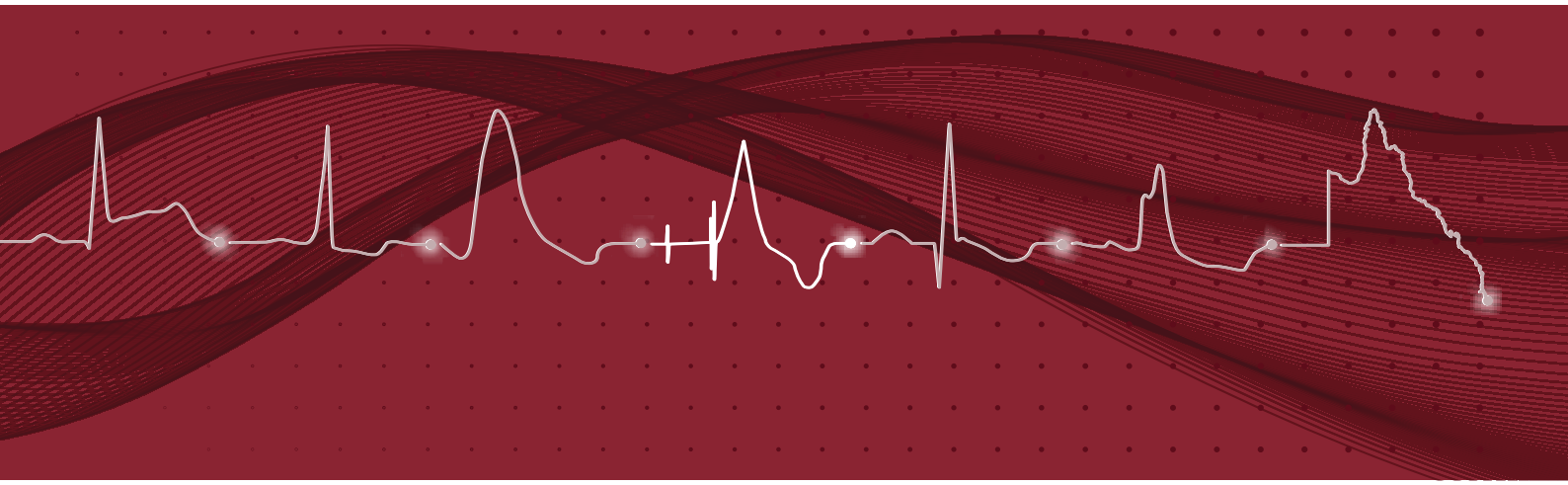
Queensland Cardiac Clinical Network

Queensland Cardiac Outcomes Registry
2021 Annual Report

Electrophysiology and Pacing Audit



Queensland Cardiac Outcomes Registry 2021 Annual Report

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1 Message from the QCCN Chair

Evolution and growth have seen QCOR become far more than a clinical quality registry and fulfil many more roles and functions than traditional registries. In compiling this seventh QCOR Annual Report we can reflect on the key deliverables and impact that the Registry has across many domains of healthcare and the health system in Queensland.

Despite declines in measures of burden of disease, cardiovascular disease and coronary heart disease are conditions with the highest burden of disease and mortality rates for Queenslanders. With the relatively contemporary nature of many of the interventions used to treat cardiovascular disease many analyses, risk scores and quality assurance frameworks exist, allowing the treatment of cardiac disease to be closely monitored. This data rich environment sets it apart from many other medical fields.

In its seventh publication year, this wide-reaching quality and safety program now comprises of cumulative analysis of over 250,000 patient interactions with the Queensland public health system for cardiac disease.

As the program develops and grows, we are frequently asked what is exceptional about QCOR? The answers are compelling and far-reaching. It is the broadest cardiac clinical quality registry of its kind in Australia. It is underpinned by point of care clinical systems and applications that allow clinicians to perform their role at the highest level, knowing their daily activities are supported by quality improvement opportunities. It is a clinical quality program that offers tools, insights, benchmarking and clinical excellence initiatives. It offers the means to enact multimillion-dollar consumables savings programs allowing healthcare money to be reinvested into patient care. But most importantly it is a tool that offers transparent, meaningful clinician-led solutions that aim to improve the health outcomes for all Queenslanders.

In the third year of the global coronavirus pandemic, healthcare providers have faced new and continuing challenges that demand innovative solutions to support the provision of first-class healthcare. The current report confirms that those involved in managing heart and lung disease have delivered volumes of work similar to, or, exceeding those observed in the pre-pandemic era. More importantly, despite unprecedented system stress, the Queensland cardiac community has rallied to maintain high standards of care that are demonstrated in the 2021 outcomes analysis.

Looking forward, we keenly await the delivery of a contemporary statewide cardiovascular information system for diagnostic and interventional cardiology and echocardiography. Investment in such a forward-thinking, all-encompassing solution would not be possible without the collegiality and cooperation of cardiac clinicians throughout the state. Such collaboration is enabled by the platform laid by QCOR and its focus on clinician engagement, supported by our colleagues at eHealth Queensland.

For the public and healthcare consumers, this report provides confidence that the quality and consistency of cardiac procedural care is routinely reported to providers, supporting continuous service improvement.

As the 2021 QCOR Annual Report is finalised, all that is left is to commend the tireless work of the collegiate network of healthcare professionals that continue to uphold the highest clinical standards. We express a sincere wish that the scope of QCOR's activities will be expanded for the benefit of more Queenslanders over many years to come.

Dr Rohan Poulter and Dr Peter Stewart
Co-chairs, Queensland Cardiac Clinical Network

2 Acknowledgements

This collaborative report was produced by the SCCIU, audit lead for QCOR for and on behalf of the Queensland Cardiac Clinical Network. This would not be possible without the tireless work of clinicians in contributing quality data and providing quality patient care, while the contributions of QCOR committee members and others who had provided writing or other assistance with this year's Annual Report is also gratefully acknowledged.

QCOR Interventional Cardiology Committee

- Dr Sugeet Baveja, The Townsville Hospital
- Dr Yohan Chacko, Ipswich Hospital
- Dr Christopher Hammett, Royal Brisbane & Women's Hospital
- Dr Dale Murdoch, The Prince Charles Hospital
- A/Prof Atifur Rahman, Gold Coast University Hospital
- Dr Sam Sidharta, Rockhampton Hospital
- Dr Yash Singbal, Princess Alexandra Hospital
- Dr Gregory Starmer, Cairns Hospital
- Dr Michael Zhang, Mackay Base Hospital
- Dr Rohan Poulter, Sunshine Coast University Hospital (Chair)

QCOR Cardiothoracic Surgery Committee

- Dr Manish Mathew, Townsville University Hospital
- Dr Anil Prabhu, The Prince Charles Hospital
- Dr Morgan Windsor, Metro North Hospital and Health Service
- Dr Sylvio Provenzano, Gold Coast University Hospital
- Dr Christopher Cole, Princess Alexandra Hospital (Chair)

QCOR Cardiac Rehabilitation Committee

- Ms Michelle Aust, Sunshine Coast University Hospital
- Ms Maura Barnden, Metro North Hospital and Health Service
- Ms Wendy Fry, Cairns and Hinterland Hospital and Health Service
- Ms Emma Harmer, Metro South Hospital and Health Service
- Ms Helen Lester, Health Contact Centre – Self Management of Chronic Conditions Service
- Ms Rebecca Pich, Metro South Hospital and Health Service
- Ms Alexandra Samuels, Gold Coast Hospital and Health Service
- Ms Samara Phillips, Statewide Cardiac Rehabilitation Coordinator

Statewide Cardiac Clinical Informatics Unit

- Mr Michael Mallouhi
- Mr Marcus Prior
- Dr Ian Smith, PhD
- Mr William Vollbon

QCOR Electrophysiology and Pacing Committee

- Ms Simone Arthur, Toowoomba Hospital
- Vanessa Beattie, Gold Coast University Hospital
- Mr John Betts, The Prince Charles Hospital
- Mr Anthony Brown, Sunshine Coast University Hospital
- Mr Andrew Claughton, Princess Alexandra Hospital
- Dr Naresh Dayananda, Sunshine Coast University Hospital
- Dr Russell Denman, The Prince Charles Hospital
- Mr Braden Dinham, Gold Coast University Hospital
- Mr Nathan Engstrom, The Townsville Hospital
- A/Prof John Hill, Princess Alexandra Hospital
- Dr Paul Martin, Royal Brisbane & Women's Hospital
- Dr Caleb Mengel, Toowoomba Hospital
- Ms Sonya Naumann, Royal Brisbane & Women's Hospital
- Dr Sachin Nayyar, The Townsville Hospital
- Dr Kevin Ng, Cairns Hospital
- Dr Robert Park, Gold Coast University Hospital
- Mr Simon Townsend, The Prince Charles Hospital

QCOR Heart Failure Support Services Committee

- Mr Ben Shea, Redland Hospital
- Ms Angie Sutcliffe, Cairns Hospital
- Ms Deepali Gupta, Queen Elizabeth II Hospital
- Ms Helen Hannan, Rockhampton Hospital
- Ms Annabel Hickey, Statewide Heart Failure Services Coordinator
- Dr Rita Hwang, PhD, Princess Alexandra Hospital
- Ms Louvaine Wilson, Toowoomba Hospital
- Ms Melanie Burgess, Ipswich Hospital
- Ms Michelle Bertram, Gold Coast Hospital and Health Service
- Dr Wandy Chan, The Prince Charles Hospital
- Prof John Atherton, Royal Brisbane & Women's Hospital (Chair)

Queensland Ambulance Service

- Dr Tan Doan, PhD

3 Introduction

The Queensland Cardiac Outcomes Registry (QCOR) is an ever-evolving clinical registry and quality program established by the Queensland Cardiac Clinical Network (QCCN) in partnership with statewide cardiac clinicians and made possible through the funding and support of Clinical Excellence Queensland. QCOR provides access to quality, contextualised clinical and procedural data to inform and enhance patient care and support the drive for continual improvement of quality and safety initiatives across cardiac and cardiothoracic surgical services in Queensland.

QCOR is a clinician-led program, and the strength of the Registry would not be possible without this input. The Registry is governed by clinical committees providing direction and oversight over Registry activities for each cardiac and cardiothoracic specialty area, with each committee reporting to the QCCN and overarching QCOR Advisory Committee. Through the QCOR committees, clinicians are continually developing and shaping the scope of the Registry based on contemporary best practices and the unique requirements of each clinical domain.

Goals and mission

- Identify, through data and analytics, initiatives to improve the quality, safety and effectiveness of cardiac care in Queensland.
- Provide data, analysis expertise, direction and advice to the Department of Health and Hospital and Health Services concerning cardiac care-related service planning and emerging issues at the local, statewide and national levels.
- Provide decision support, expertise, direction and advice to clinicians caring for patients within the domain of cardiac care services.
- Develop an open and supportive environment for clinicians and consumers to discuss data and analysis relative to cardiac care in Queensland.
- Foster education and research in cardiac care best practice.

Registry data collections and application modules are maintained and administered by the Statewide Cardiac Clinical Informatics Unit (SCCIU), which forms the business unit of QCOR. The SCCIU performs data quality, audit and analysis functions, and coordinates individual QCOR committees, whilst also providing expert technical and informatics resources and subject matter expertise to support continuous improvement and development of specialist Registry application modules and reporting.

The SCCIU team consists of:

Mr Graham Browne, Database Administrator	Mr Michael Mallouhi, Clinical Analyst
Mr Marcus Prior, Informatics Analyst	Mr William Vollbon, Manager*
Dr Ian Smith, PhD, Biostatistician	Mr Karl Wortmann, Application Developer

* Principal contact officer/QCOR program lead

The application custodian for QCOR is the Executive Director, Healthcare Improvement Unit, CEQ, while data custodianship for the overarching data collection of QCOR is the Chair/s of the QCCN. The individual modular data collections are governed by the Chair of each of the individual QCOR specialty committees.

The QCOR Clinical specialty committees provide direction and oversight for each domain of the Registry. An overarching QCOR Advisory Committee provides collective oversight with each of these groups reporting to the QCCN. Through the QCOR committees, clinicians are continually developing and shaping the scope of the Registry based on contemporary best practices and the unique requirements of each clinical domain.

QCOR manages the Cardiothoracic Surgery Quality Assurance Committee which has been formed under Part 6, of the *Hospital and Health Boards Act 2011* to facilitate the participation of clinicians and administrators responsible for the management and delivery of cardiac services. This group enables the peer review of safety and quality of the cardiothoracic services delivered in Queensland and guides any service improvement activities that may be required.

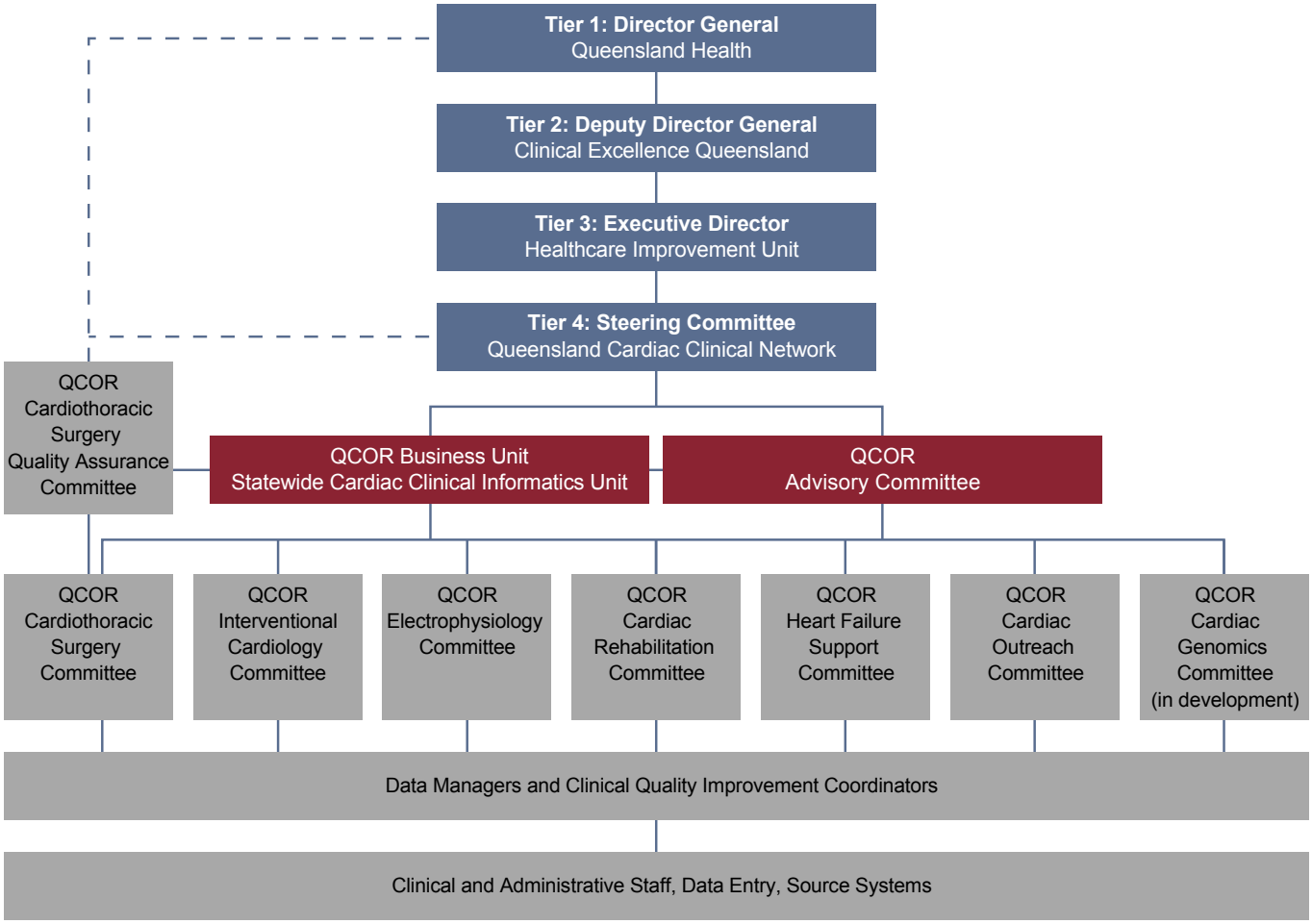


Figure 1: Governance structure

QCOR functions in line with the accepted and endorsed clinical quality registry feedback loop where improvements in clinical care through data-based initiatives and regular interaction with clinicians and stakeholders.

QCOR acts under a well-defined data custodianship model that ensures clearly defined processes and usage of the data collected. The operation of QCOR is guided by the principles outlined by the Australian Commission on Safety and Quality in Health Care in the Framework for Australian clinical quality registries.

The Registry data collection is a blend of clinician-entered data along with various data linkages activities as outlined above. The data is scrutinised using in-app data validations and automated routine data quality reporting. The data quality auditing processes aim to identify and resolve incomplete or inaccurate data to ensure clinician trust in the analysis and outcome reporting process, along with routine reporting and requests for information functions.

In 2014, the Australian Commission on Safety and Quality in Healthcare published a Framework for Australian clinical quality registries*. Since then, QCOR has worked to align itself with these guidelines and standards which form the basis of its quality and safety program. It is recognised that clinical quality registries collect, analyse and report back essential risk-adjusted clinical information to patients, consumers, frontline clinicians and government, with a focus on quality improvement.

The measurement of clinical indicators and benchmarks aims to support the feedback of safety and quality data to several levels of the health system, including consumers, clinicians, administrators and funders. Meaningful metrics are required to understand what the major safety issues are across the care continuum, proactively mitigate patient safety risks and stimulate improvement. Evidence demonstrates that safety and quality improve when clinicians and managers are provided with relevant and timely clinical information.

Through the availability of data insights, clinical reporting and clinical documentation produced by both patient-facing and technical solutions. QCOR has allowed the instantaneous delivery of clinical reports and documentation to clinicians via enterprise solutions. Data insights, performance measure and clinical indicator reporting is also made available in real time via dashboards and reports delivered to clinicians at a frequency and medium of their choosing. Access to real-time data enables key staff to plan and deliver more efficient care to more patients.

QCOR data and analytics have informed and supported statewide healthcare planning activities for capital expansion as well as made possible market share activities for procurement of high-cost clinical consumables resulting in multimillion dollar savings to the healthcare system.

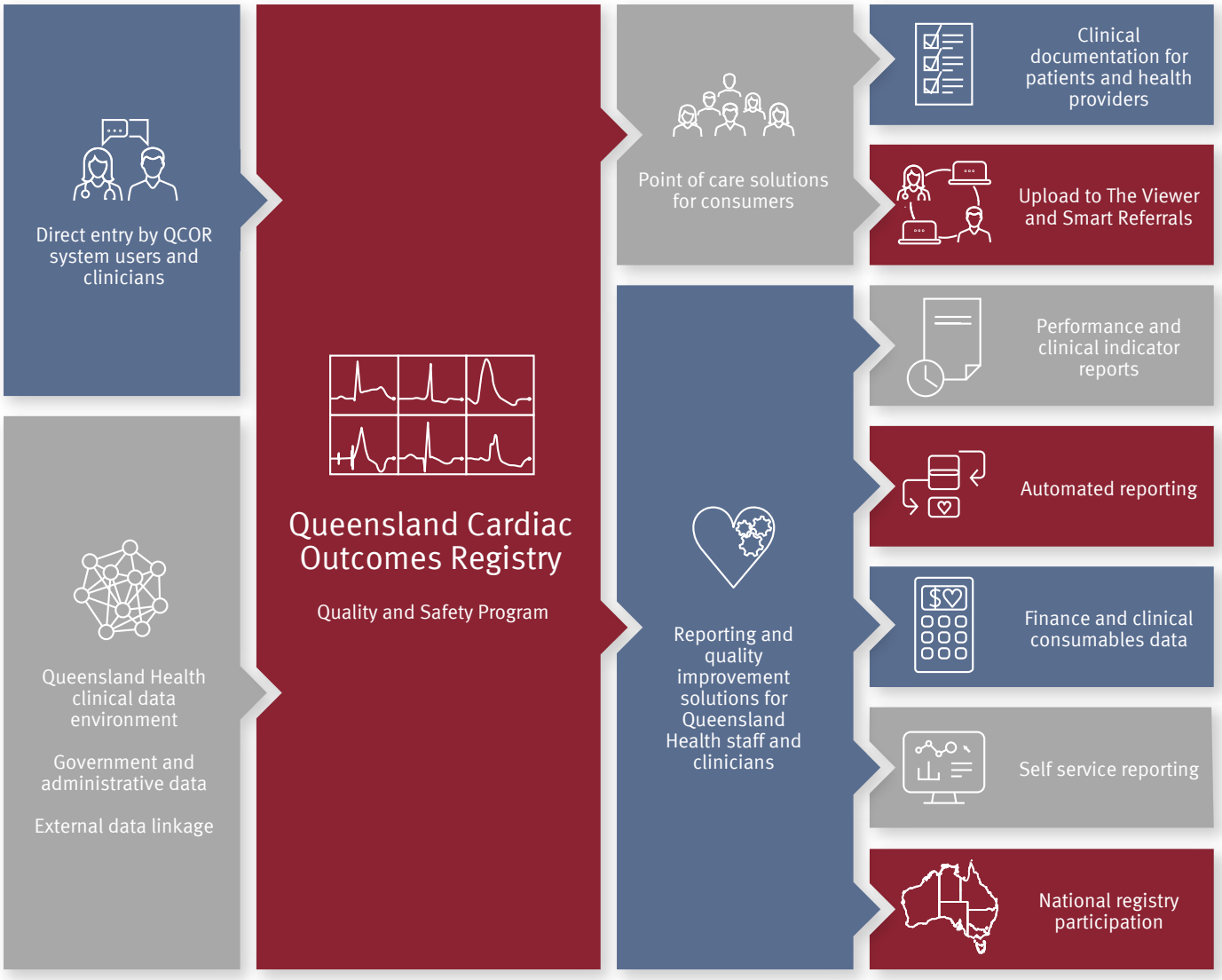
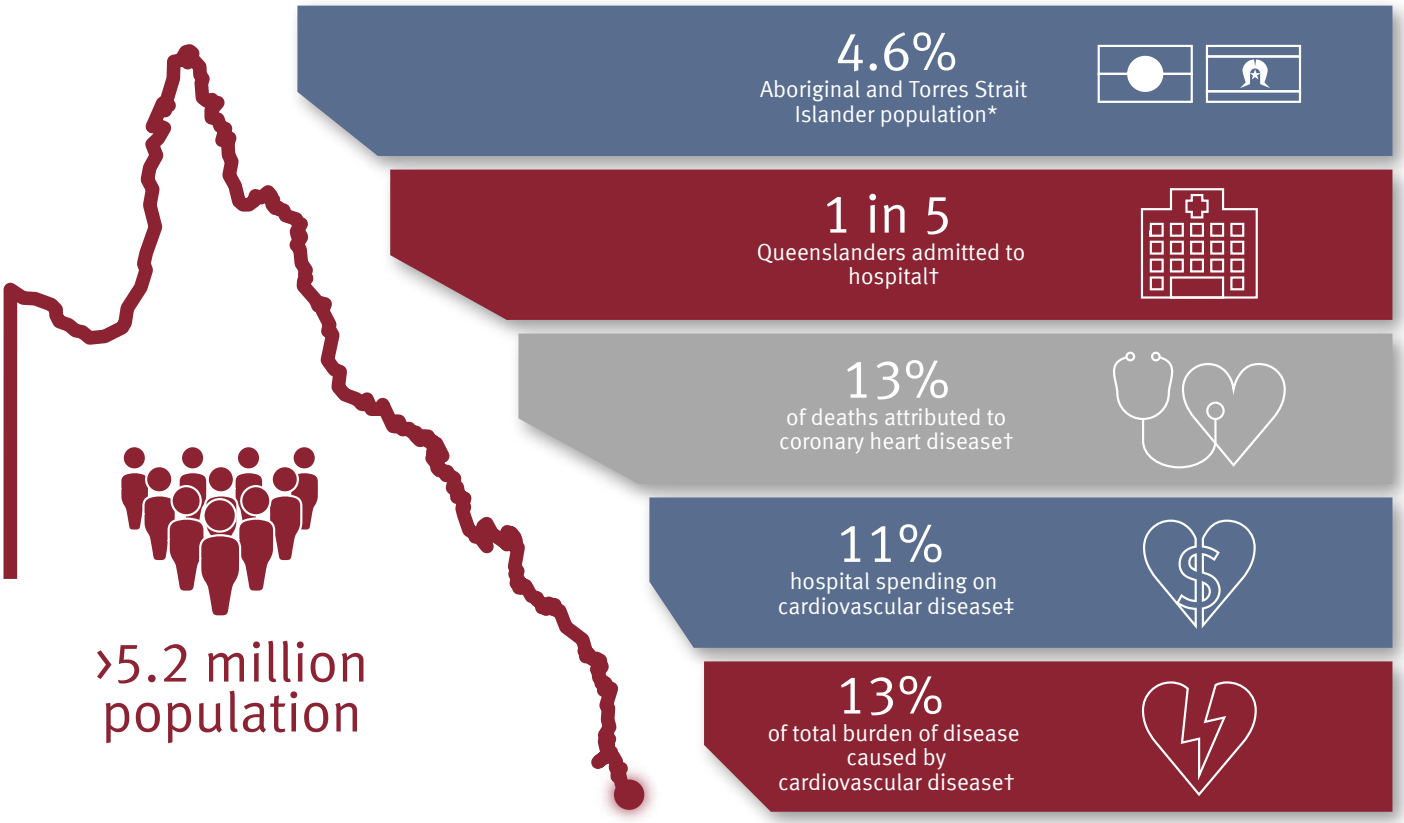


Figure 2: QCOR data flow

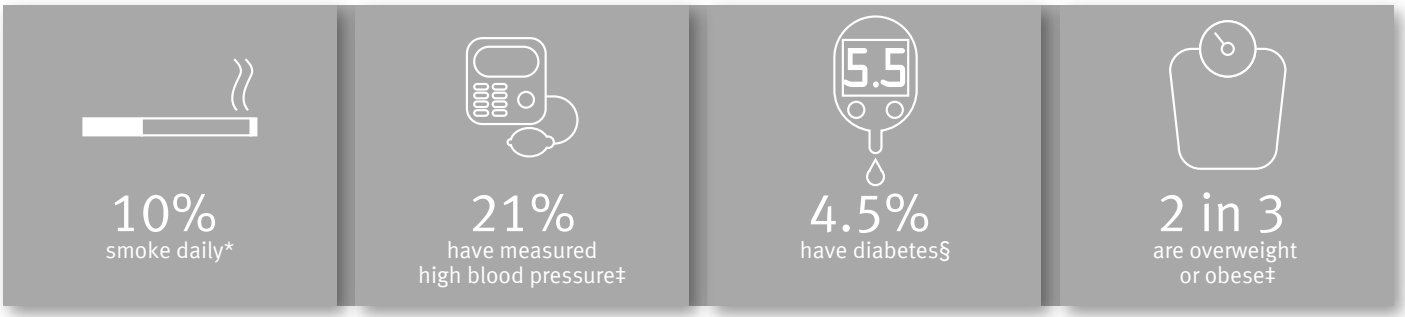
* The Australian Commission on Safety and Quality in Health Care (ACSQHC). Framework for Australian clinical quality registries. Sydney: ACSQHC; 2014.

Queensland Cardiac Outcomes Registry

The Health of Queenslanders



Comorbidities



Mortality

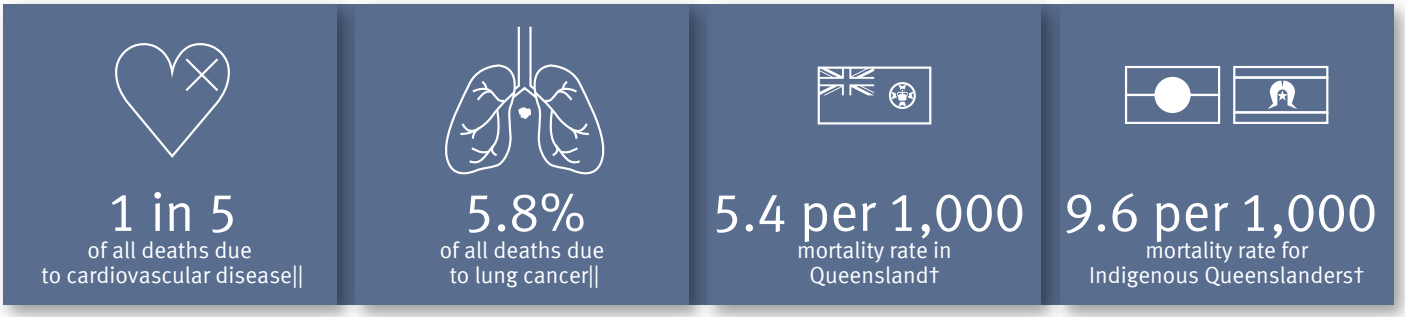


Figure 3: QCOR 2021 infographic

* Australian Bureau of Statistics. (2022, July 1). Queensland: Aboriginal and Torres Strait Islander population summary. ABS. https://www.abs.gov.au/articles/queensland-aboriginal-and-torres-strait-islander-population-summary

† Queensland Health. (2020). The health of Queenslanders 2020. *Report of the Chief Health Officer Queensland*. Queensland Government: Brisbane

‡ Australian Bureau of Statistics. (2019). *National health survey: first results, 2017-18*. Cat. no. 4364.0.55.001. ABS: Canberra.

§ Diabetes Australia. (2018). *State statistical snapshot: Queensland*. As at 30 June 2018

|| Australian Institute of Health and Welfare (2021). MORT (Mortality Over Regions and Time) books: State and territory, 2015–2019. https://www.aihw.gov.au/getmedia/8967a11e-905f-45c6-848b-6a7dd4ba89cb/MORT_STE_2015_2019.xlsx.aspx

2021 Activity at a Glance

What's New?

- Cardiac surgery outcomes and mortality
- Cardiac genomics spotlight
- Cardiac surgery bleeding complications audit
- NSTEMI patients: Interhospital transfers analysis

Interventional Cardiology

4,894
percutaneous coronary interventions

485
structural heart disease interventions

239
transcatheter aortic valve replacements

15,443
total coronary procedures

Cardiothoracic Surgery

2,623
adult cardiac surgeries

1,067
adult thoracic surgeries

Electrophysiology & Pacing

5,269
electrophysiology and pacing procedures

3,500
cardiac implantable electronic device procedures

Heart Failure Support Services

6,326
heart failure support services referrals

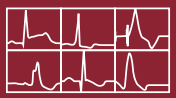
Cardiac Rehabilitation

10,647
cardiac rehabilitation referrals

Paediatric Cardiac Surgery

312
paediatric cardiac surgeries

Clinical Indicator Progress



83 mins
median first diagnostic ECG to reperfusion time for primary PCI

0.3%
procedural tamponade rate for cardiac device and electrophysiology procedures

91%
of patients referred to a heart failure support service on an ACEI, ARB or ARNI at discharge

93%
of cardiac rehabilitation referrals within 3 days of discharge

1.3%
mortality rate for coronary artery bypass surgery at 30 days

4 Facility profiles

4.1 Cairns Hospital

- Referral hospital for Cairns and Hinterland and Torres and Cape Hospital and Health Services, serving a population of approximately 280,000
- Public tertiary level invasive cardiac services provided at Cairns Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - Structural heart disease intervention
  - ICD, CRT and pacemaker implantation
- Cardiac genomics clinics provider
- Networked cardiac services outreach hub for Cairns and Hinterland and Torres and Cape Hospital and Health Services

4.2 Townsville University Hospital

- Referral hospital for Townsville and North West Hospital and Health Services, serving a population of approximately 295,000
- Public tertiary level invasive cardiac services provided at Townsville University Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - Structural heart disease intervention
  - Electrophysiology
  - ICD, CRT and pacemaker implantation
  - Cardiothoracic surgery
- Networked cardiac services outreach hub for Townsville and North West Hospital and Health Services

4.3 Mackay Base Hospital

- Referral hospital for Mackay and Whitsunday regions, serving a population of approximately 182,000
- Public tertiary level invasive cardiac services provided at Mackay Base Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - ICD and pacemaker implants

4.4 Sunshine Coast University Hospital

- Referral hospital for Sunshine Coast and Wide Bay Hospital and Health Services, serving a population of approximately 563,000
- Public tertiary level invasive cardiac services provided at Sunshine Coast University Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - Structural heart disease intervention
  - Electrophysiology
  - ICD, CRT and pacemaker implantation

4.5 The Prince Charles Hospital

- Referral hospital for Metro North, Wide Bay and Central Queensland Hospital and Health Services, serving a population of approximately 900,000 (shared referral base with the Royal Brisbane and Women's Hospital)
- Public tertiary level invasive cardiac services provided at The Prince Charles Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - Structural heart disease intervention
  - Electrophysiology
  - ICD, CRT and pacemaker implantation
  - Cardiothoracic surgery
  - Heart/lung transplant unit
  - Adult congenital heart disease unit
- Cardiac genomics clinics provider

4.6 Royal Brisbane & Women's Hospital

- Referral hospital for Metro North, Wide Bay and Central Queensland Hospital and Health Services, serving a population of approximately 900,000 (shared referral base with The Prince Charles Hospital)
- Public tertiary level invasive cardiac services provided at The Royal Brisbane and Women's Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - Structural heart disease intervention
  - Electrophysiology
  - ICD, CRT and pacemaker implantation
  - Thoracic surgery
- Cardiac genomics clinics provider

4.7 Princess Alexandra Hospital

- Referral hospital for Metro South and South West Hospital and Health Services, serving a population of approximately 1,000,000
- Public tertiary level invasive cardiac services provided at the Princess Alexandra Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - Structural heart disease intervention
  - Electrophysiology
  - ICD, CRT and pacemaker implantation
  - Cardiothoracic surgery
- Cardiac genomics clinics provider
- Networked cardiac services outreach hub for Metro South, Darling Downs and South West Hospital and Health Services

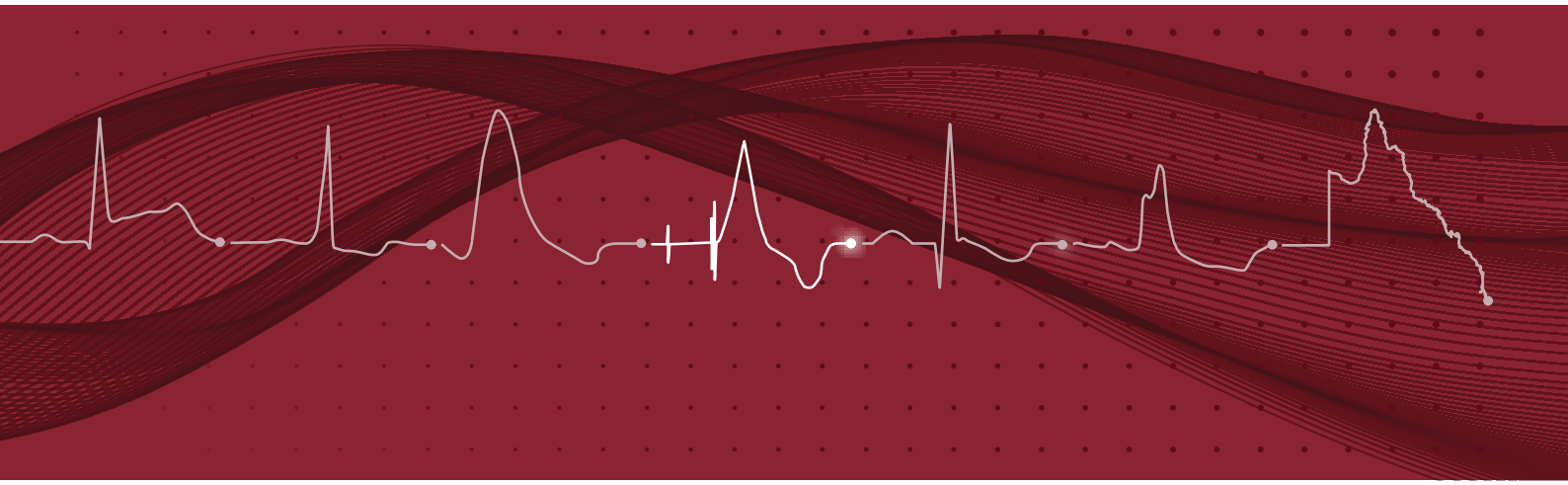
4.8 Toowoomba Hospital

- Referral hospital for Darling Downs Hospital and Health Service, servicing a population of approximately 280,000
- Public invasive cardiac services provided at the Toowoomba Hospital include:
  - ICD, CRT and pacemaker implantation
- Networked cardiac services outreach hub for Darling Downs Hospital and Health Service

4.9 Gold Coast University Hospital

- Referral Hospital for Gold Coast and northern New South Wales regions, serving a population of approximately 700,000
- Public tertiary level invasive cardiac services provided at the Gold Coast University Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - Structural heart disease intervention
  - Electrophysiology
  - ICD, CRT and pacemaker implantation
- Cardiothoracic surgery

Electrophysiology and Pacing Audit



1 Message from the QCOR Electrophysiology and Pacing Committee

Electrophysiology and pacing services in Queensland public facilities continue to experience growth and expansion. In particular, electrophysiology (EP) and ablation procedures continue to increase in volume demonstrating the demand for these investigations and interventions. These increases have been accommodated despite uncertainty and disruptions to services due to COVID-19. Once again, COVID-19 has highlighted the flexibility and adaptability of EP clinicians in ensuring the best possible care to Queenslanders.

This 2021 Annual Report once again offers detailed insight into key aspects of these procedures across the state of Queensland. All nine public sites once again are included in this analysis with detailed information on patient demographics, procedures and their outcomes. With each year of additional data, the registry builds an increasingly detailed picture to guide improvements in EP service delivery around the state and performs the role of a quality and safety program.

Furthermore, a sustained increase in volumes of complex EP studies continues to be observed with these technically challenging procedures now accounting for more than three quarters of all electrophysiology procedures with a commensurate increase in pulmonary vein isolation cases. It is expected that this demand will only increase over time, given the ageing population.

For yet another year, quality and safety indicators continue to demonstrate that procedural safety is in line with, or better than international benchmarks. The value of the data that underpins these analyses is reflected through site-based investigations into procedural volumes, outcomes and trends that ensure appropriate service planning, practice reflection and quality improvement activities can take place.

Significant savings for the health system continue to be realised through processes supported by QCOR. Cost savings have enabled funds to be reinvested into further improvements to the provision of patient care and service expansion. With a growing pool of data and analyses available to inform its stakeholders, it is hoped that the future of EP and pacing services can continue to expand and evolve to serve the needs of all Queenslanders.

On behalf of the
QCOR Electrophysiology and Pacing Committee

2 Key findings

This Electrophysiology and Pacing Audit describes baseline demographics, risk factors, procedures performed and outcomes for 2021.

Key findings include:

- Across Queensland, nine public sites contributed to the registry with all sites contributing a complete year of data.
- Of the 5,269 electrophysiology and pacing cases, 3,500 were device procedures and 1,345 were electrophysiology procedures.
- An increase of 311 device procedures was observed in 2021 over 2019 volumes and an additional 297 electrophysiology procedures were performed.
- Complex electrophysiology has increased as proportion of all electrophysiology cases from 64% in 2019 to 76% in 2021.
- Pulmonary vein isolation for atrial fibrillation cases have increased from 290 in 2019 to 367 in 2021.
- Almost three quarters of patients were aged 60 years or over (69%) with a median age of 69 years.
- The overall proportion of Aboriginal and Torres Strait Islander patients was 4.5%.
- The vast majority of patients (72%) were classed as having an unhealthy body mass index (BMI) of greater than 30 kg/m^2.
- Complex electrophysiology procedures which utilise three-dimensional mapping technology, involve pulmonary vein isolation or ventricular arrhythmias accounted for 76% of this case cohort.
- Atrial flutter, pulmonary vein isolation for atrial fibrillation, and atrioventricular node re-entry tachycardia ablations accounted for 70% of all ablation cases.
- The reported complication rate for all device procedures was 0.9%, while electrophysiology procedures had a 1.3% complication rate.
- There was a 0.3% procedural tamponade rate reported for all cases.
- The statewide median wait time for complex ablation was 78 days with 78% of cases meeting the 180 day benchmark.
- The 12 month device system loss rate due to infection was 0.4%.

3 Participating sites

There were nine public electrophysiology and pacing units spread across Metropolitan and regional Queensland. All of these entered data directly into the Queensland Cardiac Outcomes Registry (QCOR) electrophysiology and pacing application.

Patients came from a wide geographical area, with the majority of patients residing on the Eastern Seaboard.

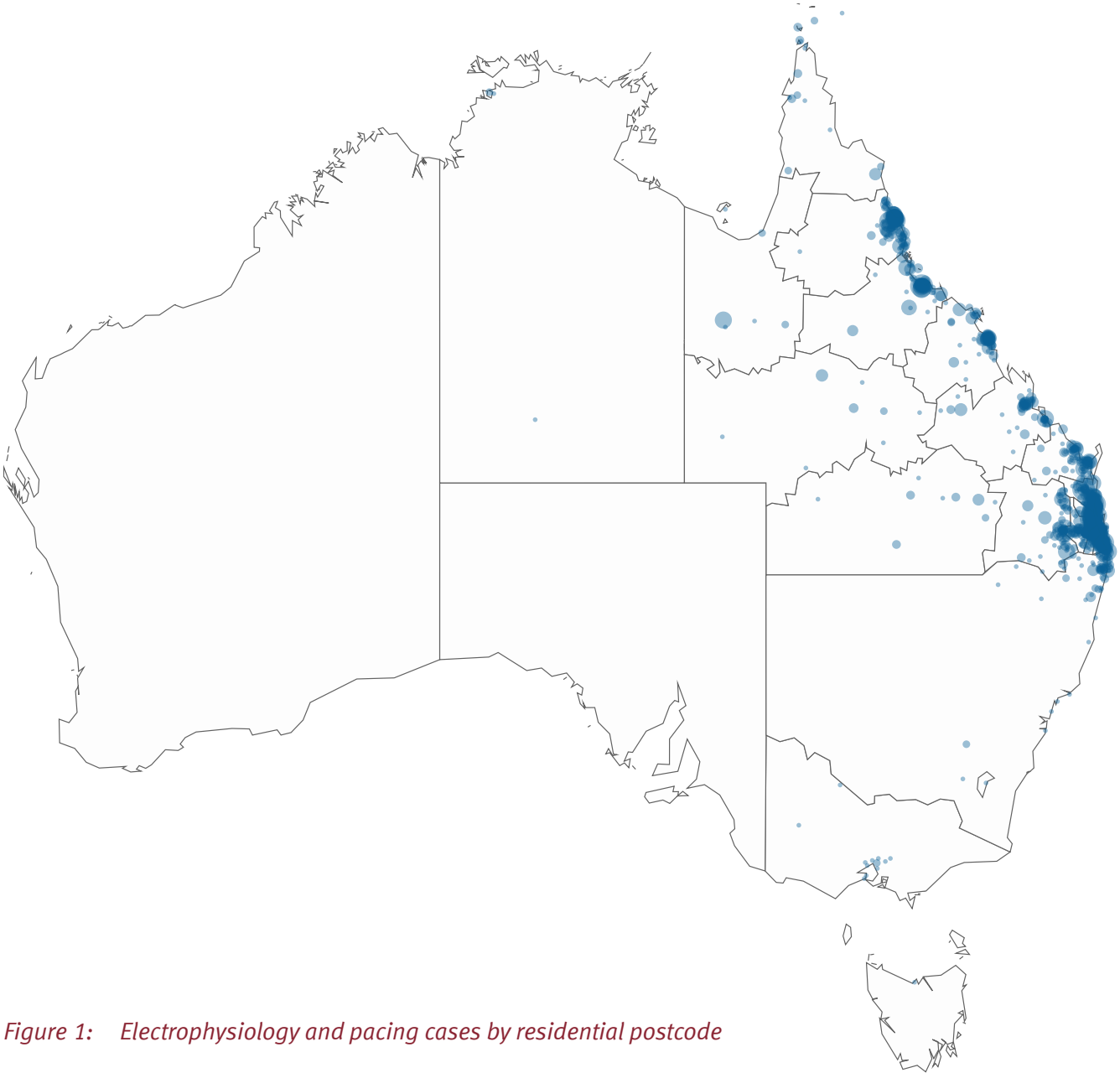


Figure 1: Electrophysiology and pacing cases by residential postcode

Table 1: Participating sites

Acronym	Site name
CH	Cairns Hospital
TUH	Townsville University Hospital
MBH	Mackay Base Hospital
SCUH	Sunshine Coast University Hospital
TPCH	The Prince Charles Hospital
RBWH	Royal Brisbane & Women's Hospital
PAH	Princess Alexandra Hospital
TWH	Toowoomba Hospital
GCUH	Gold Coast University Hospital

4 Case totals

4.1 Case volume

In 2021, were 5,269 electrophysiology and pacing procedures documented using the QCOR electrophysiology and pacing application.

Table 2: Total cases by category

Procedure combination	Category	Total cases n (%)
Cardiac device procedure	Device	3,452 (65.5)
Cardiac device procedure + EP study		31 (0.6)
Cardiac device procedure + other procedure		8 (0.2)
Cardiac device procedure + cardioversion		3 (0.1)
Cardiac device procedure + drug challenge		3 (0.1)
Cardiac device procedure + EP study + ablation		2 (<0.1)
Cardiac device procedure + EP study + drug challenge		1 (<0.1)
EP study + ablation	EP	968 (18.4)
EP study		176 (3.3)
Ablation		147 (2.8)
EP study + ablation + cardioversion		32 (0.6)
EP study + drug challenge		7 (0.1)
EP study + ablation + other procedure		6 (0.1)
EP study + ablation + drug challenge		2 (<0.1)
EP study + cardioversion		2 (<0.1)
EP study + other procedure		2 (<0.1)
Ablation + cardioversion		1 (<0.1)
EP study + ablation + cardioversion + pericardiocentesis		1 (<0.1)
EP study + ablation + pericardiocentesis		1 (<0.1)
Cardioversion	Other	344 (6.5)
Drug challenge		34 (0.6)
Other procedure		31 (0.6)
Pericardiocentesis		9 (0.2)
Cardioversion + other procedure		3 (0.1)
Drug challenge + cardioversion		1 (<0.1)
Drug challenge + other procedure		1 (<0.1)
Pericardiocentesis + other procedure		1 (<0.1)
All		**5,269 (100.0)**

4.2 Cases by category

The majority of cases performed were cardiac device procedures accounting for two thirds (66%) of documented procedures. The rest of the cases were electrophysiology and ablation procedures (26%), with the remainder categorised as 'other' procedures (8%).

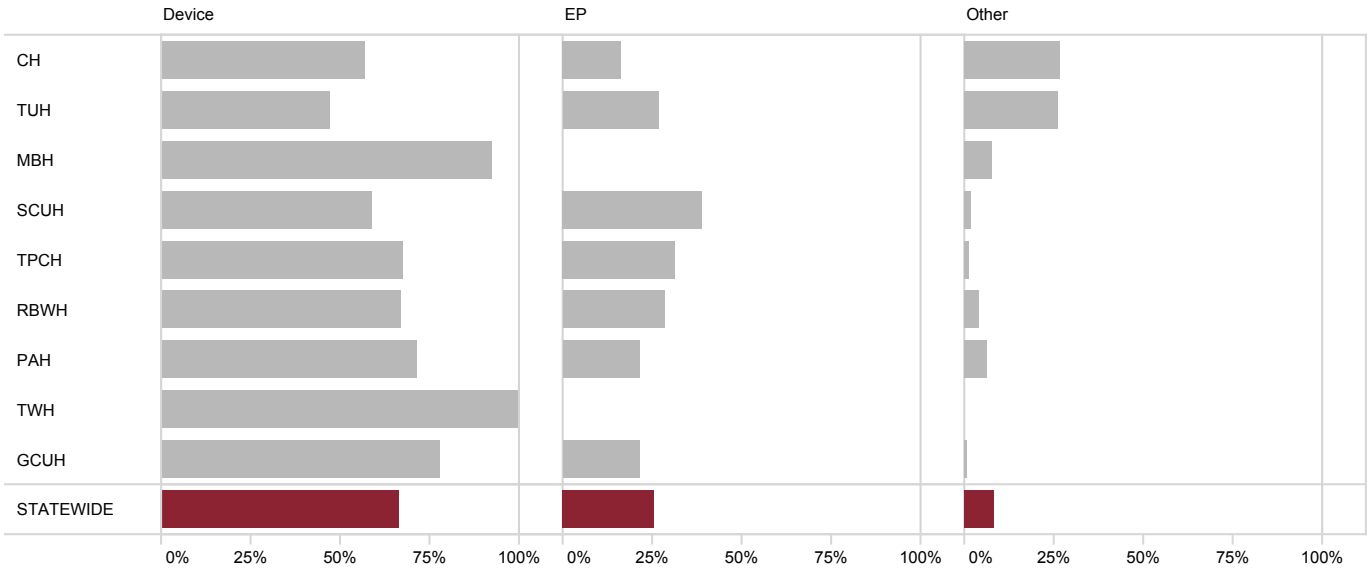


Figure 2: Proportion of cases by site and category

Table 3: Cases by case category

Site	Device n (%)	EP n (%)	Other n (%)	Total n (%)
CH	342 (9.8)	97 (7.2)	160 (37.7)	599 (11.4)
TUH	250 (7.1)	141 (10.5)	140 (33.0)	531 (10.1)
MBH	123 (3.5)	–	10 (2.4)	133 (2.5)
SCUH	366 (10.5)	249 (18.5)	9 (2.1)	624 (11.8)
TPCH	764 (21.8)	352 (26.2)	11 (2.6)	1,127 (21.4)
RBWH	424 (12.1)	180 (13.4)	26 (6.1)	630 (12.0)
PAH	683 (19.5)	208 (15.5)	64 (15.1)	955 (18.1)
TWH	122 (3.5)	–	–	122 (2.3)
GCUH	426 (12.2)	118 (8.8)	4 (0.9)	548 (10.4)
STATEWIDE	**3,500 (66.4)**	**1,345 (25.5)**	**424 (8.1)**	**5,269 (100.0)**

4.3 Yearly case distribution

Yearly growth has been noted over the years since QCOR reporting has begun and this can now be better understood with a larger dataset. It is evident that since 2019 that the volume of cardiac device procedures and electrophysiology procedures has increased. The reasons for these increases are likely multifactorial and include expansion of services at some sites and new services offered at others.

The complexity of electrophysiology procedures has a large bearing on the time taken and resources used to perform these procedures. A notable increase in the volume and proportion of complex electrophysiology procedures can be seen over time. Again, there are multiple underlying contributing factors to this increase and that this increase in ability to treat complex cases underlines the quality services in place.

An increase in the proportion and volume of pulmonary vein isolation/atrial fibrillation ablation has been observed over the past three years. It is recognised that there is a significant demand for these services.

Wait times for procedure categories and urgency status has varied over the past three years. Of particular note is a decrease in wait time for both elective PPM and ICD procedures. Also, wait times for complex ablation procedures has reduced in 2021 (104 days to 78 days).

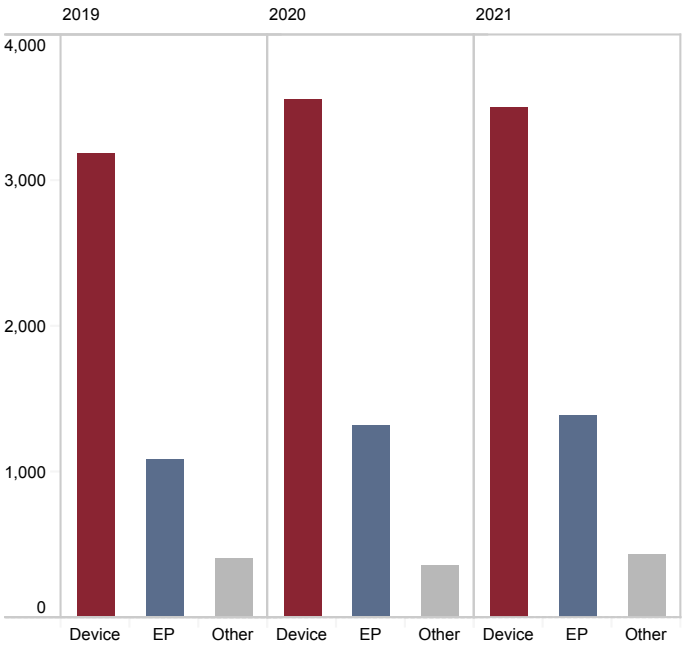


Figure 3: Proportion of cases by category, 2019–2021

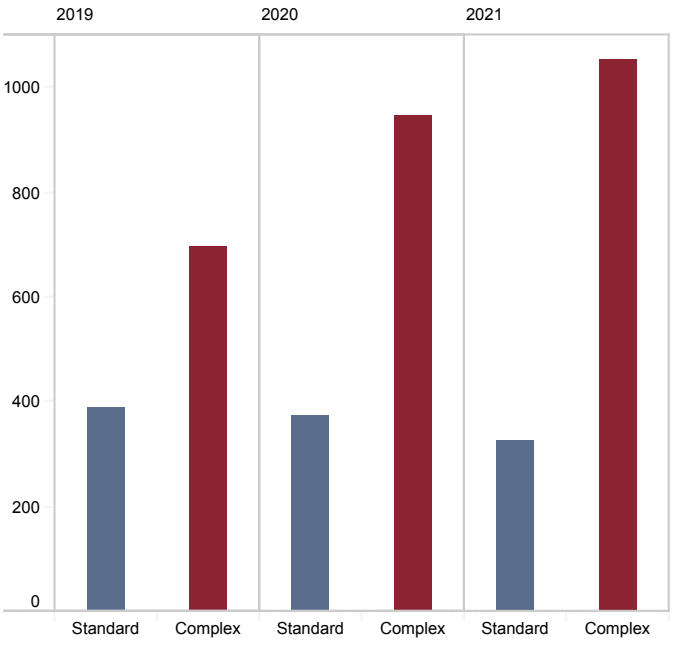


Figure 4: Yearly case volume by electrophysiology procedural complexity, 2019–2021

Table 4: Yearly case volume by case category, 2019–2021

Case category	2019 n	2020 n	2021 n
Device	3,189	3,551	3,500
EP	1,082	1,319	1,379
Other	407	364	424

Table 5: Yearly case volume by electrophysiology procedural complexity, 2019–2021

Electrophysiology procedure complexity	2019 n (%)	2020 n (%)	2021 n (%)
Standard	389 (36.0)	374 (28.3)	327 (23.7)
Complex	693 (64.0)	946 (71.7)	1,052 (76.3)

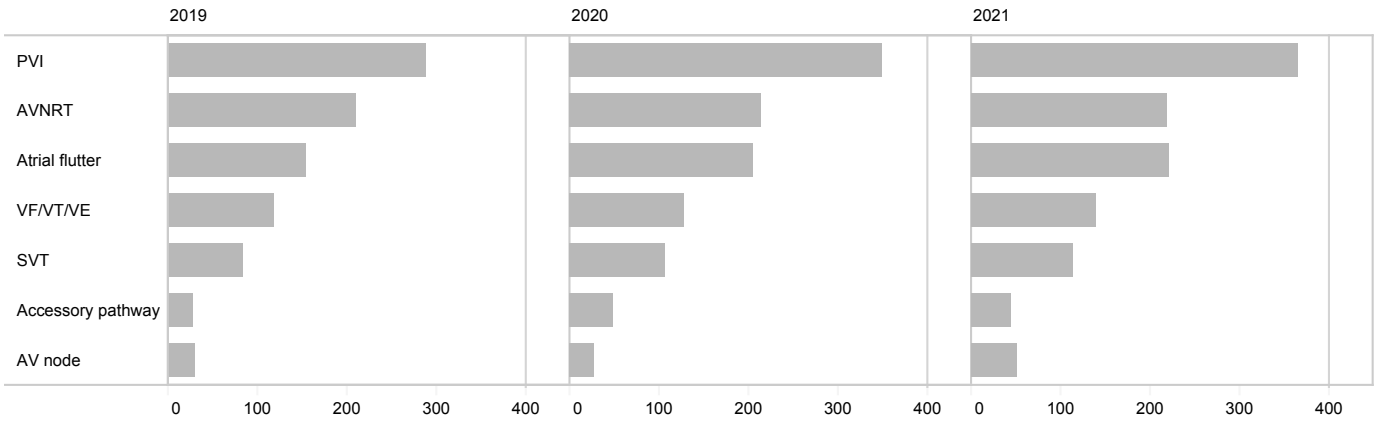


Figure 5: Number of yearly ablation cases by arrhythmia type, 2019–2021

Table 6: Yearly ablation cases by arrhythmia type, 2019–2021

Ablation type	2019 n	2020 n	2021 n
Pulmonary vein isolation	290	349	367
AVNRT	210	214	219
Atrial flutter	154	205	221
Ventricular arrhythmia/ectopy	118	129	141
Supraventricular tachycardia	83	107	115
Accessory pathway	29	49	45
AV node	30	27	52

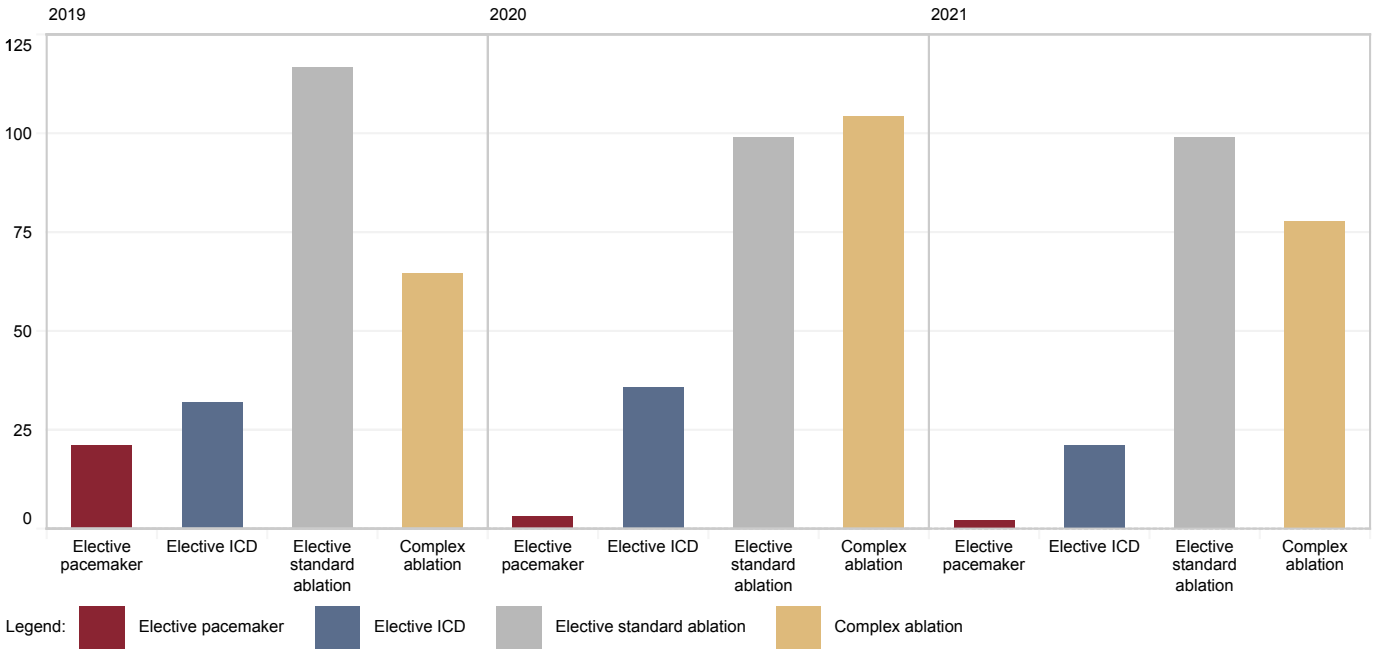


Figure 6: Median wait time analysis by procedure category, 2019–2021

Table 7: Median wait time analysis by procedure category, 2019–2021

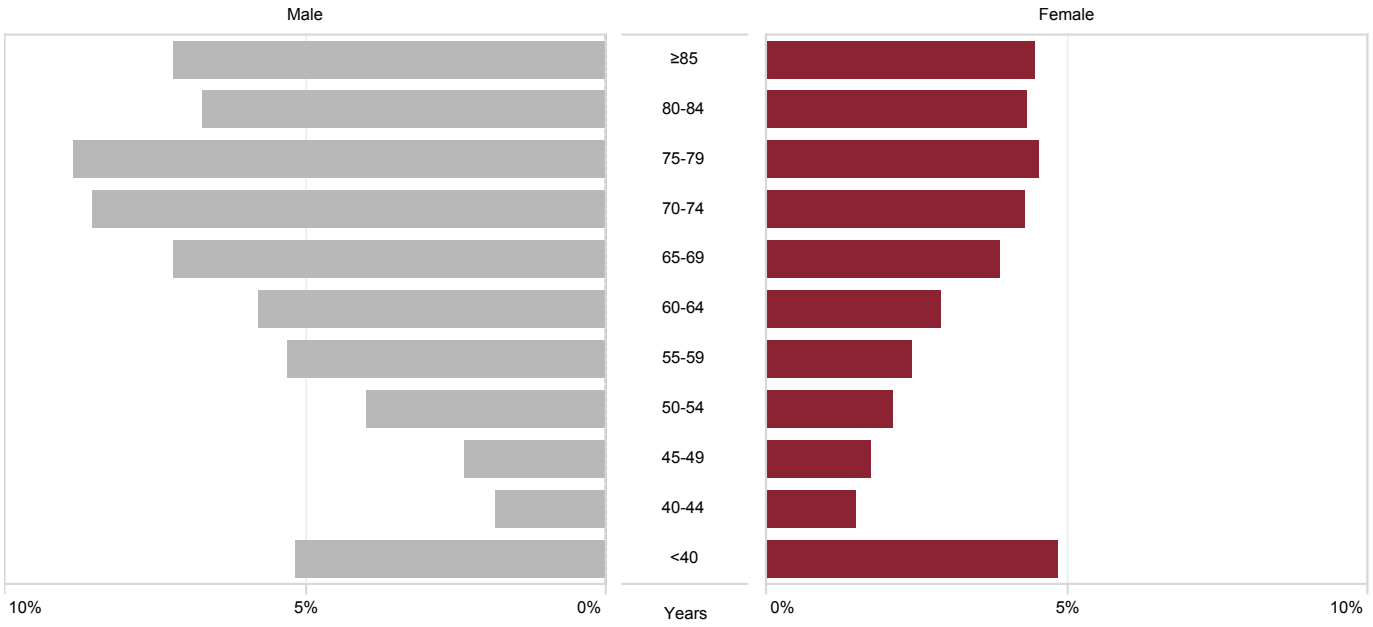
Procedure category	2019 days	2020 days	2021 days
Elective PPM	21	3	2
Elective ICD	32	36	21
Elective standard ablation	117	99	99
Complex ablation	65	104	78

5 Patient characteristics

5.1 Age and gender

Age is an important risk factor for developing cardiovascular disease with the majority of patients in this cohort aged 60 years and above (69%). The median age of the overall electrophysiology and pacing patient cohort was 69 years of age. Males between the age of 75 and 79 comprised the largest proportion by age and gender.

The median age of males was 69 years with females marginally younger at 68 years. Patient age differed considerably by procedure category with the median age of patients undergoing electrophysiology procedures being 57 years compared to 74 years for cardiac device procedures.



% of total (n=5,269)

Figure 7: Proportion of all cases by age group and gender

Table 8: Median age by gender and case category

	Total cases n	Male years	Female years	All years
Device	3,500	73	74	74
EP	1,345	59	54	57
Other	424	64	67	65
Total	**5,269**	**69**	**68**	**69**

Overall, 63% of patients were male with a similar distribution across all procedure categories. The largest proportion of females was represented in the electrophysiology category (39%).

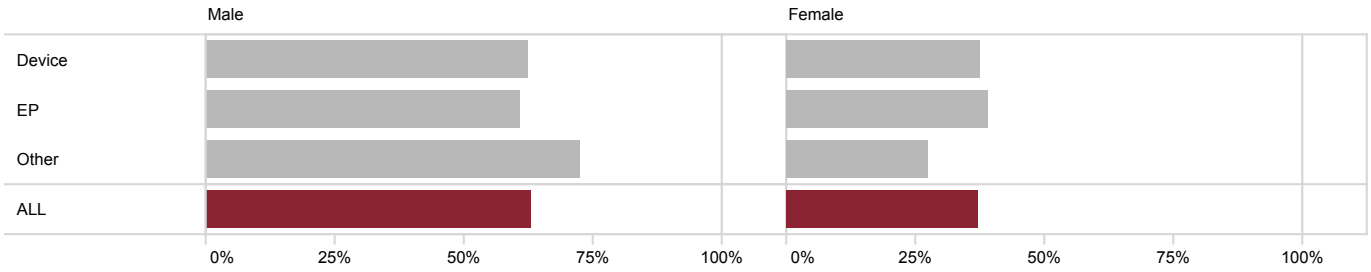


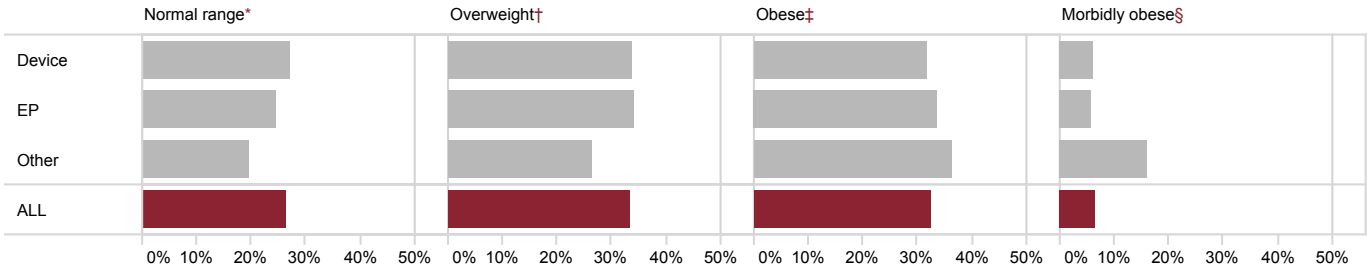
Figure 8: Proportion of cases by gender and category

Table 9: Proportion of cases by gender and category

	Total cases n	Male n (%)	Female n (%)
Device	3,500	2,186 (62.5)	1,314 (37.5)
EP	1,345	820 (61.0)	525 (39.0)
Other	424	308 (72.6)	116 (27.4)
All	**5,269**	**3,314 (62.9)**	**1,955 (37.1)**

5.2 Body mass index

Patients classed as having a body mass index (BMI) category of overweight (33%), obese (33%) or morbidly obese (6%) represented almost three quarters of all electrophysiology and pacing patients. Patients classed as underweight represented less than 2% of all cases.



* BMI 18.5–24.9 kg/m^2

† BMI 25.0–29.9 kg/m^2

‡ BMI 30.0–39.9 kg/m^2

§ BMI ≥40.0 kg/m^2

Figure 9: Proportion of cases by BMI and case category

5.3 Aboriginal and Torres Strait Islander status

Overall, the proportion of identified Aboriginal and Torres Strait Islander patients undergoing electrophysiology and pacing procedures was 4.5%. This correlates closely to the estimated proportion of Aboriginal and Torres Strait Islander peoples within Queensland (4.6%).[2] There was large variation between units, with the North Queensland and western Queensland sites seeing a larger proportion of Aboriginal and Torres Strait Islander patients.

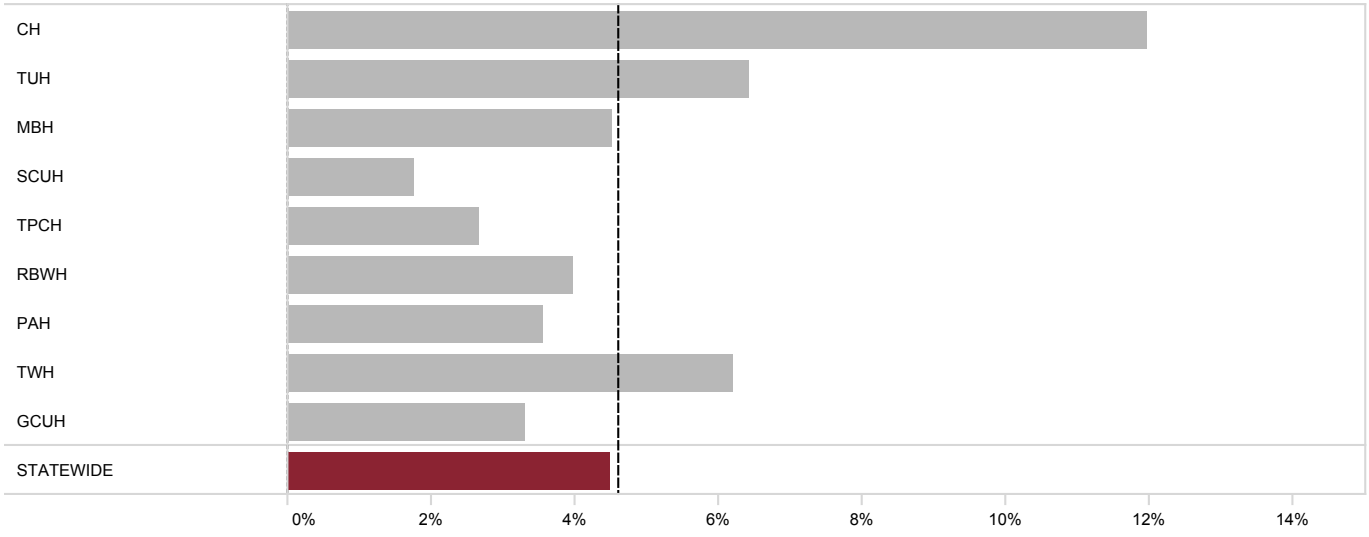


Figure 10: Proportion of cases by identified Aboriginal and Torres Strait Islander status and site

5.4 Device procedures

Case types and procedure combinations varied across the state and is driven primarily by services offered at individual sites. Single and dual chamber pacemaker implants/generator changes accounted for the majority of cases. There were eight sites across the state offering biventricular (BiV) pacemaker/ implantable cardioverter defibrillator insertion, with six sites providing leadless pacemaker implants.

Table 10: Cardiac device case types by site

Procedure type	CH	TUH	MBH	SCUH	TPCH	RBWH	PAH	TWH	GCUH
	n	n	n	n	n	n	n	n	n
Pacemaker procedure*	147	112	56	183	374	164	396	84	253
Loop recorder implant/explant	99	25	66	62	73	127	73	10	39
ICD procedure*	54	45	–	46	110	69	97	12	64
BiV ICD procedure*	23	31	–	34	98	32	53	6	34
BiV pacemaker procedure*	4	25	–	22	24	8	12	5	9
Lead revision/replacement/pocket revision	6	2	1	17	24	16	19	5	14
Device explant	4	3	–	2	50	3	8	–	2
Temporary pacing system	2	3	–	–	4	3	24	–	4
Leadless pacemaker implant	3	4	–	–	6	2	1	–	7
Defibrillation threshold testing	–	–	–	–	1	–	–	–	–
All	**342**	**250**	**123**	**366**	**764**	**424**	**683**	**122**	**426**

* Implant/generator change/upgrade

5.5 Electrophysiology studies/ablations

Electrophysiology studies involving radiofrequency ablation were the most common individual procedure performed across all sites, ranging from 57% of case volume at Cairns Hospital to 84% at TUH.

Table 11: Electrophysiology study/ablation types by site

Site	Procedure type	Complex EP n	Standard EP n	Case n (%)
CH	Radiofrequency ablation	17	39	56 (56.6)
	Cryotherapy ablation	20	–	20 (20.2)
	Electrophysiology study	9	10	19 (19.2)
	Radiofrequency and cryotherapy ablation	3	–	3 (3.0)
	Electrophysiology study and drug challenge	–	1	1 (1.0)
TUH	Radiofrequency ablation	97	21	118 (83.7)
	Electrophysiology study	10	3	13 (9.2)
	Cryotherapy ablation	8	–	8 (5.7)
	Radiofrequency and cryotherapy ablation	2	–	2 (1.4)
SCUH	Radiofrequency ablation	160	16	176 (69.6)
	Electrophysiology study	28	9	37 (14.6)
	Cryotherapy ablation	36	–	36 (14.2)
	Electrophysiology study and drug challenge	–	4	4 (1.6)
TPCH	Radiofrequency ablation	177	68	245 (67.7)
	Cryotherapy ablation	63	1	64 (17.7)
	Electrophysiology study	25	25	50 (13.8)
	Radiofrequency and cryotherapy ablation	2	–	2 (0.6)
	Electrophysiology study and drug challenge	–	1	1 (0.3)
RBWH	Radiofrequency ablation	125	1	126 (68.1)
	Electrophysiology study	29	4	33 (17.8)
	Cryotherapy ablation	19	–	19 (10.3)
	Radiofrequency and cryotherapy ablation	5	–	5 (2.7)
	Electrophysiology study and drug challenge	2	–	2 (1.1)
PAH	Radiofrequency ablation	123	52	175 (79.2)
	Electrophysiology study	17	24	41 (18.6)
	Electrophysiology study and drug challenge	2	1	3 (1.4)
	Cryotherapy ablation	2	–	2 (0.8)
GCUH	Radiofrequency ablation	55	35	90 (76.3)
	Electrophysiology study	4	10	14 (11.9)
	Cryotherapy ablation	11	1	12 (10.2)
	Radiofrequency and cryotherapy ablation	1	–	1 (0.8)
	Electrophysiology study and drug challenge	–	1	1 (0.8)
STATEWIDE		**1,052**	**327**	**1,379**

5.5.1 Ablation type/arrhythmia

The most frequently ablated clinical arrhythmia was atrial fibrillation (pulmonary vein isolation), which accounted for 32% of ablations across all sites. This was followed by atrioventricular nodal re-entry tachycardias (AVNRT) (19%) and atrial flutter (19%).

Age and gender varied depending on the arrythmia ablated. Patients undergoing accessory pathway ablation had a lower median age than those who underwent pulmonary vein isolation or AV node ablation. Furthermore, almost three quarters of patients undergoing pulmonary vein isolation were male which contrasts with the AVNRT cohort which is predominately a female group.

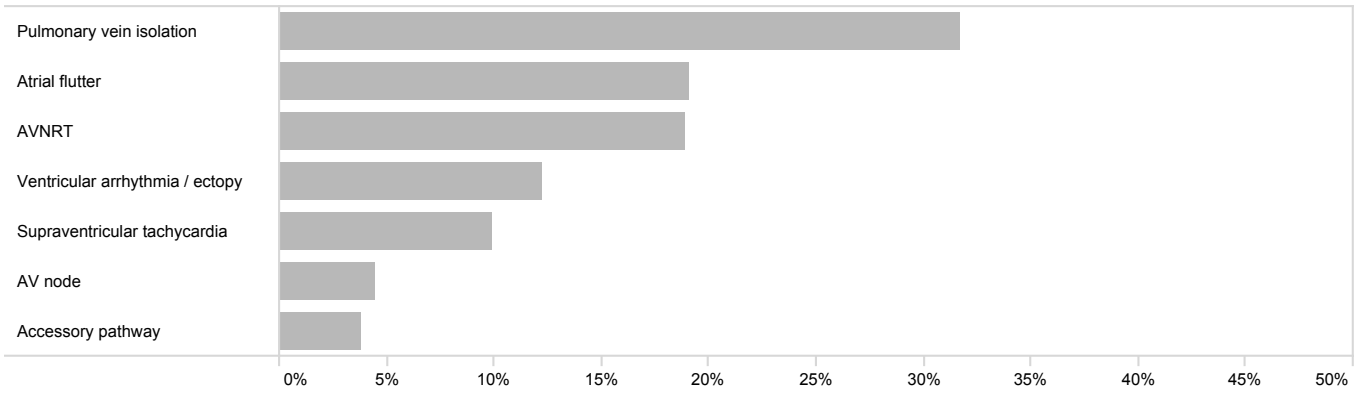


Figure 11: Proportion of arrhythmias ablated

Table 12: Median age and gender by ablation type

Ablation type	Gender	Total cases n (%)	Median age years
Pulmonary vein isolation	Male	270 (73.6)	58
	Female	97 (26.4)	64
Atrial flutter	Male	158 (71.5)	64
	Female	63 (28.5)	65
AVNRT	Male	85 (38.8)	60
	Female	134 (61.2)	47
Ventricular arrhythmia/ectopy	Male	87 (61.7)	61
	Female	54 (38.3)	47
Supraventricular tachycardia	Male	60 (52.2)	43
	Female	55 (47.8)	36
AV node	Male	22 (42.3)	76
	Female	30 (57.7)	74
Accessory pathway	Male	32 (71.1)	33
	Female	13 (28.9)	32
All		**1,160 (100.0)**	**58**

Table 13: Arrhythmia type by site

Site	Ablation type	Count n (%)
CH	Pulmonary vein isolation	29 (2.5)
	AVNRT	17 (1.5)
	Atrial flutter	16 (1.4)
	AV node	11 (0.9)
	Supraventricular tachycardia	4 (0.3)
	Ventricular arrhythmia/ectopy	2 (0.2)
TUH	Pulmonary vein isolation	39 (3.4)
	AVNRT	26 (2.2)
	Ventricular arrhythmia/ectopy	25 (2.2)
	Atrial flutter	16 (1.4)
	Supraventricular tachycardia	8 (0.7)
	AV node	8 (0.7)
	Accessory pathway	6 (0.5)
SCUH	Pulmonary vein isolation	71 (6.1)
	Atrial flutter	65 (5.6)
	AVNRT	29 (2.5)
	AV node	18 (1.6)
	Supraventricular tachycardia	15 (1.3)
	Ventricular arrhythmia/ectopy	8 (0.7)
	Accessory pathway	6 (0.5)
TPCH	Pulmonary vein isolation	96 (8.3)
	Ventricular arrhythmia/ectopy	60 (5.2)
	AVNRT	57 (4.9)
	Atrial flutter	45 (3.9)
	Supraventricular tachycardia	36 (3.1)
	Accessory pathway	13 (1.1)
	AV node	4 (0.3)
RBWH	Pulmonary vein isolation	40 (3.4)
	AVNRT	34 (2.9)
	Atrial flutter	32 (2.8)
	Supraventricular tachycardia	20 (1.7)
	Ventricular arrhythmia/ectopy	17 (1.5)
	Accessory pathway	6 (0.5)
	AV node	1 (0.1)
PAH	Pulmonary vein isolation	55 (4.7)
	AVNRT	36 (3.1)
	Atrial flutter	28 (2.4)
	Ventricular arrhythmia/ectopy	21 (1.8)
	Supraventricular tachycardia	20 (1.7)
	Accessory pathway	11 (0.9)
	AV node	6 (0.5)
GCUH	Pulmonary vein isolation	37 (3.2)
	AVNRT	20 (1.7)
	Atrial flutter	19 (1.6)
	Supraventricular tachycardia	12 (1.0)
	Ventricular arrhythmia/ectopy	8 (0.7)
	AV node	4 (0.3)
	Accessory pathway	3 (0.3)
STATEWIDE		**1,160 (100.0)**

5.6 Other procedures

The most common other procedure was cardioversion (82%). Variations in clinical practice across sites can be observed here with not all cardioversions performed being carried out in the electrophysiology laboratory environment or documented using the QCOR module.

Table 14: Other procedures

	Total n	Cardioversion n (%)	Drug challenge n (%)	Other procedure n (%)	Pericardiocentesis n (%)
CH	160	139 (86.9)	12 (7.5)	4 (2.5)	5 (3.1)
TUH	140	130 (92.9)	3 (2.1)	7 (5.0)	–
MBH	10	10 (100.0)	–	–	–
SCUH	9	1 (11.1)	5 (55.6)	1 (11.1)	2 (22.2)
TPCH	11	–	5 (45.5)	3 (27.3)	3 (27.3)
RBWH	26	13 (50.0)	5 (19.2)	8 (30.8)	–
PAH	64	55 (85.9)	4 (6.3)	5 (7.8)	–
GCUH	4	–	1 (25.0)	3 (75.0)	–
STATEWIDE	**424**	**348 (82.1)**	**35 (8.3)**	**31 (7.3)**	**10 (2.4)**

6 Procedural complications

Complications are a well-known, but rare outcome following any medical procedure or intervention. Some complications are more severe than others with a wide range of management options. The summary of complications below denotes events observed during and post procedure. The QCOR electrophysiology application is predominantly utilised for procedural detail reporting and as such, documentation of peri and post-procedural complications is the responsibility of site practitioners.

The complication rates for procedures are reflected as the proportion of the total number of device and electrophysiology procedures respectively. On some rare occasions, the development of an intraprocedural complication such as coronary sinus dissection necessitated a change of procedure type from BiV implant/upgrade to a non BiV device procedure. In these instances, complications are reported against the final procedure type.

The overall device procedure complication rate was 0.9%, while electrophysiology procedures had a 1.3% complication rate.

Table 15: Cardiac device procedure complications

Procedure type	Complication	Total n (%)
Pacemaker implant/generator change	Lead complication	2 (0.1)
	Pericardial effusion with tamponade	2 (0.1)
	Vascular injury	2 (0.1)
	Coronary sinus dissection	1 (0.1)
	Pericardial effusion without tamponade	1 (0.1)
	Other	1 (0.1)
ICD implant/generator change/upgrade	Cardiac arrest	1 (0.2)
	Coronary sinus dissection	1 (0.2)
	Haemodynamic instability	1 (0.2)
	Drug reaction	1 (0.2)
	Pericardial effusion with tamponade	1 (0.2)
BIV ICD implant/generator change/upgrade	Cardiac arrest	6 (1.9)
	Coronary sinus dissection	3 (1.0)
	Pneumothorax	1 (0.3)
	Haemodynamic instability	1 (0.3)
BIV pacemaker implant/generator change/upgrade	Coronary sinus dissection	1 (0.9)
Lead revision/replacement/pocket revision	Vascular injury	1 (1.0)
	Lead complication	1 (1.0)
Temporary pacing system	Drug reaction	1 (2.5)
	Conduction block	1 (2.5)
All		**30 (0.9)**

Table 16: Electrophysiology procedure complications by study type and complexity

Procedure type	Complexity	Complication	Total n (%)
Electrophysiology study	Complex EP	Pericardial effusion with tamponade	1 (0.8)
		Cardiac arrest	1 (0.8)
		Other	1 (0.8)
Cryotherapy ablation	Complex EP	Phrenic nerve injury	3 (1.9)
Radiofrequency ablation	Standard EP	Pericardial effusion with tamponade	1 (0.4)
	Complex EP	Pericardial effusion with tamponade	9 (1.2)
		Conduction block	2 (0.3)
All			**18 (1.3)**

7 Clinical indicators

Clinical indicators are important measures of the clinical management and outcomes of patient care. An indicator that is clinically relevant and useful should highlight specific issues that may require attention or signal areas for improvement. Rate-based indicators typically identify the rate of occurrence of an event. There is emerging recognition that a capacity to evaluate and report on quality is a critical building block for system-wide improvement of healthcare delivery and patient outcomes.

The quality and safety indicators which have been nominated by the QCOR Electrophysiology and Pacing Committee are outlined below.

Table 17: Electrophysiology and pacing clinical indicators

Clinical indicator	Description
1	Waiting time from booking date to procedure by case category
2	Procedural tamponade rates
3	Reintervention within one year of procedure date due to cardiac device lead dislodgement
4	Rehospitalisation within one year of procedure due to infection resulting in loss of the device
5	12 month all-cause mortality for cardiac device procedures

7.1 Waiting time from referral date to procedure by case category

Waiting times for clinical interventions and investigations are an important metric for monitoring service provision and identifying potential unmet need. This clinical indicator examines the waiting time for various cardiac device procedure types. Specifically, the median wait time from the date the procedure was referred to the date of the case. For the purpose of this indicator, procedures classed as elective (not performed as part of an acute admission) are examined.

The adverse consequences of treatment delay are well known and include deterioration in the condition for which treatment is awaited, the loss of utility from delay (especially if treatment can relieve significant disability), a rise in the costs of total treatment, accumulation of any loss of income from work, and, as an extreme outcome, death.

An important distinction exists between the waiting time of the patients booked for their procedure and those who are referred for specialist opinion and subsequent treatment. As this indicator examines the wait time from booking date to case date, it is reflective of system performance that is specifically focused on electrophysiology and pacing demand and need.

7.1.1 Elective pacemaker

Examination of the waiting time for elective pacemaker procedures is below. Of the 282 cases with complete data, the median wait time was two days. There were one quarter of patients waiting more than one month.

Table 18: Elective pacemaker wait time analysis

	Total cases n	Total cases analysed n	Median wait time days	Interquartile range days
STATEWIDE	385	282	2	0–232

7.1.2 Elective ICD wait time and proportion within 28 days

This analysis examines the waiting time for elective ICD procedures and the proportion adhering to the benchmark of 28 days or less.

Table 19: Elective ICD wait time analysis

	Total cases n	Total cases analysed n	Median wait time days	Interquartile range days	Met target %
STATEWIDE	236	182	21	0–316	56.0

7.1.3 Standard ablation

Waiting times for standard ablation procedures are presented below. Of the 152 cases eligible for analysis, the median wait time was 99 days.

Table 20: Elective standard ablation wait time analysis

	Total cases n	Total cases analysed n	Median wait time days	Interquartile range days
STATEWIDE	179	152	99	43–1084

7.1.4 Complex ablation with proportion within 180 days or less

Complex ablations are defined as cases using three-dimensional mapping technology or involving ventricular arrhythmia or pulmonary vein isolation. This indicator examines the waiting time for these procedures and the proportion adhering to the benchmark of 180 days or less.

A median wait time of 78 days was observed, with a large interquartile range demonstrating there are a number of patients with considerably long waits.

Table 21: Elective complex ablation wait time analysis

	Total cases n	Total cases analysed n	Median wait time days	Interquartile range days	Met target %
STATEWIDE	797	577	78	22–1307	77.6

7.2 Procedural tamponade rates

Cardiac tamponade is a known complication of cardiac device and electrophysiology procedures. This indicator examines the rate of procedural pericardial tamponade in these procedure categories. As pericardial tamponade is a clinical diagnosis, this indicator explicitly reports those patients with this specific diagnosis and does not include those patients with the diagnosis or finding of pericardial effusion.

Table 22: Procedural tamponade analysis

Procedure category	Total cases analysed n	Procedural tamponade observed n	Procedural tamponade rate %
Device	3,500	3	<0.1
EP	1,345	10	0.7
All	**4,837**	**13**	**0.3**

7.3 Reintervention within one year of procedure date due to cardiac device lead dislodgement

This indicator identifies the number of cases where lead dislodgement was observed within one year of lead insertion. The cases included in this indicator were all new device implants or upgrades where a new lead/s had been implanted and a lead revision or replacement was subsequently required due to dislodgement. Index implant procedures were cases performed within Queensland Health implanting facilities in the 2020 calendar year.

The analysis found 48 cases (2.2%) where reintervention was required within 12 months of the index procedure. There were 25 right ventricular lead dislodgements, 17 right atrial, 4 left ventricular and two other locations.

These results compare similarly with international cohorts, where observed dislodgement rates for pacemaker system implants vary from 1.0% to 2.7%.[45]

Table 23: Reintervention due to lead dislodgement analysis

	Cases analysed n	12 month lead dislodgement n	12 month lead dislodgement rate %	Median time to dislodgement days	Interquartile range days
Eligible 2020 device cases	2,204	48	2.2	7	1–78

7.4 Rehospitalisation within one year of procedure due to infection resulting in loss of the device system

One of the most serious long-term complications related to mortality and morbidity for patients with cardiac implantable electronic devices is infection. Complete removal of all hardware is the recommended treatment for patients with established device infection because infection relapse rates due to retained hardware are high. For this indicator, implant cases where new devices or leads were implanted form the cohort.

A system loss rate of 0.4% was observed at 12 months post procedure. This is reassuring when compared to international literature which suggests infection rates necessitating explant of approximately 2.4%.[46]

Table 24: Rehospitalisation with device loss analysis

	Cases analysed n	12 month system loss due to infection n	12 month system loss rate %
Eligible 2020 device cases	2,741	11	0.4

7.5 12 month all-cause mortality for cardiac device procedures

The all-cause unadjusted mortality rate following cardiac device procedure was 5.3%. To allow complete follow up over 12 months, these outcomes are reported for the previous 2020 patient cohort.

When interpreting this figure, it is important to note patients undergoing cardiac device procedures are often of advanced age (median age 75 years old). In addition, many patients have advanced symptomology such as advanced heart failure, or most likely suffering from multiple underlying risk factors or comorbidities.

Table 25: 12 month all-cause unadjusted mortality for cardiac device procedures

	Cases analysed n	12 month mortality observed n	12 month mortality rate %	Median age at procedure years	Interquartile range years
Any BiV procedure	343	20	5.8	71	62–77
ICD procedure	582	13	2.2	63	53–72
Pacemaker procedures	2,031	125	6.2	78	71–85
All 2020 device cases	**2,956**	**158**	**5.3**	**75**	**65–82**

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Electrophysiology and Pacing Audit

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Glossary

6MWT	Six Minute Walk Test
ACC	Aristotle Comprehensive Complexity
ACEI	Angiotensin Converting Enzyme Inhibitor
ACP	Advanced Care Paramedic
ACS	Acute Coronary Syndromes
AEP	Accredited Exercise Physiologist
ANZCORS	Australia and New Zealand Congenital Outcomes Registry for Surgery
ANZSCTS	Australian and New Zealand Society of Cardiac and Thoracic Surgeons
AQoL	Assessment of Quality of Life
AUC	Area Under Curve
ARB	Angiotensin II Receptor Blocker
ARF	Acute Rheumatic Fever
ARNI	Angiotensin Receptor-Neprilysin Inhibitors
ASD	Atrial Septal Defect
AV	Atrioventricular
AVNRT	Atrioventricular Nodal Re-entry Tachycardia
BCIS	British Cardiovascular Intervention Society
BiV	Biventricular
BMI	Body Mass Index
BMS	Bare Metal Stent
BNH	Bundaberg Hospital
BSSLTx	Bilateral Sequential Single Lung Transplant
BVS	Bioresorbable Vascular Scaffold
CABG	Coronary Artery Bypass Graft
CAD	Coronary Artery Disease
CBH	Caboolture Hospital
CCL	Cardiac Catheter Laboratory
CCP	Critical Care Paramedic
CH	Cairns Hospital
CI	Clinical Indicator
CIED	Cardiac Implantable Electronic Device
COVID-19	Coronavirus disease 2019
CPB	Cardiopulmonary Bypass
CR	Cardiac Rehabilitation
CRT	Cardiac Resynchronisation Therapy
CS	Cardiac Surgery
CVA	Cerebrovascular Accident
DAOH	Days Alive and Out of Hospital
DES	Drug Eluting Stent
DOSA	Day of Surgery Admission
DSWI	Deep Sternal Wound Infection
ECG	12 lead Electrocardiograph
ECMO	Extracorporeal membrane oxygenation
ED	Emergency Department
eGFR	Estimated Glomerular Filtration Rate
EP	Electrophysiology
EuroSCORE	European System for Cardiac Operative Risk Evaluation
EWMA	Exponentially Weighted Moving Average
FdECG	First Diagnostic Electrocardiograph
FMC	First Medical Contact
FTR	Failure to Rescue
GAD	Generalized Anxiety Disorder
GCCH	Gold Coast Community Health
GCS	Glasgow Coma Scale
GCUH	Gold Coast University Hospital
GLH	Gladstone Hospital
GP	General Practitioner
GYH	Gympie Hospital
HB	Haemoglobin
HBH	Hervey Bay Hospital (includes Maryborough)
HCC	Health Contact Centre
HF	Heart Failure
HFpEF	Heart Failure with Preserved Ejection Fraction
HFrEF	Heart Failure with Reduced Ejection Fraction
HFSS	Heart Failure Support Service
HHS	Hospital and Health Service
H-L	Hosmer–Lemeshow Test Statistic
HOCM	Hypertrophic Obstructive Cardiomyopathy
HSQ	Health Support Queensland
IC	Interventional Cardiology
ICD	Implantable Cardioverter Defibrillator
IE	Infective Endocarditis
IHT	Inter-hospital Transfer
IPCH	Ipswich Community Health
IVDU	Intravenous Drug Use
LAA	Left Atrial Appendage
LAD	Left Anterior Descending Artery
LCX	Circumflex Artery
LGH	Logan Hospital
LOS	Length Of Stay
LV	Left Ventricle
LVEF	Left Ventricular Ejection Fraction
LVOT	Left Ventricular Outflow Tract
MBH	Mackay Base Hospital
MI	Myocardial Infarction

MIH	Mt Isa Hospital
MKH	Mackay Base Hospital
MRA	Mineralocorticoid Receptor Antagonists
MSSA	Methicillin Susceptible Staphylococcus Aureus
MTHB	Mater Adult Hospital, Brisbane
NCDR	The National Cardiovascular Data Registry
NCR	National Cardiac Registry
NCS	Networked Cardiac Services
NP	Nurse Practitioner
NRBC	Non-Red Blood Cells
NSTEMI	Non ST Elevation Myocardial Infarction
OR	Odds Ratio
OOHCA	Out of Hospital Cardiac Arrest
ORIF	Open Reduction Internal Fixation
PAH	Princess Alexandra Hospital
PAPVD	Partial Anomalous Pulmonary Venous Drainage
PCI	Percutaneous Coronary Intervention
PDA	Patent Ductus Arteriosus
PFO	Patent Foramen Ovale
PHQ	Patient Health Questionnaire
PICU	Paediatric intensive care unit
PROMS	Patient Reported Outcome Measures
QAS	Queensland Ambulance Service
QCCN	Queensland Cardiac Clinical Network
QCOR	Queensland Cardiac Outcomes Registry
QEII	Queen Elizabeth II Jubilee Hospital
QHAPDC	Queensland Hospital Admitted Patient Data Collection
QPCR	Queensland Paediatric Cardiac Research
RBC	Red Blood Cells
RBWH	Royal Brisbane & Women's Hospital
RCA	Right Coronary Artery
RDH	Redcliffe Hospital
RHD	Rheumatic Heart Disease
RKH	Rockhampton Hospital
RLH	Redland Hospital
SCCIU	Statewide Cardiac Clinical Informatics Unit
SCUH	Sunshine Coast University Hospital
SHD	Structural Heart Disease
SMoCC	Self Management of Chronic Conditions
STEMI	ST-Elevation Myocardial Infarction
STS	Society of Thoracic Surgery
TAVR	Transcatheter Aortic Valve Replacement
TIMI	Thrombolysis in Myocardial Infarction
TMVR	Transcatheter Mitral Valve Replacement
TNM	Tumour, Lymph Node, Metastases
TPCH	The Prince Charles Hospital
TPVR	Transcatheter Pulmonary Valve Replacement
TUH	Townsville University Hospital
TWH	Toowoomba Hospital
TXA	Tranexamic Acid
VAD	Ventricular Assist Device
VATS	Video Assisted Thoracic Surgery
VCOR	Victorian Cardiac Outcomes Registry
VF	Ventricular Fibrillation
VSD	Ventricular Septal Defect

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