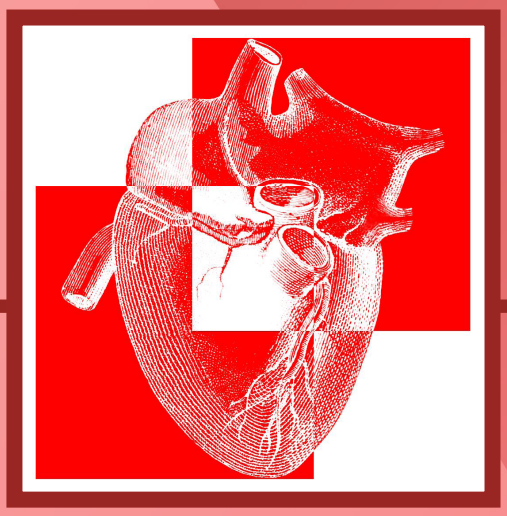
ANZSCTS Cardiac Surgery Database Program



Annual Report

2025

25TH ANNIVERSARY EDITION



Suggested citation:

Newcomb A, Williams-Spence J, Tran L, Solman N, McLaren J, Stub D and Reid C. The Australian and New Zealand Society of Cardiac and Thoracic Surgeons' Cardiac Surgery Database Program Annual Report 2025. Monash University, School of Public Health and Preventive Medicine, October 2026. Report No. 19, 88 pages.

Image location: Wilsons Promontory National Park, Victoria

Table of Contents

List of Figures ii
List of Tables iii
Acronyms v
Acknowledgements vi
Foreword vii
Introduction 1
Overview of procedures 4
The ANZSCTS Database: 25 Years On 5
Database snapshot 6
Timeline of key Database milestones 7
Identifying and responding to performance deviations 12
The Database, then and now 13
Future Directions for the Database 14
1. Isolated CABG Surgery 15
1.1 Caseload 15
1.2 Patient and surgical factors 16
1.3 Mortality 19
1.4 Complications 25
2. Isolated Valve Surgery 32
2.1 Caseload 32
2.2 Patient and surgical factors 33
2.3 Overview of all valve surgery 36
2.4 Influence of patient characteristics on operative mortality 38
2.5 AVR 40
3. Combined Valve and CABG Surgery 50
3.1 Caseload 50
3.2 Patient and surgical factors 51
3.3 Overview of all combined valve and CABG surgery 54
3.4 Influence of patient characteristics on operative mortality 55
3.5 Combined AVR and CABG 56
4. Other Cardiac Surgery 67
5. Concluding Remarks 70
Appendix A 71
Key performance indicator definitions 71
Other outcome definitions 72
Appendix B 73
ANZSCORE OM and dNRI models 73
Appendix C 75
Data preparation and key variable definitions 75
Appendix D 77

Interpretation of funnel plots 77
Appendix E 78
Interpretation of Kaplan-Meier figures and tables 78
Appendix F 80
Unit contribution in the 2025 Annual Report 80

List of Figures

Figure 1. Locations of included hospitals in the 2025 Annual Report 2
Figure 2. Cardiac surgery cases by procedure group and unit, 2025 4
Figure 3. Isolated CABG cases by unit, 2025 15
Figure 4. Isolated CABG clinical status by case volume and peer group, 2025 17
Figure 5. Age of isolated CABG patients by sex, 2025 18
Figure 6. Ten-year overview of isolated CABG patient risk, 2016-2025 19
Figure 7. Ten year public and private overview of isolated CABG mortality, 2016-2025 19
Figure 8. OM following isolated CABG surgery, by unit 21
Figure 9. Long-term survival following isolated CABG surgery by clinical status, 2015 to 2024 22
Figure 10. Long-term survival following isolated CABG surgery by sex, 2015 to 2024 22
Figure 11. Long-term survival following isolated CABG surgery by sex and clinical status, 2015 to 2024 23
Figure 12. Long-term survival following isolated CABG surgery by age, 2015 to 2024 23
Figure 13. Long-term survival following isolated CABG surgery by MI and MI timing, 2015 to 2024 24
Figure 14. dNRI following isolated CABG surgery, by unit 27
Figure 15. Permanent stroke following isolated CABG surgery, by unit 27
Figure 16. DSWI following isolated CABG surgery, by unit 28
Figure 17. RTT for bleeding following isolated CABG surgery, by unit 28
Figure 18. Ten year public and private overview of isolated CABG complications, 2016-2025 30
Figure 19. Isolated valve cases by unit, 2025 32
Figure 20. Isolated valve clinical status by case volume and peer group, 2025 34
Figure 21. Age of isolated valve patients by sex, 2025 35
Figure 22. Isolated valve surgery by year, 2016-2025 36
Figure 23. Mitral valve repair rates for myxomatous degeneration, by unit, 2021-2025 37
Figure 24. OM following AVR, MVR and MV repair, by aetiology, 2021-2025 39
Figure 25. Isolated AVR surgery by unit, 2025 40
Figure 26. Isolated AVR patient risk over time, 2016-2025 41
Figure 27. Ten year public and private overview of isolated AVR mortality, 2016-2025 41
Figure 28. OM following isolated AVR surgery 2021-2025, by unit 42
Figure 29. Long-term survival following isolated AVR surgery by clinical status, 2015 to 2024 43
Figure 30. Long-term survival following isolated AVR surgery by sex, 2015 to 2024 43
Figure 31. Long-term survival following isolated AVR surgery by sex and clinical status, 2015 to 2024 44
Figure 32. Long-term survival following isolated AVR surgery by age, 2015 to 2024 44
Figure 33. Long-term survival following isolated AVR surgery by pre-operative eGFR, 2015 to 2024. 45
Figure 34. dNRI following isolated AVR surgery 2021-2025, by unit 46

Figure 35. Complications following isolated AVR surgery 2021-2025, by unit 46
Figure 36. Ten year public and private overview of isolated AVR complications, 2016-2025 48
Figure 37. Combined valve and CABG cases by unit, 2025 50
Figure 38. Combined valve and CABG clinical status by case volume and peer group, 2025 52
Figure 39. Age of combined valve and CABG patients by sex, 2025 53
Figure 40. Combined valve and CABG surgery by year, 2016-2025 54
Figure 41. Combined AVR and CABG surgery by unit, 2025 56
Figure 42. Combined AVR and CABG patient risk over time, 2016-2025 57
Figure 43. Ten year public and private overview of combined AVR and CABG mortality, 2016-2025 57
Figure 44. OM following combined AVR and CABG surgery 2021-2025, by unit 58
Figure 45. Long-term survival following CABG with AVR surgery by clinical status, 2015 to 2024 58
Figure 46. Long-term survival following CABG with AVR surgery by sex, 2015 to 2024 59
Figure 47. Long-term survival following CABG with AVR surgery by sex and clinical status, 2015 to 2024 59
Figure 48. Long-term survival following CABG with AVR surgery by age, 2015 to 2024 60
Figure 49. dNRI following combined AVR and CABG surgery 2021-2025, by unit 63
Figure 50. Complications following combined AVR and CABG surgery 2021-2025, by unit 63
Figure 51. Ten year public and private overview of isolated CABG complications, 2016-2025 65
Figure 52. Case numbers for aortic replacement location zones, 2025 68

List of Tables

Table 1. Inclusion of participating units in the 2025 Annual Report 3
Table 2. Cardiac surgical procedure groups by year 4
Table 3. Isolated CABG patient characteristics by year 16
Table 4. Number of distal anastomoses based on conduit type for isolated CABG surgery, 2025 18
Table 5. Grafts and multi-vessel disease in isolated CABG surgery by age and cardiopulmonary bypass (CPB), 2025 18
Table 6. Ten-year overview of isolated CABG mortality, 2016-2025 19
Table 7. OM following isolated CABG surgery, by patient demographics and risk factors 20
Table 8. Long-term survival following isolated CABG surgery by clinical status, 2015 to 2024 22
Table 9. Long-term survival following isolated CABG surgery by sex, 2015 to 2024 22
Table 10. Long-term survival following isolated CABG surgery by sex and clinical status, 2015 to 2024 23
Table 11. Long-term survival following isolated CABG surgery by age, 2015 to 2024 23
Table 12. Long-term survival following isolated CABG surgery by MI and MI timing, 2015 to 2024 24
Table 13. Complications following isolated CABG surgery, by pre-operative diabetes and renal function 25
Table 14. Complications following isolated CABG surgery, by age group 25
Table 15. Complications following isolated CABG surgery, by previous surgery and CPB 26
Table 16. Incidence of dNRI following isolated CABG surgery, by pre-operative demographics and risk factors 26
Table 17. Unit variation of isolated CABG complications, 2025 29
Table 18. Unit variation of isolated CABG complications, 2021-2024 29
Table 19. Ten-year overview of isolated CABG complications, 2016-2025 29

Table 20. Resource utilisation for isolated CABG patients, 2025 31
Table 21. Blood product usage for isolated CABG patients, 2025 31
Table 22. Isolated valve patient characteristics by year 33
Table 23. In-hospital mortality and total OM in isolated valve patients, 2025 36
Table 24. OM following the three most common isolated single valve surgical procedures, by patient demographics and risk factors, 2021-2025 38
Table 25. Ten-year overview of isolated AVR mortality, 2016-2025 41
Table 26. Long-term survival following isolated AVR surgery by clinical status, 2015 to 2024 43
Table 27. Long-term survival following isolated AVR surgery by sex, 2015 to 2024 43
Table 28. Long-term survival following isolated AVR surgery by sex and clinical status, 2015 to 2024 44
Table 29. Long-term survival following isolated AVR surgery by age, 2015 to 2024 44
Table 30. Long-term survival following isolated AVR surgery by pre-operative eGFR, 2015 to 2024 45
Table 31. Unit variation of isolated AVR complications, 2021-2025 47
Table 32. Ten-year overview of isolated AVR complications, 2016-2025 47
Table 33. Resource utilisation for isolated AVR patients, 2025 49
Table 34. Blood product usage for isolated AVR patients, 2025 49
Table 35. Combined valve and CABG patient characteristics by year 51
Table 36. In-hospital mortality and total OM in combined valve and CABG patients, 2025 54
Table 37. OM following the three most common combined single valve and CABG surgical procedures, by patient demographics and risk factors, 2021-2025 55
Table 38. Ten-year overview of combined AVR and CABG mortality, 2016-2025 57
Table 39. Long-term survival following CABG with AVR surgery by clinical status, 2015 to 2024 58
Table 40. Long-term survival following CABG with AVR surgery by sex, 2015 to 2024 59
Table 41. Long-term survival following CABG with AVR surgery by sex and clinical status, 2015 to 2024 59
Table 42. Long-term survival following CABG with AVR surgery by age, 2015 to 2024 60
Table 43. Complications following combined AVR and CABG surgery, by pre-operative diabetes and renal function 61
Table 44. Complications following combined AVR and CABG surgery, by age group 61
Table 45. Complications following combined AVR and CABG surgery, by previous surgery 62
Table 46. Incidence of dNRI following combined AVR and CABG surgery, by pre-operative demographics and risk factors 62
Table 47. Unit variation of AVR and CABG complications, 2021-2025 64
Table 48. Ten-year overview of combined AVR and CABG complications, 2016-2025 64
Table 49. Resource utilisation for combined AVR and CABG patients, 2025 66
Table 50. Blood product usage for combined AVR and CABG patients, 2025 66
Table 51. Case numbers for isolated and concomitant aortic surgery, combined, 2025 67
Table 52. Case numbers for adult congenital heart disease surgery, 2025 68
Table 53. Case numbers for other isolated and concomitant uncommon cardiac surgery, combined, 2025 69
Table 54. Case numbers and OM for isolated transplant surgery, 2025 69
Table 55. Case numbers for other aortic valve surgery performed without and with CABG 69

Acronyms

ANZDATA	The Australia and New Zealand Dialysis and Transplant Registry
ANZICS	The Australian and New Zealand Intensive Care Society
ANZ-MTR	The Australian and New Zealand Massive Transfusion Registry
ANZSCTS	Australian and New Zealand Society of Cardiac and Thoracic Surgeons
AVR	Aortic valve replacement
BCA	Brachiocephalic artery
BITA	Bilateral internal thoracic artery
CABG	Coronary artery bypass graft
CCRET	Centre of Cardiovascular Research and Education in Therapeutics
CPB	Cardiopulmonary bypass
CUSUM	Cumulative sum
DHS	Department of Human Services
dNRI	Derived new renal insufficiency
DSWI	Deep sternal wound infection
EF	Ejection fraction
eGFR	Estimated glomerular filtration rate
ICU	Intensive care unit
ITA	Internal thoracic artery
IQR	Interquartile range
KPI	Key performance indicator
LCCA	Left common carotid artery
LSA	Left subclavian artery
LV	Left ventricular
LVF	Left ventricular function
MAVERIC	Monash AdVanced Environment for Research and Intelligent Computing
MI	Myocardial infarction
MV	Mitral valve
MVR	Mitral valve replacement
NDI	National Death Index
NSTEMI	Non-ST-elevation myocardial infarction
OM	Operative mortality
PEARS	Personalised external aortic root support
RA	Radial artery
RA-dNRI	Risk-adjusted derived new renal insufficiency
RA-OM	Risk-adjusted operative mortality
RTT	Return to theatre
SeRP	Secure eResearch Platform
STEMI	ST-elevation myocardial infarction
SVG	Saphenous vein graft
TAVR	Transcatheter aortic valve replacement
TMVR	Transcatheter mitral valve replacement

Acknowledgements

In 2025, the Australian and New Zealand Society of Cardiac and Thoracic Surgeons (ANZSCTS) Cardiac Surgery Database was funded by Safer Care Victoria, the New South Wales local health districts, Queensland Health and through participation fees from contributing private and public units. The ANZSCTS Database is based in the Centre of Cardiovascular Research and Education in Therapeutics (CCRET) within the School of Public Health and Preventive Medicine at Monash University.

We acknowledge the contributions made by the ANZSCTS Database Steering and Research Committees, which oversee all registry activities, including the quality assurance and research programs. We thank the Database Data Custodian, Professor Chris Reid, the Co-Director of the CCRET, Professor Dion Stub, the Steering Committee Chair and Deputy Chair, Associate Professor Andrew Newcomb and Associate Professor Siven Seevanayagam, and the Research Committee Chair, Professor Julian Smith, for their essential support of the Database. Professor Stub is supported by a National Heart Foundation Future Leader Fellowship.

We also acknowledge the Data Management and Analysis Centre staff at the CCRET (Dr Jenni Williams-Spence, Dr Lavinia Tran, Mr Noah Solman, Ms Jenna McLaren and Mr Mark Lucas).

The work of the ANZSCTS Database relies on the continuing interest and efforts of surgeons, Data Managers, and other relevant hospital staff who contribute data. We sincerely thank these individuals for their participation.



Photograph by Mark Lucas 2018 ©

Foreword



Associate Professor Andrew Newcomb

Chair, ANZSCTS Database Program Steering Committee

This year marks the 25th anniversary of the ANZSCTS Cardiac Surgery Database, and it is a privilege to introduce this milestone edition of the Annual Report. What began in 2001 as a demonstration project across six Victorian public hospitals has grown into a binational clinical quality registry currently covering 65 hospitals across Australia and New Zealand, with more than 260,000 procedures recorded over the past quarter-century. A dedicated section of this report looks back on that history and acknowledges the many surgeons, researchers and other supporters whose efforts built it. It was a fitting way to mark the milestone when, earlier this year, the Database received the inaugural Australian Clinical Trials Alliance Clinical Quality Registry Award, recognising 25 years of work by the cardiac surgical community of Australia and New Zealand.

The anniversary has also been an opportunity to review the report itself. Earlier this year, we invited feedback from all contributing surgeons on its content and format, and this edition reflects that input. The most significant change is a sharper focus: much of the risk factor, demographic and resource utilisation detail that has traditionally sat alongside outcome data has moved into a new Supplementary Report, available online. This report concentrates on the outcome data our surgeons said matters most, with the fuller picture still readily available to units and researchers wanting a closer look at the underlying data.

Reflecting the Program's maturity, this edition also introduces several new analyses. We present how overall patient risk has changed over the past decade, alongside 10-year trends in hospital contributions and outcomes, and expanded reporting of public and private sector differences. Long-term survival data, drawn from the most recent linkage with the Australian Institute of Health and Welfare's National Death Index, give visibility of outcomes well beyond the traditional 30-day window.

This report presents data on 17,055 cases from the 2025 calendar year. What makes this more than a collection of numbers is the work behind it: standardised data definitions, binational risk-adjustment models built and validated on our own patient population, and case ascertainment and data-quality processes refined over 25 years. That infrastructure allows unit performance to be compared meaningfully through risk-adjusted benchmarking, with results anonymised for public reporting but re-identifiable to individual hospitals. The Australian Commission on Safety and Quality in Health Care's Framework for Australian Clinical Quality Registries recognises this kind of benchmarking, built on complete, high-quality data, as central to the value a registry delivers; data completeness among contributing hospitals remains excellent, and we continue to encourage the private units yet to join the Program to do so.

Overall, most participating units continue to achieve satisfactory outcomes on the key performance indicators for mortality and complications, though variability in practice persists. The Program Steering Committee reviews the data quarterly, and any unit whose performance signals a potential concern is notified and supported under the Database's Special Cause Variation Management Policy. This process has underpinned the Program's quality assurance activities since 2001 and is the reason units and hospital executives can trust what a satisfactory result reflects.

Quality improvement is not confined to the peer-review cycle. Every data manager and contributing surgeon can access surgeon-level and site-level outcome reports, alongside binational summary data reports, directly through the Database's web system. Using the live dataset and customisable by procedure type and date range, these give units and surgeons the means to review their own performance at any time, not only when the next formal feedback round is due. We would encourage anyone not yet making regular use of this facility to do so.

The 25 years of data, the quality improvement it has driven, and this year's redesigned report would not be possible without the sustained engagement of contributing surgeons, hospitals and data managers across Australia and New Zealand. On behalf of the Steering Committee, thank you for your continued support, and I look forward to the next 25 years of the Database's contribution to the quality and safety of cardiac surgery in Australia and New Zealand.

Introduction

In 2001, the ANZSCTS, with the support of the Victorian Department of Health and Human Services, developed a Program to collect and report data on cardiac surgery performed in Victorian hospitals. The Program expanded to national coverage, producing annual reports for Victorian units since 2002 and at the national level since 2007. In 2019, the Database received the first data from Aotearoa New Zealand, becoming a binational Program. Currently, 65 hospitals are contracted to participate.

The ANZSCTS Database 2025 Annual Report presents data on patient characteristics, operative details and unit outcomes for a range of key performance indicators (KPIs), including post-operative complications and mortality. In recognition of the 25th anniversary of the Database, this year's report includes a summary of the evolution of the Database, and an overview of its key assets and impact.

Key performance indicators

The Database collects and analyses data for a range of clinically relevant surgical outcomes for the purpose of monitoring cardiac surgical unit performance. The indicators are risk-adjusted, where possible. The KPIs and other outcomes are defined in detail in Appendix A (pg. 71). Information about the ANZSCORE risk-adjustment models can be found in Appendix B (pg. 73). Units that fall outside the upper 99.7% control limit for any of these KPIs are supported in line with the Database *Special Cause Variation Management Policy*.

Data completeness and analysis

Of the cases submitted in 2025, 98.9% were flagged as complete. Incomplete cases miss one or more variables for a variety of reasons. The tables presented in this report include all available data. Accordingly, there are small variations in the total number of cases in each table due to the differing amount of missing data for each variable. Details of data preparation and key variable definitions are presented in Appendix C (pg. 75). Guides to interpretation of key figures and tables are detailed in Appendix D (funnel plots; pg. 77) and Appendix E (Kaplan-Meier survival analysis; pg. 78).

Supplementary analyses

Based on feedback from contributing surgeons, most risk factor, demographic, and resource utilisation analyses have been moved to a companion Supplementary Report, which can be downloaded here: 2025 ANZSCTS Database Supplementary Annual Report. This change allows the main report to focus more directly on clinical outcomes. The Supplementary Report contains analyses not included in the main report and provides additional detail on selected measures, including unit-level results for data presented here in aggregate form.

Contributing hospitals

This report presents data from 53 cardiac surgery units, representing >90% coverage of Australian and New Zealand public hospitals and >70% of private hospitals performing cardiac surgery in Australia (Figure 1). Detailed information about hospital inclusion is presented in Appendix C (pg. 75). The proportion of cases contributed by each hospital can be found in Appendix F (pg. 80).

Figure 1. Locations of hospitals included in the 2025 Annual Report

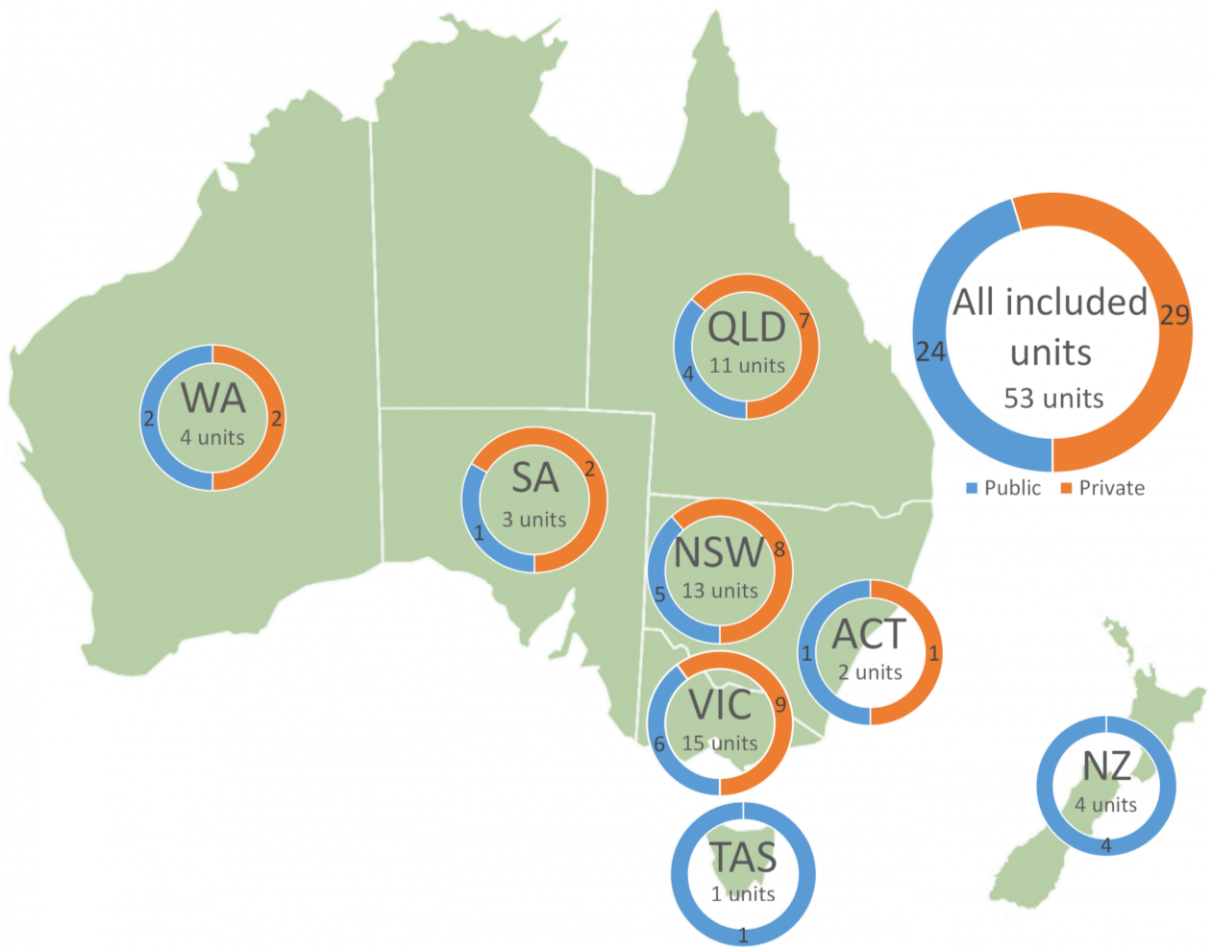


Table 1. 2025 Annual Report inclusion status for contracted hospitals

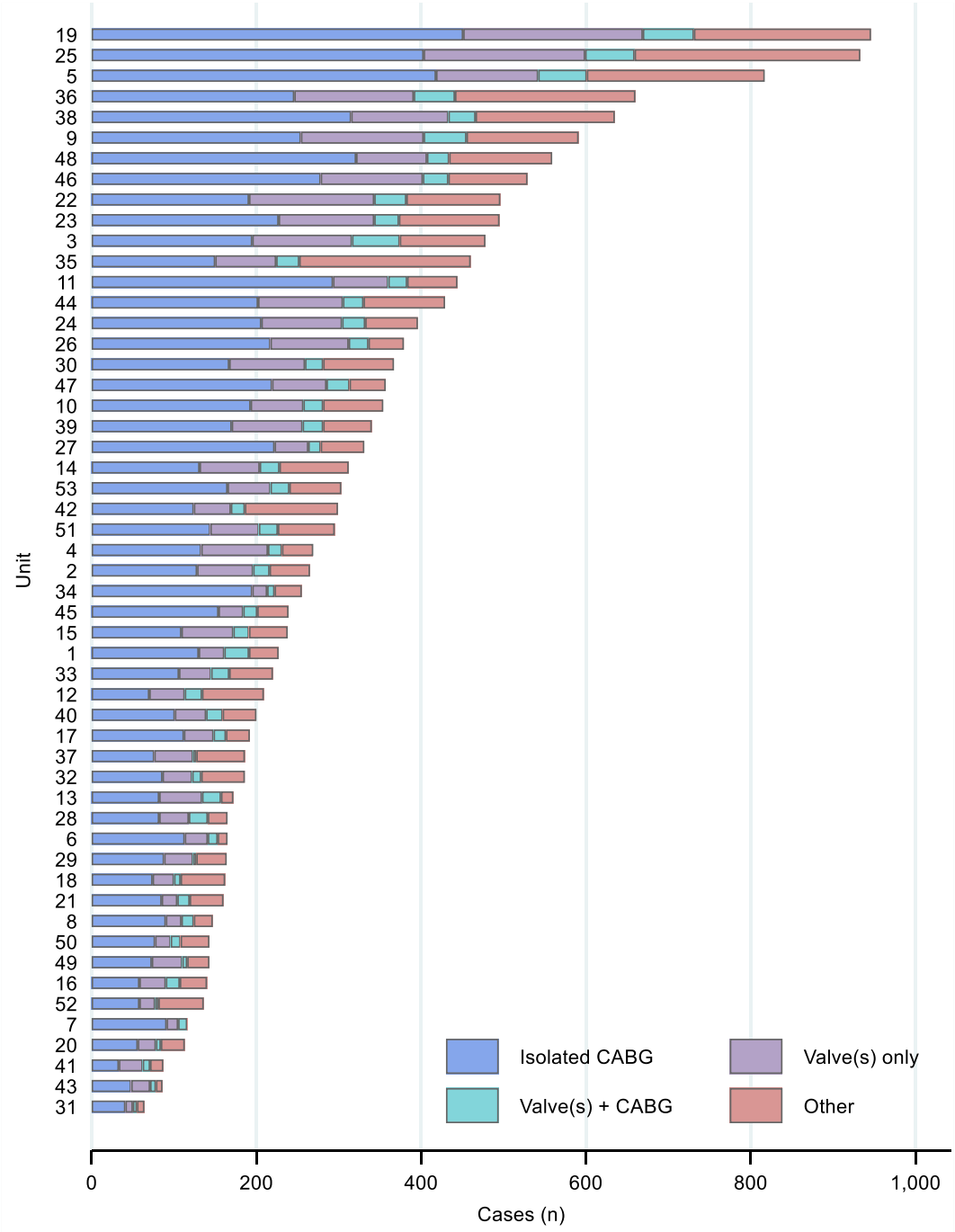
This table lists all units with a contract to participate in the ANZSCTS Database in 2025 and indicates whether they contributed sufficient data for inclusion. Refer to Appendix C (pg. 75) for detailed inclusion criteria.

Hospital	Included (Y/N)	Hospital	Included (Y/N)
AUSTRALIAN CAPITAL TERRITORY		**QUEENSLAND**	
Canberra Hospital	Y	Sunshine Coast University Private Hospital	Y
National Capital Private Hospital	Y	The Prince Charles Hospital	Y
NEW SOUTH WALES		The Wesley Hospital	Y
John Hunter Hospital	Y	Townsville University Hospital	Y
Lake Macquarie Private Hospital	Y	**SOUTH AUSTRALIA**	
Lingard Private Hospital	Y	Ashford Hospital	Y
Liverpool Hospital	Y	Flinders Medical Centre	Y
Macquarie University Hospital*	N	Flinders Private Hospital	Y
Newcastle Private Hospital	Y	Royal Adelaide Hospital	N
North Shore Private Hospital	Y	**TASMANIA**	
Northern Beaches Hospital	N	Royal Hobart Hospital	Y
Norwest Private Hospital	Y	**VICTORIA**	
Prince of Wales Hospital	N	Austin Hospital	Y
Prince of Wales Private Hospital	N	Cabrini Malvern	Y
Royal North Shore Hospital	Y	Epworth Eastern	Y
Royal Prince Alfred Hospital	Y	Epworth Richmond	Y
St George Private Hospital	Y	Jessie McPherson Private Hospital	Y
Strathfield Private Hospital	N	Knox Private Hospital	Y
St Vincent's Hospital Sydney	Y	Melbourne Private Hospital	Y
Westmead Hospital	N	Peninsula Private Hospital	Y
Westmead Private Hospital	Y	St John of God Geelong Hospital	Y
Wollongong Private Hospital	Y	St Vincent's Hospital Melbourne	Y
NEW ZEALAND		St Vincent's Private Hospital Fitzroy	Y
Auckland City Hospital	Y	The Alfred	Y
Christchurch Hospital	Y	The Royal Melbourne Hospital	Y
Waikato Hospital	Y	University Hospital Geelong	Y
Wellington Regional Hospital	Y	Victorian Heart Hospital	Y
QUEENSLAND		Warringal Private Hospital	N
Gold Coast University Hospital	Y	**WESTERN AUSTRALIA**	
Greenslopes Private Hospital	Y	Fiona Stanley Hospital	Y
John Flynn Private Hospital	Y	Hollywood Private Hospital	Y
Mater Private Hospital Gold Coast	Y	Mount Private Hospital	N
Mater Private Hospital Townsville	Y	Sir Charles Gairdner Hospital	Y
Princess Alexandra Hospital	Y	St John of God Subiaco Hospital	Y
St Vincent's Private Hospital Northside	Y		

* Unit recently joined the database but has not submitted data in time for inclusion in the 2025 Annual Report

Overview of procedures

Figure 2. Cardiac surgery cases by procedure group and unit, 2025



CABG indicates coronary artery bypass graft

Table 2. Cardiac surgical procedure groups by year

	2021	2022	2023	2024	2025	Total
Hospitals (n)	46	49	50	53	53	53
Total cases (n)	14,381	14,772	16,107	16,982	17,055	79,297
Isolated CABG (%)	51.3	52.5	50.2	49.3	49.6	50.5
Valve(s) only (%)	20.4	19.5	21.0	20.9	20.6	20.5
Valve(s) + CABG (%)	8.3	7.9	7.3	7.6	7.1	7.6
Other (%)	20.0	20.1	21.5	22.3	22.7	21.4

The ANZSCTS Database: 25 Years On



Professor Chris Reid

ANZSCTS Database Data Custodian, 2001–present

In 1999, a delegation of Victorian cardiac surgeons, including the late Brian Buxton, Peter Skillington, Gil Shardey and Frank Rosenfeldt, and I met with the then Victorian Health Minister John Thwaites to discuss the prospect of developing a standardised data collection system to report on outcomes following cardiac surgery in Victorian public hospitals. The meeting was instigated following a recently reported BMJ whistle-blower article describing excess deaths from cardiac surgery in a hospital in Bristol in the UK. The argument we made was that, in the absence of a standardised reporting system and transparent review of outcomes, the same situation could be occurring in Victorian hospitals, and no one would be aware. In addition, the argument for standardisation was supported by a recent report we published in Heart, Lung and Circulation demonstrating that, while many cardiac surgical units were collecting their own data, the lack of a standardised data definition set made comparisons meaningless.

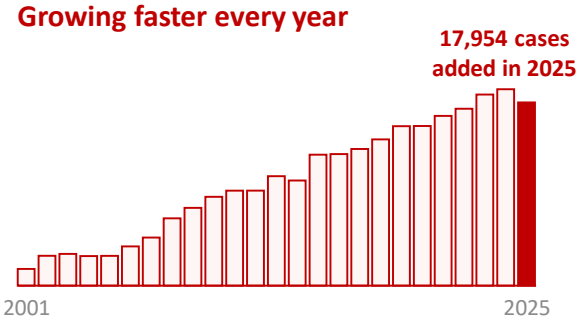
There began what is now the ANZSCTS Cardiac Surgery Database, and for the past 25 years, it has been reporting on and helping to improve the quality and safety of heart surgery across Australia and New Zealand. Now covering 65 hospitals and containing more than 260,000 procedures, the Database provides detailed, risk-adjusted information on patient outcomes, helping surgical teams benchmark performance and identify opportunities for improvement.

Its impact is tangible. Hospitals have used Database insights to reduce serious infections and post-operative bleeding, strengthen surgical practice and enhance clinical training. Importantly, it has also provided a training ground for the next generation of cardiac surgeons in Australia and New Zealand to understand the value of standardised reporting and measurement of outcomes, and to use the information collected in the Database to answer important questions in relation to cardiac surgical outcomes. Governed through the ANZ Society of Cardiothoracic surgeons and operated through Monash University's Centre for Cardiovascular Research and Education in Therapeutics, the ANZSCTS Database was recently recognised through a Clinical Quality Registries Award from the Australian Clinical Trials Alliance – the peak body for clinical trials and registries in Australia. With 128 peer-reviewed publications and 37 ongoing research projects, the Database is not only improving care today but is generating evidence that will benefit cardiac surgery patients for years to come.

Database snapshot

THE DATABASE

Growing faster every year



99.6%
case data completeness, 2016 to 2025

45M+
total data points collected

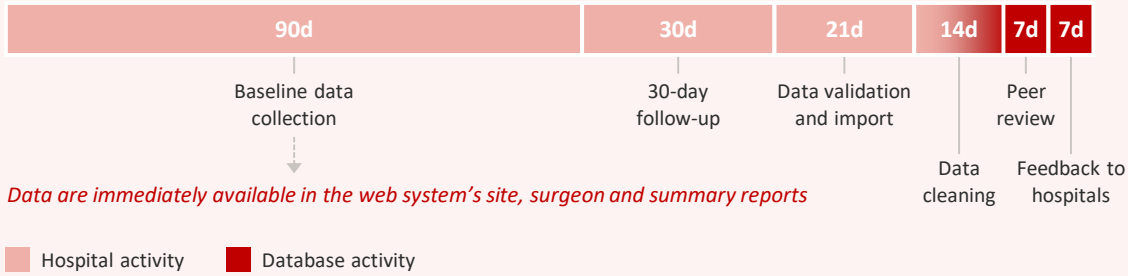
235
surgeons included and **173** active in 2025

1,218
built-in validation rules for data quality

1 of 17
declared national Quality Assurance activities

3,345
peer-reviewed reports fed back to units

Quarterly feedback timeline



THE RESEARCH PROGRAM

280
research investigators across **135** approved projects

Remote data access via the Monash Secure eResearch Platform

9
major linkage and pooled-analysis projects

1,571,452
person-years of follow-up unlocked through NDI linkage

128
publications across **61** journals, cited **2,800+** times

The Research Program trains the next generation of clinician-researchers

Timeline of key Database milestones

This overview cannot fully detail the surgeons, researchers and other advocates who played key roles in establishing the Database, or the magnitude of their contributions. The successful implementation of the Program can be credited to many people, including:

Steering Committee: Dr Peter Skillington (Inaugural Chair), Clinical Professor Mark Newman, Professor John Knight, Dr Greg Stafford

Dataset and Definitions Committee: Dr Hugh Wolfenden (Chair), Dr Gil Shardey, Dr Ian Gilfillan, Professor Alistair Royse

Data Analysis Committee: Professor Brian Buxton (Chair), Dr Nick Hendel, Professor Julian Smith

Privacy and Ethics Committee: Professor Cliff Hughes (Chair), Dr Iain Ross, Dr Michael Gardner, Professor Frank Rosenfeldt

Peer Review and Quality Assurance Committee: Dr Alan Gale (Chair), Dr Terry Mau, Dr Andrew Hodge, Professor John Alvarez

Other key contributors: Professor Chris Reid, Associate Professor Ben Bidstrup, Associate Professor Con Aroney, Dr Heather Buchan and the Victorian Department of Human Services (DHS). The Steering Committee has since been chaired by Dr Gil Shardey (2002–2022), Associate Professor Julie Mundy (2022–2025) and Associate Professor Andrew Newcomb (2025–present). The Program's continued progress reflects the contribution of all committee members, past and present.

1996–1999

Opening discussions

- A/Prof Ben Bidstrup and Prof Brian Buxton led early efforts to establish an Australian cardiac surgery database, modelled on the North American Society of Thoracic Surgeons program and supported from the outset by Clin Prof Newman and Dr Wolfenden.

1999–2001

Scoping the Database operations

- A Steering Committee, chaired by Dr Skillington, and several subcommittees were formed to address the dataset, data analysis methodology, privacy and ethics, and peer review and quality assurance.

Initial funding and management

- A proposal for the AIHW to manage a national Database did not secure federal funding. Instead, a $200,000 Victorian Government grant funded a demonstration project across six Victorian public hospitals.
- The ASCTS appointed Prof Reid's Cardiovascular Disease Prevention Unit at the Baker Medical Research Institute to run it.

2001

6 public units | 0 private units **1,640 cases**

Establishment of the ASCTS Database

- Prof Reid and the Baker Medical Research Institute published the demonstration project's results, drawing on five years of retrospective data from the six Victorian public hospitals.
- The study confirmed the Database's feasibility, defined performance indicators, and highlighted the need for standardised data definitions and risk adjustment.

2001

First prospective case

- The first prospective cases were collected on 1 July via paper forms that were scanned and manually checked before entry into the central database.

Qualified Privilege

- The Database was declared a Quality Assurance Activity under the *Health Insurance Act 1973* (Cth) in 2001, granting Qualified Privilege, renewed in 2008, 2015, 2020 and 2026.
- QP protects the confidentiality of Database quality assurance information, supporting open participation by surgeons and hospitals.
- As of 2026, it is one of just 17 nationally declared activities, and one of a smaller number that are full clinical registries.

2002

Launch of site data collection software

- Database software built on Microsoft Access, the standard desktop database software of the time, with a Visual Basic interface, was distributed to sites by floppy disk for local installation.
- It included built-in error checking and a reporting system for internal hospital auditing, with data transmitted to the central repository via encrypted email.

Commencement of quarterly peer review activities

- Quarterly unit performance was peer-reviewed using control charts for mortality, sternal wound infection, return to theatre for haemorrhage, ICU time and length of stay, with an escalation protocol for performance deviations.
- Under the chairmanship of Dr Shardey, Steering Committee Chair from 2002 to 2022, later years introduced further outlier-detection techniques, including cumulative sum charts, variable life-adjusted displays and the current gold standard for benchmarking, funnel plots.

2004

Publication of the initial results and annual report

- The Database's initial results were published in Heart, Lung and Circulation, covering patient demographics, procedural details and outcomes for 2,969 cases collected to mid-2002.
- The first surgeon and hospital annual reports followed, using EuroSCORE for risk adjustment and control charts for performance review, and the 10,000th case was collected on 18 October.

Expansion to Queensland

Enrolment of the first private hospital

Further funding from the Victorian DHS

2005

6 public units | 1 private unit **13,501 cases**

Release of the V2 Data Definitions Manual

2006 First Australian-specific risk adjustment algorithm

- Prof Reid developed the AusSCORE I risk-adjustment model for 30-day mortality following isolated CABG surgery, the first model to assess risk specific to the Australian population using ASCTS Database data. It was launched in the 2004/05 Annual Report.



Expansion to South Australia

2007 First linkage with the National Death Index (NDI)

- The linkage, established through the Australian Institute of Health and Welfare, provided critical long-term mortality data for research and has been regularly updated since, most recently in 2025.

Transfer of Database management to Monash University



Expansion to New South Wales

2008 Launch of the first web platform and V3 dataset

- This moved the Database off the desktop and onto a Monash University custom-built, multi-site web application for the first time.
- A real-time reporting module let users generate unit and surgeon comparative reports from the live dataset, while extensive validation processes improved data quality and completeness.

2009



Expansion to the Australian Capital Territory

2010



19 public units | 4 private units



44,992 cases



Expansion to Western Australia

2011 Establishment of the Research Program

- The Database's research program was established with a dedicated Committee, chaired by Professor Smith, and a new approval process for third-party access to de-identified datasets.
- The Program has produced over 120 peer-reviewed publications and driven multiple linkage studies, including with the ANZ-MTR, ANZICS and ANZDATA registries.

Introduction of the 'All Procedures' risk models

- Updated 30-day mortality models, developed from the dataset, expanded risk adjustment to isolated valve, combined valve and CABG, and all other surgery. The models were implemented in the 2011 Annual Report and quarterly benchmarking.

2012

International comparisons

- The Database took part in a Boston Consulting Group review of registries worldwide, scoring highly, or on par with other coronary registries, across all assessed domains, from measure design and data collection to analysis, reporting and governance.
- The review flagged an opportunity to improve how the Database drove change, prompting Monash University to pursue grant funding for a data feedback project across 2013 and 2014.

2014

Structured feedback trial

- A Heart Foundation Vanguard grant funded a trial comparing structured in-person performance feedback against emailed reports for driving quality improvement.
- Because units performed well at baseline and scheduling proved difficult, structured feedback was not found superior, so feedback distribution was instead expanded to other supporters of quality improvement, including Medical Directors and Quality and Risk managers.

2015



23 public units | 9 private units



97,480 cases

2016

V4 dataset and web system

- Version 4 of the Data Definitions Manual, including new modules for transcatheter aortic and mitral valve replacement, launched alongside the V4 web system.
- The rebuild moved the platform onto a modern, structured web framework with a more responsive interface and a proper relational database layer underneath it.
- All earlier data were migrated to align with the updated variables.

First secure platform for researcher data access

- Monash progressively strengthened secure researcher access, moving from the Sax Institute's external SURE platform to Monash's own Safe Haven in 2019, and then to the Secure eResearch Platform (SeRP), built and managed by Monash, in 2020. Each step added computing power, customisable workspaces and stronger security.
- SeRP now supports all ANZSCTS Database research, including AI and machine learning, with future work set to draw on MAVERIC, Monash's own AI supercomputer and the first university-led supercomputer in Australia.

2017



First use of funnel plots for quarterly unit benchmarking

2019



Expansion to a binational program, with the first New Zealand hospital

2020

25 public units | 31 private units **169,369 cases**

Expansion to Tasmania

2021

ANZ risk models for OM, dNRI and long-term mortality

- ANZSCORE risk models for operative mortality (30-day plus in-hospital) and the first dNRI risk-adjustment models were introduced in quarterly benchmarking. The high volume of available data also allowed ANZSCORE models for additional low-volume procedures, isolated AVR and AVR with CABG, validated on New Zealand data.

Release of the web system data import tool

- The tool lets sites that submit data by export from a local hospital database test and validate their extracts before upload, substantially improving the export workflow and supporting participation by New Zealand hospitals.

Publication of the 100th peer-reviewed research article

2024

Expansion of quality assurance reporting

- New annual peer-reviewed quality assurance reports monitor outcomes for low-volume procedures (AVR and AVR with CABG).
- Each pairs a risk-adjusted observed-minus-expected chart with a one-sided tabular CUSUM and a matched view of case volume. Alert thresholds are not fixed in advance but derived from a Committee-set target value and modelled through statistical simulation.

Addition of multifactor authentication to the web system

2025

V5 dataset and web system

- Version 5 of the Data Definitions Manual, following an extensive review by a multidisciplinary working group, was launched alongside the V5 web system.
- The platform now runs on upgraded technology with modern, secure sign-on and a database system used by major organisations worldwide.
- Updates and new variables were introduced to better capture and estimate risk in the New Zealand cardiac surgical population.
- The Database also collected its 250,000th case.

2026

27 public units | 38 private units **268,028 cases**

Clinical Quality Registry of the Year award

- The Database won the Australian Clinical Trials Alliance's 'Clinical Quality Registry of the Year' award, recognising its longstanding, tangible impact on cardiac surgery quality in Australia and New Zealand.

Identifying and responding to performance deviations

Since the quarterly peer review of isolated CABG surgery transitioned to funnel plots for benchmarking in Q3 2017, the ANZSCTS Database has identified and worked with units to address performance deviations across five key indicators.

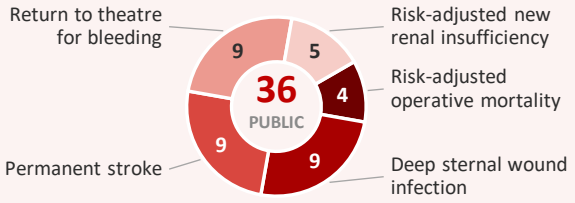
44
performance deviations identified from 27 public and private hospitals

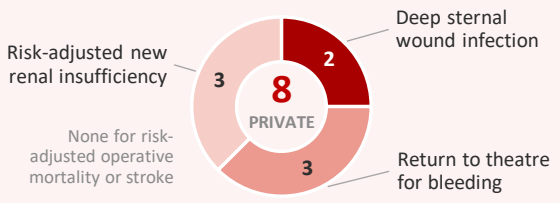
1 in 3
resolved quickly due to data correction or routine fluctuation, without extended review

82%
of units with a deviation engaged with the Committee's review process

DEVIATIONS BY INDICATOR

Some variation is expected in any benchmarking program and outcomes at every unit shift over time. A unit flagged on one indicator may later sit within or better than the expected range. Feedback on deviations enables units to identify emerging issues early and intervene promptly.





WHAT CHANGED

Investigations regularly took a multidisciplinary approach, with communication tailored to each hospital and broadening from unit directors to executive leadership as deviations escalated. While many changes were unit-specific, several **common themes** emerged.

- **Communication & prioritisation:** Strengthened interdisciplinary communication and case-prioritisation pathways, and addressed delays in receiving critical test results
- **Risk assessment:** Embedded more proactive identification and mitigation of pre-operative risk factors into routine practice, including additional specialist input
- **Bleeding management:** Improved the use and interpretation of coagulation studies to guide perioperative decision-making
- **Supervision:** Tightened oversight of junior surgeons during opening and closure
- **Infection prevention:** Reinforced antibiotic protocols and sterile technique, backed by targeted staff education
- **Governance:** Expanded review of critical cases through M&M meetings and clinical governance committees
- **Resources:** Identified and addressed staffing, equipment and maintenance shortfalls

CONTEXT

- **Case mix and risk-adjustment:** risk models narrow, but cannot fully remove, differences in case mix between units (such as public/private or low/high-volume), so units caring for the highest-risk patients may have more deviations even where care is excellent
- **Practice style:** some deviations reflect differences in practice, such as a unit's threshold for return to theatre for bleeding, that do not necessarily lead to poorer patient outcomes, which is why each deviation is reviewed with the unit
- **New renal insufficiency:** while complex to define and manage, awareness of variation in NRI helps units address the contributing factors and constraints within their systems

The Database, then and now

THEN · 2001		NOW · 2026
Victorian state database, 6 hospitals *The ASCTS Database*	→	**Binational program, 65 hospitals** ***The ANZSCTS Database***
Quarterly peer review using control charts	→	**Quarterly funnel-plot benchmarking, plus annual CUSUM monitoring**
EuroSCORE for risk-adjusted mortality	→	**In-house ANZSCORE models, built and validated on our own data**
Dataset modelled on the US STS registry	→	**5th-generation dataset, purpose-built for Australia and New Zealand**
211 variables (V1, 2001)	→	**385 variables (V5, 2025)**
Microsoft Access software, installed locally at each hospital	→	**Purpose-built web platform with live reporting and secure sign-on**
A quality assurance activity	→	**Quality assurance, and a highly active research program**
Outcomes followed for 30 days	→	**Long-term mortality data through NDI linkage**
Open and minimally invasive surgery	→	**+ transcatheter valve replacements performed by surgeons**
Key performance indicators		
Operative mortality (risk-adjusted) Return to theatre for bleeding Deep sternal wound infection ICU stay and intubation time	→	Operative mortality (risk-adjusted) Return to theatre for bleeding Deep sternal wound infection **Permanent stroke** **New renal insufficiency (risk-adjusted)**

Future Directions for the Database



Professor Julian Smith

Chair, ANZSCTS Database Research Committee

Chair, Australia and New Zealand Cardiac and Thoracic Surgery Research Institution

The future of the ANZSCTS Cardiac Surgery Database should build on its established role as a binational clinical quality registry while extending its capacity to drive improvement in cardiac surgery. With data from 67 hospitals and more than 260,000 procedures over 25 years, the Database has an unparalleled longitudinal resource for understanding outcomes across Australia and New Zealand. Its future should include continued refinement of risk-adjustment models, expansion of clinically meaningful outcome measures, and incorporation of emerging procedures and technologies. Maintaining high-quality, standardised data collection, robust validation and secure infrastructure will remain fundamental.

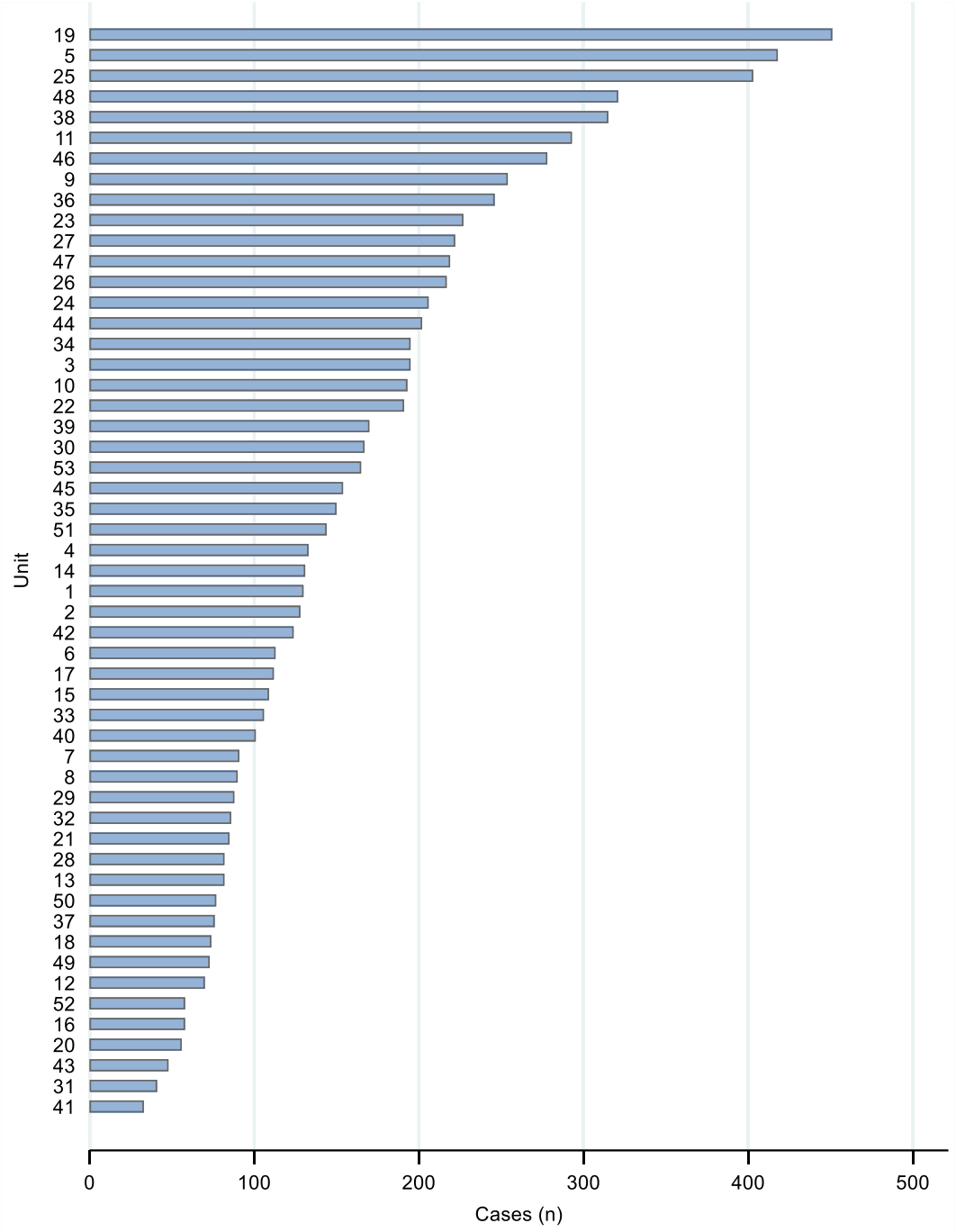
The next phase should also see the Database move increasingly from measurement to learning and improvement. Real-time reporting, benchmarking and longitudinal follow-up provide opportunities to identify variation in care earlier and support units in understanding and responding to it. Stronger links with other clinical registries and health datasets could provide a more complete picture of patients' journeys beyond the immediate perioperative period. The Database's research program should continue to support clinician-led research while embracing contemporary methods, including artificial intelligence and machine learning, to identify patterns and generate new insights from its increasingly rich dataset.

Perhaps most importantly, the future of the ANZSCTS Database should be defined by its capacity to remain relevant to the next generation of cardiac surgeons and patients. New surgical and transcatheter technologies, changing patient populations and increasing expectations for transparency will require the Database to evolve continually. Its history demonstrates that innovation in data collection, risk adjustment, benchmarking and research can translate into tangible improvements in care. The challenge for the next 25 years is to preserve the principles of collaboration, confidentiality, scientific rigour and professional ownership that underpin the Database, while using new technologies and data linkages to make it an even more powerful instrument for quality improvement, research and better outcomes for cardiac surgical patients.

1. Isolated CABG Surgery

1.1 Caseload

Figure 3. Isolated CABG cases by unit, 2025



1.2 Patient and surgical factors

1.2.1 Patient characteristics

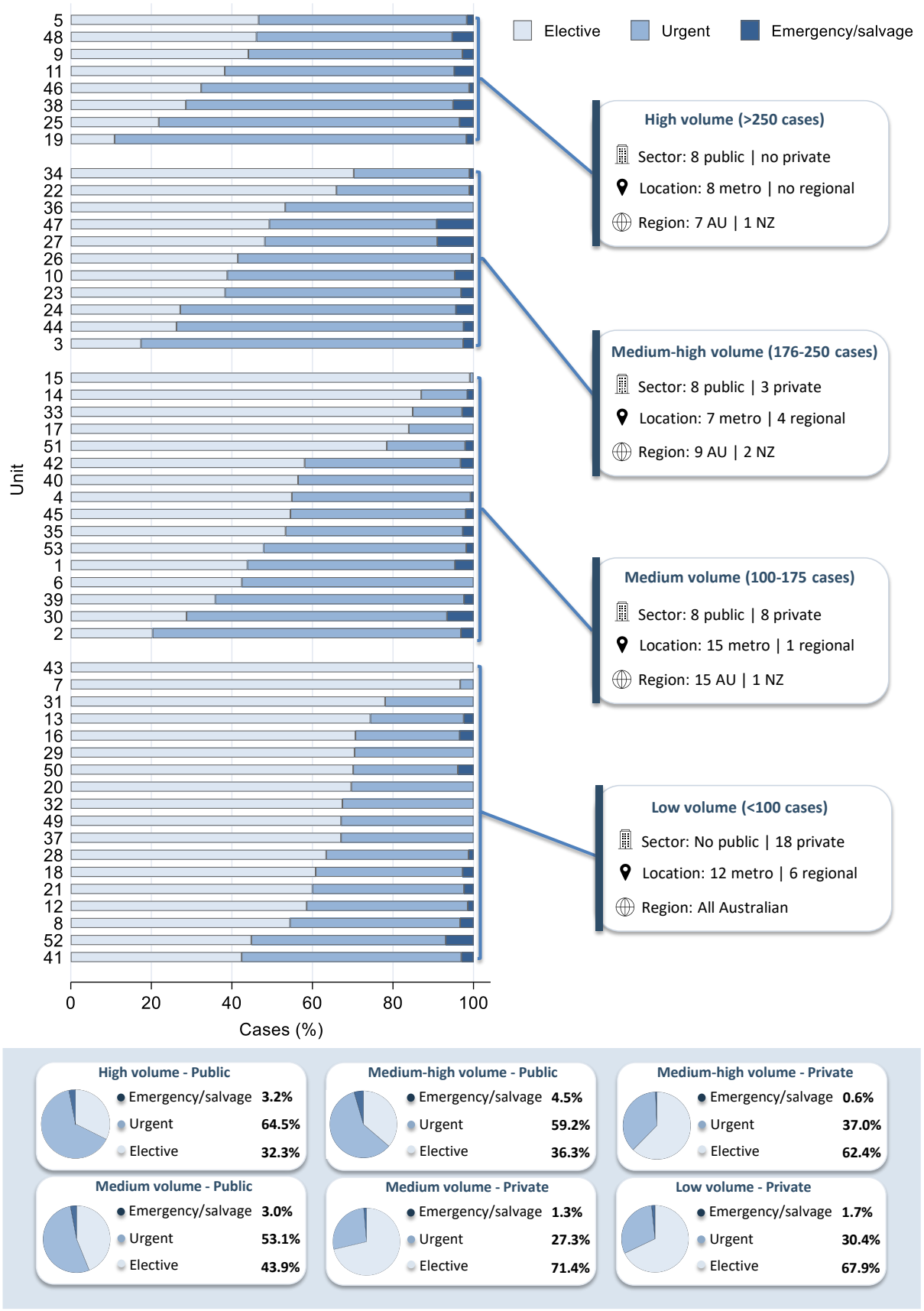
Table 3. Isolated CABG patient characteristics by year

	2021	2022	2023	2024	2025	Total
Clinical status (%)						
Elective	51.3	50.3	52.7	51.0	46.8	50.4
Urgent	45.2	46.6	44.2	46.0	50.4	46.5
Emergency/salvage	3.5	3.1	3.1	3.0	2.8	3.1
Sex (%)						
Male	83.6	83.5	83.6	83.8	83.9	83.7
Female	16.4	16.5	16.4	16.2	16.1	16.3
Another term	-	-	-	-	0.0	0.0
LVF (%)						
EF>45%	81.1	82.1	82.2	80.0	80.3	81.1
EF≥30% - ≤45%	15.9	15.3	15.4	16.9	17.4	16.2
EF<30%	3.0	2.6	2.4	3.1	2.3	2.7
Previous MI (%)						
No MI	51.5	49.1	53.8	52.9	52.4	52.0
NSTEMI	35.1	37.3	33.9	35.4	35.7	35.5
STEMI	10.3	10.5	9.2	9.3	9.8	9.8
Unknown type	3.1	3.1	3.0	2.4	2.2	2.8
Timing of previous MI (%)						
≤6hr	1.4	1.0	0.9	1.2	1.2	1.1
>6hr - <24hr	1.6	2.2	2.0	2.6	2.5	2.2
≥1d - ≤7d	36.8	35.4	35.5	35.4	36.9	36.0
>7d	60.1	61.4	61.7	60.8	59.4	60.7
Previous surgery (%)						
Initial	98.9	99.0	99.0	99.3	99.3	99.1
Redo	1.1	1.0	1.0	0.7	0.7	0.9
CPB (%)						
On-pump	93.7	91.0	90.0	88.9	89.1	90.5
Off-pump	6.3	9.0	10.0	11.1	10.9	9.5

LVF indicates left ventricular function; EF, ejection fraction; MI, myocardial infarction; NSTEMI, non-ST-elevation myocardial infarction; STEMI, ST-elevation myocardial infarction; CPB, cardiopulmonary bypass

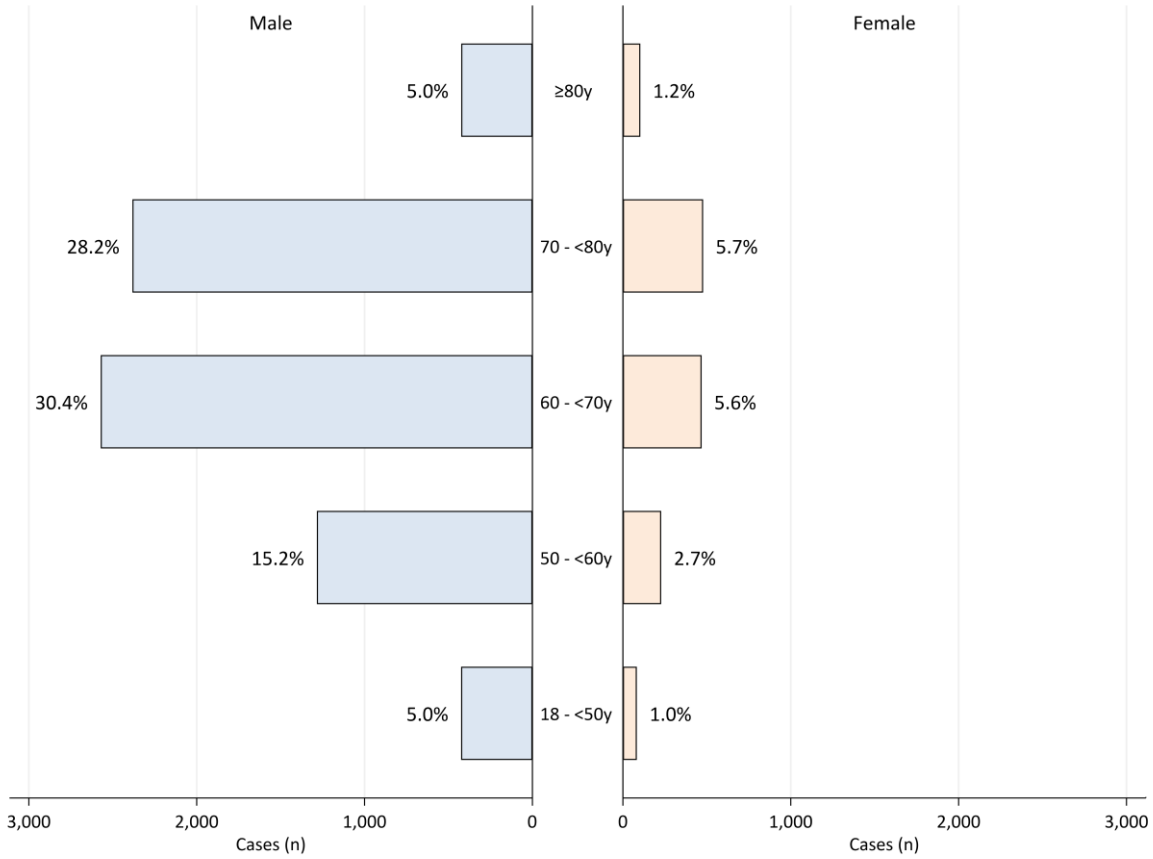
1.2.2 Clinical status

Figure 4. Isolated CABG clinical status by case volume and peer group, 2025



1.2.3 Sex and age

Figure 5. Age of isolated CABG patients by sex, 2025



1.2.4 Conduit selection

Table 4. Number of distal anastomoses based on conduit type for isolated CABG surgery, 2025

	%	Used alone (%)	Used with other conduits (%)	Mean	Median	IQR
Single ITA	90.0	6.4	83.6	1.1	1	1 - 1
BITA	6.3	1.6	4.7	2.3	2	2 - 2
RA (x1 or x2)	53.8	0.7	53.1	1.4	1	1 - 2
SVG	66.0	2.0	64.0	1.6	1	1 - 2

*Mean, median and interquartile range (IQR) refer to distal anastomoses per conduit type
ITA indicates internal thoracic artery; BITA, bilateral internal thoracic artery; RA, radial artery; SVG, saphenous vein graft

Table 5. Grafts and multi-vessel disease in isolated CABG surgery by age and CPB, 2025

	Mean grafts (n)	Multi-vessel disease (%)	Total arterial revascularisation (%)
Age			
18 - <50y	2.9	89.6	44.6
50 - <60y	3.0	94.2	38.4
60 - <70y	2.9	93.9	34.6
70 - <80y	2.9	94.7	28.7
≥80y	2.8	94.1	28.8
CPB			
On-pump	3.0	95.1	29.8
Off-pump	2.6	84.9	63.8

1.3 Mortality

1.3.1 Trends in patient complexity and mortality risk

Figure 6. Ten-year overview of isolated CABG patient risk, 2016-2025

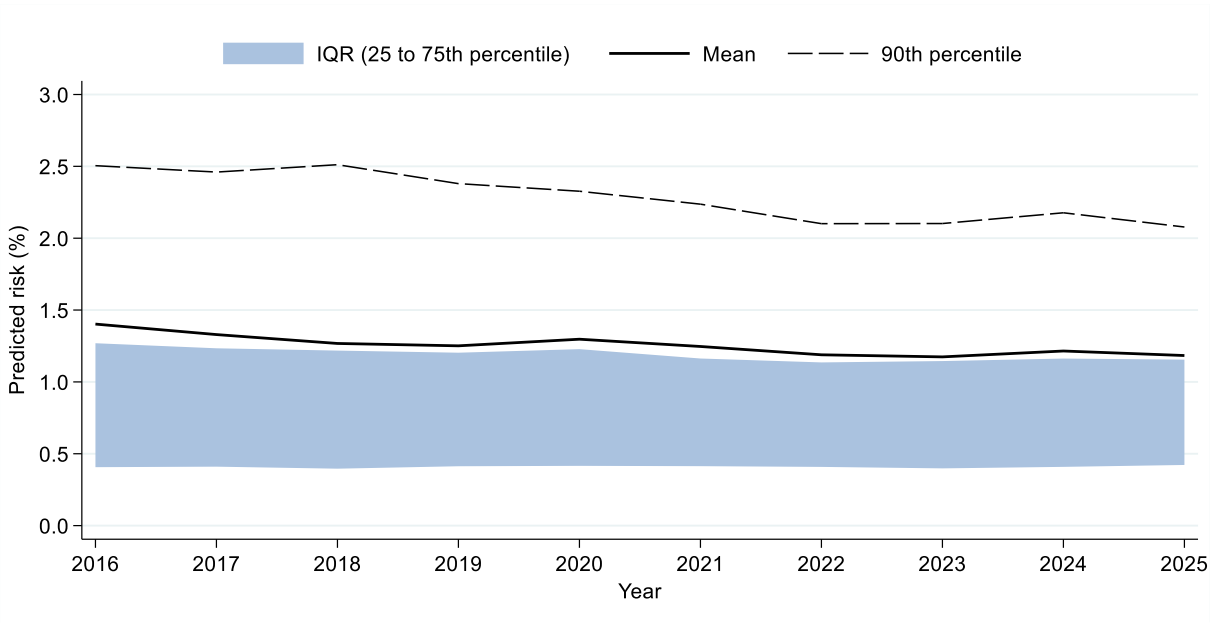


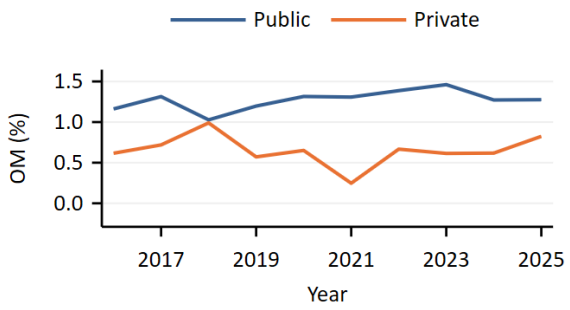
Table 6. Ten-year overview of isolated CABG mortality, 2016-2025

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total hospitals (n)	26	32	34	34	42	46	49	50	53	53
Case numbers (n)										
Public	4,307	4,431	4,388	5,030	5,033	4,842	4,564	4,941	5,545	5,581
Private	837	1,314	1,639	1,579	1,709	2,532	3,189	3,140	2,821	2,870
Overall	5,144	5,745	6,027	6,609	6,742	7,374	7,753	8,081	8,366	8,451
Outcome (%)										
OM	1.08	1.18	1.02	1.05	1.15	0.95	1.09	1.13	1.05	1.13
RA-OM	0.79	1.05	0.82	0.88	1.02	0.74	1.00	1.10	0.92	1.07

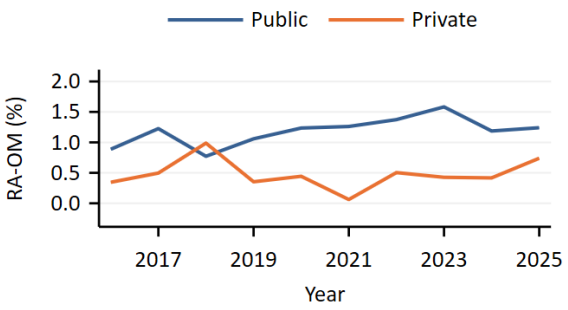
OM indicates operative mortality; RA-OM, risk-adjusted operative mortality

Figure 7. Ten year public and private overview of isolated CABG mortality, 2016-2025

a. OM



b. RA-OM



1.3.2 Influence of patient risk factors on mortality

Table 7. OM following isolated CABG surgery, by patient demographics and risk factors

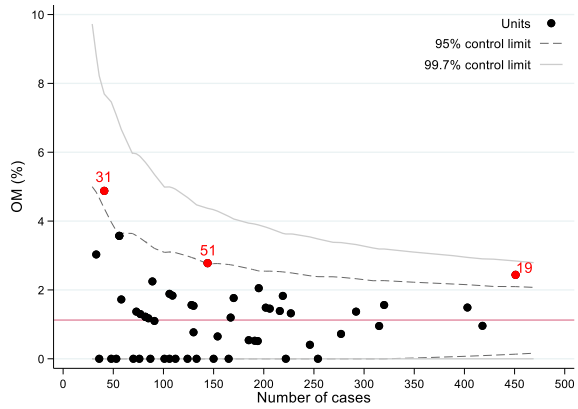
	2025		2021-2024	
	n	OM (%)	n	OM (%)
Clinical status				
Elective	3,895	0.5	16,000	0.6
Urgent	4,226	1.1	14,218	1.3
Emergency/salvage	234	11.5	992	5.6
Sex/age				
Male	7,005	1.0	26,097	0.9
18 - <50y	423	0.9	1,567	0.7
50 - <60y	1,277	0.5	5,002	0.5
60 - <70y	2,543	0.7	9,391	0.7
70 - <80y	2,342	1.2	8,509	1.3
≥80y	420	3.3	1,628	2.0
Female	1,349	1.7	5,113	1.7
18 - <50y	83	4.8	278	1.8
50 - <60y	226	0.4	845	1.2
60 - <70y	465	1.1	1,719	1.1
70 - <80y	475	2.1	1,862	2.0
≥80y	100	3.0	409	3.9
LVF				
EF>45%	6,510	0.7	24,951	0.7
EF≥30% - ≤45%	1,414	2.5	4,862	1.9
EF<30%	190	5.3	852	6.0
Previous MI				
No MI	4,366	0.6	16,154	0.7
NSTEMI	2,992	1.5	11,074	1.4
STEMI	823	2.7	3,060	2.1
Unknown type	173	1.7	906	1.0
Timing of previous MI				
≤6hr	49	14.3	168	10.7
>6hr - <24hr	99	11.1	313	6.1
≥1d - ≤7d	1,469	1.6	5,371	1.5
>7d	2,369	1.1	9,163	1.2
Previous surgery				
Initial	8,293	1.1	30,907	1.0
Redo	62	1.6	291	2.4
CPB				
On-pump	7,443	1.2	28,324	1.1
Off-pump	912	0.4	2,885	0.8
Dialysis				
No	8,139	1.1	30,723	1.0
Yes	216	3.2	478	7.5
Pre-operative creatinine				
≤200 µmol/L	8,186	1.1	30,482	0.9
>200 µmol/L	168	4.8	714	6.0

1.3.3 Unadjusted and risk-adjusted unit outcomes

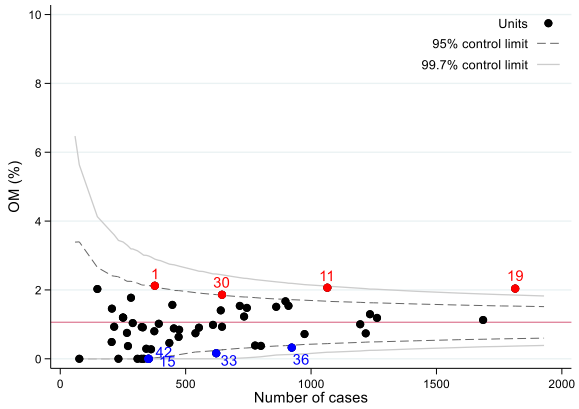
A full summary of outcomes for all units is provided in the 2025 ANZSCTS Database Supplementary Annual Report.

Figure 8. OM following isolated CABG surgery, by unit

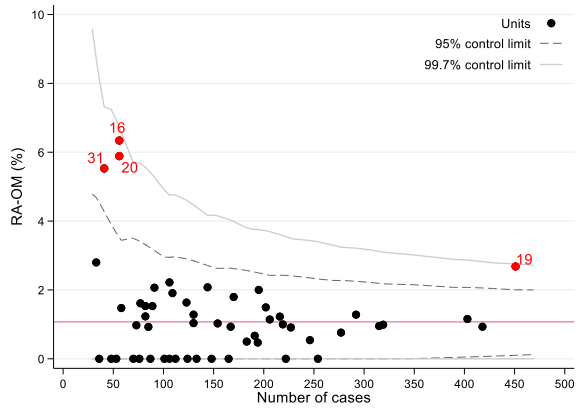
a. 2025 OM



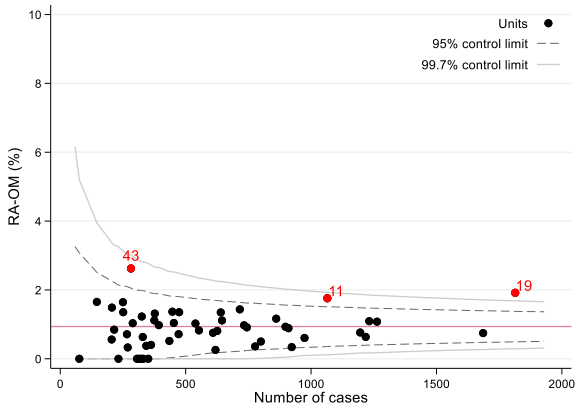
b. 2021-2024 OM



c. 2025 RA-OM



d. 2021-2024 RA-OM



1.3.4 Long-term survival

Figure 9. Long-term survival following isolated CABG surgery by clinical status, 2015 to 2024

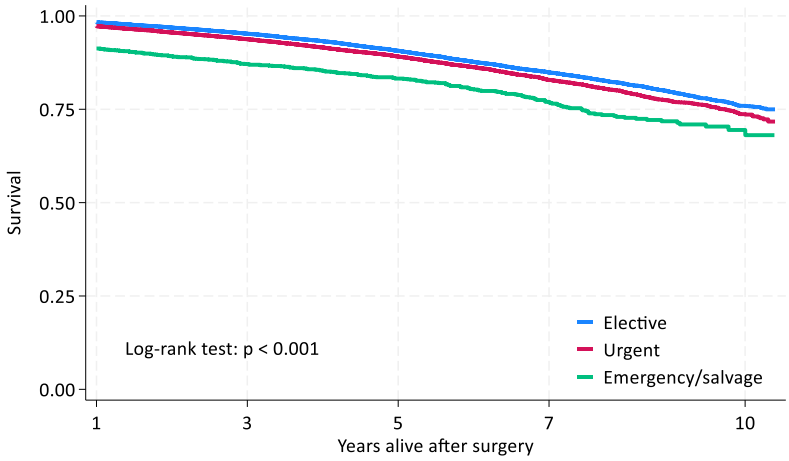


Table 8. Long-term survival following isolated CABG surgery by clinical status, 2015 to 2024

	n	Survival years (%, number at risk)				
		1	3	5	7	10
Elective	42,398	98.3 (37,239)	95.2 (27,528)	90.7 (18,887)	84.9 (10,468)	75.9 (1,269)
Urgent	29,843	97.2 (25,589)	93.8 (17,514)	89.1 (10,734)	82.9 (5,630)	73.7 (598)
Emergency/salvage	2,408	91.3 (1,962)	87.1 (1,376)	83.2 (891)	76.8 (471)	69.5 (50)

Figure 10. Long-term survival following isolated CABG surgery by sex, 2015 to 2024

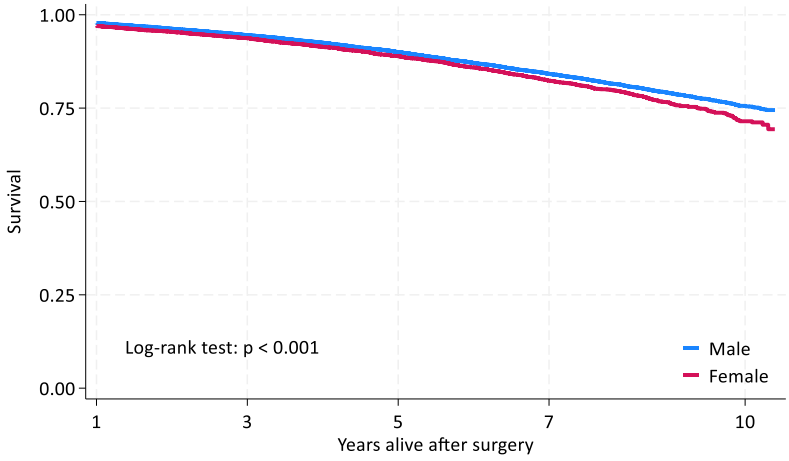


Table 9. Long-term survival following isolated CABG surgery by sex, 2015 to 2024

	n	Survival years (%, number at risk)				
		1	3	5	7	10
Male	61,873	97.8 (53,694)	94.5 (38,329)	90.0 (25,130)	84.2 (13,647)	75.6 (1,596)
Female	12,776	97.0 (11,096)	93.7 (8,089)	88.9 (5,382)	82.4 (2,922)	71.5 (321)

Figure 11. Long-term survival following isolated CABG surgery by sex and clinical status, 2015 to 2024

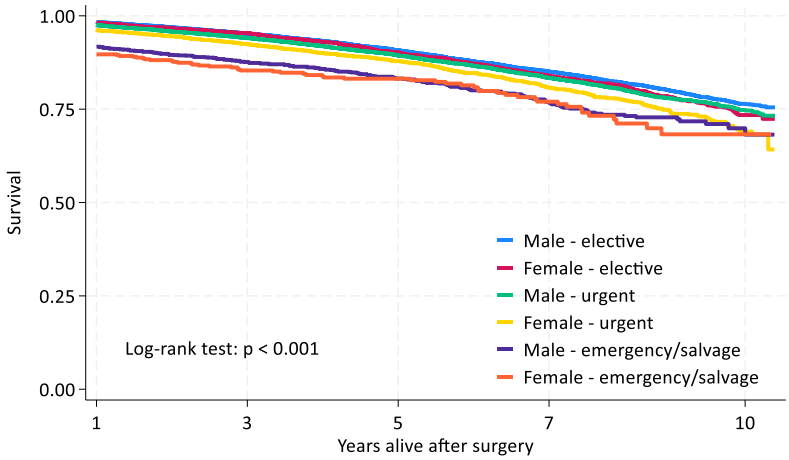


Table 10. Long-term survival following isolated CABG surgery by sex and clinical status, 2015 to 2024

	n	Survival years (%, number at risk)				
		1	3	5	7	10
Male - elective	35,498	98.3 (31,148)	95.2 (22,942)	90.8 (15,734)	85.1 (8,710)	76.4 (1,065)
Female - elective	6,900	98.2 (6,091)	95.4 (4,586)	90.2 (3,153)	83.9 (1,758)	73.4 (204)
Male - urgent	24,507	97.5 (21,015)	94.1 (14,324)	89.4 (8,718)	83.4 (4,585)	74.8 (490)
Female - urgent	5,336	96.2 (4,574)	92.4 (3,190)	87.9 (2,016)	80.8 (1,045)	69.0 (108)
Male - emergency/salvage	1,868	91.7 (1,531)	87.6 (1,063)	83.2 (678)	76.8 (352)	69.9 (41)
Female - emergency/salvage	540	89.7 (431)	85.4 (313)	83.2 (213)	77.0 (119)	-

Figure 12. Long-term survival following isolated CABG surgery by age, 2015 to 2024

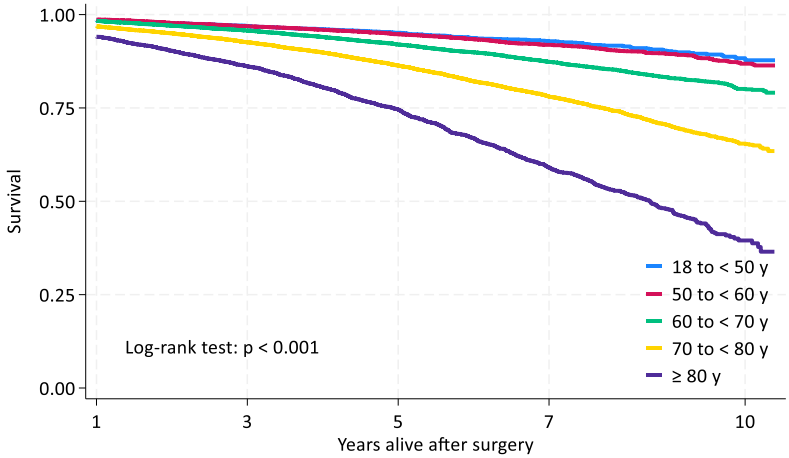


Table 11. Long-term survival following isolated CABG surgery by age, 2015 to 2024

	n	Survival years (%, number at risk)				
		1	3	5	7	10
18 to < 50 y	4,821	98.5 (4,260)	97.0 (3,204)	95.1 (2,229)	92.9 (1,262)	88.3 (162)
50 to < 60 y	14,555	98.7 (12,822)	96.9 (9,546)	94.7 (6,516)	91.9 (3,753)	86.9 (491)
60 to < 70 y	26,433	98.3 (23,087)	95.7 (16,626)	92.0 (11,060)	87.3 (6,172)	80.1 (727)
70 to < 80 y	23,851	96.9 (20,417)	92.6 (14,211)	86.4 (8,993)	78.1 (4,580)	65.4 (474)
≥ 80 y	4,989	94.1 (4,204)	86.2 (2,831)	74.5 (1,714)	59.1 (802)	39.5 (63)

Figure 13. Long-term survival following isolated CABG surgery by MI and MI timing, 2015 to 2024

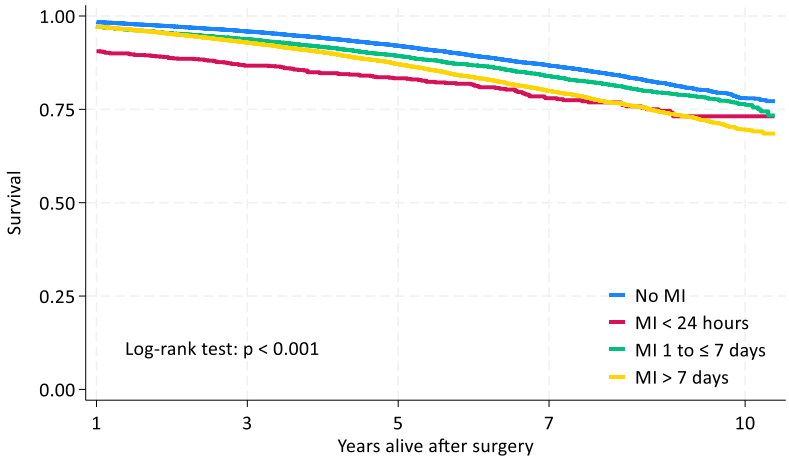


Table 12. Long-term survival following isolated CABG surgery by MI and MI timing, 2015 to 2024

	n	Survival years (%, number at risk)				
		1	3	5	7	10
No MI	37,289	98.4 (32,242)	95.9 (22,893)	92.0 (15,100)	86.8 (8,214)	78.0 (938)
MI < 24 hours	1,353	90.6 (1,090)	86.7 (804)	83.3 (564)	78.0 (310)	73.1 (41)
MI 1 to ≤ 7 days	12,899	97.1 (11,138)	93.8 (7,896)	89.3 (4,952)	83.9 (2,718)	76.4 (306)
MI > 7 days	23,019	97.2 (20,236)	92.9 (14,763)	87.1 (9,882)	79.9 (5,323)	69.6 (631)

1.4 Complications

1.4.1 Influence of patient risk factors on complications

Table 13. Complications following isolated CABG surgery, by pre-operative diabetes and renal function

		Insulin dependent diabetes		Pre-operative creatinine		Pre-operative eGFR	
		No	Yes	≤200 µmol/L	>200 µmol/L	>60 mL/ min/1.73m²	≤60 mL/ min/1.73m²
n	2025	7,491	896	8,281	168	7,170	1,278
	2021-2024	28,234	3,330	30,835	718	26,605	4,948
Permanent stroke (%)	2025	0.8	1.8	0.9	1.2	0.8	1.6
	2021-2024	0.8	1.1	0.8	1.1	0.7	1.3
DSWI (%)	2025	0.6	2.7	0.8	3.6	0.8	1.3
	2021-2024	0.7	2.0	0.8	2.5	0.8	1.4
RTT for bleeding (%)	2025	2.2	1.8	2.1	4.8	2.0	2.7
	2021-2024	2.3	2.8	2.3	6.4	2.1	3.6
New cardiac arrhythmia (%)	2025	28.6	23.1	27.7	33.9	27.0	32.7
	2021-2024	27.8	25.3	27.5	28.7	26.8	31.6

eGFR indicates estimated glomerular filtration rate; DSWI, deep sternal wound infection; RTT, return to theatre

Table 14. Complications following isolated CABG surgery, by age group

		Age				
		18 - <50y	50 - <60y	60 - <70y	70 - <80y	≥80y
n	2025	508	1,512	3,041	2,861	529
	2021-2024	1,866	5,908	11,257	10,487	2,056
Permanent stroke (%)	2025	1.0	0.4	0.6	1.4	0.6
	2021-2024	0.4	0.5	0.7	1.1	1.4
DSWI (%)	2025	1.2	0.9	0.9	0.8	0.6
	2021-2024	1.3	0.9	0.8	0.9	0.8
RTT for bleeding (%)	2025	3.5	2.0	1.9	2.1	2.5
	2021-2024	2.3	1.9	2.3	2.6	2.4
New cardiac arrhythmia (%)	2025	11.8	19.0	26.5	35.0	37.9
	2021-2024	12.3	19.4	26.5	33.7	39.2

Table 15. Complications following isolated CABG surgery, by previous surgery and CPB

		Previous surgery		CPB	
		Initial	Redo	On-pump	Off-pump
n	2025	8,389	62	7,533	918
	2021-2024	31,261	295	28,672	2,899
Permanent stroke (%)	2025	0.9	0.0	0.9	0.8
	2021-2024	0.8	1.7	0.9	0.5
DSWI (%)	2025	0.9	0.0	0.9	0.8
	2021-2024	0.9	2.1	0.9	0.9
RTT for bleeding (%)	2025	2.1	1.6	2.2	1.5
	2021-2024	2.3	4.7	2.4	1.7
New cardiac arrhythmia (%)	2025	27.8	28.3	28.0	26.4
	2021-2024	27.6	24.4	27.9	24.1

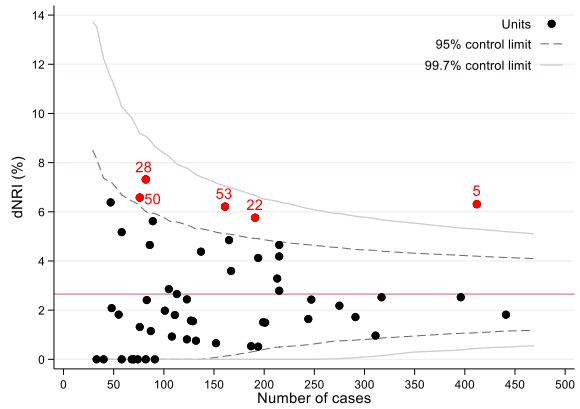
Table 16. Incidence of derived new renal insufficiency (dNRI) following isolated CABG surgery, by pre-operative demographics and risk factors

	2025		2021-2024	
	n	dNRI (%)	n	dNRI (%)
Insulin dependent diabetes				
No	7,359	2.3	27,869	2.3
Yes	838	6.1	3,129	5.0
Pre-operative creatinine				
≤200 µmol/L	8,154	2.5	30,693	2.4
>200 µmol/L	61	18.0	307	21.5
Pre-operative eGFR				
>60 mL/min/1.73m²	7,060	1.7	26,501	1.7
≤60 mL/min/1.73m²	1,154	8.6	4,499	8.0
Age				
18 - <50y	483	3.3	1,809	1.7
50 - <60y	1,460	1.8	5,774	2.4
60 - <70y	2,955	2.1	11,043	2.0
70 - <80y	2,795	3.3	10,350	3.2
≥80y	522	3.8	2,024	4.6
Previous surgery				
Initial	8,156	2.7	30,703	2.6
Redo	59	0.0	288	5.9
CPB				
On-pump	7,315	2.8	28,165	2.6
Off-pump	900	1.6	2,833	2.4

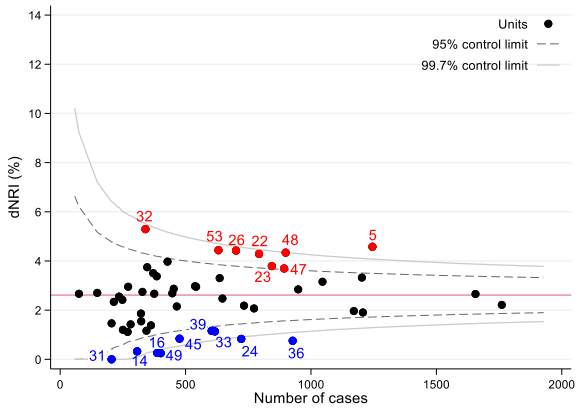
1.4.2 Unit outcomes

Figure 14. dNRI following isolated CABG surgery, by unit

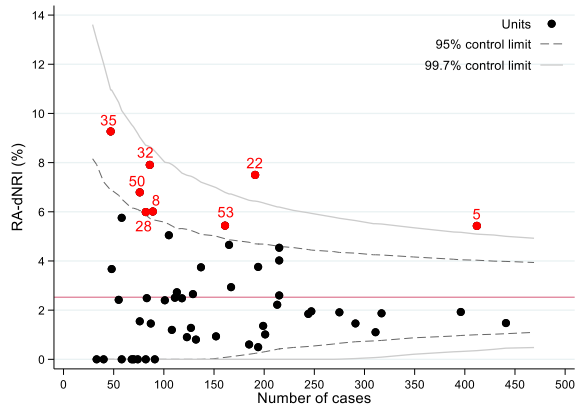
a. 2025 dNRI



b. 2021-2024 dNRI



c. 2025 RA-dNRI



d. 2021-2024 RA-dNRI

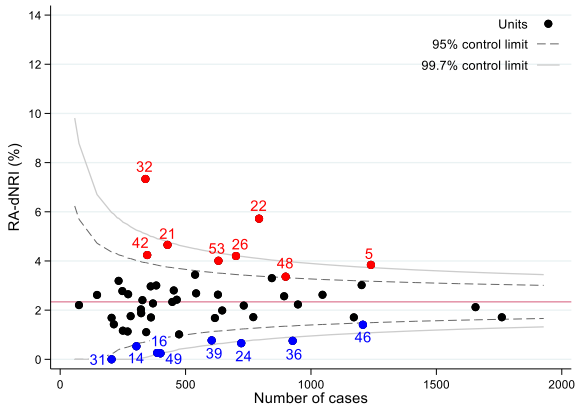
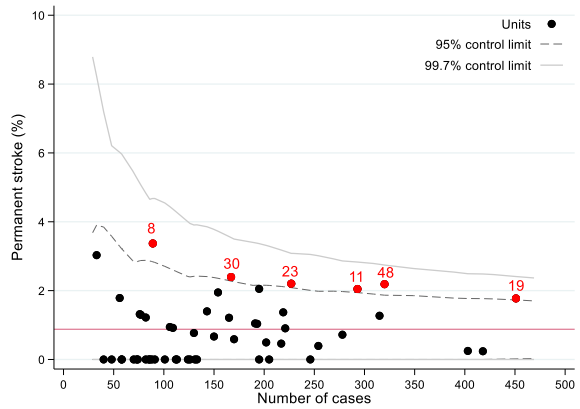


Figure 15. Permanent stroke following isolated CABG surgery, by unit

a. 2025 permanent stroke



b. 2021-2024 permanent stroke

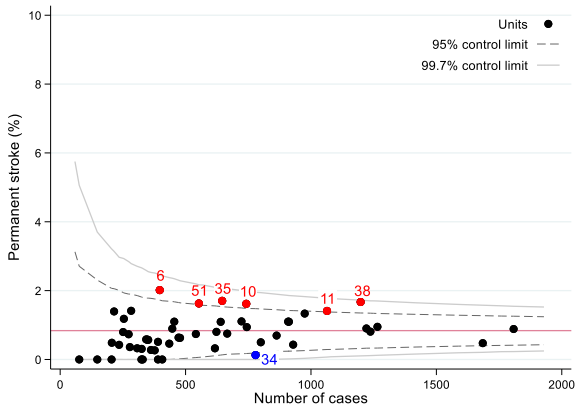
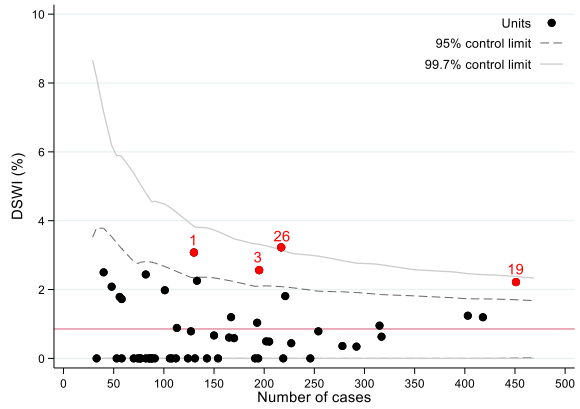


Figure 16. DSWI following isolated CABG surgery, by unit

a. 2025 DSWI



b. 2021-2024 DSWI

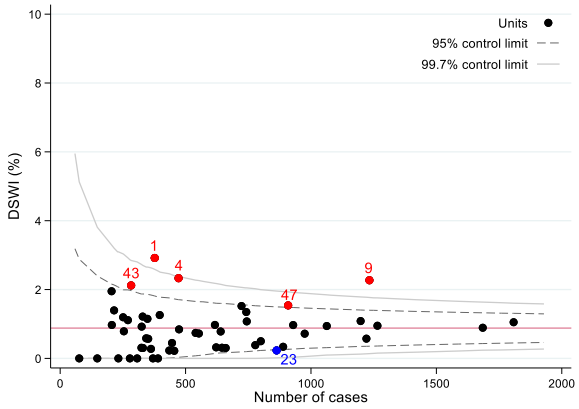
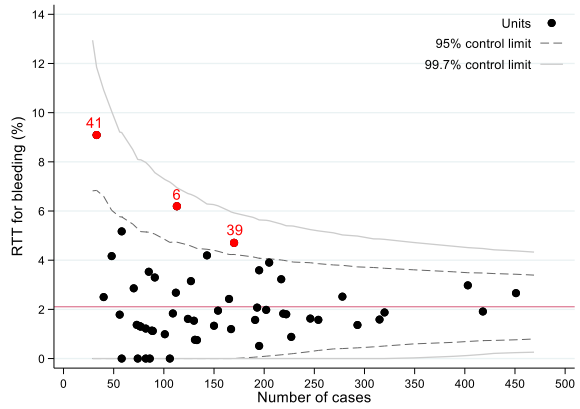


Figure 17. RTT for bleeding following isolated CABG surgery, by unit

a. 2025 RTT for bleeding



b. 2021-2024 RTT for bleeding

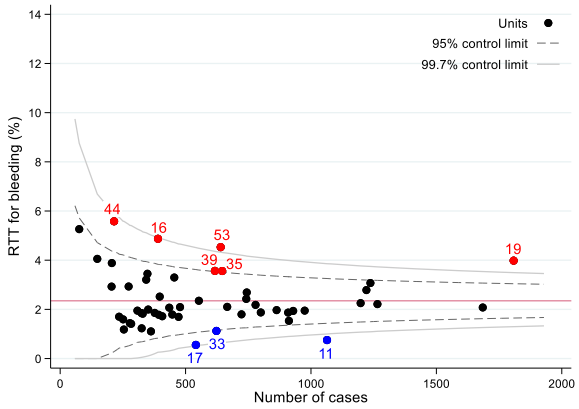


Table 17. Unit variation of isolated CABG complications, 2025

		Median unit rate, % (IQR)	Range of unit rates, %
New cardiac arrhythmia	Public	27.6 (21.6-30.1)	15.5-43.3
	Private	29.0 (22.0-36.5)	9.1-55.0
	Overall	28.6 (21.6-35.2)	9.1-55.0
All-cause readmission	Public	10.9 (10.2-13.3)	2.7-23.8
	Private	8.8 (5.5-12.8)	0.0-20.8
	Overall	10.3 (7.4-12.9)	0.0-23.8
Prolonged intubation [> 24h]	Public	8.0 (6.3-11.5)	2.4-13.2
	Private	4.7 (3.0-6.9)	1.2-17.5
	Overall	6.1 (4.5-9.9)	1.2-17.5

Table 18. Unit variation of isolated CABG complications, 2021-2024

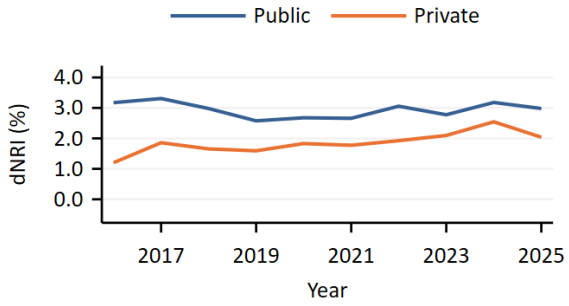
		Median unit rate, % (IQR)	Range of unit rates, %
New cardiac arrhythmia	Public	27.2 (25.9-29.9)	17.1-36.4
	Private	29.7 (24.2-33.4)	15.8-46.6
	Overall	28.9 (25.7-31.9)	15.8-46.6
All-cause readmission	Public	9.4 (8.3-12.3)	2.0-17.9
	Private	7.4 (4.9-10.2)	1.8-14.0
	Overall	8.9 (6.4-10.9)	1.8-17.9
Prolonged intubation [> 24h]	Public	9.3 (8.3-12.1)	6.0-23.6
	Private	4.7 (3.9-6.8)	2.2-19.7
	Overall	7.2 (4.7-9.5)	2.2-23.6

Table 19. Ten-year overview of isolated CABG complications, 2016-2025

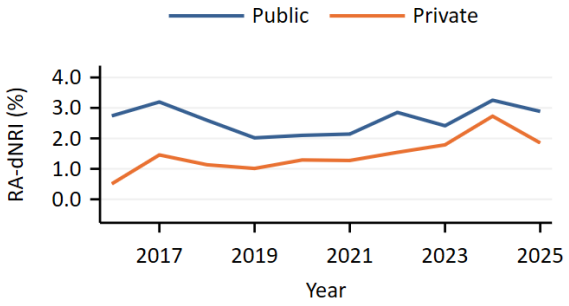
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total hospitals (n)	26	32	34	34	42	46	49	50	53	53
Case numbers (n)										
Public	4,307	4,431	4,388	5,030	5,033	4,842	4,564	4,941	5,545	5,581
Private	837	1,314	1,639	1,579	1,709	2,532	3,189	3,140	2,821	2,870
Overall	5,144	5,745	6,027	6,609	6,742	7,374	7,753	8,081	8,366	8,451
Outcome (%)										
dNRI	2.81	2.98	2.62	2.34	2.46	2.35	2.59	2.51	2.96	2.65
RA-dNRI	2.24	2.78	2.17	1.76	1.89	1.84	2.30	2.17	3.07	2.52
Permanent stroke	0.88	0.96	0.86	1.06	1.05	0.86	0.77	0.83	0.89	0.88
DSWI	1.83	1.50	1.10	0.98	1.10	0.86	0.93	0.95	0.79	0.86
RTT for bleeding	2.08	2.23	2.52	2.38	2.51	1.98	2.28	2.42	2.66	2.11
New cardiac arrhythmia	28.11	27.57	27.13	25.58	27.08	27.43	27.08	27.79	27.80	27.84
All-cause readmission	9.18	10.15	10.06	10.54	10.36	8.91	8.22	9.31	9.63	10.30
Prolonged intubation [> 24h]	10.23	8.56	8.39	9.29	9.13	8.91	9.03	8.38	8.58	7.63

Figure 18. Ten year public and private overview of isolated CABG complications, 2016-2025

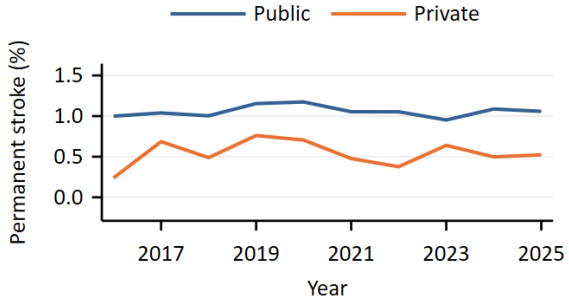
a. dNRI



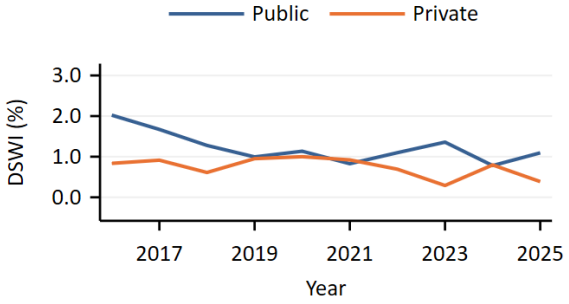
b. RA-dNRI



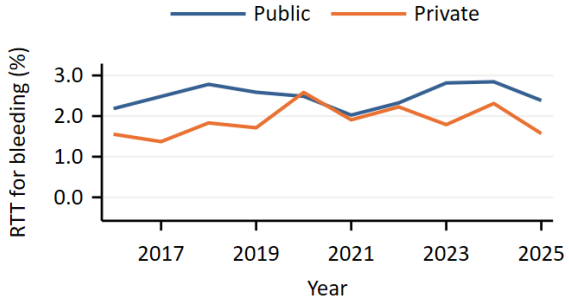
c. Permanent stroke



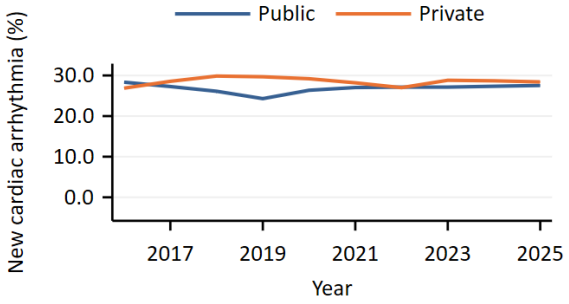
d. DSWI



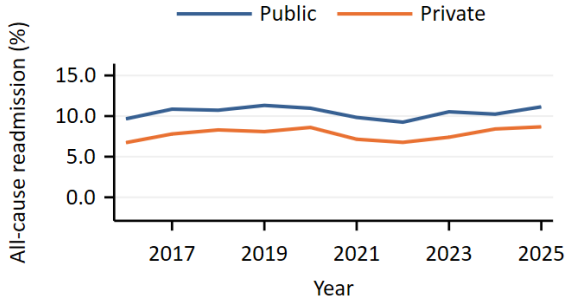
e. RTT for bleeding



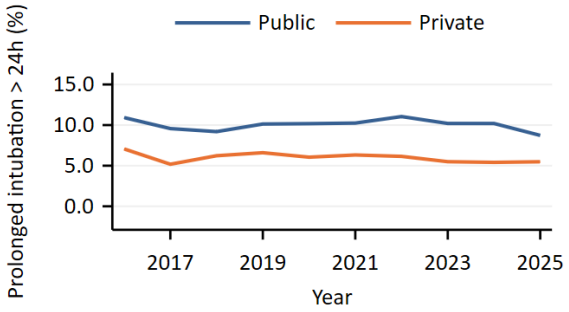
f. New cardiac arrhythmia



g. All-cause readmission



h. Prolonged intubation [> 24h]



1.4.3 Resource utilisation

Table 20. Resource utilisation for isolated CABG patients, 2025

	Mean	Median	IQR
Pre-operative length of stay (days)	3.1	1.0	1.0 - 5.0
Post-operative length of stay (days)	8.4	7.0	6.0 - 9.0
Initial post-operative ventilation (hours)	12.5	7.4	5.2 - 12.7
ICU length of stay (hours)	62.6	48.1	26.4 - 73.8

ICU indicates intensive care unit

Cases deemed clinical outliers were excluded from the analysis.

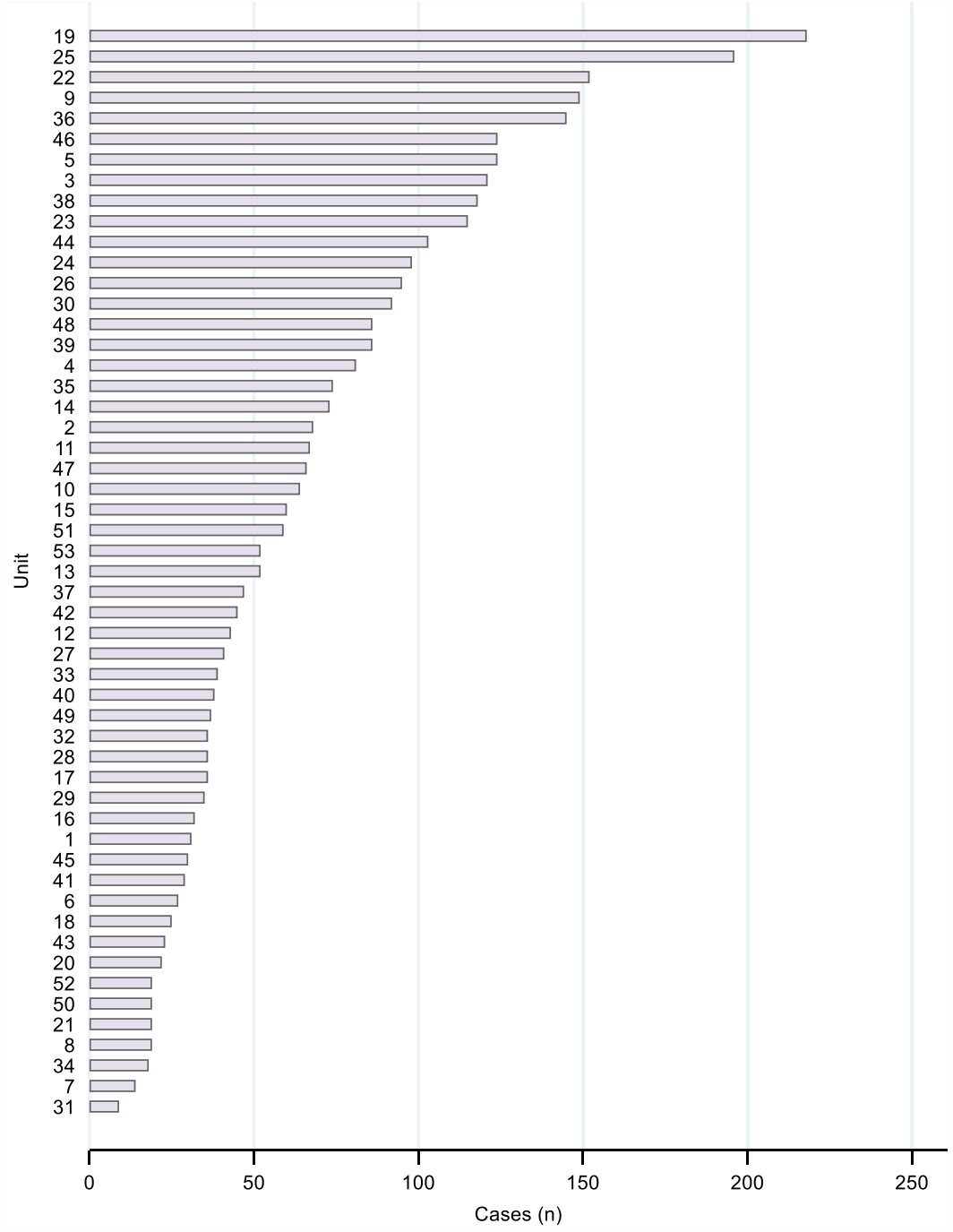
Table 21. Blood product usage for isolated CABG patients, 2025

	Patients (n)	Patients (%)
Transfusion type		
Red blood cell only	1,355	16.0
Non-red blood cell only	962	11.4
Red and non-red blood cell	1,261	14.9
Use of non-red blood cell products		
Platelets	1,571	18.6
Fresh frozen plasma	675	8.0
Novo 7	10	0.1
Cryoprecipitate	1,023	12.1
Prothrombinex	496	5.9
Fibrinogen	134	1.6

2. Isolated Valve Surgery

2.1 Caseload

Figure 19. Isolated valve cases by unit, 2025



2.2 Patient and surgical factors

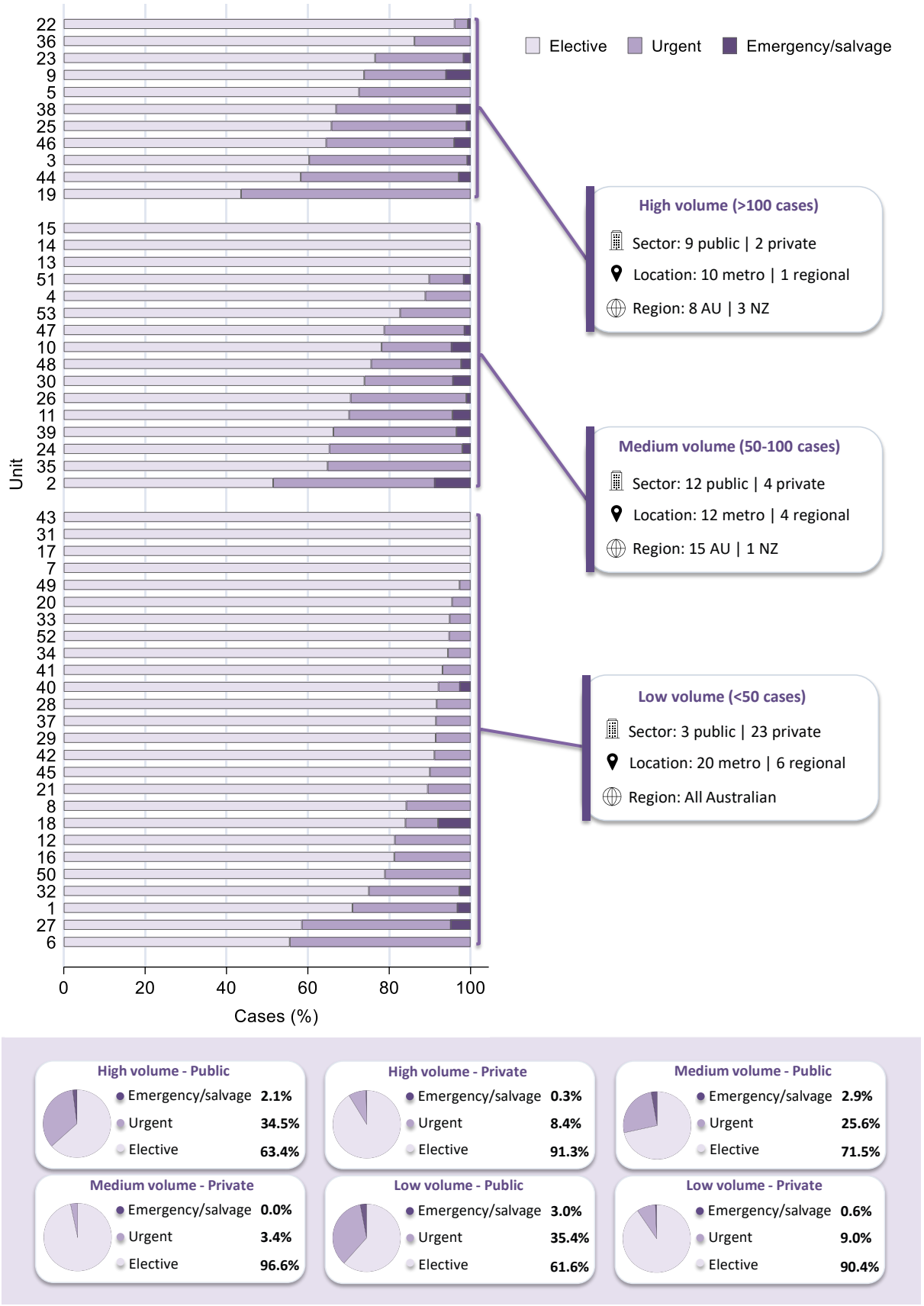
2.2.1 Patient characteristics

Table 22. Isolated valve patient characteristics by year

	2021	2022	2023	2024	2025	Total
Clinical status (%)						
Elective	78.7	77.1	78.5	78.0	75.5	77.5
Urgent	19.1	21.2	19.6	19.9	22.8	20.6
Emergency/salvage	2.2	1.7	1.9	2.1	1.7	1.9
Sex (%)						
Male	62.3	63.1	63.3	62.1	62.3	62.6
Female	37.7	36.9	36.7	37.9	37.7	37.4
Another term	-	-	-	-	0.0	0.0
Previous surgery (%)						
Initial	84.7	84.9	84.8	84.8	85.1	84.9
Redo	15.3	15.1	15.2	15.2	14.9	15.1
Valve surgery type (%)						
Single aortic	55.1	55.8	50.6	53.0	56.0	54.0
Single mitral	39.9	39.5	43.9	41.7	39.4	41.0
Single tricuspid/pulmonary	4.9	4.7	5.4	5.2	4.7	5.0

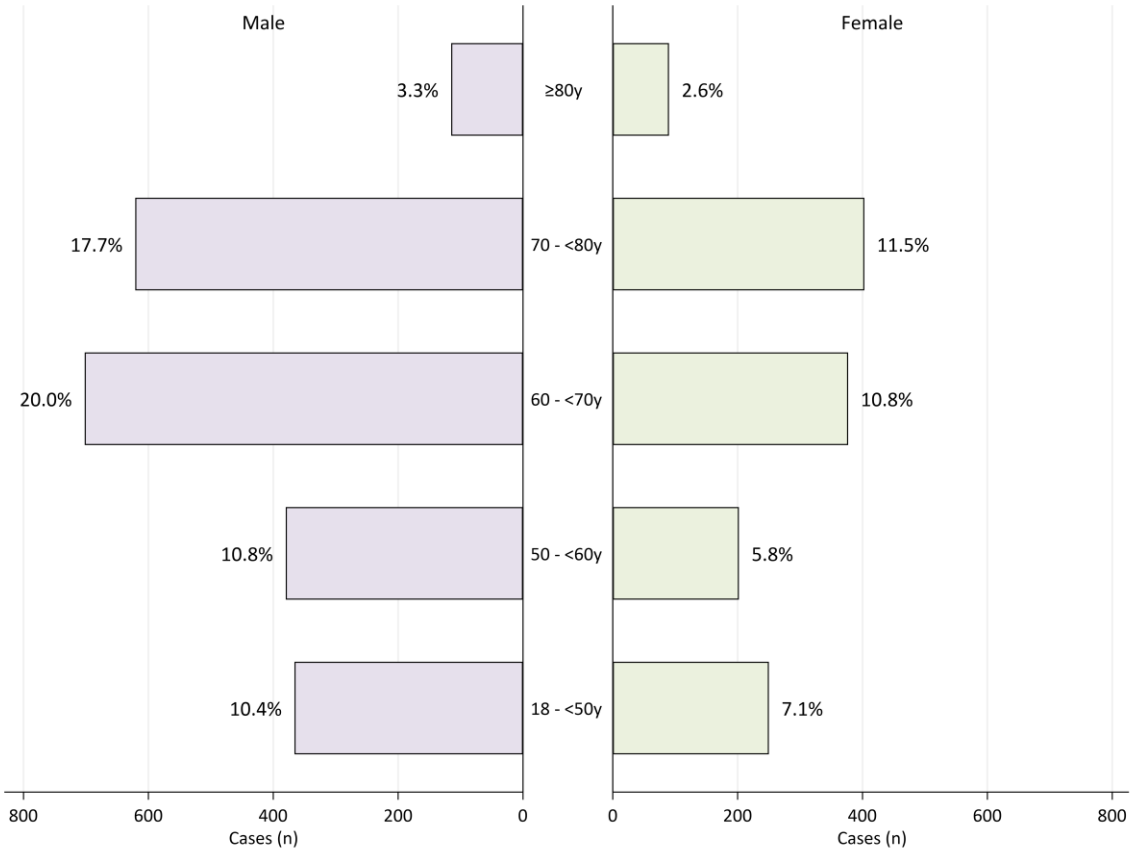
2.2.2 Clinical status

Figure 20. Isolated valve clinical status by case volume and peer group, 2025



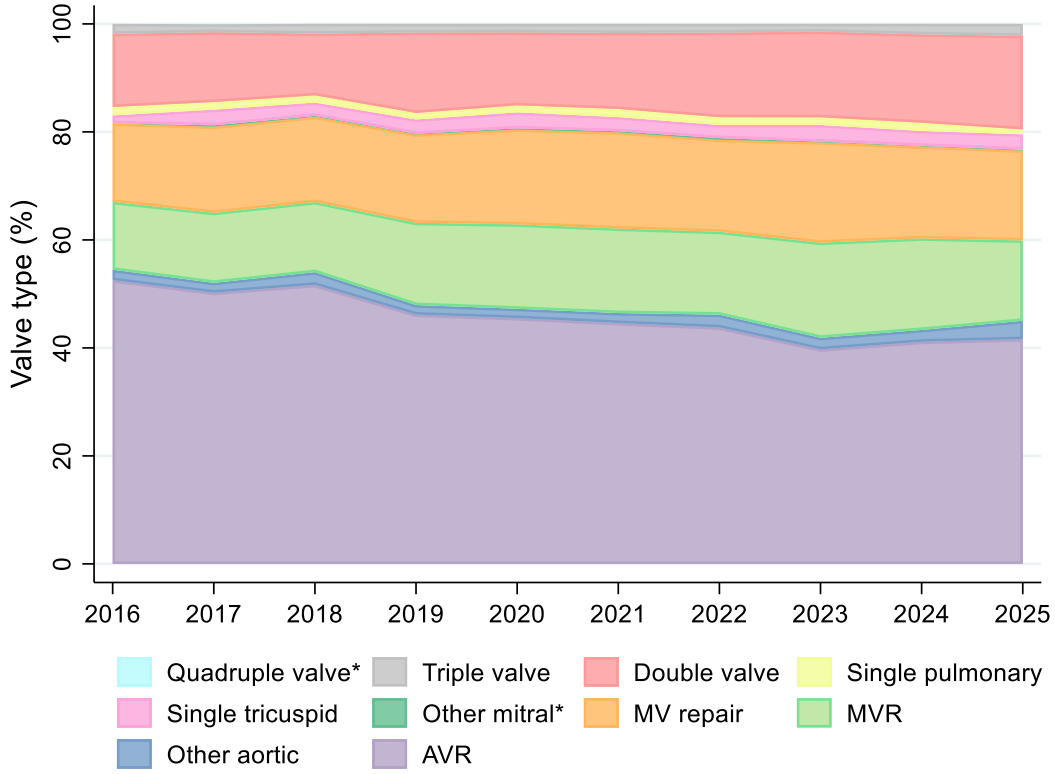
2.2.3 Sex and age

Figure 21. Age of isolated valve patients by sex, 2025



2.3 Overview of all valve surgery

Figure 22. Isolated valve surgery by year, 2016-2025



*Not visible on the figure as these categories represent a total of 45 out of 29,102 cases, combined, between 2016 and 2025

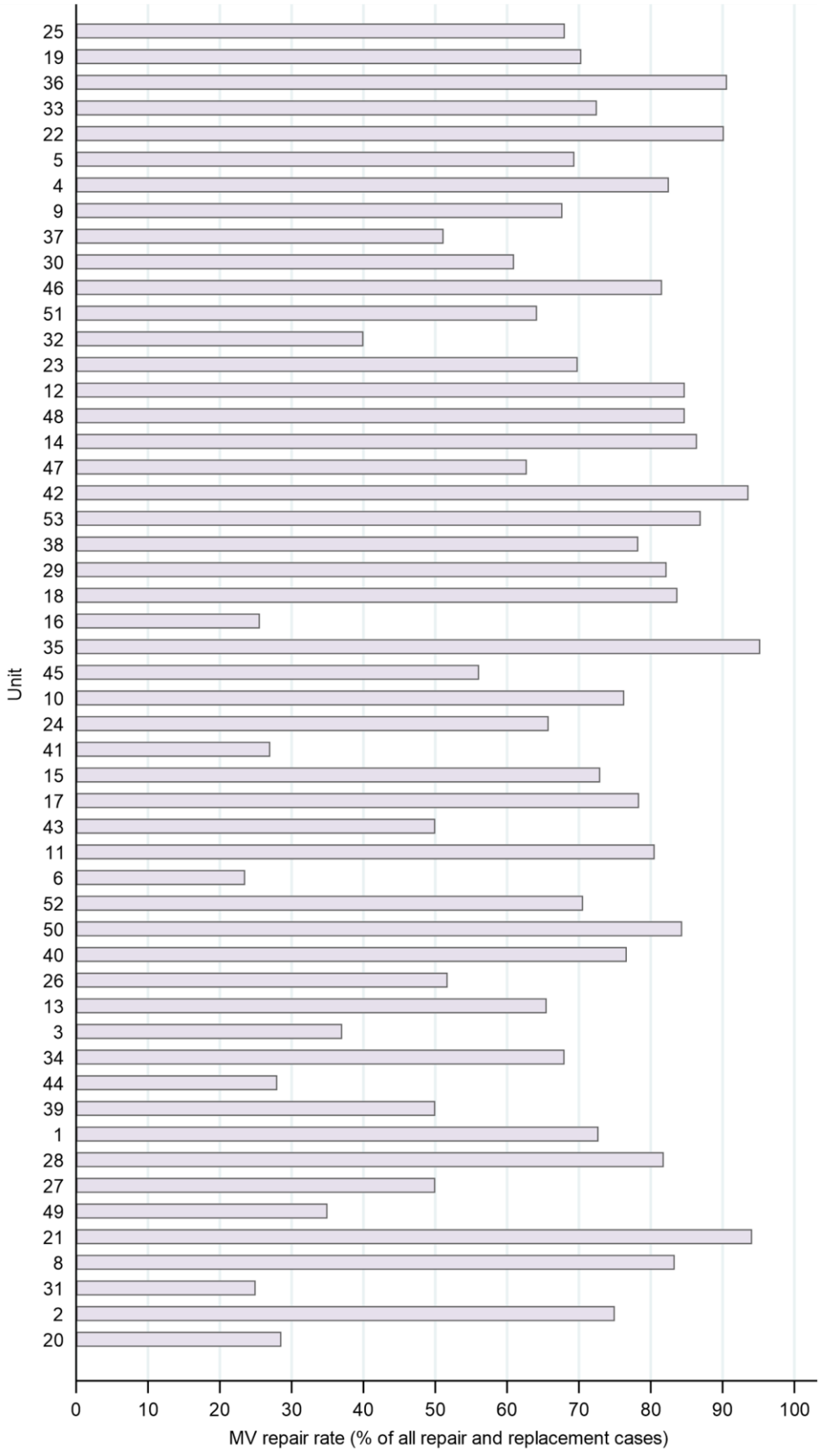
MV indicates mitral valve; MVR, mitral valve replacement; AVR, aortic valve replacement

Table 23. In-hospital mortality and total OM in isolated valve patients, 2025

	Total cases		In-hospital mortality		Total OM	
Valve surgery type	n	%	n	%	n	%
Single aortic	1,564	45.1	21	1.3	26	1.7
AVR	1,447	41.7	21	1.5	26	1.8
Other aortic	117	3.4	0	0.0	0	0.0
Single mitral	1,091	31.4	13	1.2	14	1.3
MVR	506	14.6	11	2.2	12	2.4
MV repair	580	16.7	2	0.3	2	0.3
Other mitral	5	0.1	0	0.0	0	0.0
Single tricuspid	99	2.9	5	5.1	5	5.1
Single pulmonary	31	0.9	1	3.2	1	3.2
Aortic and mitral	222	6.4	10	4.5	10	4.5
Mitral and tricuspid	332	9.6	5	1.5	5	1.5
Aortic and tricuspid	33	1.0	1	3.0	1	3.0
Other double valve	20	0.6	0	0.0	0	0.0
Triple valve	77	2.2	5	6.5	5	6.5
Quadruple valve	0	0.0	-	-	-	-
Total valve surgery	3,469	100	61	1.8	67	1.9

Figure 23. Mitral valve repair rates for myxomatous degeneration, by unit, 2021-2025

Repair as a proportion of all mitral valve repair or replacement procedures for myxomatous degeneration. The remainder in each unit are cases involving replacements.



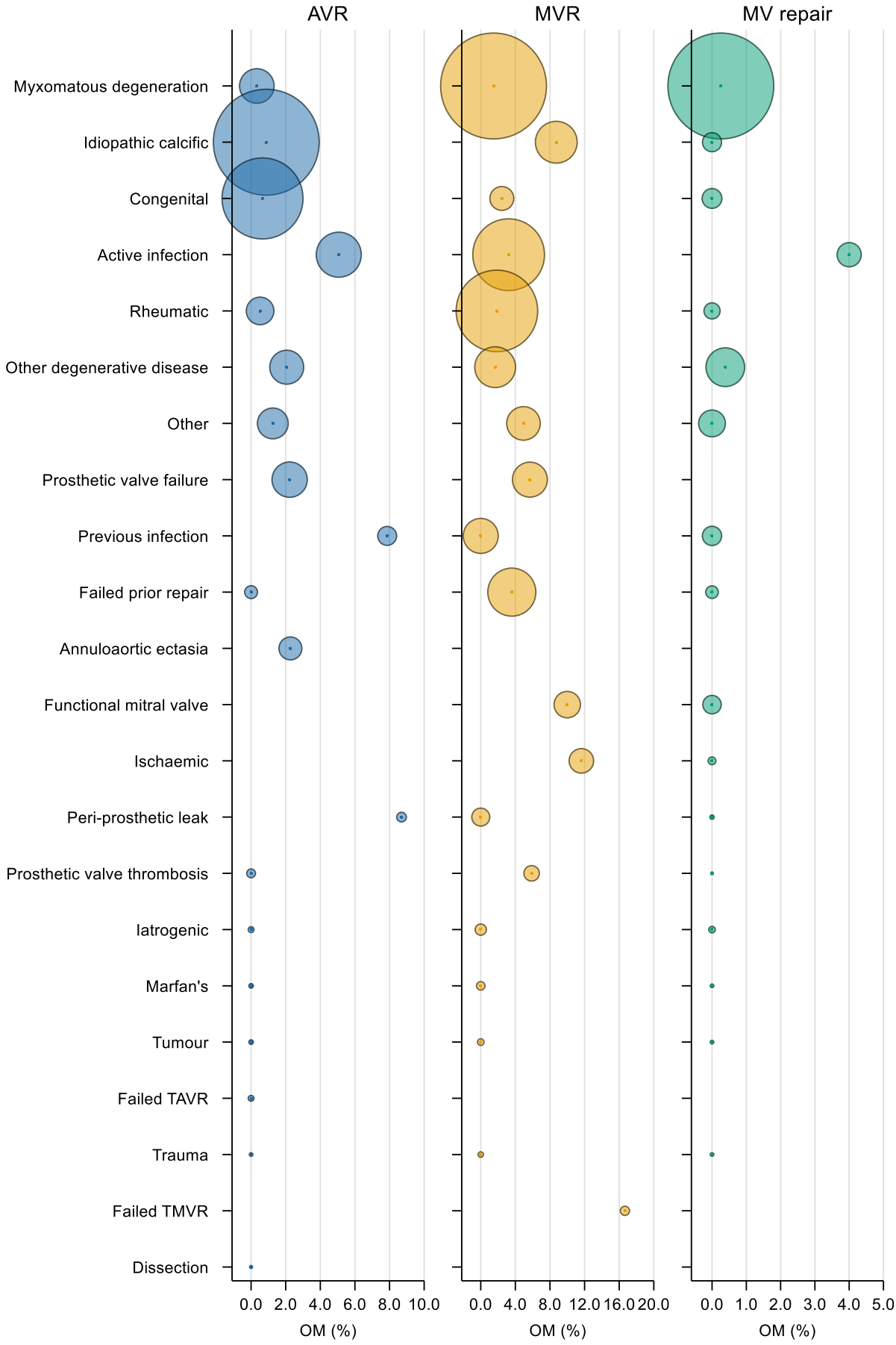
n	%
194	68.0
182	70.3
160	90.6
120	72.5
112	90.2
111	69.4
103	82.5
96	67.7
86	51.2
82	61.0
76	81.6
67	64.2
65	40.0
63	69.8
59	84.7
59	86.4
59	84.7
51	62.7
47	93.6
46	78.3
46	87.0
45	82.2
43	83.7
43	25.6
42	95.2
41	56.1
38	76.3
38	65.8
37	27.0
37	73.0
37	78.4
36	50.0
36	80.6
34	70.6
34	23.5
32	84.4
30	76.7
29	51.7
29	65.5
27	37.0
25	68.0
25	28.0
24	50.0
22	81.8
22	72.7
22	50.0
20	35.0
17	94.1
12	83.3
12	25.0
8	75.0
7	28.6

2.4 Influence of patient characteristics on operative mortality

Table 24. OM following the three most common isolated single valve surgical procedures, by patient demographics and risk factors, 2021-2025

	AVR		MVR		MV repair	
	n	OM (%)	n	OM (%)	n	OM (%)
Clinical status						
Elective	5,288	1.0	1,789	2.3	2,433	0.2
Urgent	1,348	2.2	686	3.2	347	1.2
Emergency/salvage	107	10.3	99	12.1	19	0.0
Sex/age						
Male	4,593	1.3	1,332	3.0	1,894	0.3
18 - <50 y	489	1.0	219	1.8	343	0.0
50 - <60 y	785	1.4	193	2.6	451	0.4
60 - <70 y	1,623	0.9	342	3.5	601	0.5
70 - <80 y	1,462	1.0	441	3.9	423	0.0
≥80 y	234	5.6	137	1.5	76	0.0
Female	2,150	1.6	1,242	2.8	905	0.6
18 - <50 y	189	2.6	259	1.9	128	0.8
50 - <60 y	309	1.6	161	1.2	156	0.0
60 - <70 y	736	1.5	273	1.8	312	0.6
70 - <80 y	785	1.4	418	4.1	257	0.4
≥80 y	131	2.3	131	4.6	52	1.9
LVF						
EF>45%	5,720	1.3	2,236	2.6	2,618	0.4
EF≥30% - ≤45%	702	1.6	262	3.4	132	0.0
EF<30%	197	2.0	24	12.5	4	0.0
Previous MI						
No MI	6,338	1.4	2,417	2.5	2,739	0.3
NSTEMI	268	1.1	85	4.7	32	6.3
STEMI	63	1.6	47	17.0	14	0.0
Unknown type	74	2.7	24	8.3	14	0.0
Previous surgery						
Initial	5,954	1.2	1,978	2.6	2,723	0.4
Redo	788	2.4	594	4.0	74	0.0
Dialysis						
No	6,649	1.3	2,531	2.8	2,785	0.4
Yes	94	8.5	42	11.9	14	0.0
Pre-operative creatinine						
≤200 µmol/L	6,617	1.3	2,493	2.7	2,781	0.3
>200 µmol/L	125	4.8	80	8.8	17	11.8

Figure 24. OM following AVR, MVR and MV repair, by aetiology, 2021-2025

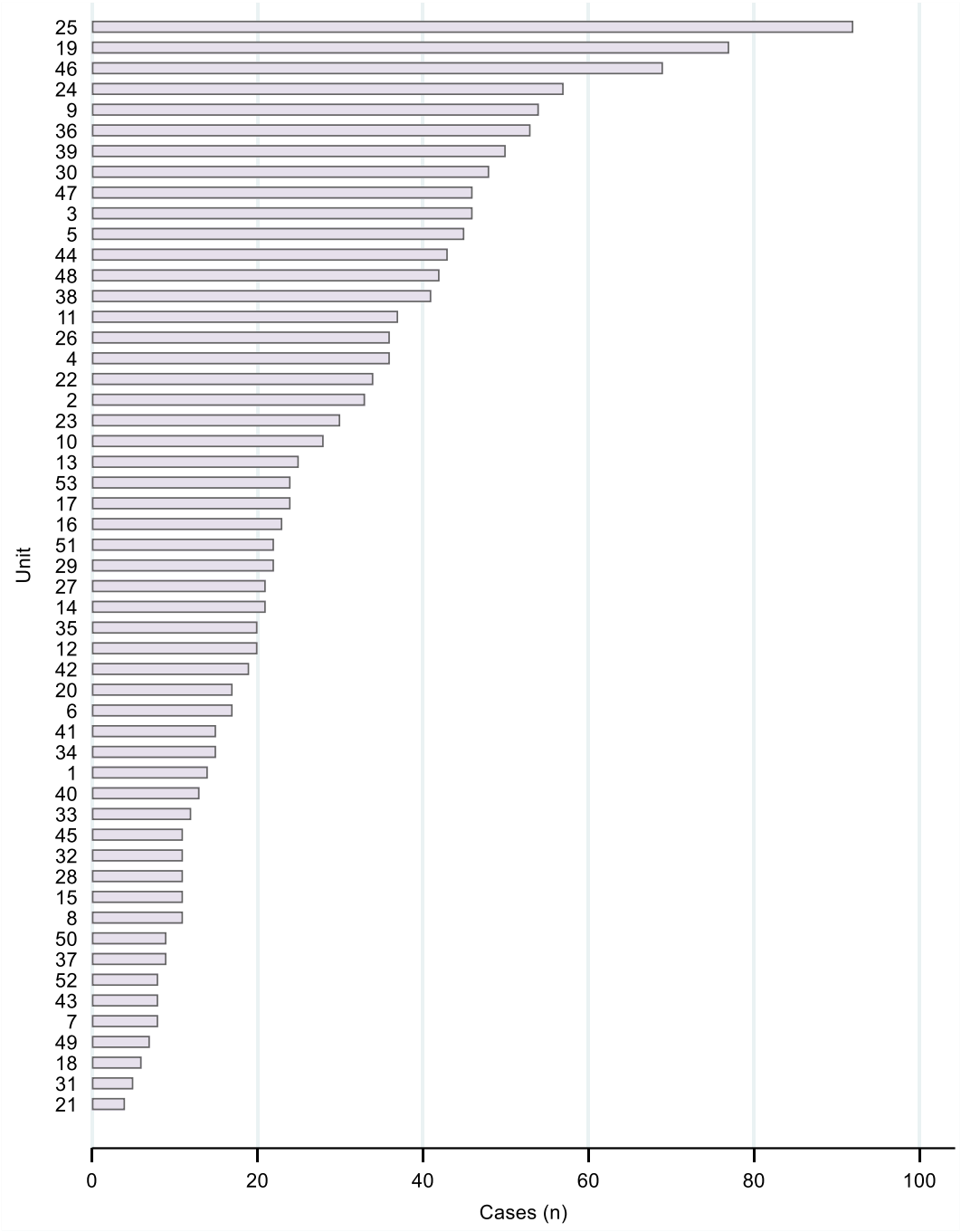


Bubble size represents the number of cases

TAVR indicates transcatheter aortic valve replacement; TMVR, transcatheter mitral valve replacement

2.5 AVR

Figure 25. Isolated AVR surgery by unit, 2025



2.5.1 Mortality

2.5.1.1 Trends in patient complexity and mortality risk

Figure 26. Isolated AVR patient risk over time, 2016-2025

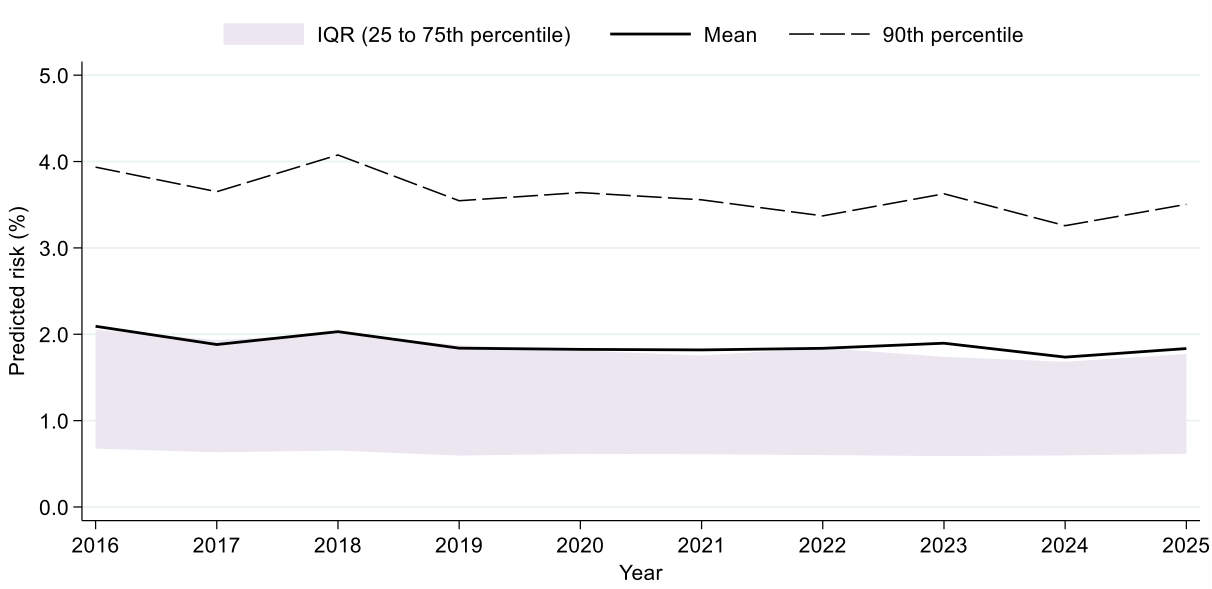
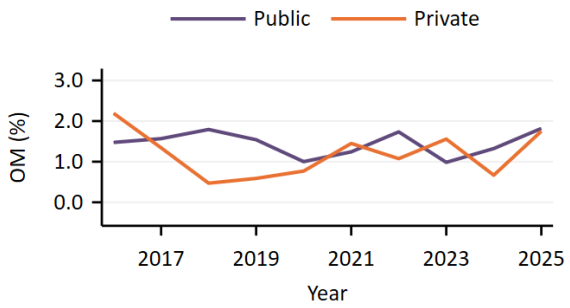


Table 25. Ten-year overview of isolated AVR mortality, 2016-2025

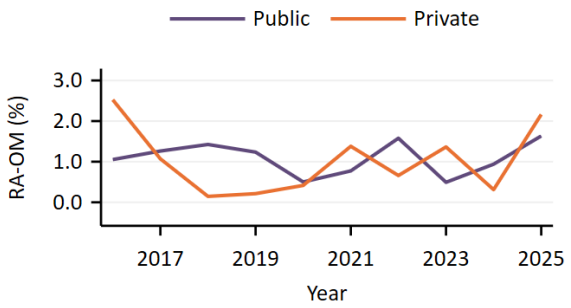
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total hospitals (n)	26	32	34	35	42	46	49	49	53	53
Case numbers (n)										
Public	949	896	950	915	900	807	694	821	992	992
Private	230	316	434	340	393	496	567	519	461	468
Overall	1,179	1,212	1,384	1,255	1,293	1,303	1,261	1,340	1,453	1,460
Outcome (%)										
OM (%)	1.61	1.51	1.38	1.28	0.93	1.32	1.44	1.21	1.12	1.80
RA-OM (%)	1.28	1.21	0.94	0.89	0.47	0.96	1.13	0.77	0.72	1.76

Figure 27. Ten year public and private overview of isolated AVR mortality, 2016-2025

a. OM



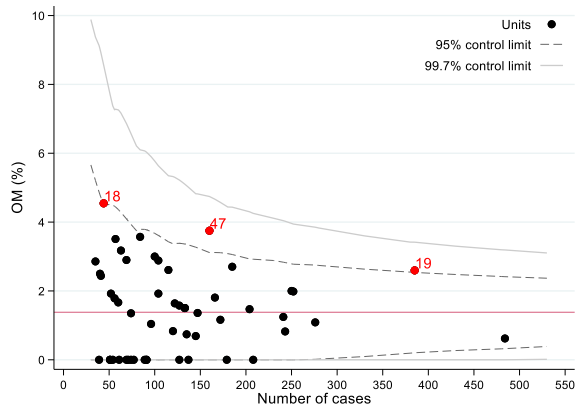
b. RA-OM



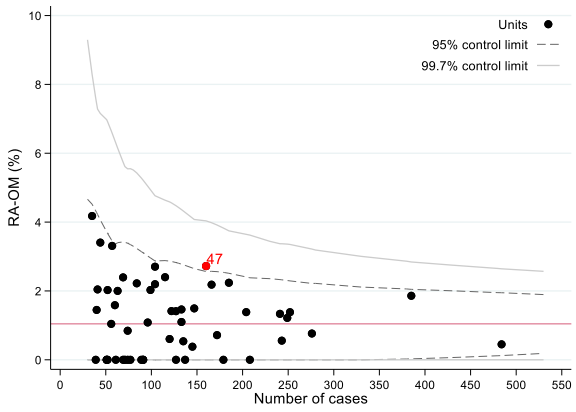
2.5.1.2 Unadjusted and risk-adjusted unit outcomes

Figure 28. OM following isolated AVR surgery 2021-2025, by unit

a. OM



b. RA-OM



A full summary of outcomes for all units is provided in the 2025 ANZSCTS Database Supplementary Annual Report.

2.5.1.3 Long-term survival

Figure 29. Long-term survival following isolated AVR surgery by clinical status, 2015 to 2024

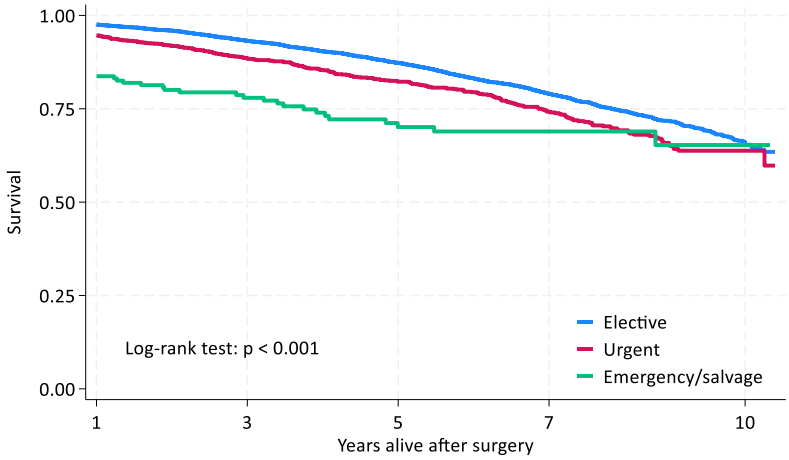


Table 26. Long-term survival following isolated AVR surgery by clinical status, 2015 to 2024

	n	Survival years (%, number at risk)				
		1	3	5	7	10
Elective	11,723	97.6 (10,327)	93.2 (7,808)	87.3 (5,303)	79.0 (2,784)	65.6 (302)
Urgent	2,064	94.7 (1,731)	88.5 (1,149)	82.2 (708)	74.2 (390)	63.8 (34)
Emergency/salvage	201	83.7 (148)	77.9 (105)	70.1 (65)	68.9 (40)	-

Figure 30. Long-term survival following isolated AVR surgery by sex, 2015 to 2024

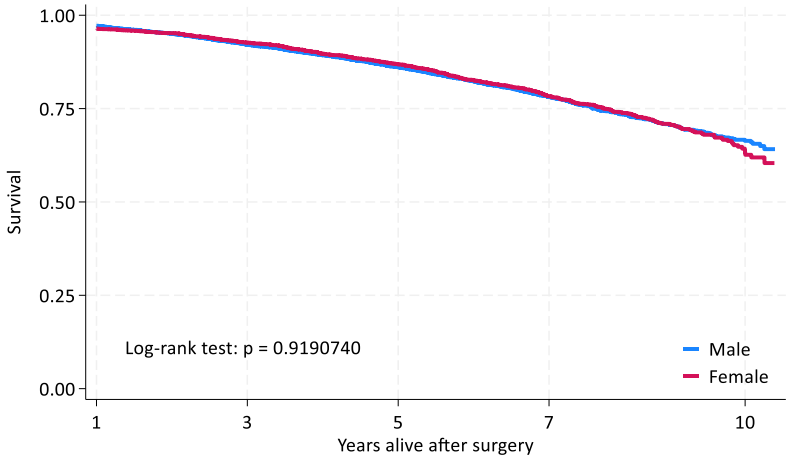


Table 27. Long-term survival following isolated AVR surgery by sex, 2015 to 2024

	n	Survival years (%, number at risk)				
		1	3	5	7	10
Male	9,344	97.2 (8,156)	92.1 (5,983)	86.1 (3,957)	78.1 (2,071)	66.4 (224)
Female	4,644	96.4 (4,050)	92.7 (3,079)	86.8 (2,119)	78.3 (1,143)	63.2 (114)

Figure 31. Long-term survival following isolated AVR surgery by sex and clinical status, 2015 to 2024

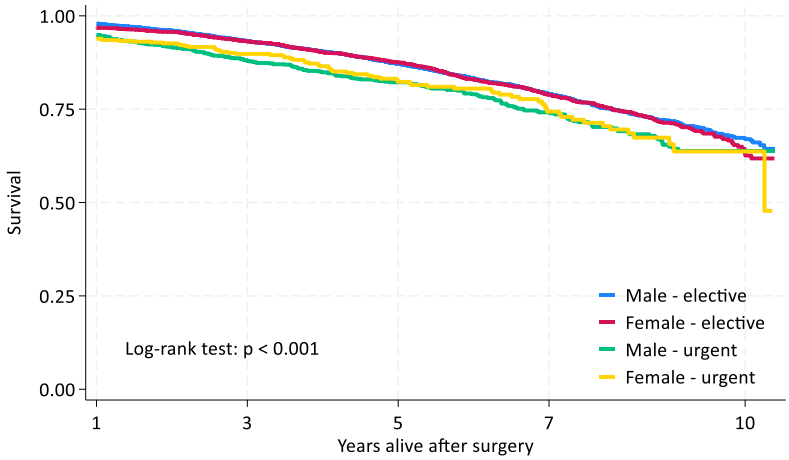


Table 28. Long-term survival following isolated AVR surgery by sex and clinical status, 2015 to 2024

	n	Survival years (%, number at risk)				
		1	3	5	7	10
Male - elective	7,676	97.9 (6,778)	93.2 (5,069)	87.2 (3,397)	79.1 (1,760)	67.0 (197)
Female - elective	4,047	96.9 (3,549)	93.2 (2,739)	87.5 (1,906)	78.9 (1,024)	63.2 (105)
Male - urgent	1,511	94.9 (1,265)	88.0 (835)	82.2 (513)	74.2 (280)	63.8 (26)
Female - urgent	553	93.9 (466)	89.8 (314)	82.3 (195)	74.4 (110)	-

Figure 32. Long-term survival following isolated AVR surgery by age, 2015 to 2024

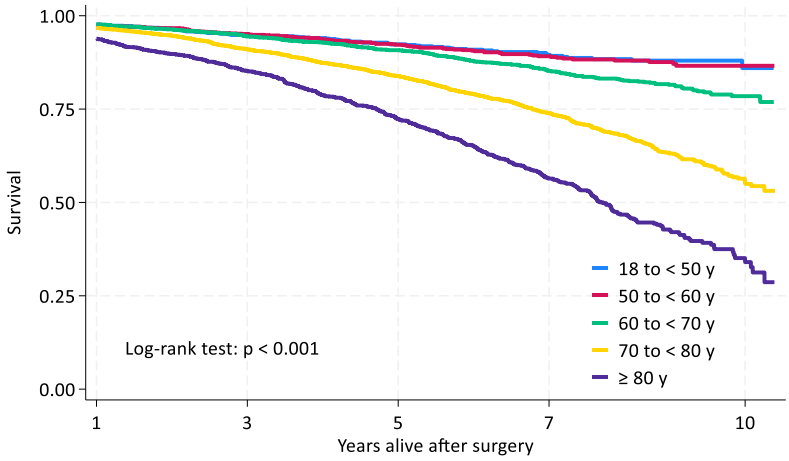


Table 29. Long-term survival following isolated AVR surgery by age, 2015 to 2024

	n	Survival years (%, number at risk)				
		1	3	5	7	10
18 to < 50 y	1,298	97.7 (1,140)	94.7 (853)	92.3 (585)	89.5 (347)	86.0 (40)
50 to < 60 y	1,966	97.5 (1,697)	95.1 (1,219)	92.2 (830)	89.2 (440)	86.6 (40)
60 to < 70 y	4,232	97.7 (3,636)	94.5 (2,622)	90.8 (1,736)	85.3 (919)	78.5 (108)
70 to < 80 y	5,132	96.7 (4,510)	91.0 (3,396)	83.8 (2,240)	73.9 (1,164)	55.4 (118)
≥ 80 y	1,360	93.8 (1,223)	85.3 (972)	72.3 (685)	56.4 (344)	34.0 (32)

Figure 33. Long-term survival following isolated AVR surgery by pre-operative eGFR, 2015 to 2024

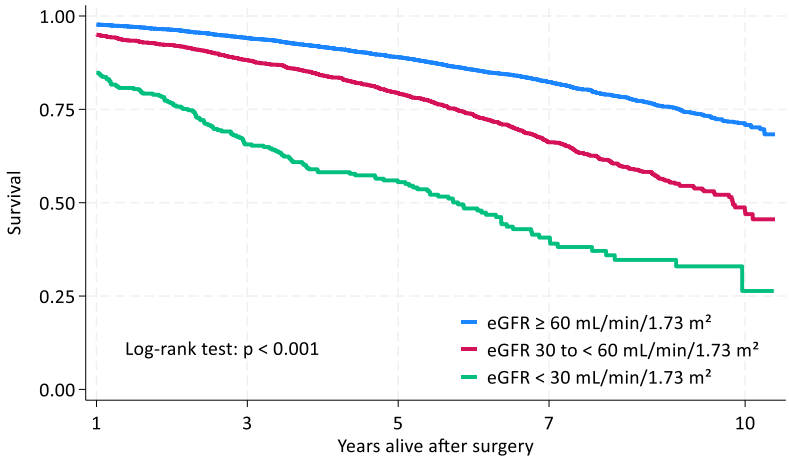


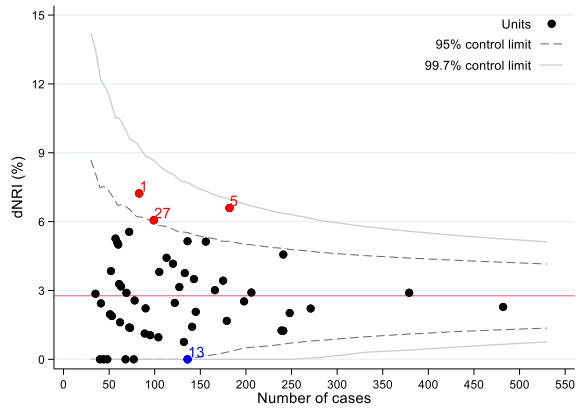
Table 30. Long-term survival following isolated AVR surgery by pre-operative eGFR, 2015 to 2024

	n	Survival years (%, number at risk)				
		1	3	5	7	10
eGFR ≥ 60 mL/min/1.73 m²	11,323	97.7 (9,913)	94.1 (7,359)	89.0 (4,919)	82.3 (2,630)	70.8 (282)
GFR 30 to < 60 mL/min/1.73 m²	2,289	95.0 (1,995)	88.2 (1,516)	79.3 (1,038)	66.2 (534)	47.8 (53)
eGFR < 30 mL/min/1.73 m²	376	84.8 (298)	65.6 (187)	55.5 (119)	40.7 (50)	-

2.5.2 Complications

Figure 34. dNRI following isolated AVR surgery 2021-2025, by unit

a. dNRI



b. RA-dNRI

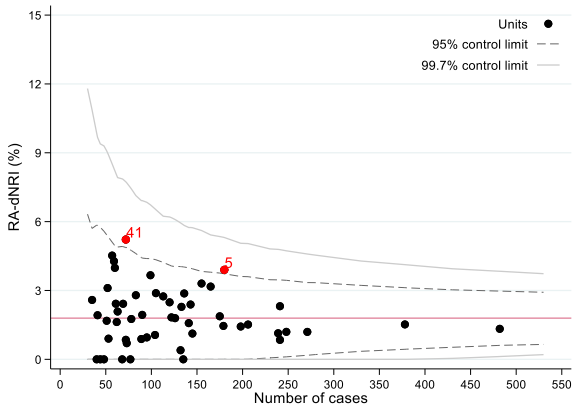
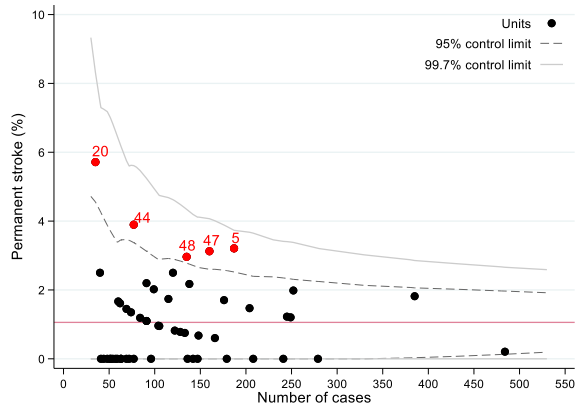
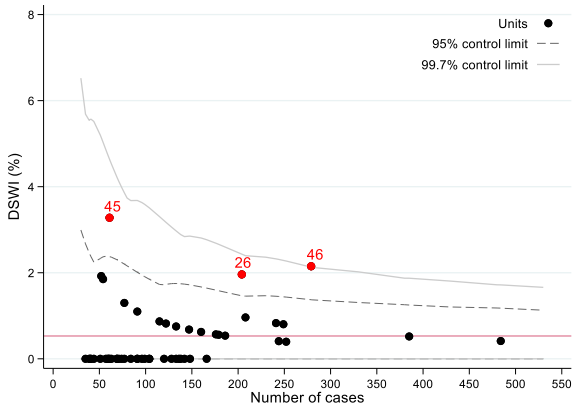


Figure 35. Complications following isolated AVR surgery 2021-2025, by unit

a. Permanent stroke



b. DSWI



c. RTT for bleeding

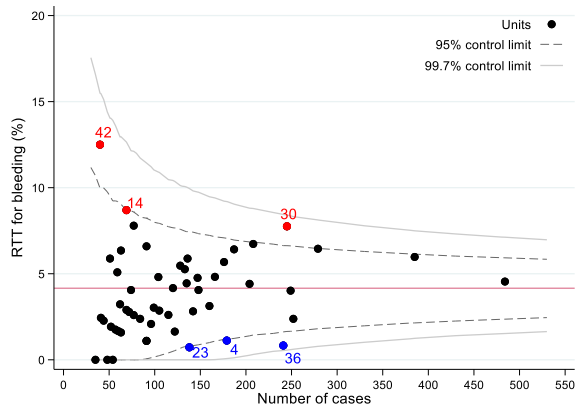


Table 31. Unit variation of isolated AVR complications, 2021-2025

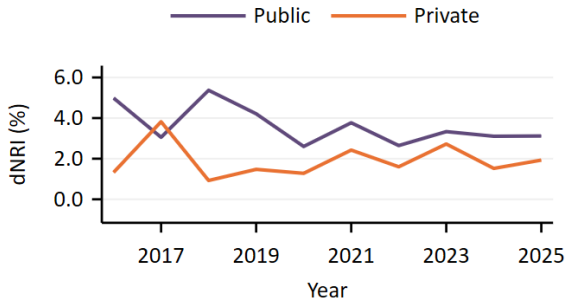
		Median unit rate, % (IQR)	Range of unit rates, %
New cardiac arrhythmia	Public	34.4 (31.3-37.1)	22.2-50.5
	Private	33.0 (27.0-41.0)	18.2-50.7
	Overall	33.3 (29.9-37.5)	18.2-50.7
All-cause readmission	Public	10.3 (9.0-11.0)	0.0-18.4
	Private	7.1 (4.0-9.0)	0.0-16.3
	Overall	8.7 (5.5-10.9)	0.0-18.4
Prolonged intubation [> 24h]	Public	10.3 (7.4-13.1)	3.1-21.1
	Private	5.8 (4.2-9.9)	0.0-15.0
	Overall	8.5 (4.8-11.9)	0.0-21.1

Table 32. Ten-year overview of isolated AVR complications, 2016-2025

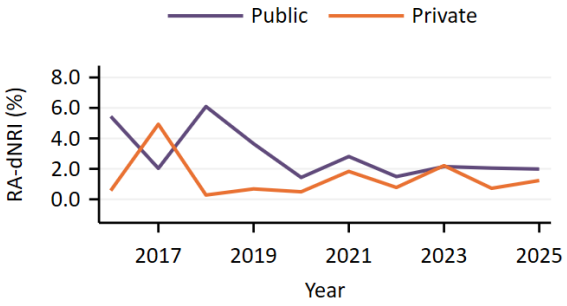
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total hospitals (n)	26	32	34	35	42	46	49	49	53	53
Case numbers (n)										
Public	949	896	950	915	900	807	694	821	992	992
Private	230	316	434	340	393	496	567	519	461	468
Overall	1,179	1,212	1,384	1,255	1,293	1,303	1,261	1,340	1,453	1,460
Outcome (%)										
dNRI	4.16	3.26	3.96	3.46	2.20	3.25	2.17	3.10	2.59	2.73
RA-dNRI	4.10	2.54	3.73	2.73	1.12	2.44	1.16	2.15	1.59	1.74
Permanent stroke	0.93	1.24	1.30	1.67	1.08	0.84	0.87	1.04	0.76	1.71
DSWI	1.79	0.83	0.51	0.40	0.31	0.61	0.56	0.82	0.49	0.21
RTT for bleeding	3.99	4.05	3.90	3.51	3.64	4.07	4.12	3.51	3.94	5.07
New cardiac arrhythmia	32.71	30.83	33.74	31.79	34.60	33.26	36.00	35.52	36.26	31.19
All-cause readmission	10.21	10.71	9.65	11.18	9.51	9.41	7.89	8.93	10.46	8.49
Prolonged intubation [> 24h]	9.86	7.70	8.93	8.87	8.30	8.47	9.38	10.70	9.22	9.40

Figure 36. Ten year public and private overview of isolated AVR complications, 2016-2025

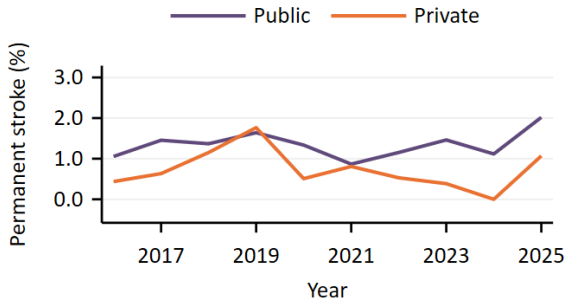
a. dNRI



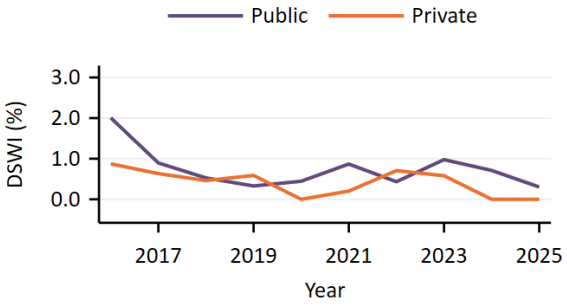
b. RA-dNRI



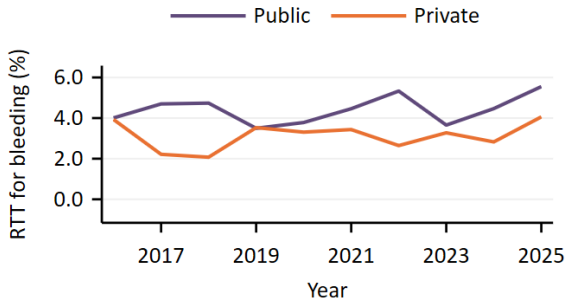
c. Permanent stroke



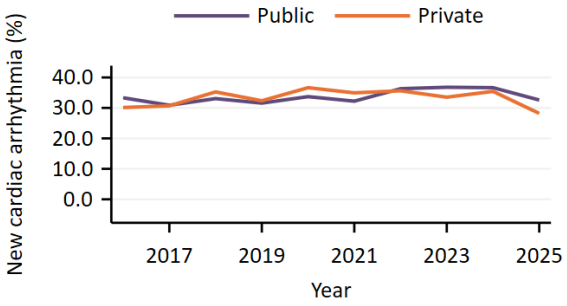
d. DSWI



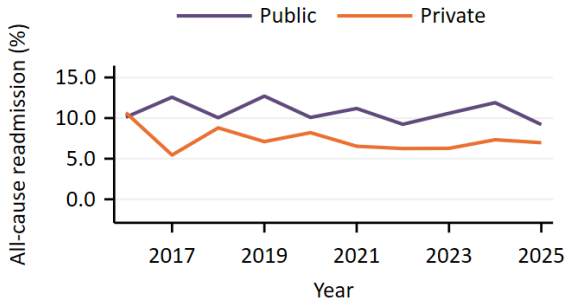
e. RTT for bleeding



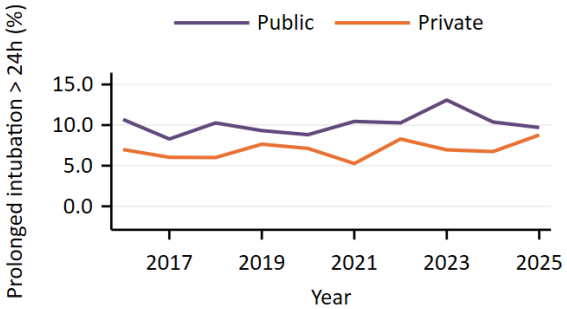
f. New cardiac arrhythmia



g. All-cause readmission



h. Prolonged intubation [> 24h]



2.5.3 Resource utilisation

Table 33. Resource utilisation for isolated AVR patients, 2025

	Mean	Median	IQR
Pre-operative length of stay (days)	2.2	1.0	1.0 - 2.0
Post-operative length of stay (days)	9.1	7.0	6.0 - 10.0
Initial post-operative ventilation (hours)	14.4	7.3	5.2 - 13.0
ICU length of stay (hours)	62.2	47.5	25.2 - 73.5

Cases deemed clinical outliers were excluded from the analysis.

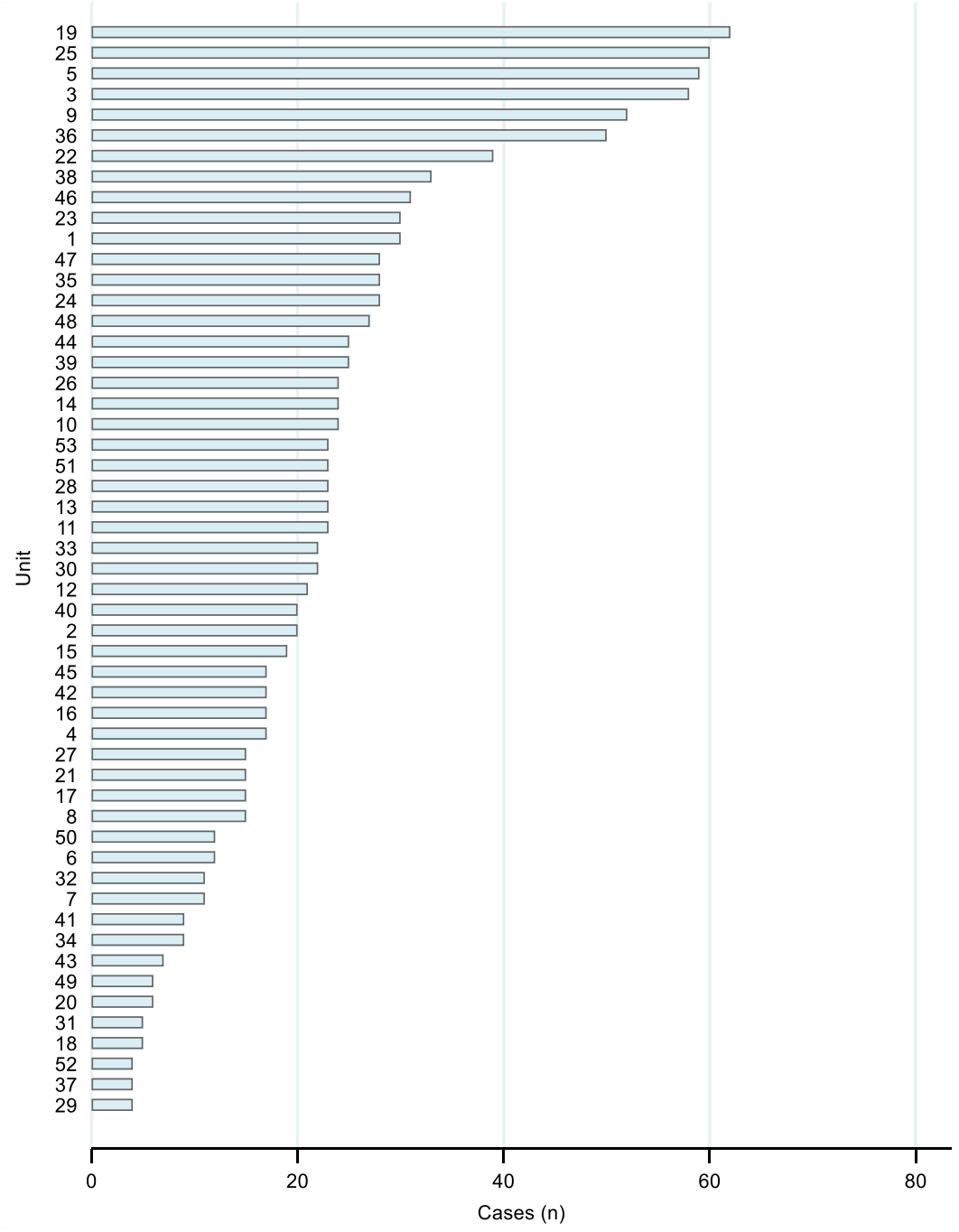
Table 34. Blood product usage for isolated AVR patients, 2025

	Patients (n)	Patients (%)
Transfusion type		
Red blood cell only	169	11.6
Non-red blood cell only	222	15.2
Red and non-red blood cell	285	19.5
Use of non-red blood cell products		
Platelets	374	25.6
Fresh frozen plasma	165	11.3
Novo 7	6	0.4
Cryoprecipitate	262	17.9
Prothrombinex	186	12.7
Fibrinogen	47	3.2

3. Combined Valve and CABG Surgery

3.1 Caseload

Figure 37. Combined valve and CABG cases by unit, 2025



3.2 Patient and surgical factors

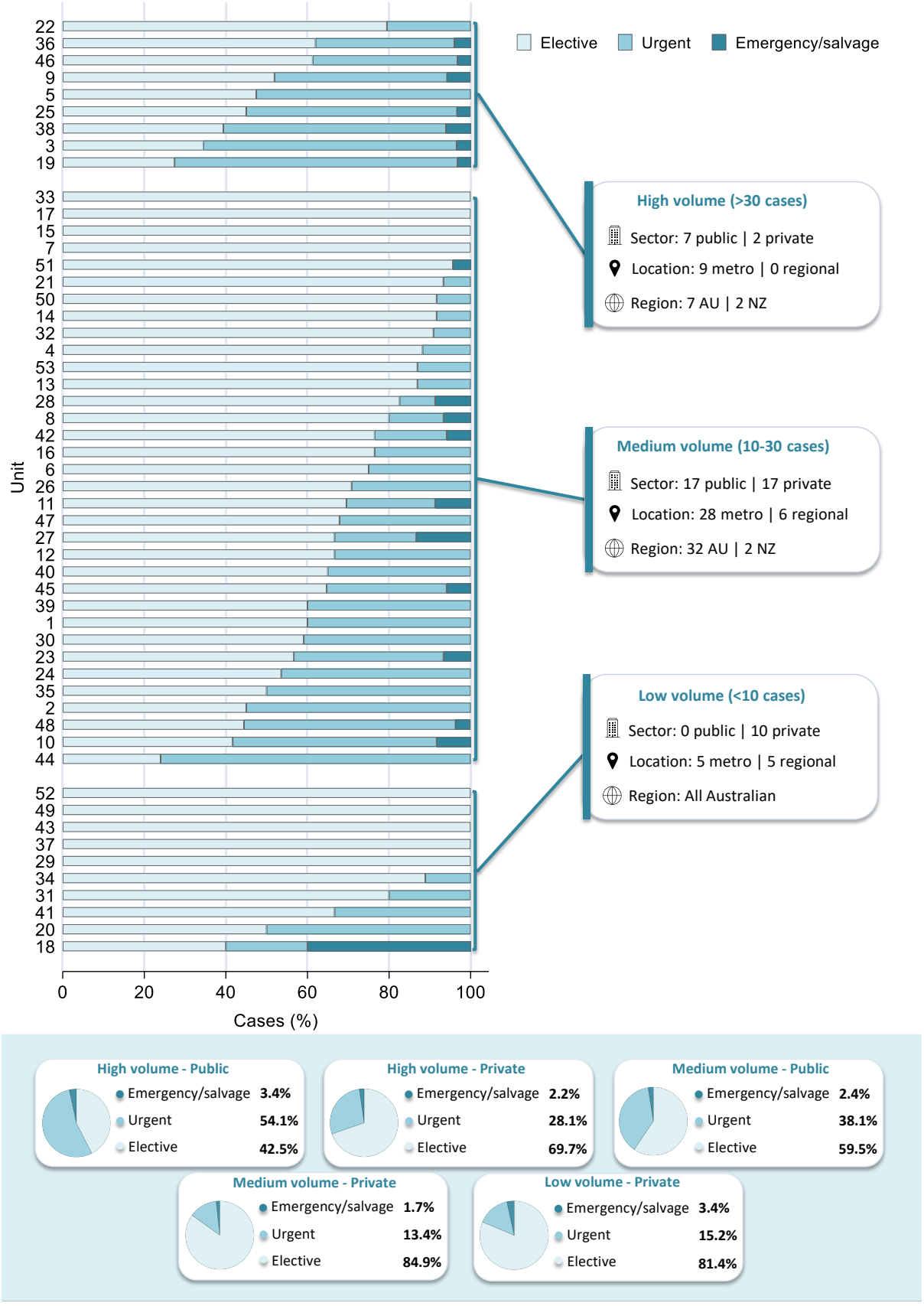
3.2.1 Patient characteristics

Table 35. Combined valve and CABG patient characteristics by year

	2021	2022	2023	2024	2025	Total
Clinical status (%)						
Elective	66.1	66.2	66.9	66.8	62.6	65.7
Urgent	31.8	31.1	30.8	31.4	34.8	32.0
Emergency/salvage	2.1	2.7	2.3	1.9	2.6	2.3
Sex (%)						
Male	80.3	81.7	80.7	81.8	82.0	81.3
Female	19.7	18.3	19.3	18.2	18.0	18.7
Another term	-	-	-	-	0.0	0.0
LVF (%)						
EF>45%	80.8	77.6	80.3	81.7	76.8	79.5
EF≥30% - ≤45%	15.1	18.7	17.2	15.3	18.7	17.0
EF<30%	4.1	3.7	2.4	3.0	4.5	3.5
Previous MI (%)						
No MI	71.3	71.7	73.6	72.7	74.1	72.7
NSTEMI	19.9	20.2	18.5	19.8	18.9	19.5
STEMI	5.3	5.3	4.7	5.2	5.3	5.2
Unknown type	3.5	2.8	3.2	2.3	1.7	2.7
Timing of previous MI (%)						
≤6hr	1.5	0.6	1.0	0.6	1.9	1.1
>6hr - <24hr	2.1	1.2	1.3	2.6	1.6	1.8
≥1d - ≤7d	26.8	27.6	23.5	22.5	24.0	24.9
>7d	69.6	70.6	74.3	74.4	72.5	72.3
Previous surgery (%)						
Initial	95.4	95.7	96.1	96.7	96.8	96.1
Redo	4.6	4.3	3.9	3.3	3.2	3.9
Surgical valve type (%)						
Single aortic	72.8	70.9	71.0	71.1	74.0	72.0
Single mitral	26.3	28.1	27.2	27.1	24.6	26.7
Single tricuspid/pulmonary	0.9	0.9	1.9	1.8	1.4	1.4

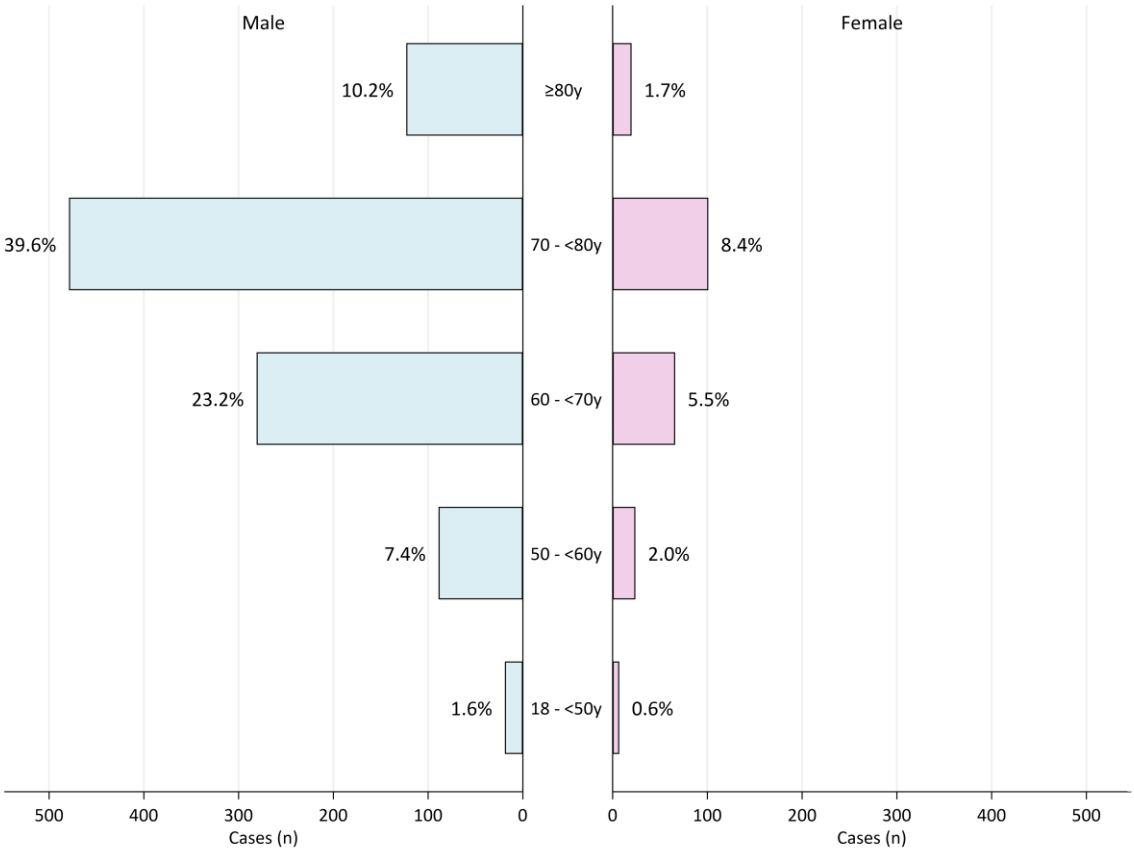
3.2.2 Clinical status

Figure 38. Combined valve and CABG clinical status by case volume and peer group, 2025



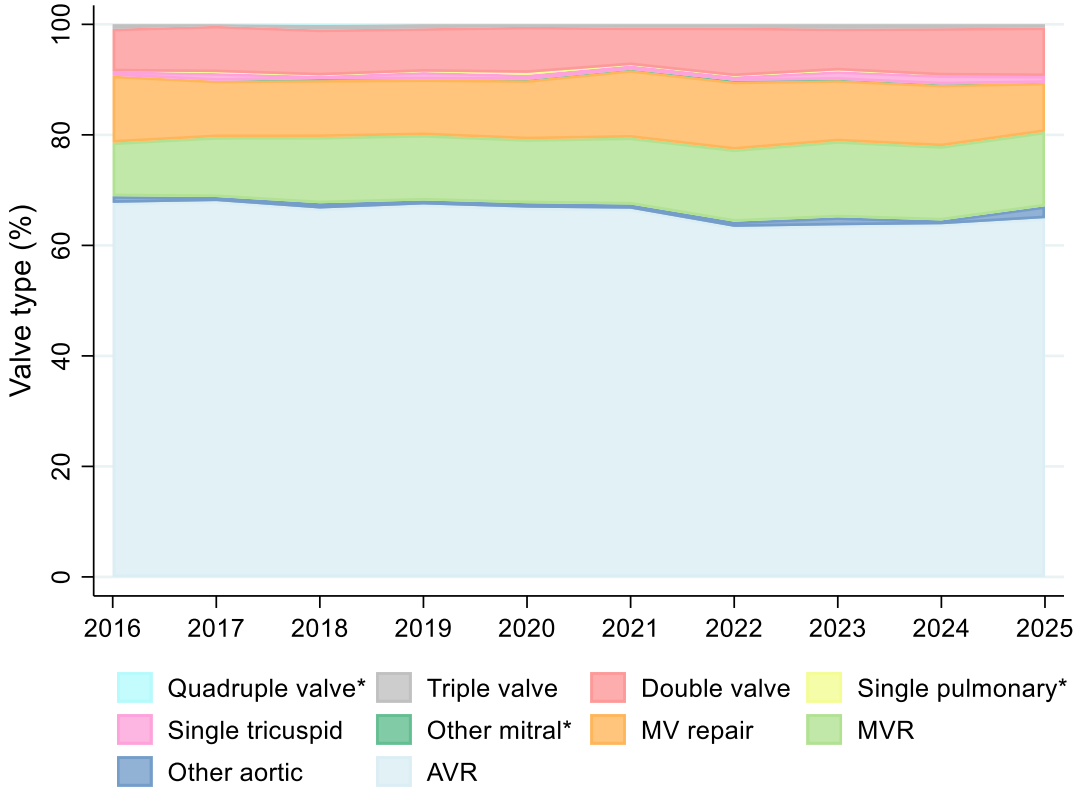
3.2.3 Sex and age

Figure 39. Age of combined valve and CABG patients by sex, 2025



3.3 Overview of all combined valve and CABG surgery

Figure 40. Combined valve and CABG surgery by year, 2016-2025



*Not visible on the figure as these categories represent a total of 21 out of 11,387 cases, combined, between 2015 and 2024

Table 36. In-hospital mortality and total OM in combined valve and CABG patients, 2025

	Total cases		In-hospital mortality		Total OM	
Valve surgery type	n	%	n	%	n	%
Single aortic	804	67.0	22	2.7	22	2.7
AVR	778	64.8	20	2.6	20	2.6
Other aortic	26	2.2	2	7.7	2	7.7
Single mitral	268	22.3	13	4.9	16	6.0
MVR	163	13.6	11	6.7	13	8.0
MV repair	105	8.8	2	1.9	3	2.9
Other mitral	0	0.0	-	-	-	-
Single tricuspid	15	1.3	1	6.7	1	6.7
Single pulmonary	0	0.0	-	-	-	-
Aortic and mitral	51	4.3	4	7.8	5	9.8
Mitral and tricuspid	52	4.3	3	5.8	3	5.8
Aortic and tricuspid	2	0.2	2	100.0	2	100.0
Other double valve	1	0.1	0	0.0	0	0.0
Triple valve	7	0.6	0	0.0	0	0.0
Quadruple valve	0	0.0	-	-	-	-
Total valve surgery	1,200	100	45	3.8	49	4.1

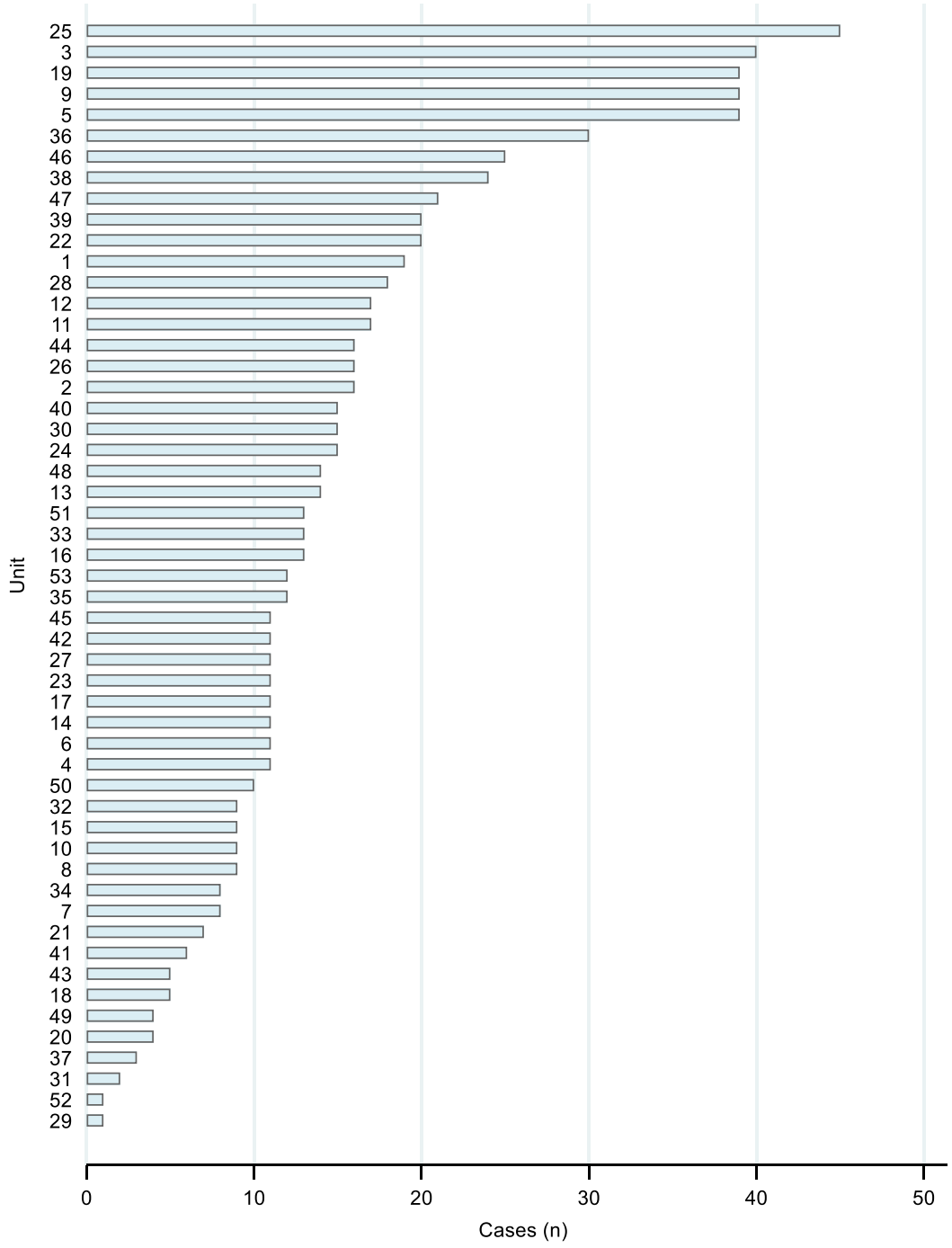
3.4 Influence of patient characteristics on operative mortality

Table 37. OM following the three most common combined single valve and CABG surgical procedures, by patient demographics and risk factors, 2021-2025

	AVR and CABG		MVR and CABG		MV repair and CABG	
	n	OM (%)	n	OM (%)	n	OM (%)
Clinical status						
Elective	2,546	1.9	469	3.0	420	2.1
Urgent	1,226	2.9	264	10.6	221	3.6
Emergency/salvage	63	15.9	52	19.2	12	8.3
Sex/age						
Male	3,203	2.2	569	6.3	546	2.6
18 - <50y	41	0.0	17	0.0	21	0.0
50 - <60y	225	2.7	72	4.2	71	5.6
60 - <70y	889	1.8	147	3.4	195	2.6
70 - <80y	1,618	1.7	264	9.5	208	1.9
≥80y	430	4.7	69	4.3	51	2.0
Female	632	3.8	216	7.4	107	3.7
18 - <50y	13	0.0	13	0.0	4	0.0
50 - <60y	50	0.0	26	0.0	14	7.1
60 - <70y	140	2.1	57	7.0	36	5.6
70 - <80y	343	5.5	90	11.1	47	2.1
≥80y	86	2.3	30	6.7	6	0.0
LVF						
EF>45%	3,127	2.0	554	6.0	478	1.3
EF≥30% - ≤45%	561	3.9	170	7.6	119	5.9
EF<30%	94	8.5	43	14.0	49	10.2
Previous MI						
No MI	2,843	1.8	511	4.3	445	1.8
NSTEMI	743	5.1	176	10.8	138	4.3
STEMI	149	2.0	79	12.7	49	6.1
Unknown type	100	2.0	19	5.3	21	4.8
Timing of previous MI						
≤6hr	9	22.2	5	40.0	2	0.0
>6hr - <24hr	15	13.3	9	22.2	3	0.0
≥1d - ≤7d	246	5.3	75	13.3	54	3.7
>7d	720	3.5	185	8.6	149	5.4
Previous surgery						
Initial	3,715	2.3	747	6.6	647	2.6
Redo	120	5.8	38	7.9	6	16.7
Dialysis						
No	3,775	2.3	753	6.4	643	2.3
Yes	60	8.3	32	12.5	10	30.0
Pre-operative creatinine						
≤200 µmol/L	3,750	2.2	731	5.9	638	2.2
>200 µmol/L	84	11.9	53	15.1	15	26.7

3.5 Combined AVR and CABG

Figure 41. Combined AVR and CABG surgery by unit, 2025



3.5.1 Mortality

3.5.1.1 Trends in patient complexity and mortality risk

Figure 42. Combined AVR and CABG patient risk over time, 2016-2025

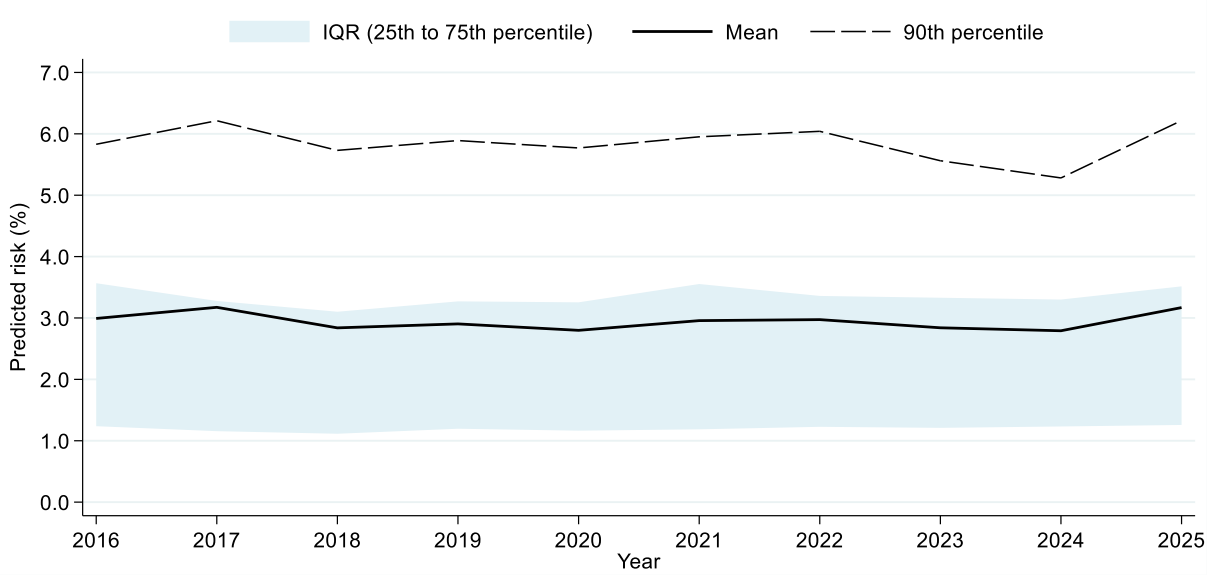
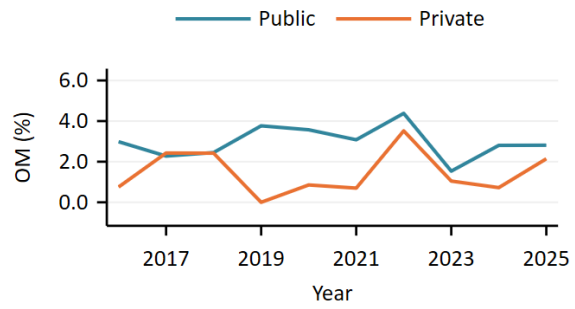


Table 38. Ten-year overview of combined AVR and CABG mortality, 2016-2025

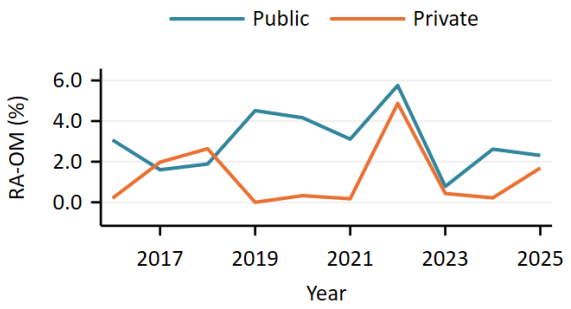
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total hospitals (n)	26	32	33	34	42	46	49	49	53	53
Case numbers (n)										
Public	538	529	449	532	504	489	391	458	542	499
Private	139	211	251	225	235	298	347	291	280	286
Overall	677	740	700	757	739	787	738	749	822	785
Outcome (%)										
OM (%)	2.54	2.32	2.44	2.65	2.71	2.20	3.98	1.35	2.09	2.57
RA-OM (%)	2.24	1.70	2.10	2.42	2.62	1.64	5.34	0.64	1.57	2.09

Figure 43. Ten year public and private overview of combined AVR and CABG mortality, 2016-2025

a. OM



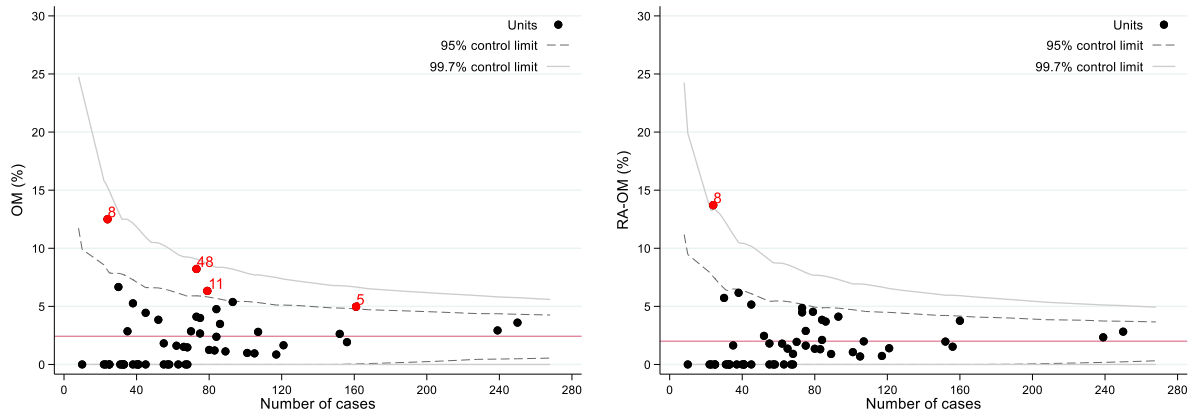
b. RA-OM



3.5.1.2 Unadjusted and risk-adjusted unit outcomes

Figure 44. OM following combined AVR and CABG surgery 2021-2025, by unit

a. OM b. RA-OM



A full summary of outcomes for all units is provided in the 2025 ANZSCTS Database Supplementary Annual Report.

3.5.1.3 Long-term survival

Figure 45. Long-term survival following CABG with AVR surgery by clinical status, 2015 to 2024

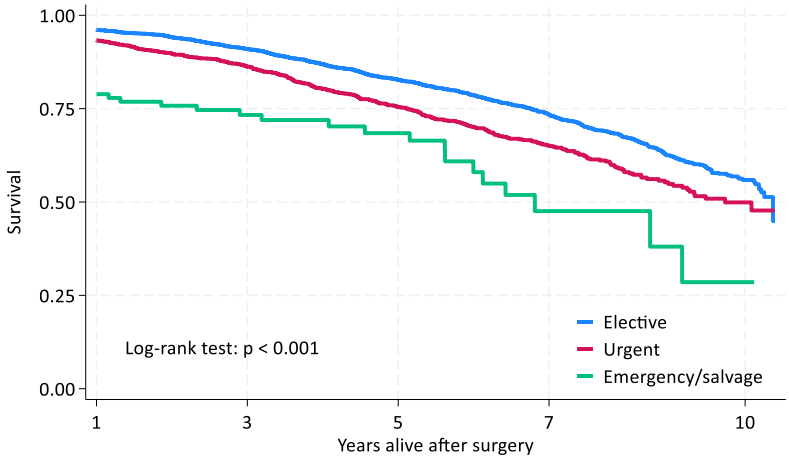


Table 39. Long-term survival following CABG with AVR surgery by clinical status, 2015 to 2024

	n	Survival years (%, number at risk)				
		1	3	5	7	10
Elective	6,194	96.1 (5,398)	91.0 (4,116)	82.7 (2,753)	73.3 (1,471)	55.9 (155)
Urgent	1,921	93.3 (1,599)	86.3 (1,067)	75.4 (603)	65.0 (315)	49.9 (26)
Emergency/salvage	110	78.9 (80)	73.3 (55)	68.4 (35)	47.6 (11)	-

Figure 46. Long-term survival following CABG with AVR surgery by sex, 2015 to 2024

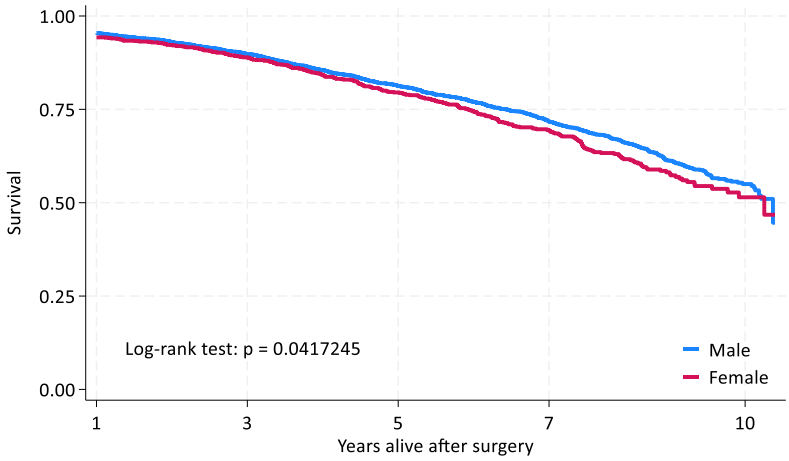


Table 40. Long-term survival following CABG with AVR surgery by sex, 2015 to 2024

	n	Survival years (%, number at risk)				
		1	3	5	7	10
Male	6,748	95.4 (5,783)	89.8 (4,260)	81.3 (2,736)	71.7 (1,428)	55.0 (145)
Female	1,477	94.3 (1,294)	88.9 (978)	79.5 (655)	69.3 (369)	51.5 (37)

Figure 47. Long-term survival following CABG with AVR surgery by sex and clinical status, 2015 to 2024

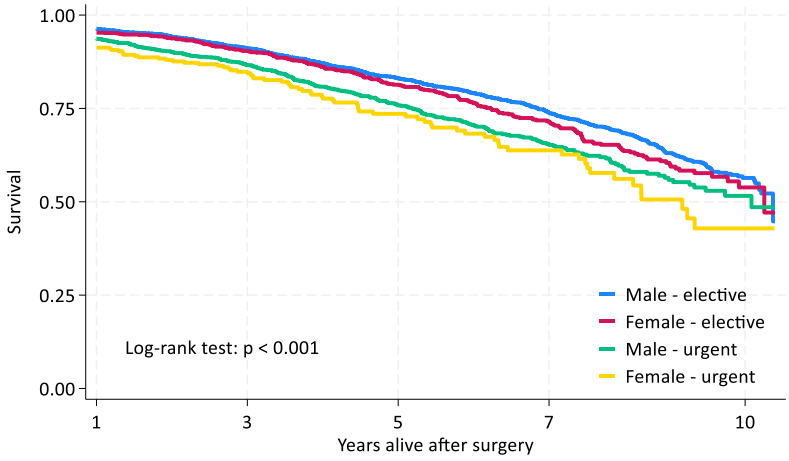


Table 41. Long-term survival following CABG with AVR surgery by sex and clinical status, 2015 to 2024

	n	Survival years (%, number at risk)				
		1	3	5	7	10
Male - elective	5,068	96.3 (4,410)	91.1 (3,343)	83.0 (2,211)	73.8 (1,164)	56.4 (125)
Female - elective	1,126	95.3 (988)	90.4 (773)	81.4 (542)	71.3 (307)	53.8 (30)
Male - urgent	1,585	93.7 (1,306)	86.6 (870)	75.8 (497)	65.2 (255)	51.6 (19)
Female - urgent	336	91.3 (293)	84.8 (197)	73.5 (106)	63.8 (60)	-

Figure 48. Long-term survival following CABG with AVR surgery by age, 2015 to 2024

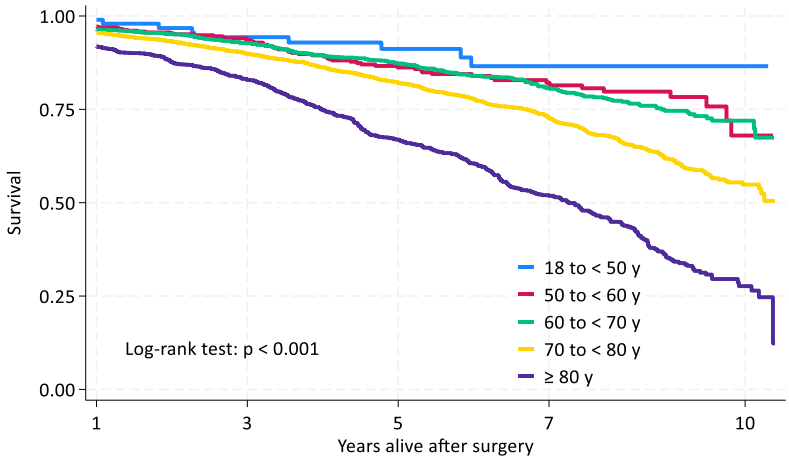


Table 42. Long-term survival following CABG with AVR surgery by age, 2015 to 2024

	n	Survival years (%, number at risk)				
		1	3	5	7	10
18 to < 50 y	105	99.0 (96)	94.3 (71)	91.2 (50)	86.6 (30)	-
50 to < 60 y	537	97.2 (454)	93.7 (325)	86.2 (207)	82.1 (117)	68.0 (10)
60 to < 70 y	2,065	96.4 (1,776)	92.7 (1,329)	87.3 (881)	80.7 (484)	72.0 (53)
70 to < 80 y	4,094	95.5 (3,551)	89.9 (2,612)	82.1 (1,692)	72.6 (880)	54.9 (90)
≥ 80 y	1,424	91.9 (1,200)	82.9 (901)	66.9 (561)	51.8 (286)	27.7 (26)

3.5.2 Complications

3.5.2.1 Influence of patient risk factors on complications

Table 43. Complications following combined AVR and CABG surgery, by pre-operative diabetes and renal function

		Insulin dependent diabetes		Pre-operative creatinine		Pre-operative eGFR	
		No	Yes	≤200 µmol/L	>200 µmol/L	>60 mL/ min/1.73m²	≤60 mL/ min/1.73m²
n	2025	718	67	766	19	611	174
	2021-2024	2,825	271	3,029	66	2,411	684
Permanent stroke (%)	2025	2.1	3.0	2.2	0	2.0	2.9
	2021-2024	1.6	1.5	1.6	1.5	1.2	2.9
DSWI (%)	2025	0.8	3.0	0.9	5.3	1.1	0.6
	2021-2024	1.0	3.7	1.1	4.5	1.0	1.9
RTT for bleeding (%)	2025	6.6	9.0	6.2	31.6	5.7	10.3
	2021-2024	4.6	5.2	4.3	18.2	4.2	6.0
New cardiac arrhythmia (%)	2025	41.5	37.3	41.8	15.8	42.0	37.9
	2021-2024	41.4	40.5	41.3	42.4	40.7	43.6

Table 44. Complications following combined AVR and CABG surgery, by age group

		Age				
		18 - <50y	50 - <60y	60 - <70y	70 - <80y	≥80y
n	2025	11	51	221	409	93
	2021-2024	43	227	816	1,579	431
Permanent stroke (%)	2025	0.0	2.0	1.4	1.7	6.5
	2021-2024	0.0	0.4	1.3	1.6	2.8
DSWI (%)	2025	9.1	2.0	0.9	0.5	2.2
	2021-2024	0.0	0.9	1.1	1.3	1.2
RTT for bleeding (%)	2025	18.2	5.9	6.8	6.1	8.6
	2021-2024	2.3	4.4	5.4	4.1	5.6
New cardiac arrhythmia (%)	2025	18.2	33.3	39.8	44.0	38.7
	2021-2024	23.3	30.5	39.7	43.8	42.9

Table 45. Complications following combined AVR and CABG surgery, by previous surgery

		Previous surgery	
		Initial	Redo
n	2025	764	21
	2021-2024	2,995	101
Permanent stroke (%)	2025	2.2	0.0
	2021-2024	1.5	3.0
DSWI (%)	2025	1.0	0.0
	2021-2024	1.2	0.0
RTT for bleeding (%)	2025	7.0	0.0
	2021-2024	4.7	4.0
New cardiac arrhythmia (%)	2025	41.6	23.8
	2021-2024	41.4	39.6

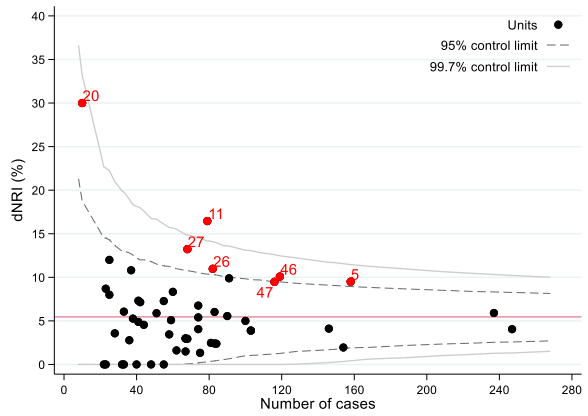
Table 46. Incidence of dNRI following combined AVR and CABG surgery, by pre-operative demographics and risk factors

	2025		2021-2024	
	n	dNRI (%)	n	dNRI (%)
Insulin dependent diabetes				
No	702	5.6	2,791	5.1
Yes	61	8.2	257	8.6
Pre-operative creatinine				
≤200 µmol/L	754	5.2	3,019	5.2
>200 µmol/L	9	55.6	29	27.6
Pre-operative eGFR				
>60 mL/min/1.73m²	602	4.7	2,402	3.2
≤60 mL/min/1.73m²	161	9.9	646	13.3
Age				
18 - <50y	10	30.0	41	2.4
50 - <60y	49	8.2	218	6.4
60 - <70y	216	5.1	802	4.9
70 - <80y	397	4.0	1,556	5.0
≥80y	91	11.0	431	7.4
Previous surgery				
Initial	742	5.9	2,948	5.2
Redo	21	0.0	100	10.0

3.5.2.2 Unit outcomes

Figure 49. dNRI following combined AVR and CABG surgery 2021-2025, by unit

a. dNRI



b. RA-dNRI

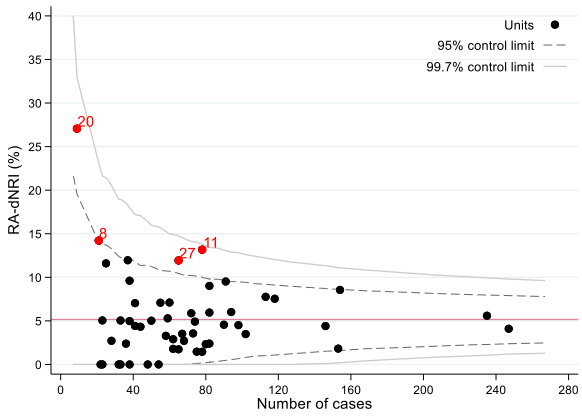
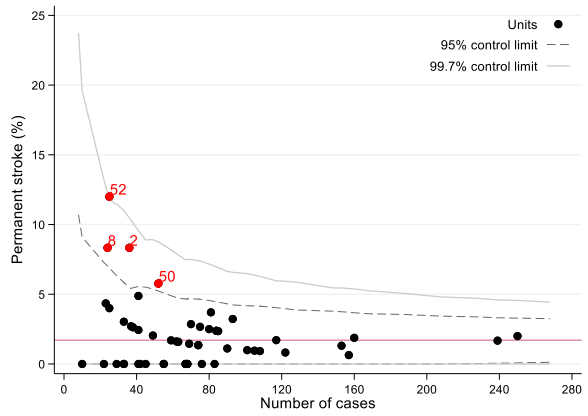
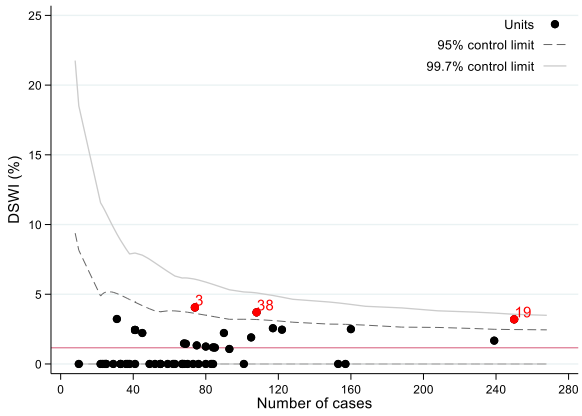


Figure 50. Complications following combined AVR and CABG surgery 2021-2025, by unit

a. Permanent stroke



b. DSWI



c. RTT for bleeding

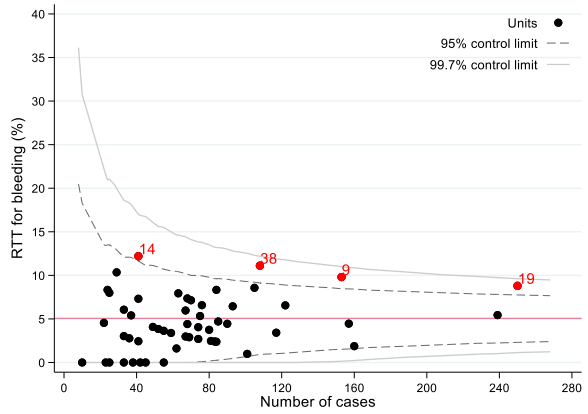


Table 47. Unit variation of AVR and CABG complications, 2021-2025

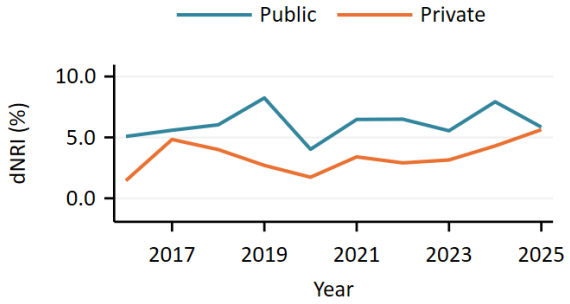
		Median unit rate, % (IQR)	Range of unit rates, %
New cardiac arrhythmia	Public	40.6 (35.9-47.3)	29.0-65.5
	Private	43.5 (31.7-50.0)	9.1-64.0
	Overall	42.1 (33.8-49.5)	9.1-65.5
All-cause readmission	Public	11.9 (7.7-14.9)	1.5-20.0
	Private	7.9 (3.4-13.0)	0.0-20.4
	Overall	9.8 (4.9-13.7)	0.0-20.4
Prolonged intubation [> 24h]	Public	19.0 (15.4-24.1)	1.7-32.1
	Private	10.4 (8.1-17.2)	3.0-27.3
	Overall	13.6 (9.6-20.0)	1.7-32.1

Table 48. Ten-year overview of combined AVR and CABG complications, 2016-2025

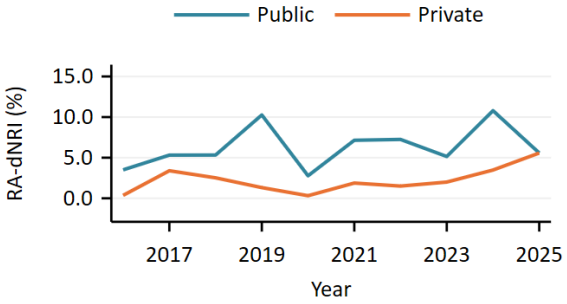
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total hospitals (n)	26	32	33	34	42	46	49	49	53	53
Case numbers (n)										
Public	538	529	449	532	504	489	391	458	542	499
Private	139	211	251	225	235	298	347	291	280	286
Overall	677	740	700	757	739	787	738	749	822	785
Outcome (%)										
dNRI	4.23	5.37	5.29	6.59	3.30	5.30	4.80	4.61	6.67	5.77
RA-dNRI	2.50	4.73	4.21	6.84	1.76	4.84	3.97	3.79	7.85	5.57
Permanent stroke	1.04	2.30	1.00	1.32	2.44	2.16	0.68	1.47	1.96	2.17
DSWI	1.34	1.35	1.43	0.93	0.95	1.27	1.36	1.07	1.10	1.02
RTT for bleeding	4.75	3.92	4.58	4.76	5.28	4.19	5.29	4.41	4.65	6.77
New cardiac arrhythmia	35.76	38.02	40.83	36.90	38.29	41.30	42.06	40.37	41.56	41.12
All-cause readmission	9.64	9.81	10.98	11.11	14.05	8.54	10.49	9.61	10.13	11.37
Prolonged intubation [> 24h]	13.23	14.77	12.73	15.50	16.51	18.07	18.45	15.80	15.04	16.01

Figure 51. Ten year public and private overview of isolated CABG complications, 2016-2025

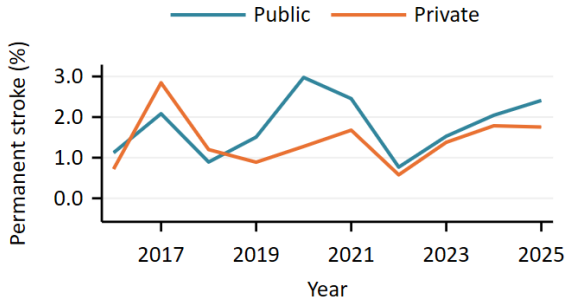
a. dNRI



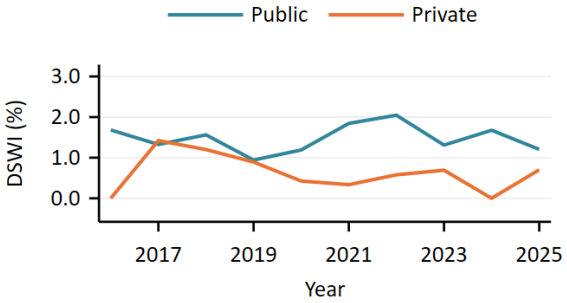
b. RA-dNRI



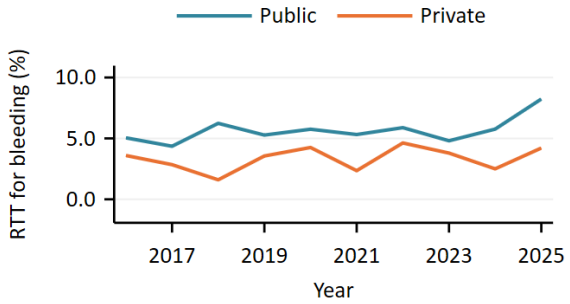
c. Permanent stroke



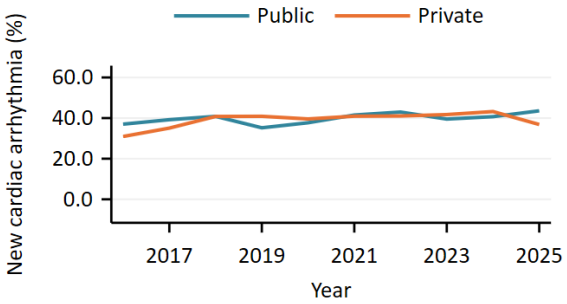
d. DSWI



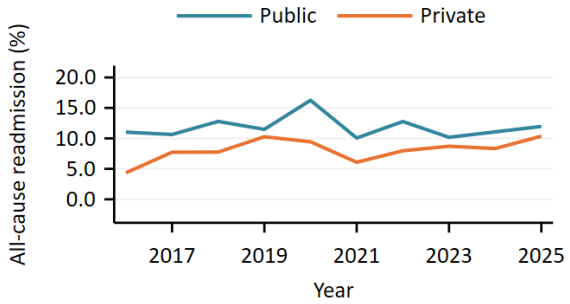
e. RTT for bleeding



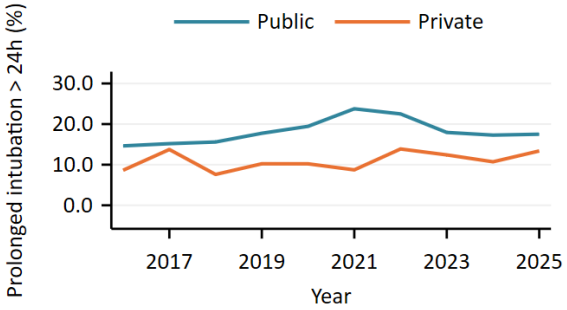
f. New cardiac arrhythmia



g. All-cause readmission



h. Prolonged intubation [> 24h]



3.5.2.3 Resource utilisation

Table 49. Resource utilisation for combined AVR and CABG patients, 2025

	Mean	Median	IQR
Pre-operative length of stay (days)	2.9	1.0	1.0 - 4.0
Post-operative length of stay (days)	11.0	8.0	7.0 - 12.0
Initial post-operative ventilation (hours)	21.2	10.1	6.1 - 19.8
ICU length of stay (hours)	82.3	64.7	42.6 - 97.0

Cases deemed clinical outliers were excluded from the analysis.

Table 50. Blood product usage for combined AVR and CABG patients, 2025

	Patients (n)	Patients (%)
Transfusion type		
Red blood cell only	121	15.4
Non-red blood cell only	120	15.3
Red and non-red blood cell	296	37.7
Use of non-red blood cell products		
Platelets	337	42.9
Fresh frozen plasma	174	22.2
Novo 7	3	0.4
Cryoprecipitate	213	27.1
Prothrombinex	129	16.4
Fibrinogen	33	4.2

4. Other Cardiac Surgery

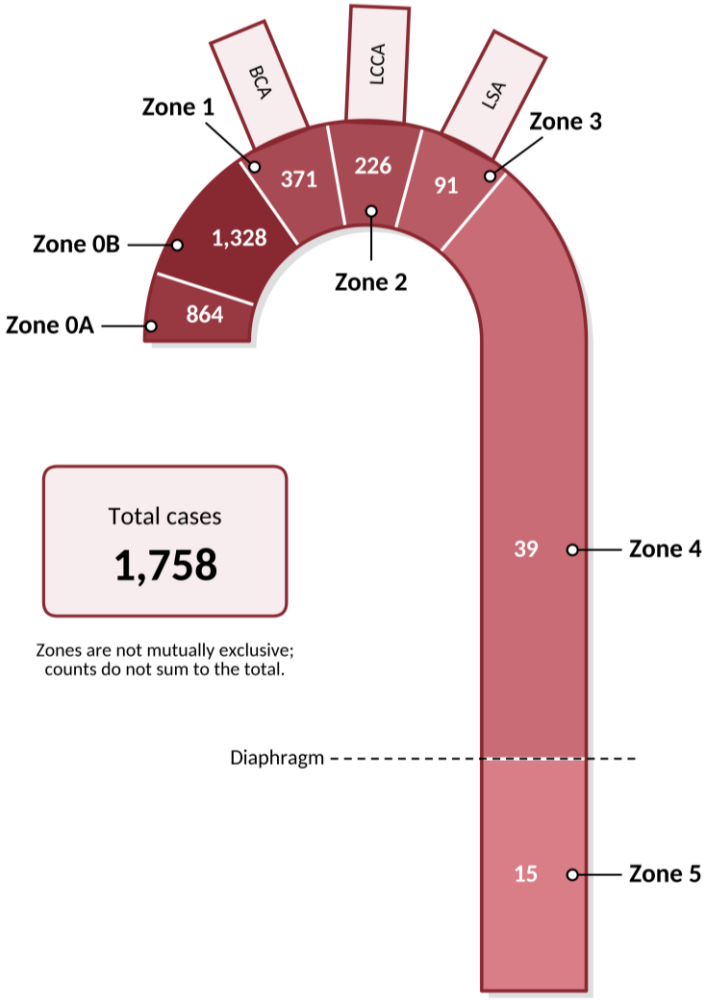
The following section describes the frequency of the other types of cardiac surgical procedures submitted to the ANZSCTS Database. Outcome data is not included due to the small sample sizes.

Table 51. Case numbers for isolated and concomitant aortic surgery, combined, 2025

Surgery type (not mutually exclusive)	n
Aortic replacement	1,758
Aortoplasty	206
Direct reduction aortoplasty	88
Patch augmentation repair	126
Endarterectomy	31
Ascending aortic wrap	60
PEARS procedure	36
Florida procedure	4
Simple wrap	21
Indication for aortic procedure	
Aneurysm	1,239
Dissection	416
Traumatic transection (<2 weeks)	5
Calcification	75
Other	236
Dilation of the sinuses of Valsalva	39

PEARS indicates personalised external aortic root support

Figure 52. Case numbers for aortic replacement location zones, 2025



BCA indicates brachiocephalic artery; LCCA, left common carotid artery; LSA, left subclavian artery

Table 52. Case numbers for adult congenital heart disease surgery, 2025

	n
Adult congenital heart disease procedure	330
Primary procedure type	
Repair of Tetralogy of Fallot	2
Atrial septal defect repair	111
Congenital ventricular septal defect repair	7
Repair of coarctation of the aorta	2
Repair of Ebstein's anomaly	4
Repair of patent ductus arteriosus	5
Partial anomalous pulmonary venous return repair	15
Atrioventricular septal defect repair	4
Fontan/revision of Fontan	1
Right ventricular outflow tract reconstruction	21
Patent foramen ovale repair	126
Other	32

Table 53. Case numbers for other isolated and concomitant uncommon cardiac surgery, combined, 2025

Surgery type (not mutually exclusive)	n
LV aneurysm	24
Acquired ventricular septal defect	28
Cardiac trauma	9
LV outflow tract myectomy	105
LV rupture repair	9
Pericardiectomy	43
Pulmonary thrombo-endarterectomy	36
LV reconstruction	6
Pulmonary embolectomy	5
Cardiac tumour	134
Closure of interatrial septostomy	60
Permanent LV epicardial lead	29
Left atrial appendage closure	1187
Atrial arrhythmia surgery	680
Anomalous coronary artery repair	32
Other	392

LV indicates left ventricular

Table 54. Case numbers and OM for isolated transplant surgery, 2025

Surgery type (performed in isolation)	n	OM (%)
Cardiac transplant	92	3.3
Cardiopulmonary transplant	19	10.5

Table 55. Case numbers for other aortic valve surgery performed without and with CABG

Valve surgery		Without CABG	With CABG
Aortic root replacement with valved conduit	2025	436	83
	2021-2024	1317	249
Pulmonary autograft aortic root replacement (Ross)	2025	82	1
	2021-2024	140	3
Aortic root reconstruction with valve sparing (David)	2025	97	12
	2021-2024	236	28
Total other valve surgery	2025	615	96
	2021-2024	1693	280

5. Concluding Remarks

The outcomes presented in this report continue to reflect the strength of the Database's quality assurance program, with mortality and complication rates remaining low across the major procedure groups.

This is the first Annual Report to draw on Version 5 of the Data Definitions Manual, launched alongside a rebuilt web system in 2025 and now fully replacing its predecessor. While the impact on this report is modest, the revised Manual incorporates a broad range of enhancements to data definitions and collection. Within this report, these changes are reflected primarily through the addition of non-red blood cell transfusion products and more detailed categorisation of aortic and congenital procedures. The changes introduced in Version 5 will continue to support more detailed analyses as data for the new elements accrues. The Manual continues to be refined between major versions, with input from data managers and findings from a recent survey of contributing surgeons informing the next round of updates. The online reporting suite available to units and surgeons has also been enhanced, including through the addition of unit-level resource utilisation data.

As in previous years, private sector coverage expanded, with three additional hospitals joining the Program in 2026. The Data Management and Analysis Centre has also continued to support a growing number of ad hoc summary data requests from contributing units and clinicians, assisting with conference analyses, internal hospital audits, and evaluations of changes in clinical practice alongside its core reporting and quality assurance responsibilities.

Since the previous Annual Report, the Database's research program has approved nine new projects, many of which utilise long-term mortality data obtained through the most recent linkage with the National Death Index. As the dataset continues to increase in size and complexity, so too does the importance of maintaining robust governance and data protection frameworks. In response, the Research Committee and the Data Management and Analysis Centre jointly developed a Special Variable Protocol that supports high-quality research while upholding the Program's ethical, security, and governance standards and protecting participating hospitals and patients.

As with any organisation of this scale, the Database's Research and Steering Committees saw some membership changes during the year. We thank departing members for their valuable contributions and welcome those joining the committees. Continued engagement from committee members, contributing surgeons, and data managers remains central to the Program's success and its efforts to improve the quality and safety of cardiac surgery care.

Appendix A
Key performance indicator definitions

The KPIs presented in this report are based on the ANZSCTS Cardiac Surgery Database Data Definitions Manual, as follows:

In-hospital and 30-day mortality or operative mortality (OM)

- *Operative mortality*
  Includes all in-hospital mortality and any post discharge mortalities that occurred within 30 days of the surgery.
- *Risk-adjusted operative mortality (RA-OM)*
  Derived based on the ANZSCTS Database Program's risk model (Appendix B, pg. 73), and used to account for the degree of risk associated with the surgery and patient profile.

Return to Theatre (RTT) for bleeding

The patient returned to theatre for bleeding/tamponade.

This includes if bleeding was a reason for the return to theatre, **regardless of the intra-operative finding**.

Derived new renal insufficiency (dNRI)^

- *This indicator is derived from reported renal data*
  Acute post-operative renal insufficiency is characterised by one of the following:
  a. Serum creatinine to >0.2mmol/L (>200µmol/L) AND a doubling or greater increase in creatinine over the baseline pre-operative value and the patient did not require pre-operative dialysis or haemofiltration.
  b. A new post-operative requirement for dialysis or haemofiltration (when the patient did not require this pre-operatively).
- *Risk-adjusted derived new renal insufficiency (RA-dNRI)*
  The observed outcome is adjusted based on the ANZSCTS Database Program's risk model (Appendix B, pg. 73), and used to account for the degree of risk associated with the surgery and patient profile.

^Where this measure is reported patients on dialysis pre-operatively are excluded from analysis.

Deep sternal wound infection (DSWI)

Infection of sternal bone and/or mediastinum. The patient must have **wound debridement and** one of the following:

a. Positive cultures
b. Treatment with antibiotics

Includes all in-hospital DSWI events and any readmissions due to DSWI within 30 days of surgery.

Permanent stroke

New stroke or central neurologic deficit (persisting for > 72 hours) intra-/post-operatively.

Other outcome definitions

New cardiac arrhythmia

Any new form of cardiac arrhythmia that occurred post-surgery that required treatment. Including:

a. Heart block requiring permanent pacemaker.
b. New other bradyarrhythmia requiring permanent pacemaker.
c. Cardiac arrest documented by one of the following:
    - Ventricular fibrillation.
    - Rapid ventricular tachycardia with haemodynamic instability.
    - Asystole.
    - Pulseless electrical activity.
d. New atrial arrhythmia (requiring treatment) - atrial fibrillation or flutter.
e. New ventricular tachycardia.

ICU length of stay (initial stay only)

Number of hours spent by the patient in the ICU prior to transfer to the high dependency unit or general ward (does not include readmission to ICU). Calculated by subtracting the ICU admission date and time from ICU discharge date and time, where both values are available.

Initial post-operative ventilation

Number of hours post-operation for which the patient was ventilated. Calculated by subtracting ICU admission time from the ICU extubation time, where both values are available. If the patient was extubated on the operating table, duration of ventilation is zero. Delayed re-intubation time is not counted.

Red blood cell transfusions

Allogeneic red blood cells transfused during the intra-operative or post-operative period.
Does not include pre-donated autologous blood, cell saver blood, pump residual blood, or chest tube recirculated blood.

Non-red blood cell transfusions

Blood products other than red blood cells transfused during the intra-operative or post-operative period. Includes platelets, fresh frozen plasma, Novo 7, cryoprecipitate, prothrombinex and fibrinogen.

Does not include albumin.

Appendix B

ANZSCORE OM and dNRI models

Table B1. Variables that define risk in the ANZSCORE isolated CABG models

ANZSCORE (RA-OM, isolated CABG) model variables	ANZSCORE (RA-dNRI, isolated CABG) model variables
*Age^*	*Age^*
Timing of previous myocardial infarction	*Previous myocardial infarction*
Clinical status	*Clinical status*
*eGFR^*	*eGFR^*
New York Heart Association class	*New York Heart Association class*
Medicare	*Medicare*
Cerebrovascular disease	*Cerebrovascular disease*
Previous surgery	*Previous surgery with cardiopulmonary bypass*
EF grade	*EF grade*
Direct transfer from catheter lab/ICU to theatre	*Direct transfer from catheter lab/ICU to theatre*
Cardiogenic shock at the time of surgery	*Cardiogenic shock at the time of surgery*
Intravenous nitrates at time of surgery	*Intravenous nitrates at time of surgery*
Peripheral vascular disease	*Peripheral vascular disease*
Race	*Number of diseased vessels*
Pre-operative dialysis	*Body mass index^*
Resuscitation within one hour prior to operation	*Hypertension*
Lung disease	*Permanent pacemaker in situ*
Pre-operative arrhythmia	*History of diabetes*
Left main disease	*Congestive heart failure at the current admission*
Inotropes at time of surgery	*Sex*
	Previous catheterisation

^data for continuous variables has an upper limit, any data that exceeds this upper limit for a case will not generate a risk score for that patient – the upper limits for age, eGFR and body mass index are 130, 200mL/min/1.73m^2 and 60kg/m^2, respectively

Table B2. Variables that define risk in the ANZSCORE isolated AVR surgery models

ANZSCORE (RA-OM, isolated AVR surgery) model variables	ANZSCORE (RA-dNRI, isolated AVR surgery) model variables
*Age^*	*Sex*
*Estimated glomerular filtration rate^*	*Body mass index^*
Arrhythmia	*New York Heart Association class*
EF grade	*eGFR^*
Clinical status	*Arrhythmia*
Previous surgery	*Previous CABG*
Diabetes	*Intravenous nitrates at time of surgery*
Respiratory disease	*Medicare*
Active endocarditis	*Infective endocarditis*
Shock	
Sex	
Anticoagulants at time of surgery	

^data for continuous variables has an upper limit, any data that exceeds this upper limit for a case will not generate a risk score for that patient – the upper limits for age, eGFR and body mass index are 130, 200mL/min/1.73m² and 60kg/m² respectively

Table B3. Variables that define risk in the ANZSCORE combined AVR and CABG models

ANZSCORE (RA-OM, combined AVR and CABG surgery) model variables	ANZSCORE (RA-dNRI, combined AVR and CABG surgery) model variables
*Age^*	*Sex*
*eGFR^*	*Body mass index^*
Arrhythmia	*New York Heart Association class*
EF grade	*eGFR^*
Clinical status	*Arrhythmia*
Previous surgery	*Smoking*
Diabetes on med/Insulin	
Number of diseased vessels	
Active endocarditis	

*New York Heart Association
^data for continuous variables has an upper limit, any data that exceeds this upper limit for a case will not generate a risk score for that patient – the upper limits for age, eGFR and body mass index are 130, 200mL/min/1.73m² and 60kg/m² respectively

Appendix C

Data preparation and key variable definitions

Data preparation and presentation

Data includes operative details and outcomes of cardiac surgery performed in 53 participating units for operations that occurred between 2015-2025.

Final data related to this report was received by the ANZSCTS Database Program Data Management and Analysis Centre in the Centre of Cardiovascular Research and Education in Therapeutics of the School of Public Health and Preventive Medicine, Monash University, on May 5th, 2026. Submitted data was checked for completeness and Data Managers in each unit were given opportunities to amend any errors. Any changes to the data after May 5th, 2026 are not reflected in this report.

Hospitals that have joined the Program more recently do not have data over the full period analysed. Only units that submitted at least three quarters' worth of data (9 months, or equivalent for new units) in 2025 are included in the report. Units with insufficient data in 2025 are excluded from all analyses, including figures and tables for the preceding years.

Variable definitions

All definitions are based on the ANZSCTS Database Data Definitions Manual. Version 3.0 applies to all patients with admission dates prior to September 1st, 2016, version 4.0 applies to patients with admission dates on and after September 1st, 2016. Version 5 of the Data Definitions Manual was released in January 2025 and applies to all operation dates on and after January 1st, 2025. The below definitions are those from the version 5 definitions.

Key variables presented in this report are defined below.

- Clinical status

Elective

The surgery could be deferred without risk of compromised cardiac outcome.

Urgent

a) Within 72 hours of angiography if operation was performed in the same admission as angiography (here 'same admission' includes situations where angiography was performed in another hospital prior to direct transfer to current hospital where operation is to be performed).
b) Within 72 hours of an **unplanned admission** (in patients who had a previous angiogram and were scheduled for surgery but admitted acutely).
c) Procedure required during same hospitalisation in a **clinically compromised** patient in order to minimise chance of further clinical deterioration.

Emergency*

Unscheduled surgery required in the next available theatre on the same day (as admission) due to refractory angina or haemodynamic compromise.

Salvage*

The patient underwent cardiopulmonary resuscitation *en route* to, or in the operating room, prior to surgical incision.

** Due to low number of cases, emergency and salvage patients are combined within the report, and labelled as emergency/salvage.*

- Left ventricular function

Based on left ventricular EF, the percentage of blood emptied from the left ventricle at the end of the contraction. The most recent determination prior to intervention is used. If it's exact value is unknown enter EF estimate.

EF estimates are categorised as follows:

EF (%)	Measure of function
EF ≥ 60%	Normal LVF
EF 46-59%	Mild impairment
EF 30-45%	Moderate impairment
EF < 30%	Severe impairment

- All-cause readmission

Patient readmitted as an in-patient within 30 days from the date of surgery for ANY reason to general hospital; not emergency, short-stay wards or planned transfer to rehabilitation facility. Date of surgery counts as day zero.

- Redo operation

Operation performed on a patient who has undergone any prior cardiac surgery.

Appendix D

Interpretation of funnel plots

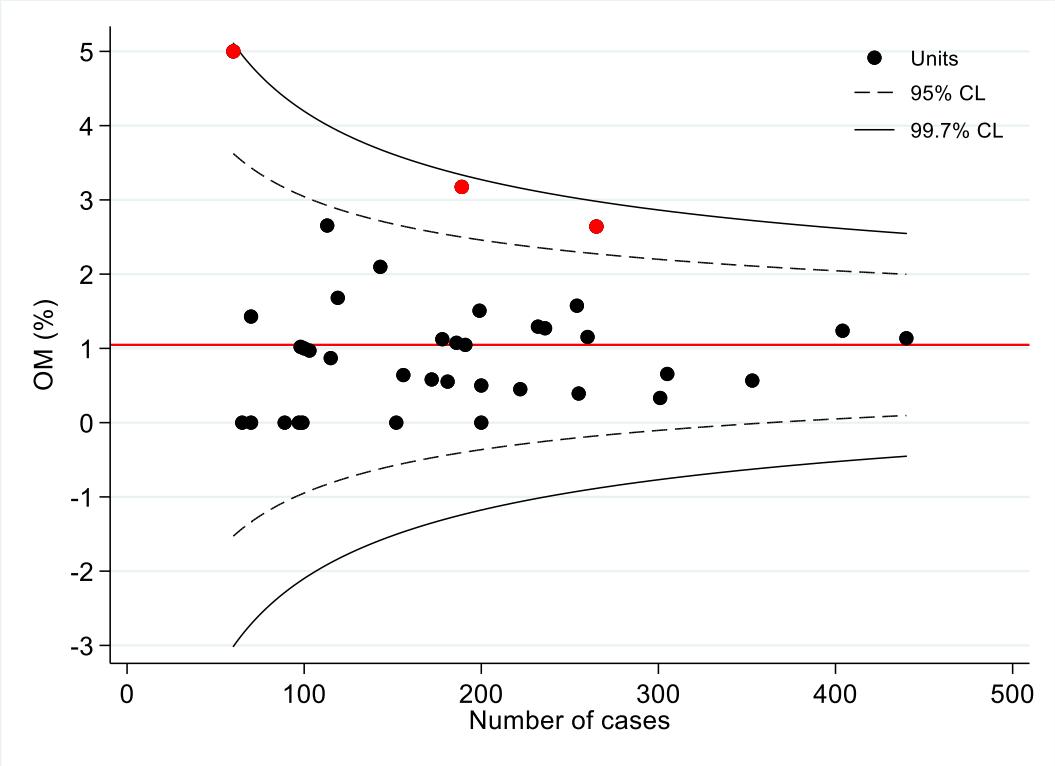
Funnel plots are an established benchmarking tool used to compare performance between healthcare providers. The plots include a single datapoint for each unit with the coordinates based on unit case number (x-axis) and aggregate outcome data (y-axis) for the specified time period.

The mean and standard deviation for all units, combined, are used to plot two sets of control limits (the 'funnels') which correspond to 95% (approximately two standard deviations) and 99.7% (approximately three standard deviations) from the mean. These cut-offs equate to the probability with which a unit performing at the expected level would be expected to fall within the control limits. Statistically, the selected limits impose a probability of false positive identification of an outlier of five or 0.3% for units outside the 95 or 99.7% control limits, respectively.

An advantage of funnel plots is that case number is factored into the control limits due to the reduced standard deviation for units with higher case volumes. This ensures that smaller volume units that are more susceptible to higher variation in outcomes are not evaluated using the lower thresholds associated with the larger volume units.

Figure E below illustrates operative mortality (OM) after isolated CABG in Australia in 2018. The solid red line represents the OM for all units, the two-dashed lines are the 95% control limits and the solid black lines are the 99.7% control limits. The funnel plot demonstrates how the control limits narrow as the number of cases increases. This representation illustrates the invalidity of ranking all of those units from "best" to "worst" as only three were worse than the majority, all of which had statistically similar outcomes.

Figure D. OM following isolated CABG by unit



Appendix E

Interpretation of Kaplan-Meier figures and tables

Kaplan-Meier overview

Kaplan-Meier survival analysis is an established method for describing time-to-event data, such as the long-term survival after surgery described in this report.

Long-term survival data

Long-term survival data was obtained through linkage of ANZSCTS Database data with the National Death Index, held by the Australian Institute of Health and Welfare (AIHW), and includes death from any cause. The analyses include patients operated on in Australian units between 2015 and 2024. New Zealand units are excluded as linked mortality data are not available. Patients not known to have died were assumed to be alive at the end of follow-up (31st of December 2024).

As patients were operated on at different times throughout the reporting period, the length of follow-up varies between patients. For example, a patient operated on 1st of January 2023 can contribute two years of follow-up. When a patient's follow-up ends while they are still alive, they are 'censored'. They contribute information for as long as they were followed and are then removed from the calculation without being counted as a death. The Kaplan-Meier method builds a step-by-step cumulative survival curve at each time point among patients still under follow-up to estimate the probability of surviving to each time point. The survival percentages are therefore estimates, not proportion of the original cohort who are still alive.

Kaplan-Meier survival analysis format

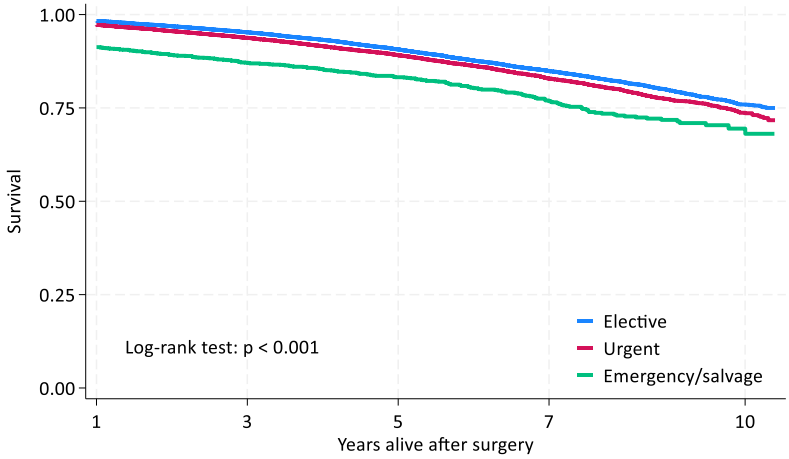
The Kaplan-Meier charts show estimated survival (y-axis) against years after surgery (x-axis), with a separate curve for each patient group. Each downward step in a curve represents one or more deaths. The log-rank test, shown on each chart, tests whether survival differs across the groups over the whole follow-up period. A p-value below 0.001 indicates a global statistical significance across the entire follow-up period and does not identify which groups differ or at what time point.

The accompanying tables report the estimated survival (%) at 1, 3, 5, 7 and 10 years after surgery for each group, with the number of patients remaining at risk in parentheses. The number-at-risk shows how many patients are still alive and under follow-up at that time point. It declines over time due to deaths and/or censoring and largely reflects how many years of follow-up are available rather than how many patients have died. Estimates based on few patients at risk are less precise and should be interpreted with caution.

Example interpretation – long-term survival following isolated CABG surgery by clinical status

Figure E below illustrates survival following isolated CABG by clinical status. The curves display lower survival among emergency/salvage patients reflecting higher early mortality. After the first year, the curves run approximately parallel, indicating similar rates of late mortality between groups once patients have survived the early postoperative period. According to the log-rank test result of $p < 0.001$ we observe statistical significance between the survival of these groups.

Figure E. Long-term survival following isolated CABG surgery by clinical status, 2015 to 2024



As shown below in Table E estimated survival at 10 years was 75.9% for elective, 73.7% for urgent and 69.5% for emergency/salvage patients. The number of patients remaining at risk falls substantially by 10 years (1,269, 598 and 50 patients, respectively), mainly because most patients had not yet reached 10 years of follow-up rather than because they had died. The 10-year estimates are therefore less precise than those at earlier time points, particularly for emergency/salvage patients.

Table E. Long-term survival following isolated CABG surgery by clinical status, 2015 to 2024

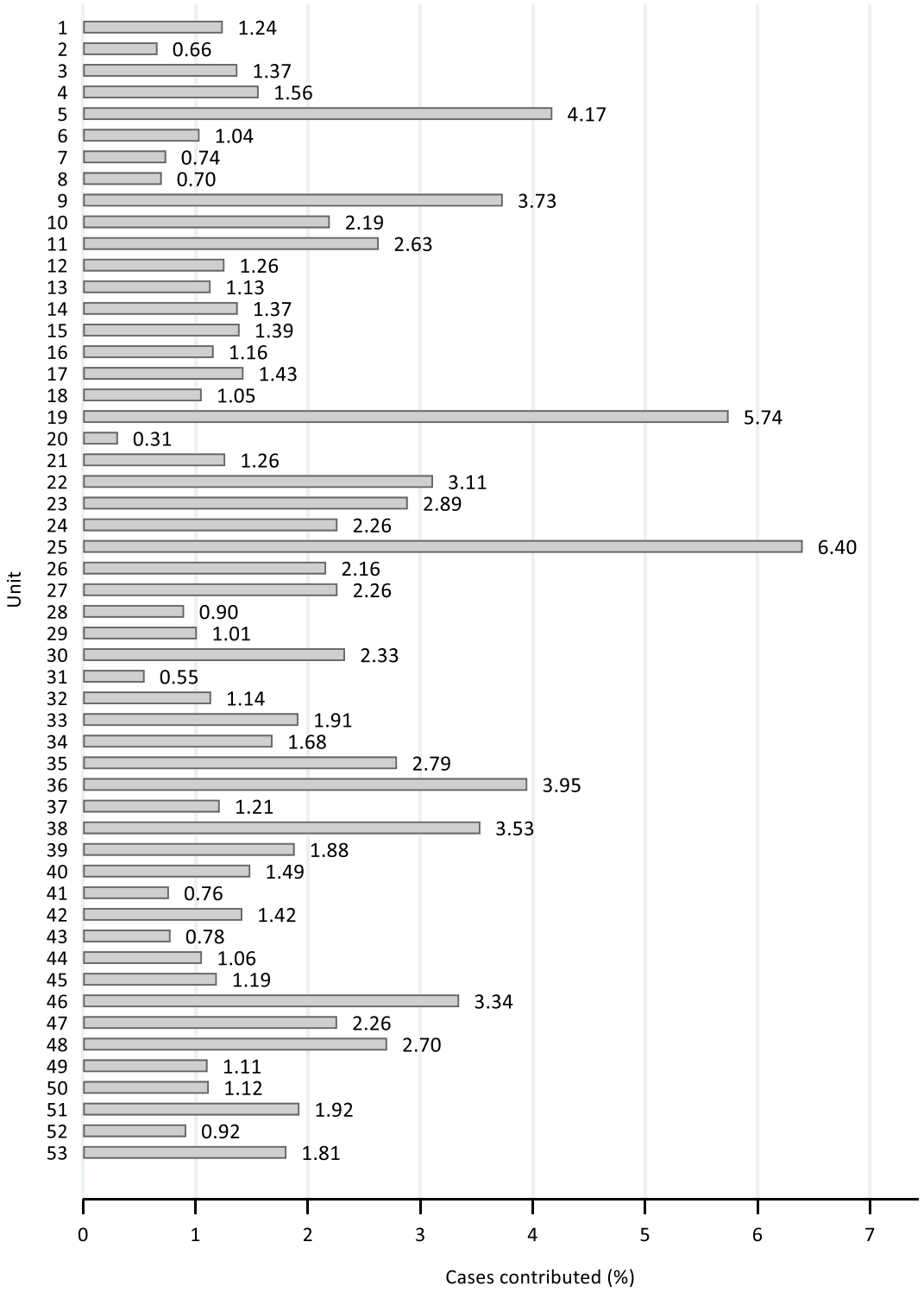
	n	Survival years (%, number at risk)				
		1	3	5	7	10
Elective	42,398	98.3 (37,239)	95.2 (27,528)	90.7 (18,887)	84.9 (10,468)	75.9 (1,269)
Urgent	29,843	97.2 (25,589)	93.8 (17,514)	89.1 (10,734)	82.9 (5,630)	73.7 (598)
Emergency/salvage	2,408	91.3 (1,962)	87.1 (1,376)	83.2 (891)	76.8 (471)	69.5 (50)

When interpreting these results, note that the survival estimates are unadjusted. Differences between groups may reflect differences in patient characteristics, such as age, comorbidities or urgency of surgery, rather than the effect of the grouping itself.

Appendix F

Unit contribution in the 2025 Annual Report

Figure F. Percentage of cases each hospital contributed to the 2025 Annual Report



Contact Details

Postal Address:
ANZSCTS Database
Monash University
509 St Kilda Road
Melbourne 3004

Web: www.anzscts.org/database
Email: anzscts@monash.edu
Telephone: +61 3 9903 0518

© ANZSCTS Cardiac Surgery Database Program
The contents of this report may not be used or reproduced without permission