliative</i> | | | | | | | | | | | | |
| <i>corrective</i> | | | | | | | | | | | | |
| Truncus arteriosus <i>palliative</i> | | | | | | | | | | | | |
| <i>corrective</i> | | | | | | | | | | | | |
| Other (please specify) | | | | | | | | | | | | |
| TOTALS (this page) | | | | | | | | | | | | |
| TOTAL PATIENTS : CONGENITAL DEFECTS (pages 12 to 17) | | | | | | | | | | | | |

Please note: *Please be careful to put the cases in the correct columns, indicating whether they were done using the open or closed technique.*

Related publications

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