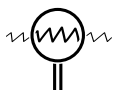
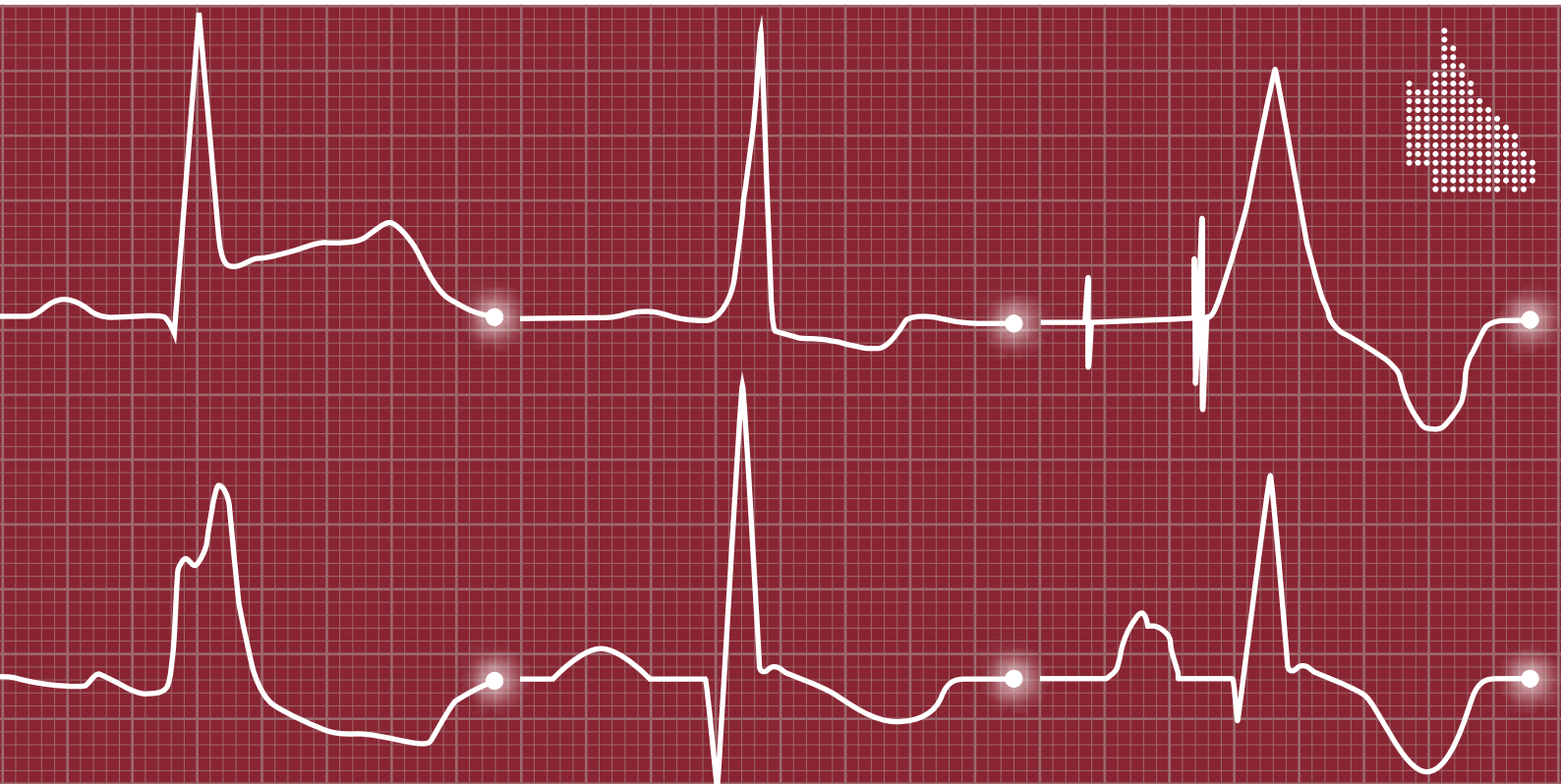


Statewide Cardiac Clinical Network

Queensland Cardiac Outcomes Registry

2019 Annual Report

Cardiac Rehabilitation Audit



Improvement | Transparency | Patient Safety | Clinician Leadership | Innovation



Queensland
Government

Queensland Cardiac Outcomes Registry 2019 Annual Report

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1 Message from the SCCN Chair

We are pleased to present the 2019 Queensland Cardiac Outcomes Registry (QCOR) Annual Report, which marks five years of publication. Yet again, the Report documents the world-class quality of care offered by practitioners within the Queensland public health system. The QCOR program is driven by the passion of Queensland's clinicians to not only report on the quality, performance and outcomes of cardiac services delivered to Queenslanders, but to enable and provide a comprehensive platform to directly support frontline cardiac services and be a driving force for continuous improvement. The result has been collaboration on a statewide scale, with QCOR directly supporting the efforts of hundreds of clinicians across often incredible distances.

The breadth of QCOR is highlighted by the development of a new module to support cardiac outreach services, starting with the Far North Queensland outreach unit in late 2019. Outreach services are an important part of delivering quality care to patients for whom cardiac care is less accessible, due to their remoteness from traditional facility-based services. This initial reporting will be expanded as additional units are established or come online over following years. This Report also shines a spotlight on the new partnership between QCOR and the Queensland Rheumatic Heart Disease (RHD) Registry. Despite being in its infancy, this collaboration has already led to the identification and development of specialised care plans for almost two hundred Queenslanders suffering from RHD. These are outcomes which are seldom linked to traditional research-focused registries and reflect a far greater vision at the core of this clinician-led initiative.

Clinical quality has again continued to be a focus of this report, with several new clinical indicators having been added to these audits for the new year to align with ever-changing international guidelines for the management and treatment of patients. As such, the registry continues to evolve and clinical indicators across all areas of interest will continue to be reviewed and expand accordingly over future years. It is yet again reassuring to see performance of Queensland services strong when compared to these often optimistic benchmarks and targets.

Investment in the collection of clinical data is now recognised as a valuable means of returning on investment and identifying areas of efficiency that subsequently enable cost savings and redirection of health funding to areas of need or emerging clinical technologies. QCOR data has underpinned bulk purchase arrangements and continues to demonstrate the ability to negotiate strongly with industry via commercial processes and ensure that each health funding dollar is spent wisely and carefully. Future processes now have the potential to increase in scope which will drive further financial realisation on investment that compound and grow over time.

The tireless work of Queensland cardiac clinicians and administrative staff must be recognised, not only for delivering high quality clinical outcomes but for their engagement, understanding and enthusiasm for quality clinical processes that are supported by quality data, and we look forward to future expansion that seeks to apply a similar scope and high standard of reporting to echocardiography and structural heart disease.

Dr Rohan Poulter and Dr Peter Stewart

Co-chairs

Statewide Cardiac Clinical Network

2 Introduction

The Queensland Cardiac Outcomes Registry (QCOR) is an ever-evolving clinical registry and quality program established by the Statewide Cardiac Clinical Network (SCCN) 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 improve patient care and support quality improvement activities 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 SCCN 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.

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 Marcus Prior, Informatics Analyst
 Dr Ian Smith, PhD, Biostatistician
 Mr William Vollbon, Manager*

Mr Michael Mallouhi, Clinical Analyst
 Ms Bianca Sexton, Project Manager
 Mr Karl Wortmann, Application Developer

* Principal contact officer/QCOR program lead

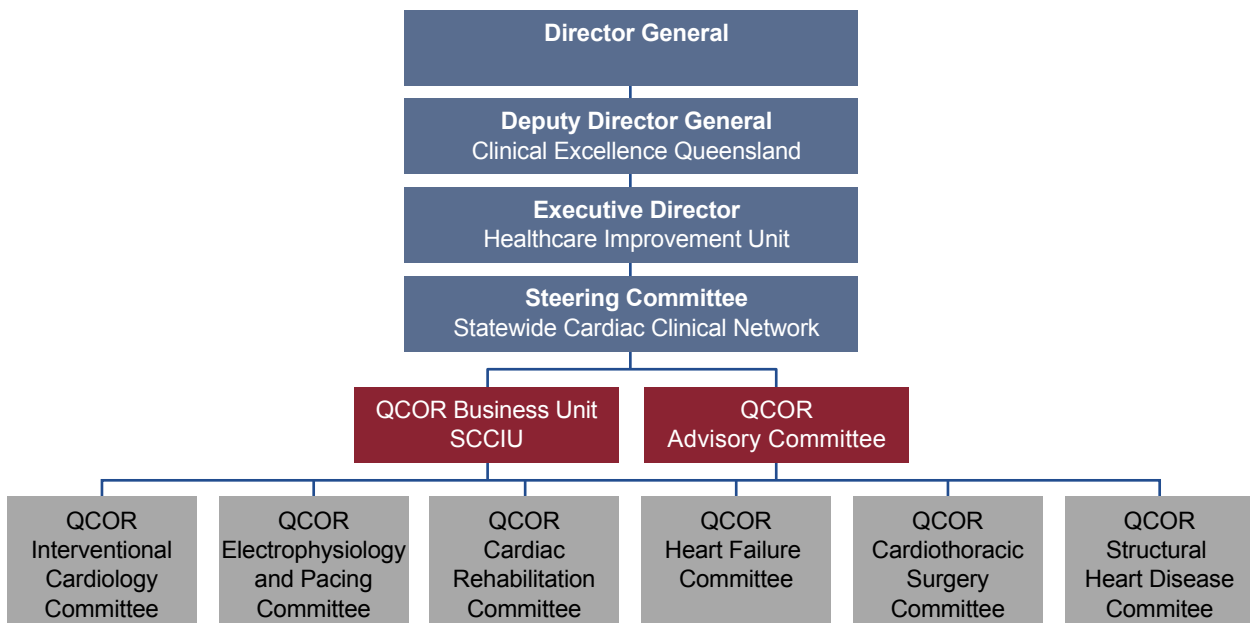
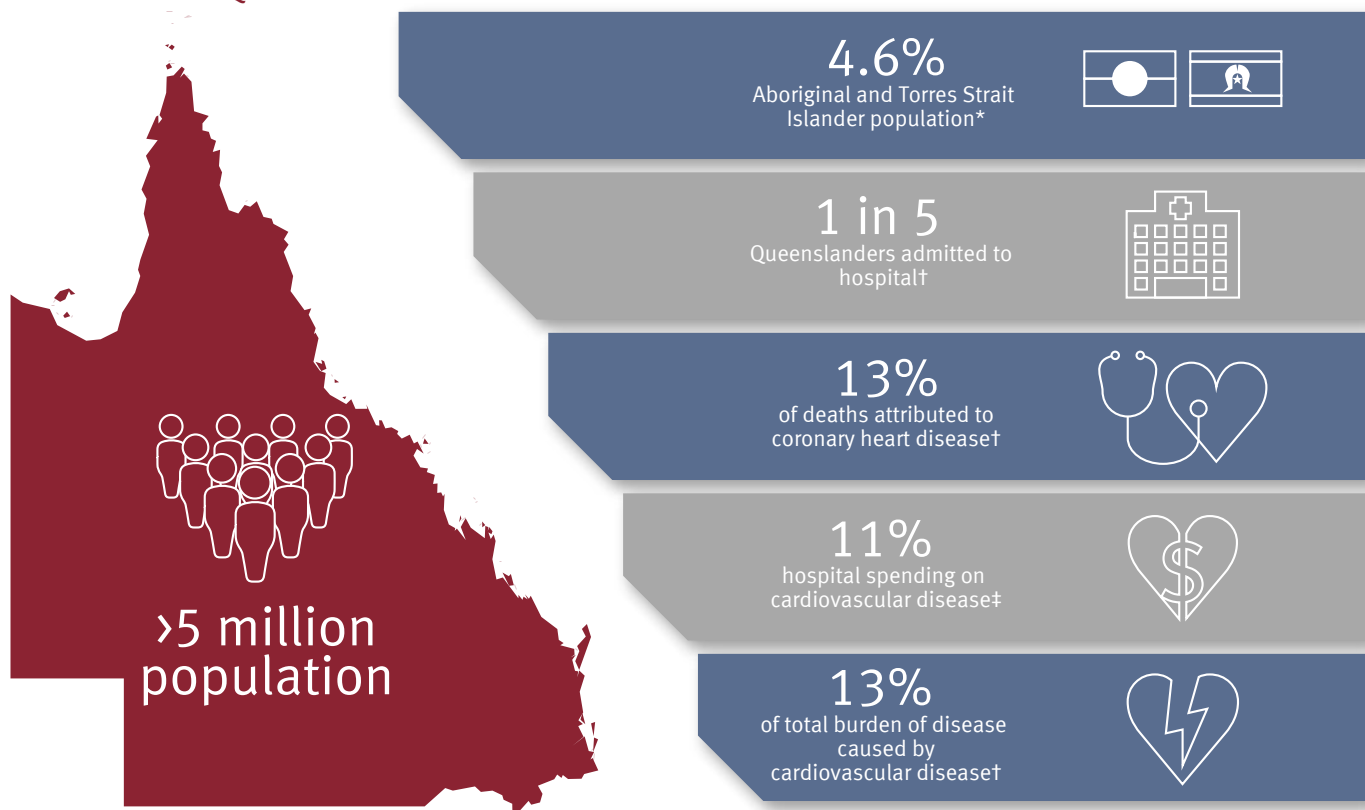


Figure 1: Governance structure

Queensland Cardiac Outcomes Registry

The Health of Queenslanders



Comorbidities



Mortality

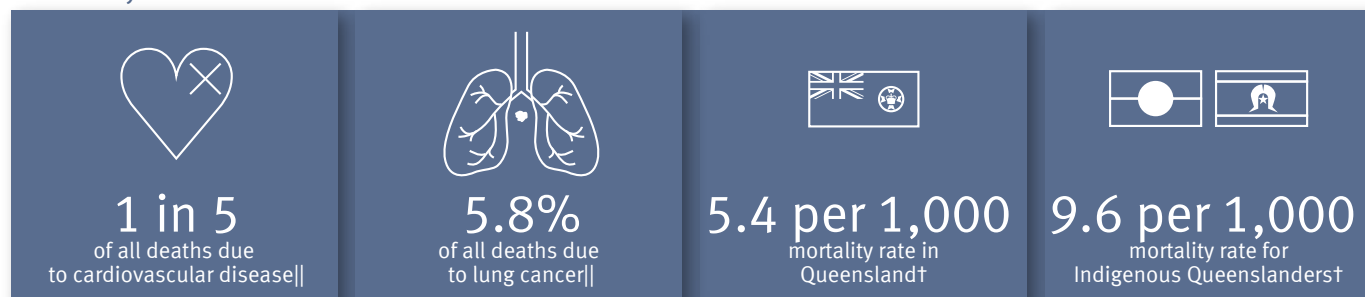


Figure 2: QCOR 2019 infographic

* Australian Bureau of Statistics. (2018). *Estimates of Aboriginal and Torres Strait Islander Australians*, June 2016. Cat. no 3238.055001. ABS: Canberra.

† 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 Bureau of Statistics. (2019). *Deaths, Australia, 2018*. Cat. no. 3302.0. ABS: Canberra.

2019 Activity at a Glance

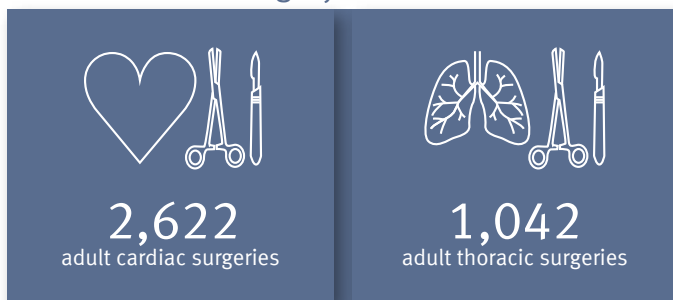
What's New?

Rheumatic heart disease, cardiac outreach and ECG Flash spotlights	Expanded thrombolysis for STEMI analysis
Cardiac surgery EuroSCORE II risk adjustment analysis	Cardiac surgery remoteness investigation
New timely non-acute assessments cardiac rehabilitation indicator	New mineralocorticoid antagonist prescription heart failure indicator

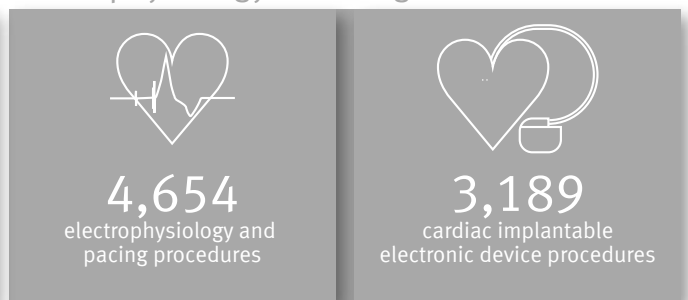
Interventional Cardiology



Cardiothoracic Surgery



Electrophysiology & Pacing

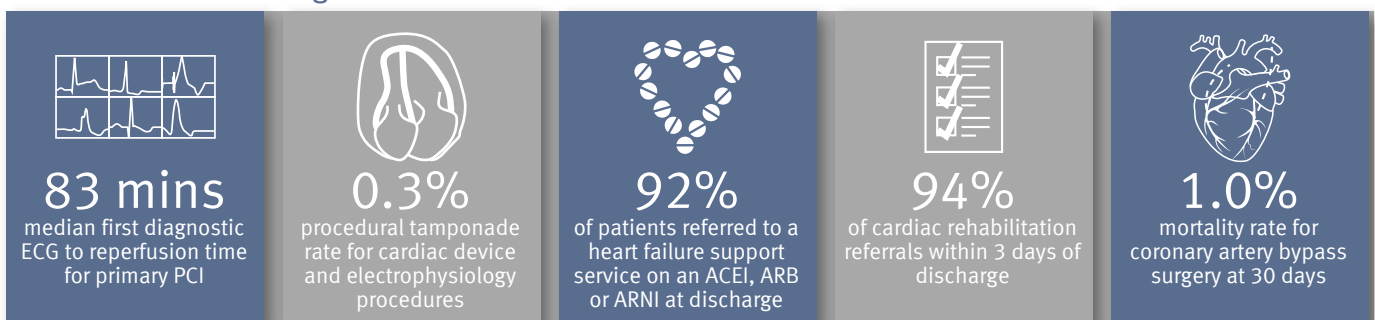


Heart Failure Support Services Cardiac Rehabilitation



Rheumatic Heart Disease

Clinical Indicator Progress



QCOR Yearly Trends

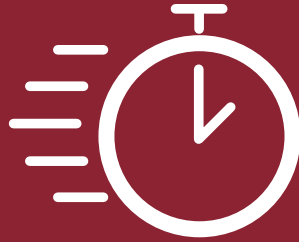
Interventional Cardiology

15,615
cases in 2019
– up from 15,293 in 2017



5,002
PCI cases in 2019
– up from 4,867 in 2018

3 minute
improvement in median time to reperfusion
for STEMI PCI
from 2017 to 2019



8%
increase in primary PCI cases meeting
90 minute target for timely reperfusion
– 2017 to 2019

Cardiothoracic Surgery

11%
increase in cardiac surgery cases
– 2017 to 2019



23%
increase in thoracic surgery cases
– 2018 to 2019

Electrophysiology & Pacing

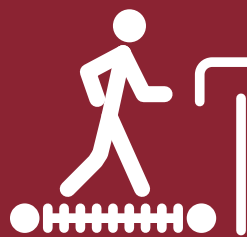
4,654
cases in 2019
– up from 4,474 in 2018



22%
increase in complex EP cases
– 2018 to 2019

Outpatient Support Services

23,000+
cardiac rehabilitation referrals
– 2018 and 2019



17%
increase in new heart failure
support services referrals
– 2017 to 2019

3 Acknowledgements

This collaborative report was produced by the SCCIU, audit lead for QCOR for and on behalf of the Statewide 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.

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- Dr Sugeet Baveja, Townsville University Hospital
- Dr Niranjan Gaikwad, The Prince Charles Hospital
- Dr Paul Garrahy, Princess Alexandra Hospital
- Dr Christopher Hammett, Royal Brisbane & Women's Hospital
- A/Prof Richard Lim, Princess Alexandra Hospital
- Dr Rohan Poulter, Sunshine Coast University Hospital
- A/Prof Atifur Rahman, Gold Coast University Hospital
- Dr Shantisagar Vaidya, Mackay Base Hospital
- Dr Gregory Starmer, Cairns Hospital (Chair)

QCOR Cardiothoracic Surgery Committee

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- Dr Pallav Shah, Townsville University Hospital
- Dr Andrie Stroebel, Gold Coast University Hospital
- Dr Morgan Windsor, Metro North Hospital and Health Service
- Dr Christopher Cole, Princess Alexandra Hospital (Chair)

QCOR Cardiac Rehabilitation Committee

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- Ms Maura Barnden, Metro North Hospital and Health Service
- Ms Jacqueline Cairns, Cairns Hospital
- Ms Yvonne Martin, Chronic Disease Brisbane South
- Dr Johanne Neill, Ipswich Hospital
- Ms Samara Phillips, Statewide Cardiac Rehabilitation Coordinator
- Ms Madonna Prenzler, West Moreton Hospital and Health Service
- Ms Deborah Snow, Gold Coast Hospital and Health Service
- Ms Natalie Thomas, South West Hospital and Health Service
- Mr Gary Bennett, Health Contact Centre (Chair)

Statewide Cardiac Clinical Informatics Unit

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

QCOR Electrophysiology and Pacing Committee

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- Mr Anthony Brown, Sunshine Coast University Hospital
- Mr Andrew Cloughton, Princess Alexandra Hospital
- Dr Naresh Dayananda, Sunshine Coast University Hospital
- Dr Russell Denman, The Prince Charles Hospital
- Mr Braden Dinham, Gold Coast University Hospital
- Ms Sanja Doneva, Princess Alexandra Hospital
- Mr Nathan Engstrom, Townsville University Hospital
- A/Prof John Hill, Princess Alexandra Hospital
- Dr Bobby John, Townsville University Hospital
- Dr Paul Martin, Royal Brisbane & Women's Hospital
- Ms Sonya Naumann, Royal Brisbane & Women's Hospital
- Dr Kevin Ng, Cairns Hospital
- Dr Robert Park, Gold Coast University Hospital

QCOR Heart Failure Support Services Committee

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- Ms Angie Sutcliffe, Cairns Hospital
- Ms Tina Ha, Princess Alexandra Hospital
- Ms Helen Hannan, Rockhampton Hospital
- Ms Annabel Hickey, Statewide Heart Failure Services Coordinator
- Dr Rita Hwang, PhD, Princess Alexandra Hospital
- Dr Kevin Ng, Cairns Hospital
- Ms Robyn Peters, Princess Alexandra Hospital
- Ms Serena Rofail, Royal Brisbane & Women's Hospital
- Dr Yee Weng Wong, The Prince Charles Hospital
- A/Prof John Atherton, Royal Brisbane & Women's Hospital (Chair)

Queensland Ambulance Service

- Dr Tan Doan, PhD
- Mr Brett Rogers

4 Executive summary

This report comprises an account for cases performed in the eight cardiac catheterisation laboratories (CCL) and nine electrophysiology and pacing (EP) facilities, along with five cardiothoracic surgery units operating across Queensland public hospitals in 2019. Referrals to the 21 heart failure support and 57 cardiac rehabilitation services for the management of heart disease have also been included in this Audit.

- 15,615 diagnostic or interventional cases were performed across the eight public CCL facilities in Queensland hospitals. Percutaneous coronary intervention (PCI) was performed in 5,002 of these cases.
- Patient outcomes following PCI remain encouraging. The 30 day mortality rate following PCI was 2.2%, and of the 108 deaths observed, 77% were classed as either salvage or emergency PCI.
- When analysing the ST segment elevation myocardial infarction (STEMI) patient cohort, the median time from first diagnostic electrocardiograph (ECG) to reperfusion and arrival at PCI facility to reperfusion was observed at 83 minutes and 42 minutes.
- Across the four sites with a cardiac surgery unit, a total of 2,622 cases were performed including 1,567 coronary artery bypass grafting (CABG) and 1,104 valve procedures.
- The observed rates for cardiac surgery mortality and morbidity are either within the expected range or better than expected, depending on the risk model used to evaluate these outcomes. This is consistent with the results of previous audits.
- Approximately 4% of all cardiac surgical patients resided in remote or very remote Australia.
- Patients in Outer Regional and Remote/Very Remote areas were two to four times more likely to have a postoperative length of stay >14 days (Outer Regional: OR 2.02, $p < 0.01$), Remote/Very Remote: OR 4.05, $p < 0.001$).
- Patients residing outside of a Major City of Australia had a higher likelihood of having a length of stay <6 days (Inner Regional: OR 1.61 $p = 0.009$, Outer Regional: OR 1.45 $p = 0.044$).
- A total of 1,042 thoracic surgery cases were performed across the five public hospitals providing thoracic surgery services in 2019. Almost a quarter (24%) of surgeries followed a preoperative diagnosis of primary lung cancer, whereas pleural disease accounted for nearly a third of all cases (32%).
- At the nine public Electrophysiology and Pacing (EP) sites, a total of 4,654 cases were performed, which included 3,189 cardiac device procedures and 1,058 electrophysiology procedures. This year's EP Audit sees the addition of Toowoomba Hospital, which began direct entry in November 2019.
- The EP clinical indicator audit identified a median wait time of 81 days for complex ablation procedures, and 32 days for elective implantable cardioverter defibrillator (ICD) implants. Meanwhile the median wait time for a standard ablation procedure was 117 days.
- There was a total of 11,547 referrals to one of the 57 public cardiac rehabilitation (CR) services in 2019. Almost three quarters of referrals (74%) followed an admission at a public hospital in Queensland.
- The vast majority of referrals to CR were created within three days of the patient being discharged from hospital (94%), while over half of patients went on to complete an initial assessment by CR within 28 days of discharge (56%). This performance measure is consistent with the data observed in 2018.
- There were 5,304 new referrals to a heart failure support service in 2019. Clinical indicator benchmarks were achieved for timely follow-up of referrals and appropriate medication prescriptions as per clinical guidelines for all medications except mineralocorticoid receptor antagonists.

5 Cardiac Outreach Spotlight

The development and implementation of the QCOR Cardiac Outreach module is an initiative of the Statewide Cardiac Clinical Network in partnership with the Healthcare Improvement Unit and the Health Minister's 'Rapid Results Program'.

People living in rural and remote locations (such as North Queensland) and Aboriginal and Torres Strait Islander people are admitted to hospital for cardiac related conditions at two to three times the rate of the broader Queensland population*. Equitable access to health care across Queensland can be a challenge due to its vast size and dispersed population, which can require patients to travel significant distances to access cardiac care. Furthermore, due to the vast distances this patient cohort need to travel to access tertiary care, their healthcare journey is often fragmented contributing to poorer access and health outcomes. The foundation of this model is based on a coordinated approach which supports the patient journey by linking to services. Through the outreach model, patients in a remote setting can access support from a team of practitioners much closer to home including a specialist cardiologist, cardiac scientists, nurses and health workers.

As well as seeing a cardiologist for initial consultation, review or follow-up, patients attending a cardiac outreach clinic can have specialised tests such as echocardiograms and stress tests, as well as the potential for referral to tertiary care for more complex procedures. Close links with other Queensland Health outpatient services such as cardiac rehabilitation programs or heart failure support services are also an advantage of this model of care. These services are further supplemented by telehealth and remote cardiac testing capabilities.

Through 2018–2019, the SCCIU and Rapid Results Program collaborated with staff and subject matter experts across the various Queensland Health cardiac outreach units to develop a new QCOR module specifically oriented towards this work. The new QCOR Outreach Module establishes a foundation for cardiac outreach care coordination across the health system, and a reporting platform which allows an unprecedented amount of information to be available for an area otherwise characterised by relative paucity of data.

The QCOR Outreach Module provides Queensland Health practitioners with:

- Patient-centric clinical case management – tailored towards the outreach setting,
- Improved follow up and activity-based reporting for outreach patients and services,
- Reporting of outreach-specialty clinical indicators and other key performance measures, and
- Potential for future integration with other Queensland Health and QCOR systems.

The new QCOR Outreach Module was deployed from 2019 as part of a staggered rollout, with the Far North Queensland Outreach Unit as the first site commencing in November 2019. Further units have been added to the system over the following year as either new outreach programs are established or existing services transition to the system.

Table 1: QCOR cardiac outreach module – participating outreach units

Cardiac outreach unit	Hub facility	Commenced date
Far North Queensland Cardiac Outreach	Cairns Hospital	November 2019
Townsville and North West Queensland Cardiac Outreach	Townsville University Hospital	January 2020
Princess Alexandra Hospital Cardiac Outreach	Princess Alexandra Hospital	July 2020
Toowoomba Hospital Cardiac Outreach	Toowoomba Hospital	August 2020
Ipswich Hospital Cardiac Outreach	Ipswich Hospital	November 2020

* Australian Commission on Safety and Quality in Health Care (ACSQHC) and Australian Institute of Health and Welfare. (2017). The second Australian atlas of healthcare variation. Sydney: ACSQHC.

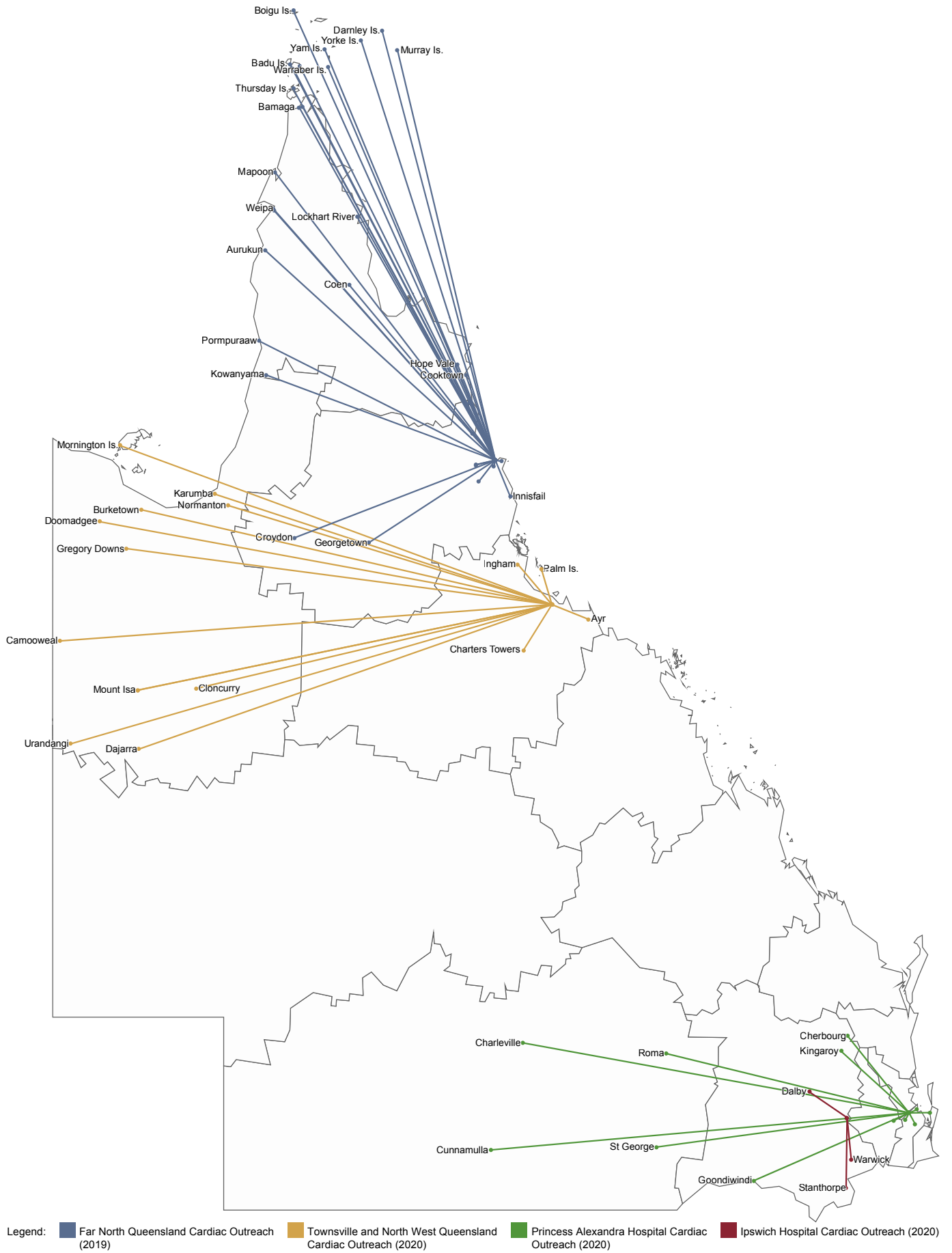


Figure 3: Cardiac outreach hub and spoke locations

6 ECG Flash Spotlight

ECG Flash, a Statewide Cardiac Clinical Network initiative, aims to give rural and remote clinicians 24/7 access to urgent specialist cardiology advice. When a patient presents at emergency and an ECG is taken, the system lets clinicians send time critical, difficult-to-interpret ECGs straight to an on call cardiologist for rapid analysis. The on call cardiologist receives a digital copy of the ECG to review and will call the treating clinician back to provide treatment advice. ECG Flash has been implemented to use a hub and spoke model of care where larger facilities with specialist staff cardiologists act as the hub to smaller regional and remote centres.

Regional and remote sites (spoke sites) use a digitally enabled ECG cart which automatically transmits all ECGs taken to an enterprise clinical data storage application. This digital storage solution for ECGs is available at each site and from there clinicians can selectively transmit time critical, difficult-to-interpret ECGs directly to the on call cardiologist at their referring tertiary hospital (hub site). They are also able to access ECGs taken at other participating hospitals within their HHS, allowing them to have access to patients' ECGs across multiple facilities.

In 2019, there were 30 rural sites utilising the ECG Flash solution and they sent 252 ECGs through to five receiving cardiology departments.

Implementation at an additional 51 rural sites and 3 hub sites is planned for 2020. Further use of ECG Flash data to complement existing QCOR data collections will be the focus for future work.

Table 2: ECG Flash – participating hub sites

ECG Flash hub	Commenced date	Number of spoke sites 2019	Number of spoke sites 2020
Princess Alexandra Hospital	August 2018	9	9
Cairns Hospital	September 2018	10	19
Mackay Base Hospital	February 2019	7	7
Townsville University Hospital	June 2019	4	6
Bundaberg Hospital	February 2020	–	8

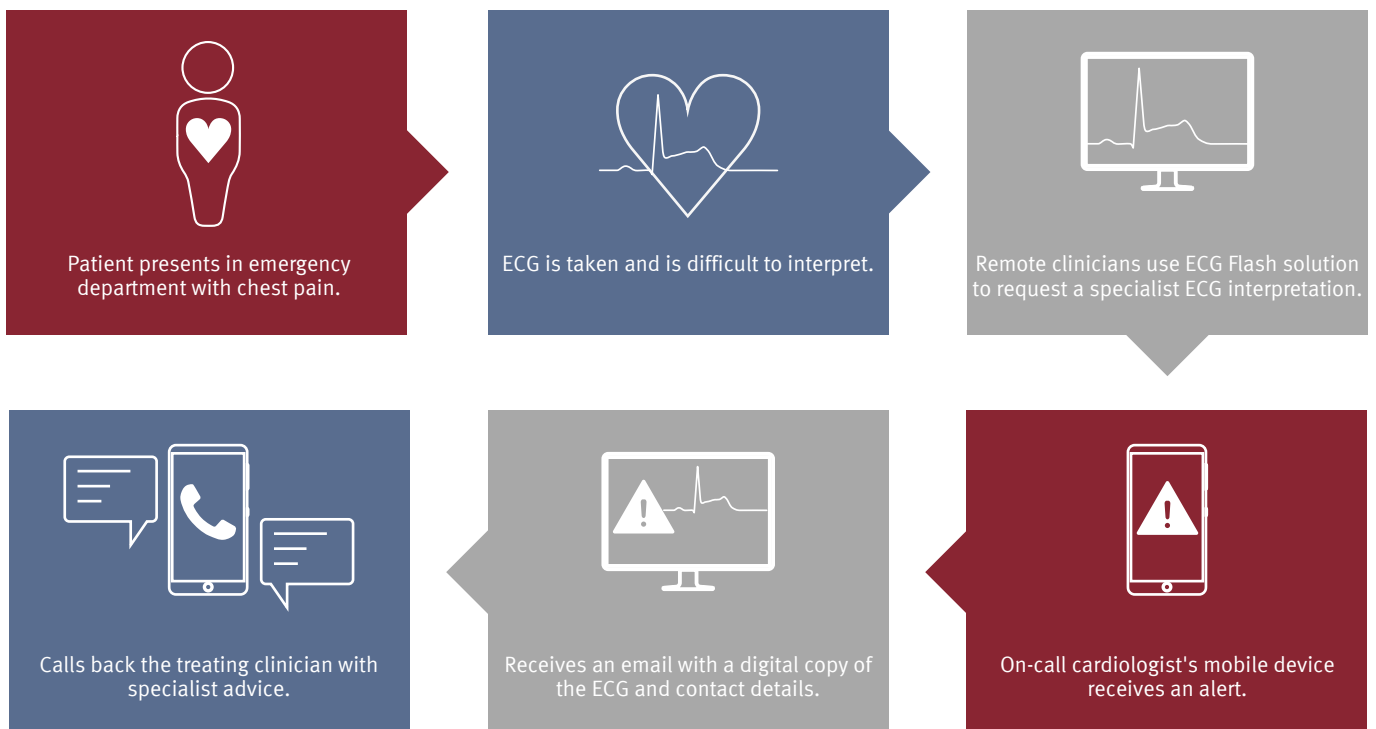


Figure 4: ECG Flash process flow

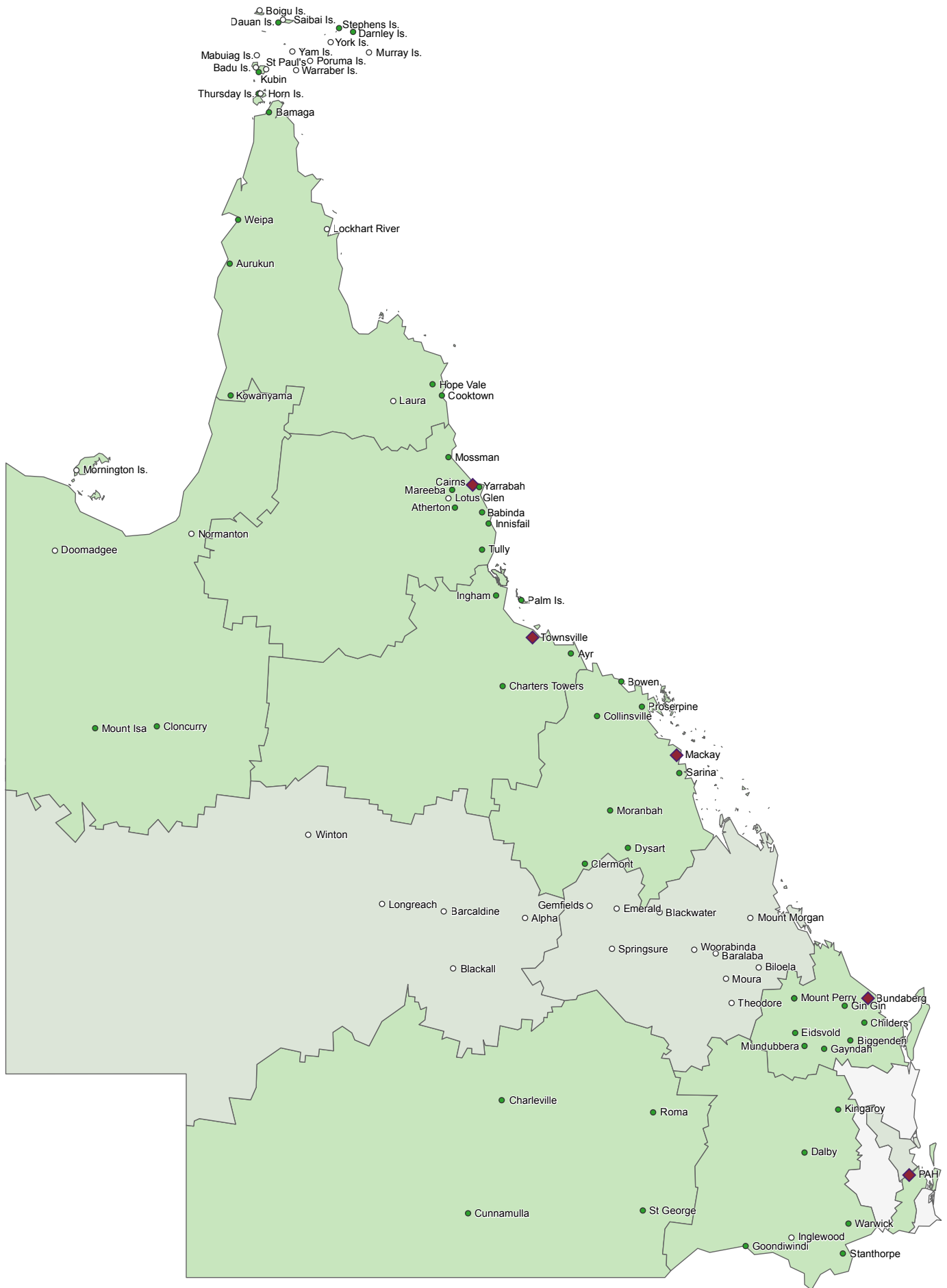


Figure 5: ECG Flash hub and spoke locations as at November 2020

7 RHD Spotlight

7.1 Background

The Queensland rheumatic heart disease register and control program (RHD Program) was established in 2009 to address rheumatic heart disease (RHD) as the leading cause of cardiovascular disparity between Aboriginal and Torres Strait Islander peoples and Australians of other descent. The program supports existing healthcare services with client care by maintaining a skilled health workforce, promoting culturally appropriate care, supporting education and health promotion for patients and communities, and working with patients and primary health care staff to optimise timely delivery of secondary prophylaxis.

The program further advocates for and supports activities aimed at preventing, identifying, managing and treating acute rheumatic fever (ARF) and RHD, and promotes primordial, primary and secondary prevention aimed at preventing initial episodes of ARF and development of RHD. This includes the development and distribution of ARF/RHD education and health promotion-focused resources such as client and family educational material to improve health literacy, and information on diversionary therapy aids and reward/incentive products.

Additional strategies are being undertaken to enhance the quality of support the program provides including, creation and distribution of reports for outreach clinics, HHS, service providers and health service planning managers. Individual client information and clinical advice is being provided to healthcare providers including, diagnostic criteria, notification process, treatment and follow-up requirements (point of care information).

The World Health Organization recommends a coordinated, public health approach in areas where there are substantial populations with ARF or RHD. The Australian Guideline for prevention, diagnosis and management of ARF and RHD (3rd edition)* states that 'Comprehensive RHD control programs which span action in the social and environmental determinants of health and primary and secondary prevention of ARF, can provide an effective approach to reducing the burden of RHD.' It is with this structure and suggested methodology that the Queensland RHD Program has been established.

7.2 The disease

ARF is an acute illness causing a generalised, autoimmune inflammatory response following repeated exposure to and infection with Group A Streptococcal bacteria. The inflammatory response occurs predominantly in the heart, joints, brain and skin. Clients typically present with a history of a sore throat and/or infected skin sores, pain and swelling in one or more joints, fever, malaise, a skin rash, chorea (jerky, uncoordinated movements of the hands, feet, tongue and face) and sometimes chest pain. Clinical investigations may identify prolonged atrioventricular junctional arrhythmias on an electrocardiogram, a heart murmur or carditis.

Once the initial acute illness has resolved, ARF leaves no lasting damage to the joints or skin however, any remaining damage to the brain can cause ongoing mental health and neurological issues. Similarly, anatomical changes occur affecting the heart valves with the ensuing clinical sequelae known as RHD. Repeated episodes of ARF inevitably lead to the development or worsening of RHD.

Severe RHD usually requires surgical intervention in the form of valve repair and/or replacement. Individuals receiving mechanical valves require lifelong anticoagulation. Every year, RHD kills people and devastates lives, particularly those of young Aboriginal and Torres Strait Islander Queenslanders. The disease process begins with symptoms as modest as a sore throat or skin infection which can be easily treated with common antibiotics, however if left untreated, it can lead to stroke and valve disease requiring cardiac surgery, often in an adolescent population. Efforts to prevent ARF and RHD currently centre on primary prevention (of the sore throat or skin infection), and secondary prevention via delivery of secondary prophylactic antibiotics to prevent recurrent episodes.

7.3 Disease demographics

Across Australia, sustained improvements to the conditions in which we are born, grow, live and work have permanently reduced the rates of preventable infectious diseases. Unfortunately, this progress is inequitable and Aboriginal and Torres Strait Islander people have not benefitted from the same improvements in health and living outcomes as the rest of Australia. Household disadvantage, poor-quality living conditions, poverty and overcrowding all contribute to health inequalities in at-risk populations.

ARF and RHD are diseases that exemplify the ‘gap’ between Aboriginal and Torres Strait Islander peoples and Australians of other descent. In 2017, there was a rate of 111 ARF cases per 100,000 Aboriginal and Torres Strait Islander Australians whereas for Australians of other descent the rate was 1 per 100,000. (Australian Institute of Health and Welfare (AIHW) 2019).[†] Between the ages of 5 years to 24 years, Aboriginal and Torres Strait Islander peoples are three times more likely to die from RHD than Australians of other descent.

7.4 The costs of ARF and RHD

Eliminating RHD means preventing all new cases of ARF. Preventing ARF is as simple as early diagnosis and treatment of a Streptococcal infection. This cost is negligible in comparison to the long term management of what would become chronic disease.

ARF and RHD contribute to increased death and disability in Queensland. RHD accrues early in life, with 20% of people on the Queensland RHD Register under 18 years of age and 26% of all ARF and RHD clients having had or will require valvular surgery.

The estimated financial costs of ARF and RHD diagnosis and management are outlined in Table 1.[‡]

Table 3: Costs of diagnosis and management of ARF and RHD

	Child \$	Adult \$
Management of Acute disease requiring hospitalisation		
ARF – Inpatient	12,075	12,912
RHD – Non-Surgical	11,798	9,787
RHD – Surgical	74,915	72,042
ARF/RHD Management (per year)		
ARF with/without mild RHD	2,048	2,048
Severe RHD	3,920	3,920

7.5 Disease prevention

Interventions to eradicate ARF and RHD in Australia require strategies that target the underlying economic, social and environmental conditions. These are structural and health system considerations that include moving away from a silo-based culture and transitioning towards functional multiagency, multidisciplinary teams. By actioning disparities in the environmental, social, cultural and economic determinants of health, primary and secondary prevention strategies for ARF and RHD can be developed. These then lend themselves to effective tertiary care which provides clients with high-quality medical and surgical management of their RHD.

* RHD Australia (ARF/RHD writing group) (2020). *The 2020 Australian guideline for prevention, diagnosis and management of acute rheumatic fever and rheumatic heart disease* (3rd edition). Retrieved from <https://www.rhdaustralia.org.au/arf-rhd-guideline>

† Australian Institute of Health and Welfare (2020). *Acute rheumatic fever and rheumatic heart disease in Australia, 2014–2018*. Retrieved from <https://www.aihw.gov.au/reports/heart-stroke-vascular-diseases/acute-rheumatic-fever/contents/summary>

‡ Wyber, R., Noonan, K., Halkon, C., Enkel, S., Ralph, A., ... Carapetis, J. (2020.). *The RHD Endgame Strategy: A Snapshot. The blueprint to eliminate rheumatic heart disease in Australia by 2031*. Perth: The END RHD Centre of Research Excellence, Telethon Kids Institute

7.6 Queensland RHD Program and QCOR

In September 2018, RHD became a notifiable condition in Queensland. Since April 2019, QCOR and the RHD program have collaborated to enhance the reporting of all RHD-identified echocardiograms to the RHD register for Cairns, Townsville, Mackay and Rockhampton hospitals. Interaction between the RHD Register and QCOR acts as a supporting notification mechanism, assisting to identify those patients who have not previously been or were escalated for notification of RHD at the time of their clinical encounter.

Through QCOR, reporting of positive RHD findings by echocardiography has resulted in 172 previously unknown clients with RHD being added to the Register.

Table 4: QCOR echocardiography module RHD notifications

	Positive RHD findings n	Unknown RHD clients identified n
Cairns	494	66
Townsville	150	62
Mackay	47	26
Rockhampton	28	18
Total	719	172

Through the QCOR cardiac surgery RHD notification reports, seven previously unknown clients requiring surgery for their RHD have been added to the RHD register since October 2019.

Table 5: QCOR cardiac surgery module RHD notifications

	Positive RHD findings n	Unknown RHD clients identified n
Statewide cardiac surgery	14	7

8 Facility profiles

8.1 Cairns Hospital

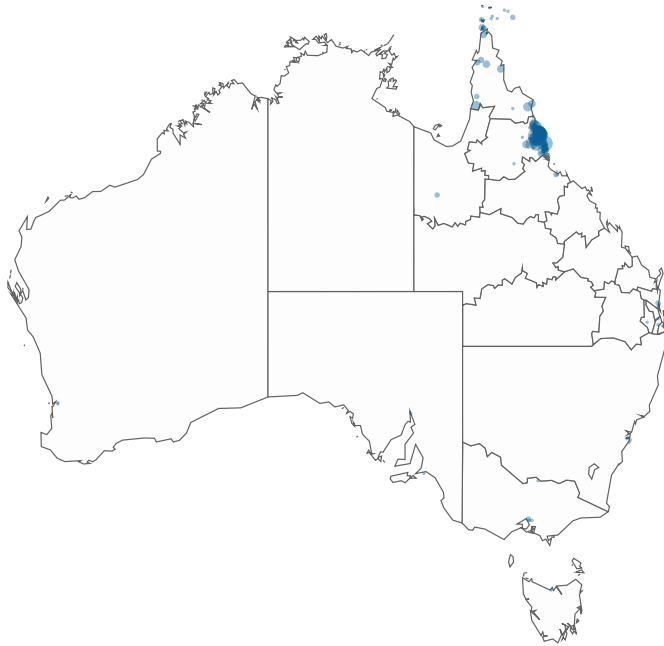


Figure 6: Cairns Hospital

- 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

8.2 Townsville University Hospital

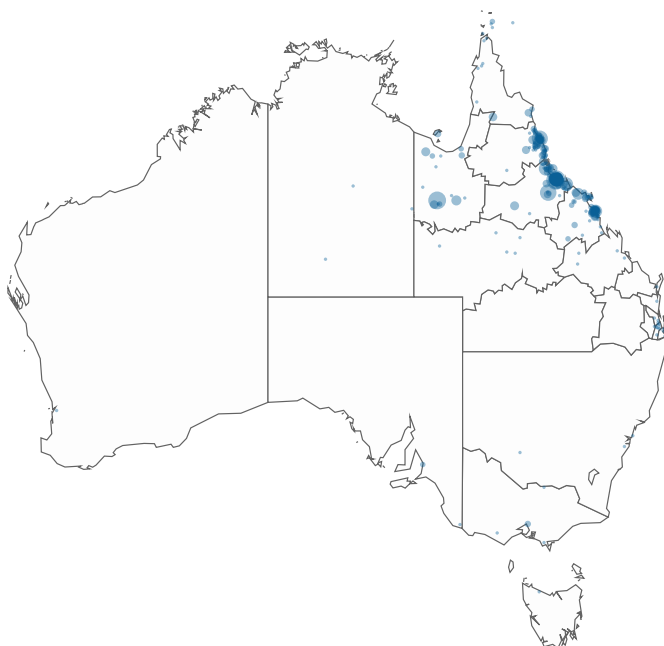


Figure 7: Townsville University Hospital

- 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

8.3 Mackay Base Hospital

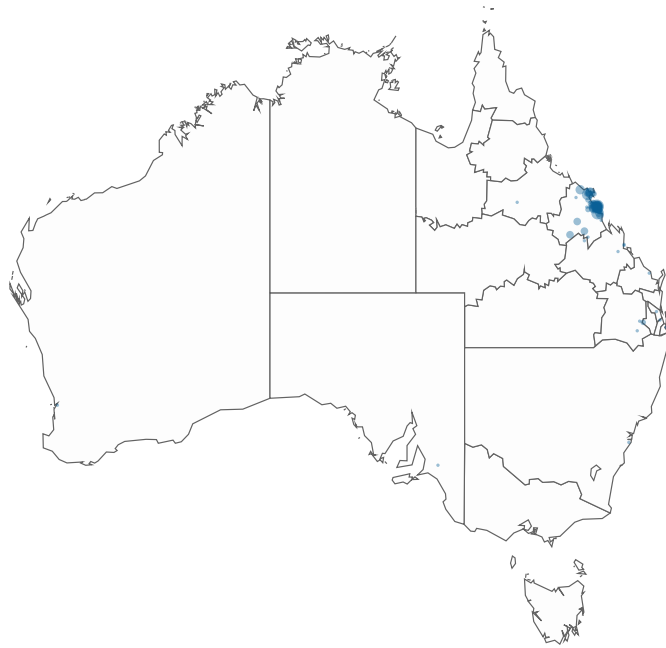


Figure 8: Mackay Base Hospital

- 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

8.4 Sunshine Coast University Hospital

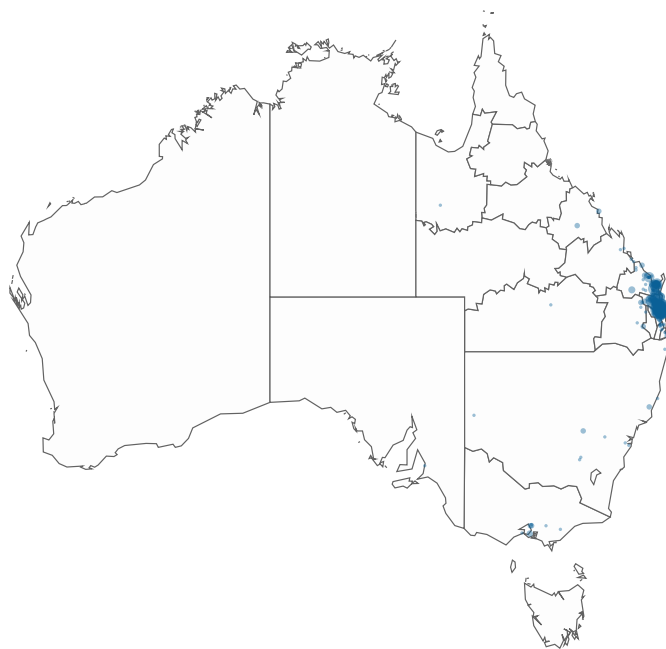


Figure 9: Sunshine Coast University Hospital

- 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

8.5 The Prince Charles Hospital

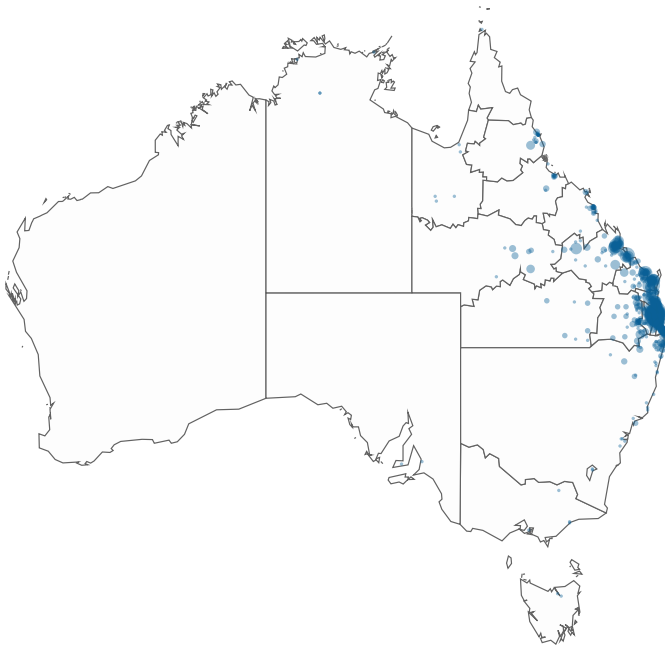


Figure 10: The Prince Charles Hospital

- 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 & 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

8.6 Royal Brisbane & Women's Hospital

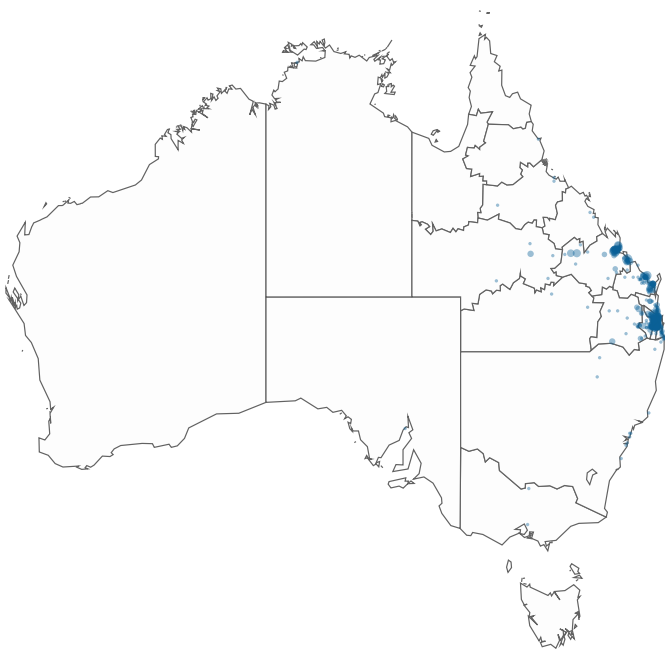
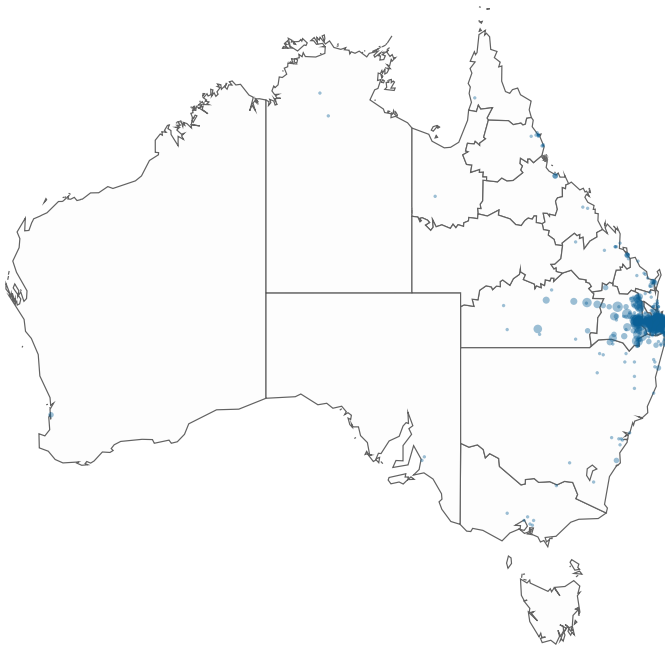


Figure 11: Royal Brisbane & Women's Hospital

- 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 & Women's Hospital include:
 - Coronary angiography
 - Percutaneous coronary intervention
 - Structural heart disease intervention
 - Electrophysiology
 - ICD, CRT and pacemaker implantation
 - Thoracic surgery

8.7 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

Figure 12: Princess Alexandra Hospital

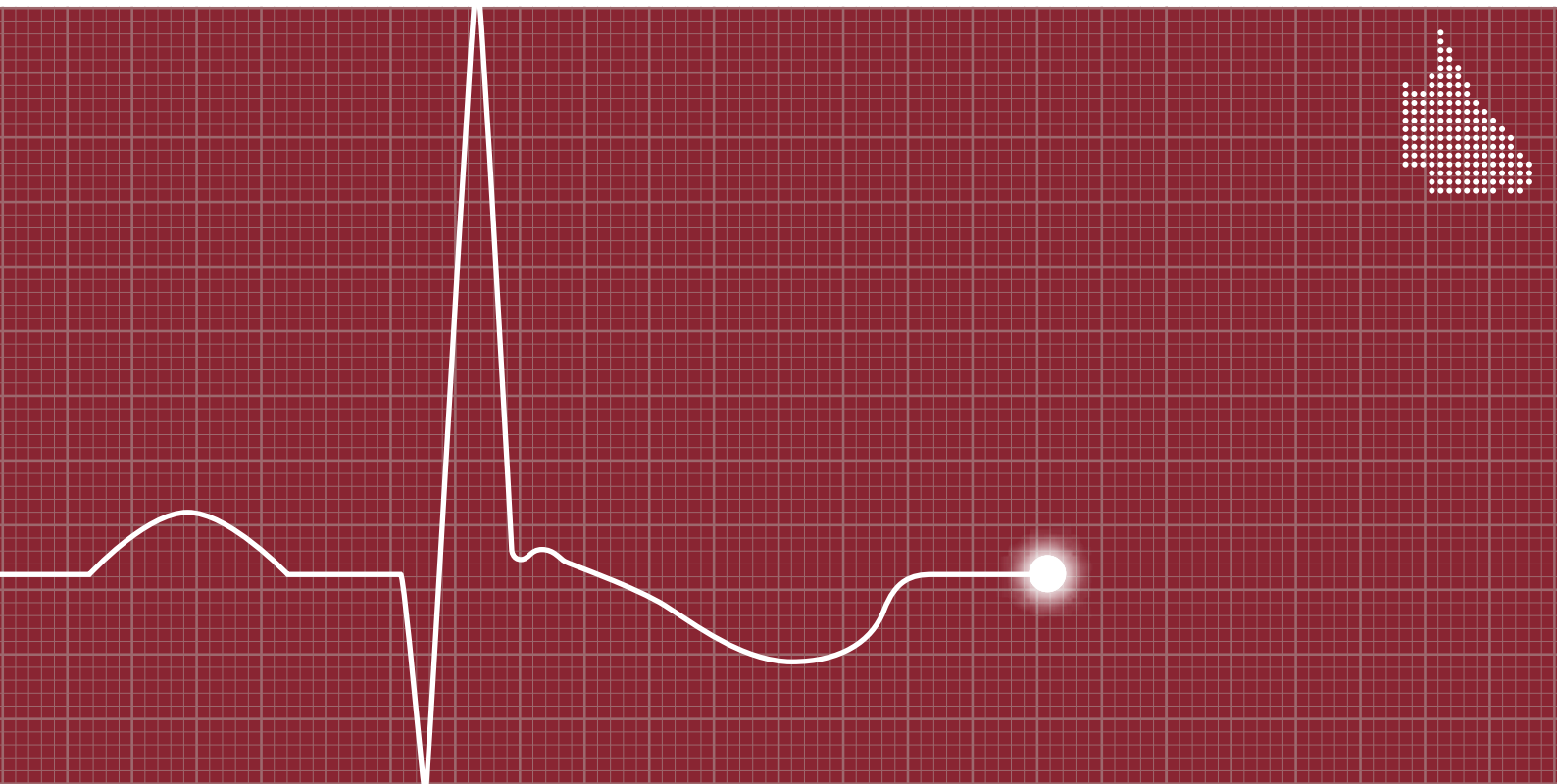
8.8 Gold Coast University Hospital



- 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

Figure 13: Gold Coast University Hospital

Cardiac Rehabilitation Audit



1 Message from the QCOR Cardiac Rehabilitation Committee Chair

The 2019 Annual Report offers detailed insight into key aspects of cardiac rehabilitation (CR) across the state of Queensland, with a record 57 public CR sites participating. It includes information on referral trends, patient demographics, the patient journey, and their outcomes. Each year, the data collected builds a picture that will guide improvements in CR service delivery around the state. With CR known to save lives, reduce avoidable hospital admissions and improve the quality of life for those that participate, this increasing pool of data also offers invaluable research opportunities for those with a passion for CR.

With new analysis and data collections available for this Report, we are now able to further investigate the cohort of patients who decline CR at the time of their admission. This has the potential to enable clinicians to better identify those who may benefit from alternate rehabilitation programs or education to increase the reach and effectiveness of services.

With an aim of every client who would benefit from CR receiving CR, identifying system-wide barriers will go some way to achieving this goal. There can be significant variation in the content delivered, as well as the number of sessions and duration of CR services. In the future, the module will allow greater visibility into the different models of care currently in place and their outcomes. This will offer opportunities to continually learn from successful service models and to incorporate models of excellence more broadly.

Continual development of the technical infrastructure associated with CR services has made all associated documentation available to clinicians within The Viewer. This in turn has allowed for greater collaboration with treating teams and primary care. Further development opportunities also include the collection of data regarding physical assessments and possible collaboration with other outpatient support services.

I would like to acknowledge the efforts of clinicians around the state in contributing to this dataset and strongly encourage any sites not yet contributing to add their data to this statewide collective.

Mr Gary Bennett
Chair
QCOR Cardiac Rehabilitation Committee

2 Key findings

This third Audit examines the characteristics and outcomes for patients referred to and assessed by public cardiac rehabilitation (CR) services in Queensland. It also outlines clinical indicator performance for participating services.

- There were 57 public CR sites that contributed data to QCOR.
- A total of 11,547 referrals were made to public CR sites across Queensland.
- Approximately 74% of all referrals originated from an inpatient setting, while 14% of referrals originated from outside of Queensland Health.
- Male patients accounted for 69% of all referrals to CR.
- The median age of all patients was 66 years, with three quarters of patients aged 57 years and above. There was considerable variation in median age between Aboriginal and Torres Strait Islander patients (56 years) and patients of other descent (67 years).
- The total proportion of Aboriginal and Torres Strait Islander patients was 6.6%. Large geographical variance was noted, with sites in North Queensland having a significantly higher proportion of Aboriginal and Torres Strait Islander patients.
- Of all referrals, there were 65% of patients who completed the initial CR pre assessment. The most common reasons that the pre assessment did not take place was that the patient declined, had been uncontactable or failed to attend the appointment.
- 41% of patients who completed a pre assessment continued CR to the completion of a post assessment.
- Overall, 66% of referrals had a pre assessment diagnosis of ischaemic heart disease.
- The most common procedure undergone by patients who attended a CR pre assessment was a percutaneous coronary intervention, which had been performed for 39% of patients. There were 18% of patients who had undergone coronary artery bypass grafting.
- At pre assessment, 80% of patients were classed as having an unhealthy body mass index (BMI) including 36% classed as overweight, 38% obese and 6% morbidly obese.
- Only 36% of patients were recorded as being sufficiently active at pre assessment.
- Completion of a timely referral for Queensland Health inpatients (within 3 days of discharge from hospital) was achieved in 94% of cases.
- A timely overall journey occurred in 56% of cases (Queensland Health inpatients referred within 3 days of discharge and assessed by CR program within 28 days of discharge).
- The majority of patients completing a post assessment reported an improved health status following completion of CR, regardless of which measure was used.

3 Participating sites

Table 1: Participating CR sites

Legend: ✓ Engaged and contributing ● Partially contributing (<50% of referrals) ○ Not contributing

HHS/Organisation	CR program	Locations	2017	2018	2019
Cairns and Hinterland	Cairns Outpatient CR Program	Cairns	✓	✓	✓
	Cassowary Area CR	Innisfail, Tully	✓	✓	✓
	Tablelands CR	Atherton, Mareeba	✓	✓	✓
	Mossman CR and Prevention Program	Mossman	✓	✓	✓
Central Queensland	Community Health CR	Gladstone	✓	✓	✓
	Biloela CR Program	Biloela	✓	✓	✓
	CR Outpatient Program	Rockhampton, Capricorn Coast	✓	✓	✓
	Mount Morgan CR	Mount Morgan†	-	-	✓
Central West	Longreach and Central West CR Program	Longreach	✓	✓	✓
		Blackall*	-	✓	✓
Darling Downs	Toowoomba Hospital Heart Care	Toowoomba	✓	✓	✓
	Warwick CR Service	Warwick	✓	✓	✓
	Chinchilla-Miles CR Service	Chinchilla, Miles	✓	✓	✓
	Dalby-Tara CR Service	Dalby, Tara	✓	✓	✓
	Kingaroy Hospital South Burnett CR	Kingaroy	✓	✓	✓
	Goondiwindi CR	Goondiwindi	○	○	✓
	Texas OPCR Program	Texas†	-	-	✓
	Stanthorpe Health CR Program	Stanthorpe	○	○	○
Gold Coast	Gold Coast Heart Health Service	Robina	✓	✓	✓
HSQ‡	COACH Program	Health Contact Centre	✓	✓	✓
Mackay	Mackay Heart Health Service	Mackay	✓	✓	✓
	Mackay Rural District CR	Proserpine	✓	●	○
		Bowen	○	○	○
Metro North	Complex Chronic Disease	Caboolture, Chermside, North Lakes, Redcliffe	✓	✓	✓
Metro South	PAH Heart Recovery Program	Princess Alexandra Hospital	✓	✓	✓
	Bayside CR Program	Redland	✓	✓	✓
	Brisbane South Heart Smart	Eight Mile Plains, Inala	✓	✓	✓
	Logan-Beaudesert CR Service	Browns Plains	✓	✓	✓
North West	North West CR Program	Mount Isa	✓	✓	✓
South West	South West HHS CR Services	Charleville, Roma	✓	✓	✓
		St George*	-	✓	✓
Sunshine Coast	Sunshine Coast HHS Cardiac Rehab	Caloundra, Gympie, Maroochydore, Nambour, Noosa	✓	✓	✓
Townsville	Townsville CR Outpatient Program	Townsville	✓	✓	✓
	Ingham CR Outpatient Program	Ingham	✓	●	●
	Charters Towers CR	Charters Towers	○	●	●
	Ayr Health Service	Ayr	○	○	○
	Hughenden CR Program	Hughenden	○	○	○
West Moreton	Ipswich and West Moreton CR	Ipswich, Boonah, Esk, Gatton, Laidley	✓	✓	✓
Wide Bay	Fraser Coast CR	Hervey Bay, Maryborough	✓	✓	✓
	Wide Bay Rural and Allied Health*	Biggenden, Eidsvold, Gayndah, Mundubbera	-	✓	✓

* New service commencing in 2018

† New service commencing in 2019

‡ Health Support Queensland

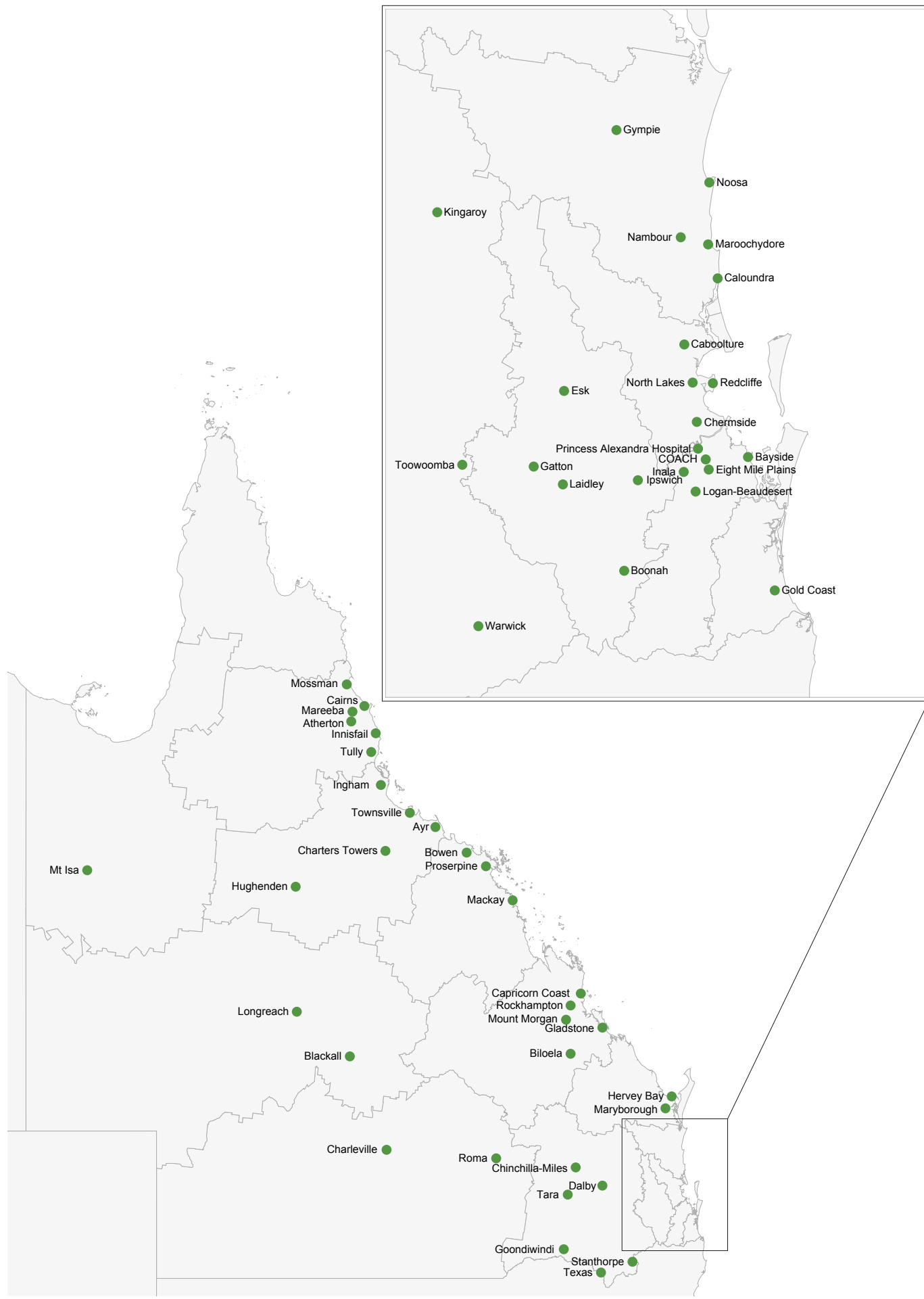


Figure 1: Map of Queensland public CR sites

4 Total referrals

4.1 Statewide

The volume of cardiac rehabilitation (CR) referrals entered into QCOR expanded through 2019 to include an additional 11,547 new referrals for the year. This brings the overall total to almost 30,000 referrals since the system was first launched and CR data collection commenced in July 2017 (Figure 2). Clinicians at 57 Queensland CR sites have incorporated QCOR into their daily practices, with most sites directly entering data into QCOR at the time of assessment. A number of sites that are delivering public outpatient CR, but not contributing to the database, remain a focus for engagement and involvement.

An enhanced QCOR module delivered in April 2020 allowed for an increased level of detail to be recorded in cases where the patient declined or was unsuitable to participate in CR for whatever reason. In this current reporting, a limiting factor has been that these referrals, due to their inherent unsuitability for CR, were not always entered into the QCOR CR module. It is hoped this more recent change will increase the availability of data, allowing these cases to be examined in more detail in future reports.

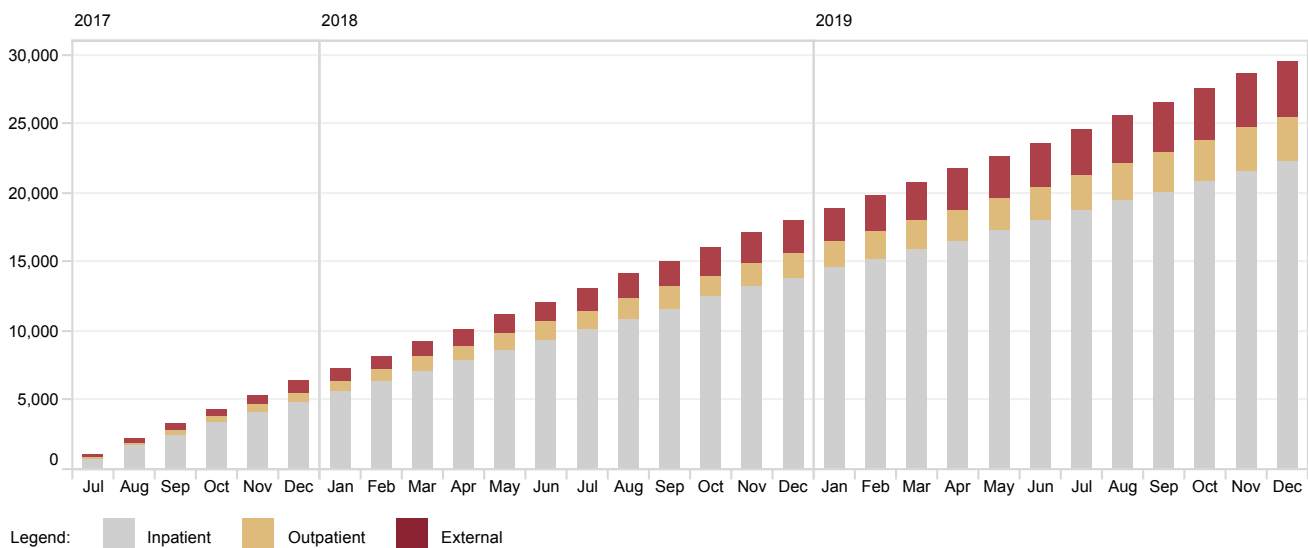


Figure 2: Cumulative total CR referrals by month, 2017–2019

Table 2: Total referrals by admission source, 2017–2019

Referral origin	2017 %	2018 %	2019 %
Inpatient	78.0	76.5	73.9
Outpatient	9.6	10.0	12.1
Non Queensland Health	12.5	13.5	14.1

Figure 3 represents the distribution of CR referrals by the patient’s usual place of residence. Patients were located across a wide geographical area with the majority residing in population centres along the eastern seaboard.

It is important to note that referrals for patients residing interstate or overseas are not generally accepted by Queensland public CR programs. The inclusion of these data is reflective of local site processes and may also vary based on available resources. While some sites leverage QCOR to maintain a record of overall referral volumes, others utilise different processes and as such may not represent phase one activity which does not lead to a referral to a public CR program.

Half of all patients were residing in major cities, and the remainder in regional and remote areas of Queensland. This is reflective of the decentralised distribution of the population within the state.

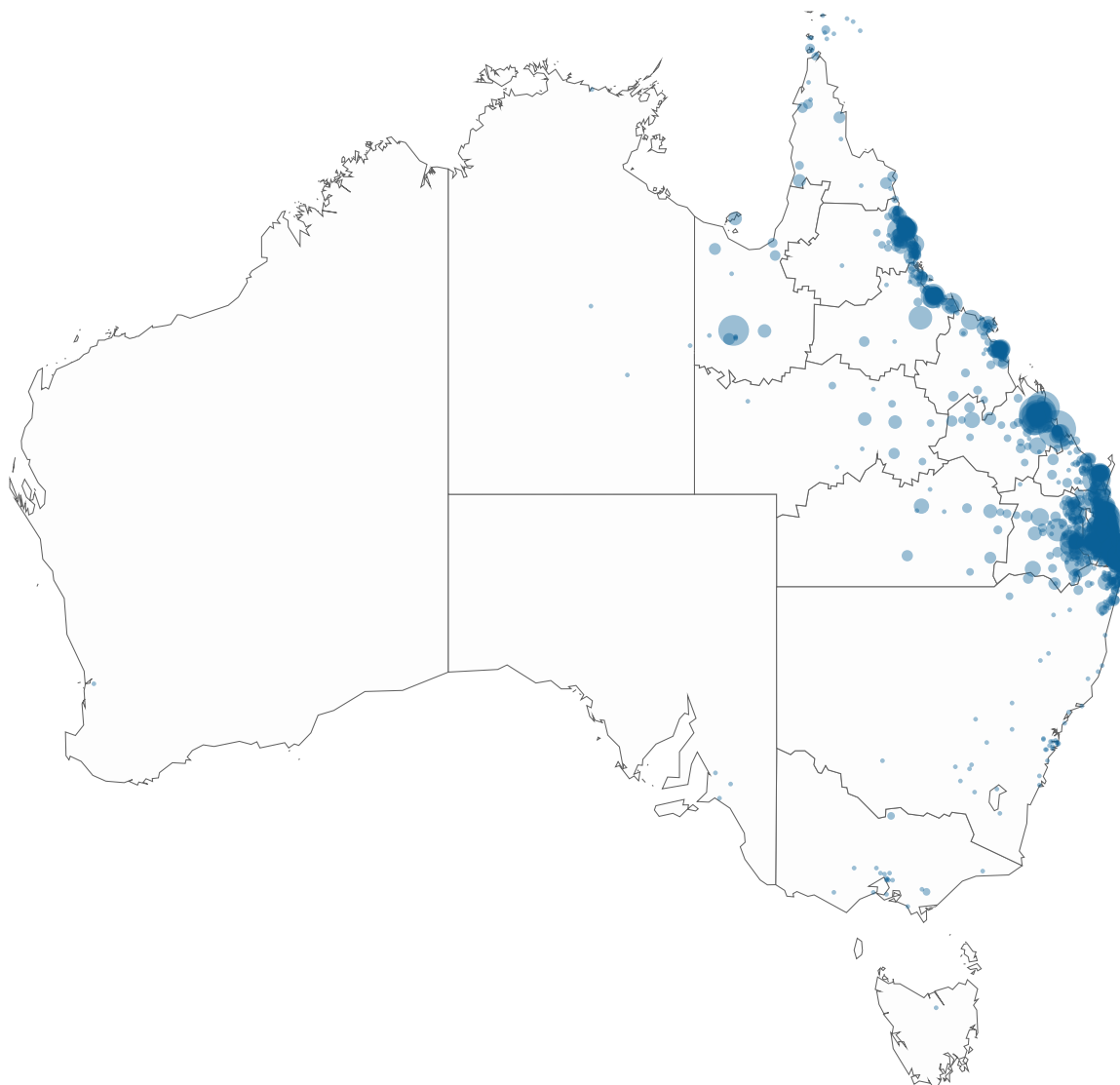


Figure 3: CR referrals by residential postcode

Table 3: CR referrals by remoteness classification

Remoteness area*	%
Major Cities of Australia	50.5
Inner Regional Australia	29.1
Outer Regional Australia	17.2
Remote Australia	1.0
Very Remote Australia	2.2
ALL	100.0

Excludes missing data (0.6%)

* Classified by Australian Statistical Geography Standard remoteness area

4.2 Origin of referrals

The majority of referrals (74%) originated from an inpatient setting, with smaller proportions of referrals flowing to CR from an outpatient setting (12%) and outside of Queensland Health (14%).

There was considerable variation across participating CR programs in the proportion of referrals from external sources, which ranged from 0% to 27%. This suggests not all sites are entering details for patients referred from general practitioners, private hospitals or external specialists.

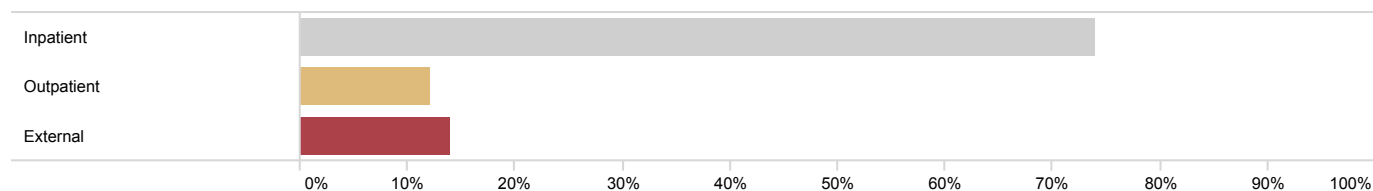


Figure 4: Proportion of referrals by referral source

Table 4: Referral sources by outpatient program HHS

HHS/division	Total referrals n	Inpatient* n (%)	Outpatient* n (%)	External n (%)
Cairns and Hinterland	864	710 (82.2)	83 (9.6)	71 (8.2)
Central Queensland	1,200	690 (57.5)	238 (19.8)	272 (22.7)
Central West	23	11 (47.8)	12 (52.2)	–
Darling Downs	562	389 (69.2)	78 (13.9)	95 (16.9)
Gold Coast	1,456	1,199 (82.3)	185 (12.7)	72 (4.9)
Health Support Queensland	1,238	1,060 (85.6)	149 (12.0)	29 (2.3)
Mackay	277	203 (73.3)	65 (23.5)	9 (3.2)
Metro North	1,449	1,011 (69.8)	138 (9.5)	300 (20.7)
Metro South	1,869	1,253 (67.0)	108 (5.8)	508 (27.2)
North West	89	48 (53.9)	39 (43.8)	2 (2.2)
South West	40	26 (65.0)	12 (30.0)	2 (5.0)
Sunshine Coast	926	809 (87.4)	48 (5.2)	69 (7.5)
Townsville	534	419 (78.5)	114 (21.3)	1 (0.2)
West Moreton	717	456 (63.6)	70 (9.8)	191 (26.6)
Wide Bay	303	247 (81.5)	54 (17.8)	2 (0.7)
Statewide	11,547	8,531 (73.9)	1,393 (12.1)	1,623 (14.1)

* Includes referrals from a Queensland Health public hospital

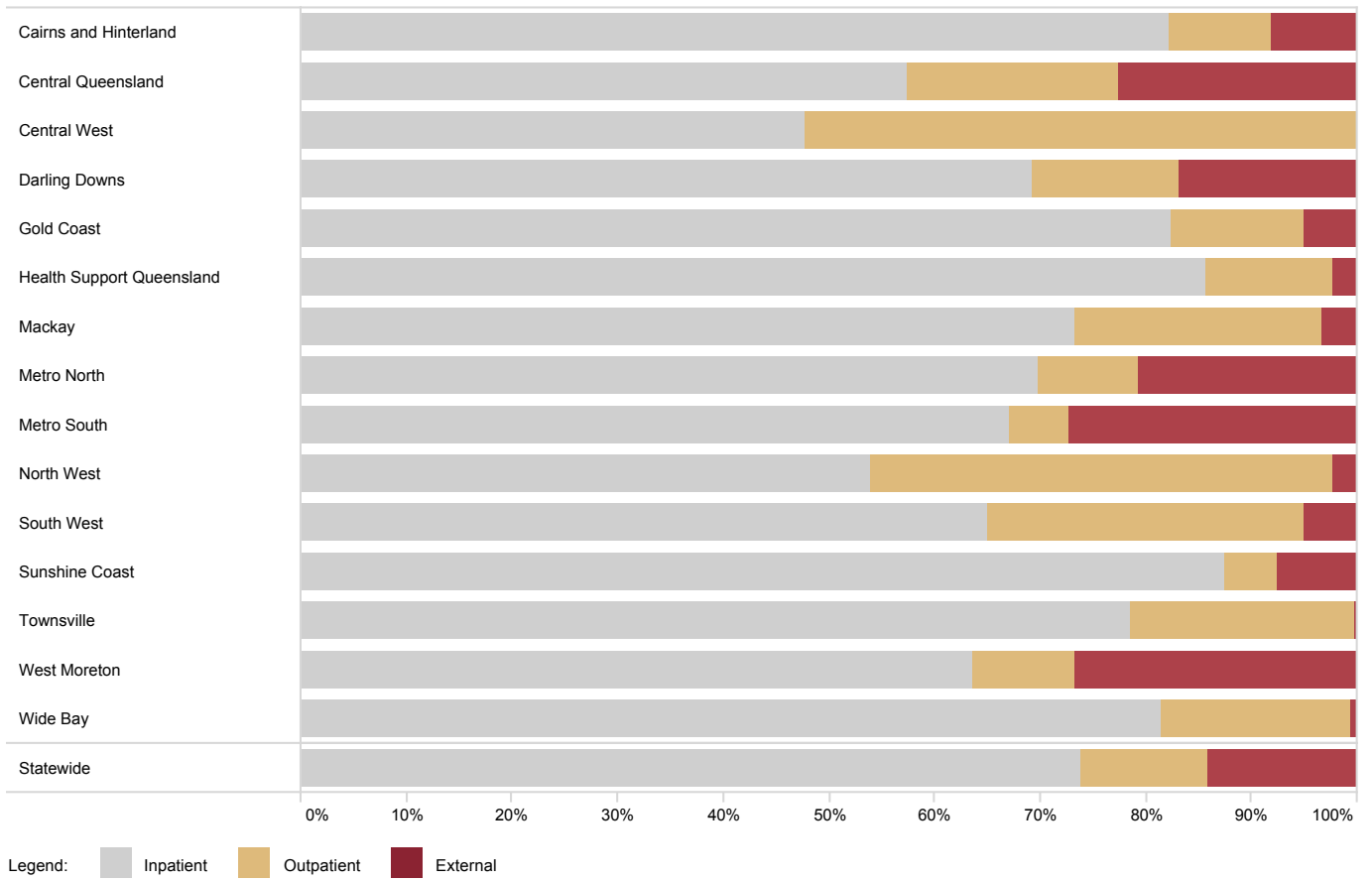


Figure 5: Proportion of referrals by referral source and outpatient program HHS

4.3 Inpatient referrals

For referrals originating from an inpatient setting, the largest referrer was Metro North HHS which accounted for approximately one quarter (26%) of referrals, while Metro South HHS received the largest volume of inpatient referrals (15%).

Table 5: CR inpatient referrals by source and destination HHS

HHS/organisation	Outgoing inpatient referrals n (%)	Incoming inpatient referrals n (%)
Cairns and Hinterland	628 (7.4)	710 (8.3)
Central Queensland	501 (5.9)	690 (8.1)
Central West	–	11 (0.1)
Darling Downs	115 (1.3)	389 (4.6)
Gold Coast	1,206 (14.1)	1,199 (14.1)
Health Support Queensland	–	1,060 (12.4)
Mackay	183 (2.1)	203 (2.4)
Mater Health Services	75 (0.9)	–
Metro North	2,174 (25.5)	1,011 (11.8)
Metro South	1,838 (21.5)	1,253 (14.7)
North West	–	48 (0.6)
South West	–	26 (0.3)
Sunshine Coast	793 (9.3)	809 (9.5)
Townsville	808 (9.5)	419 (4.9)
West Moreton	170 (2.0)	456 (5.3)
Wide Bay	40 (0.5)	247 (2.9)
Statewide	8,531 (100.0)	8,531 (100.0)

The flow of inpatient referrals from the originating HHS or organisation (acute site) to the CR outpatient program HHS is illustrated in Figure 6. The majority of inpatient referrals remained within the originating HHS, though there was some variation noted.

It should be highlighted that there are no outpatient programs for Mater Health Services, and conversely Health Support Queensland provides an outpatient (telephone based) service only.

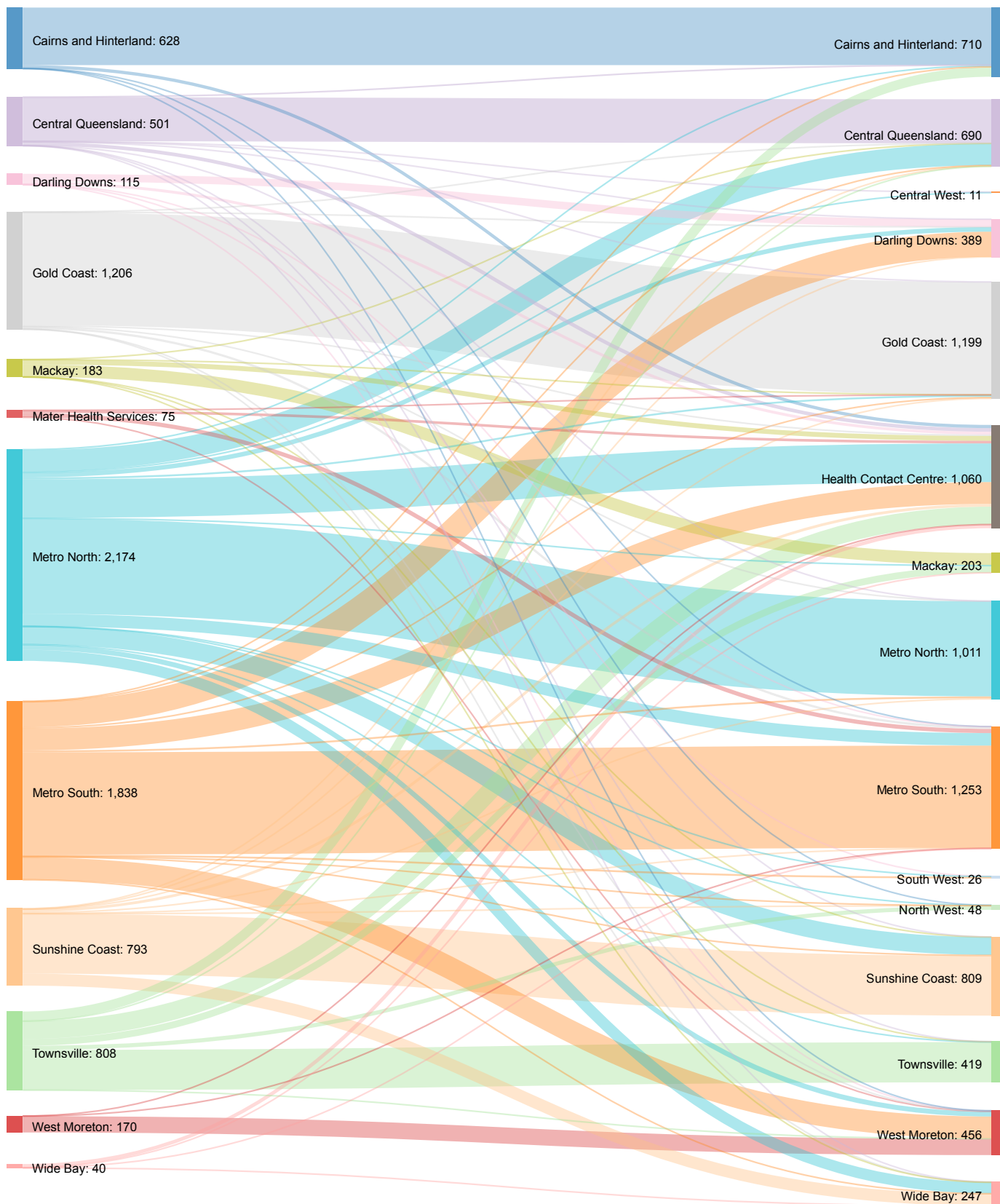


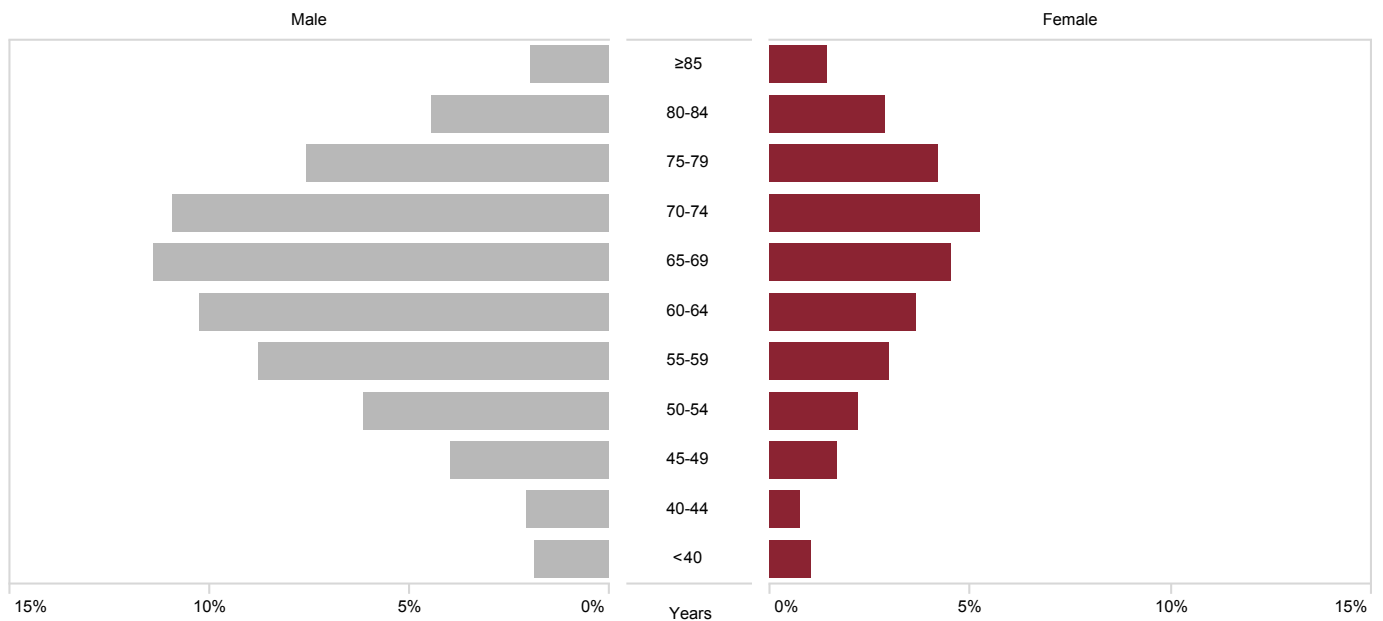
Figure 6: CR inpatient referrals by source and destination HHS

5 Patient characteristics

5.1 Age and gender

Development of cardiovascular disease is related to age. Overall, 69% of patients were male and 31% female. The age distribution of referrals was similar for genders, though the median age for males was slightly lower than for females (66 years vs. 68 years). These results have been very similar since the initial 2017 report.

Overall, three quarters of patients were 57 years of age or older (interquartile range 57 years to 74 years).



% of total referrals (n=11,547)

Figure 7: Referrals by patient gender and age group

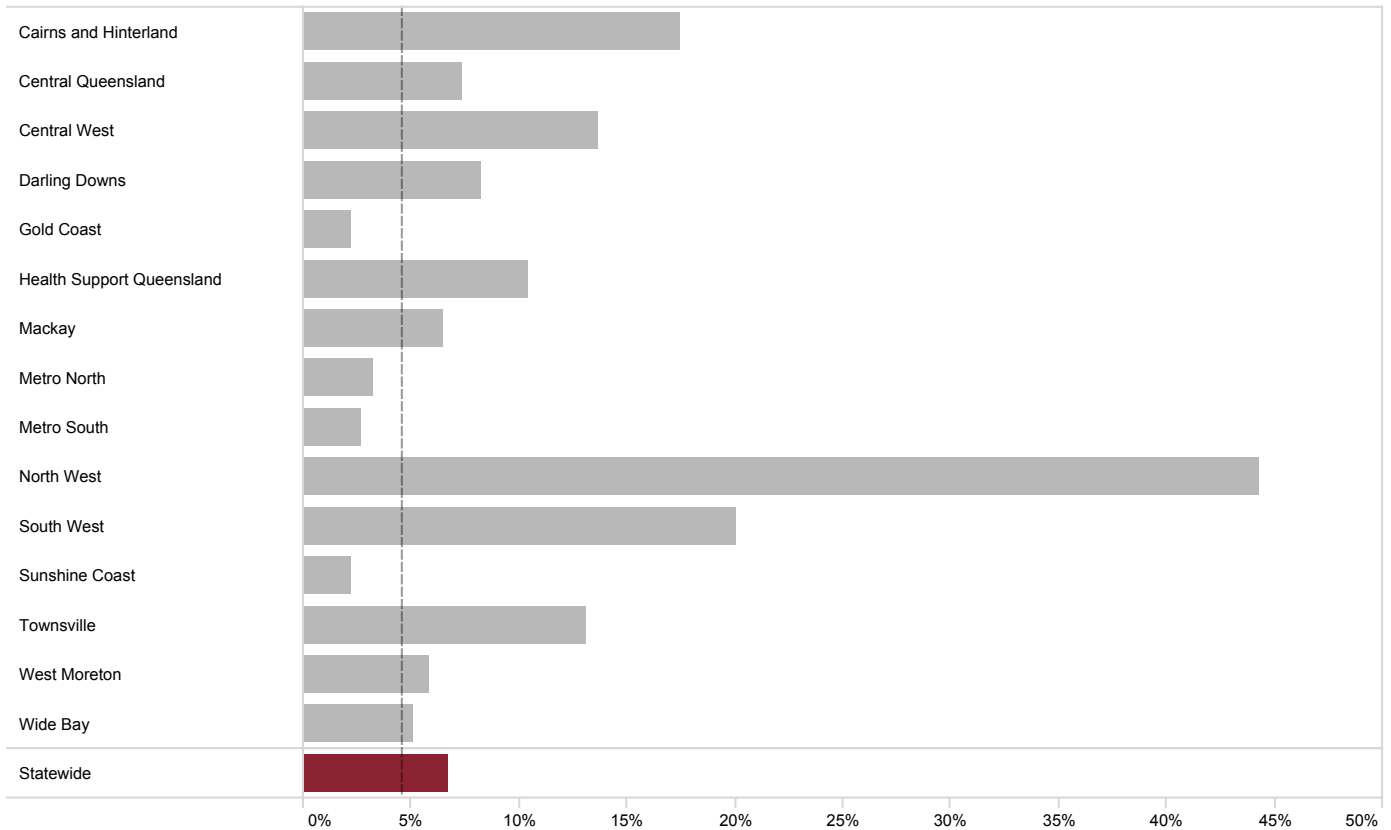
Table 6: Median patient age by gender and HHS

Outpatient HHS/division	Male years	Female years	ALL years
Cairns and Hinterland	65	66	65
Central Queensland	67	70	68
Central West	60	66	60
Darling Downs	67	68	67
Gold Coast	67	70	67
Health Support Queensland	64	67	64
Mackay	63	63	63
Metro North	67	70	68
Metro South	65	68	66
North West	58	58	58
South West	67	64	66
Sunshine Coast	68	71	69
Townsville	64	63	63
West Moreton	65	66	65
Wide Bay	69	69	69
Statewide	66	68	66

5.2 Aboriginal and Torres Strait Islander status

Ethnicity is an important determinant in the development of cardiovascular disease. It is recognised that the Aboriginal and Torres Strait Islander population has a higher incidence and prevalence of coronary artery disease. In this cohort, Aboriginal and Torres Strait Islander patients represent 6.6% of all statewide referrals, with considerable variation observed across CR programs. By comparison, the estimated overall proportion of the Aboriginal and Torres Strait Islander people's population in Queensland is 4.6%.

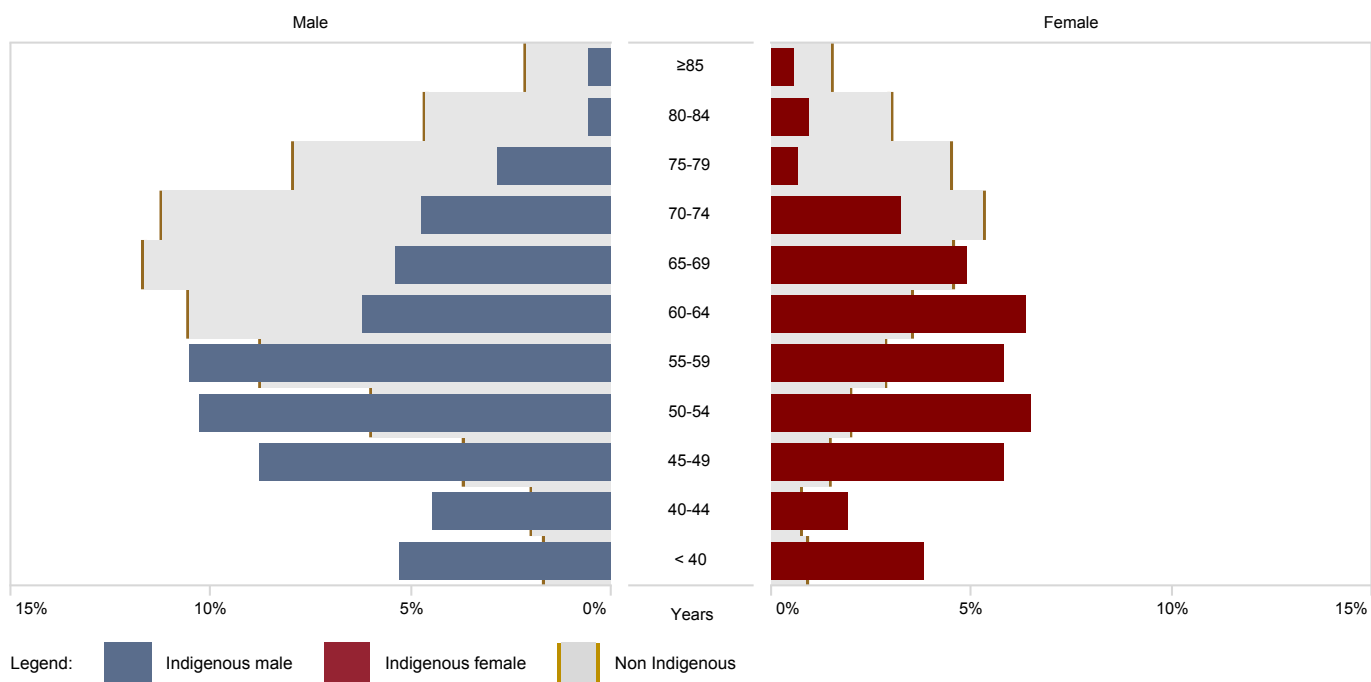
Larger proportions of Aboriginal and Torres Strait Islander patients were referred to CR programs in northern and western HHSs. Cairns and Hinterland, Central West, North West, South West and Townsville HHSs all reported more than 12% of patients identifying as Aboriginal and Torres Strait Islander.



Excludes missing data (3.4%)

Figure 8: Proportion of identified Aboriginal and Torres Strait Islander patients by outpatient HHS

The proportion of Aboriginal and Torres Strait Islander patients referred to CR had a median age considerably lower than other patients (56 years vs. 67 years respectively). This suggests the presence of a cardiovascular disease gap compared to Australians of other descent.



Excludes missing data (3.4%)

Figure 9: Proportion of all CR referrals by age group and Indigenous status

Table 7: Patient age by gender and Indigenous status

	Male years	Female years	All years
Aboriginal and Torres Strait Islander	55	57	56
Non Aboriginal and Torres Strait Islander	66	69	67
ALL	66	68	66

Excludes missing data 3.4%

6 Program participation

6.1 Pre assessment stage

The assessment of a patient by CR comprises a comprehensive cardiovascular disease risk factor review. This extends beyond a patient's presenting medical and social history to encompass overall health, physical well-being, psychological factors, availability of social support and patient-reported quality of life.

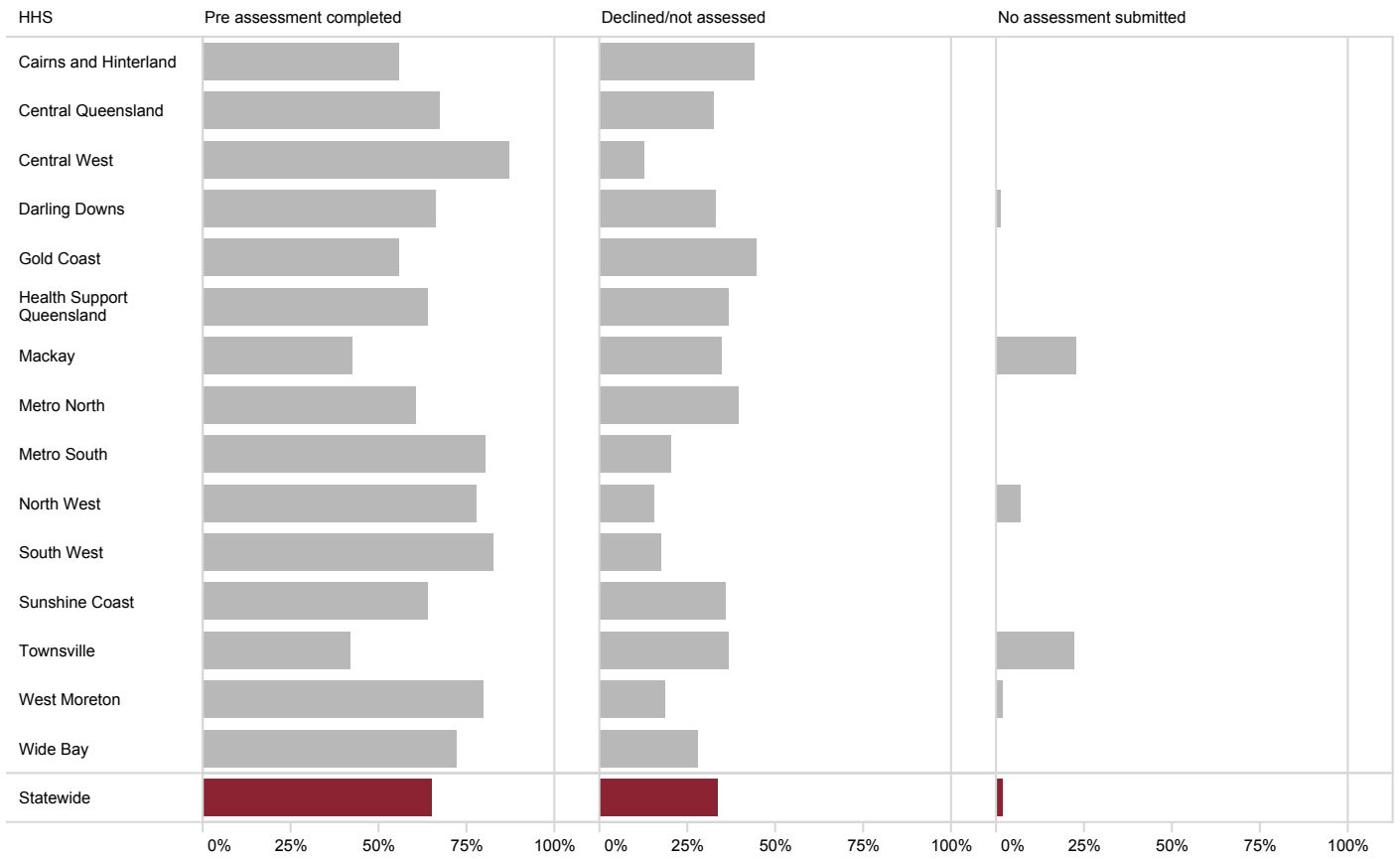
An assessment by outpatient CR is generally conducted in two stages which occur before and after a patient attends the specialist CR program. These stages are referred to as the pre assessment and post assessment. The pre assessment signifies the successful uptake and recruitment of a patient onto the CR program. Assessments may be undertaken over the phone or face-to-face.

The proportion of total referrals which proceeded to a pre assessment within any timeframe was 65%. It should be noted this is a very limited metric which should be interpreted with caution, due to varying processes across the state for patients refusing or not interested in attending CR, and for patients residing overseas and interstate. Capacity for service delivery is also a contributing factor for referrals not proceeding to pre assessment. These issues are discussed later in the report.

Table 8: Total pre-assessments completed by outpatient HHS/division

Outpatient HHS/division	Pre assessment completed n (%)	Declined/not assessed n (%)	No assessment submitted n (%)
Cairns and Hinterland	481 (55.7)	383 (44.3)	–
Central Queensland	808 (67.3)	392 (32.7)	–
Central West	20 (87.0)	3 (13.0)	–
Darling Downs	370 (65.8)	185 (32.9)	7 (1.2)
Gold Coast	810 (55.6)	646 (44.4)*	–
Health Support Queensland	787 (63.6)	451 (36.4)	–
Mackay	118 (42.6)	97 (35.0)	62 (22.4)
Metro North	877 (60.5)	572 (39.5)	–
Metro South	1,495 (80.0)	374 (20.0)	–
North West	69 (77.5)	14 (15.7)	6 (6.7)
South West	33 (82.5)	7 (17.5)	–
Sunshine Coast	591 (63.8)	335 (36.2)	–
Townsville	223 (41.8)	194 (36.3)	117 (21.9)
West Moreton	570 (79.5)	134 (18.7)	13 (1.8)
Wide Bay	218 (71.9)	85 (28.1)	–
Statewide	7,470 (64.7)	3,872 (33.5)	205 (1.8)

* Total for Gold Coast HHS includes 21% of referrals for patients residing interstate, who are typically referred for CR outside of Queensland Health



Total for Gold Coast HHS includes 21% of referrals for patients residing interstate

Figure 10: Proportion of CR referrals proceeding to pre assessment by outpatient HHS/division

6.2 Post assessment stage

The post assessment is representative of completion and graduation from the specialist CR outpatient program. This provides an opportunity for the patient and clinician to reflect upon the targets defined at the pre assessment. Of 7,470 completed pre assessments, 41% proceeded to post assessment.

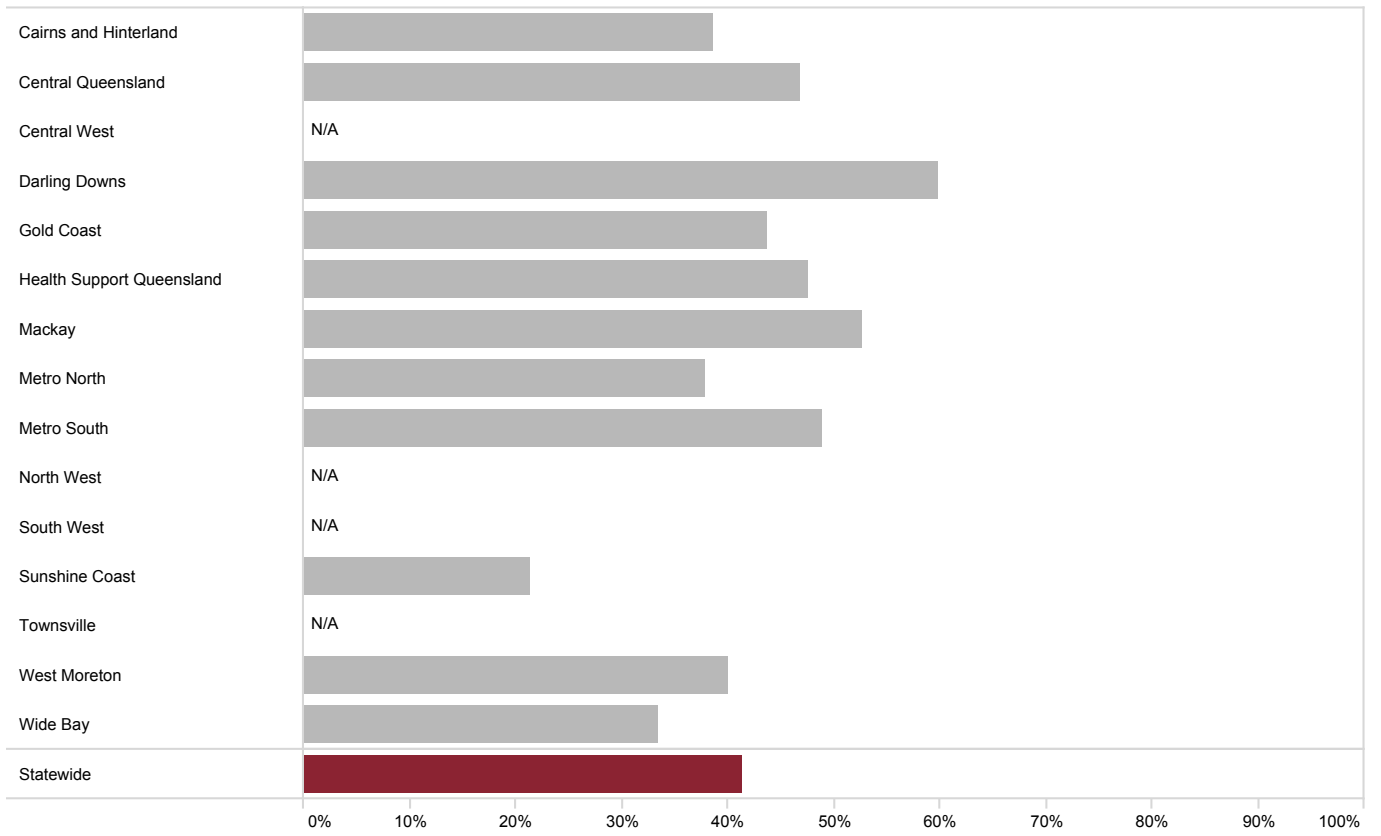
Completion rates and median time delays from post assessment to pre assessment varied considerably by HHSs. The median time from pre assessment to post assessment was 80 days, ranging from 48 days to 163 days across outpatient HHSs. There was considerable variation in the proportion of cases where a post assessment was completed, indicating practices towards post assessment completion and data entry vary considerably at a local level. A range of issues can contribute to completion of the post assessment which may include timing, patient availability or other factors outside the control of the program.

It is important to note that the data reported in this section uses a minimum 90 day window for post assessment completion, which may skew results for sites using longer program timeframes.

Table 9: Total post assessments completed by HHS

Outpatient HHS/division	Post assessment completed n (%)	Median time to post assessment days
Cairns and Hinterland	186 (38.7)	74
Central Queensland	378 (46.8)	74
Central West	5 (25.0)	N/A
Darling Downs	221 (59.7)	56
Gold Coast	354 (43.7)	67
Health Support Queensland	375 (47.6)	163
Mackay	62 (52.5)	81
Metro North	332 (37.9)	120
Metro South	731 (48.9)	74
North West	14 (20.3)	N/A
South West	7 (21.2)	N/A
Sunshine Coast	126 (21.3)	125
Townsville	4 (1.8)	N/A
West Moreton	228 (40.0)	66
Wide Bay	73 (33.5)	48
Statewide	3,096 (41.4)	80

N/A: Not displayed due to <20 post assessments for analysis



N/A: Not displayed due to <20 post assessments for analysis

Figure 11: Proportion of CR assessments proceeding to post assessment

6.3 Program outcomes

The following sections use paired observations from the pre assessment and post assessment stages to identify changes in health status for patients participating in CR. Measures included in this analysis include patient reported outcome measures (PROMS) and other functional or pathological investigations.

A limiting factor for this analysis is availability of data for the post assessment stage. Specifically, the availability of updated pathology and other investigations, and specific model of care employed by the CR program may result in limited data from which conclusions can be drawn. This is a focus for future reporting methods and enhancements in data collection.

Table 10: Summary of program outcome measures

Program outcome	Category	Measure
1	Pathology	Lipid profile
2	Functional	Six minute walk test
3	PROMS	Patient Health Questionnaire
4	PROMS	Assessment of Quality of Life
5	PROMS	Other patient reported outcomes

6.3.1 Lipid profile

Data for lipid values such as total cholesterol was available for a smaller proportion of patients completing CR. A barrier to reporting this outcome is that updated pathology results are not always available for the post assessment stage. With increased availability of enterprise Queensland Health data collections, it is hoped that future analyses can address this current limitation.

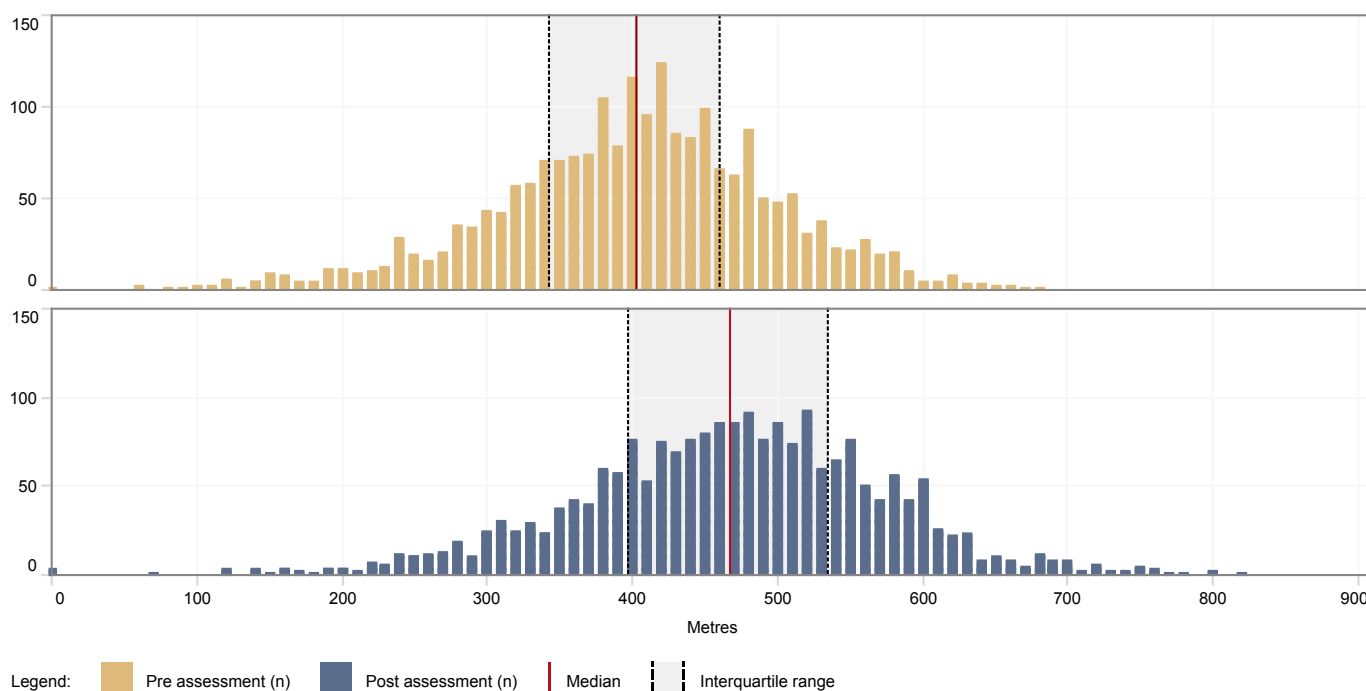
Table 11: Summary of lipid values

	Total analysed n	Pre assessment Mean \pm SD	Post assessment Mean \pm SD	Change in value Mean \pm SD
Total cholesterol (mmol/L)	326	4.8 \pm 1.4	3.9 \pm 1.0	-0.9 \pm 1.4
Triglycerides (mmol/L)	306	1.8 \pm 1.3	1.5 \pm 0.8	-0.4 \pm 1.1
HDL-C (mmol/L)	283	1.1 \pm 0.4	1.1 \pm 0.3	0.0 \pm 0.3
LDL-C (mmol/L)	273	2.8 \pm 1.2	2.0 \pm 0.8	-0.8 \pm 1.2

6.3.2 Six minute walk test

A functional measure is indicated prior to implementing an exercise program in order to determine exercise prescription and measure improvement. The six minute walk test (6MWT) is a standardised investigation of submaximal exercise capacity that is often used in patients with cardiopulmonary disease. Changes in the six minute walk distance are useful in assessing functional capacity and the efficacy of therapeutic interventions such as pharmacotherapy and CR.²⁵

There were 2,109 cases where the patient completed a 6MWT at the pre assessment and post assessment stages. The 6MWT is not always feasible due to the different models of care that exist, with some programs not offering an exercise component. In the majority of instances (75%) patients demonstrated an improvement in 6MWT, with 57% showing an increase of greater than 50 metres (Table 13).



Results rounded to 10 metres

Figure 12: Comparison of pre assessment and post assessment six minute walk test results

Table 12: Summary of six minute walk test results

	Total analysed n	Pre assessment Mean ± SD	Post assessment Mean ± SD	Change in value Mean ± SD
Distance travelled (metres)	2,109	398.6 ± 94.5	463.6 ± 107.3	65.1 ± 64.2

Table 13: Change in six minute walk test results

	n (%)
Improved ≥50 metres	1,201 (56.9)
Improved 26–49 metres	391 (18.5)
No change (±25 metres)	425 (20.2)
Worsened >25 metres	92 (4.4)
ALL	2,109 (100.0)

6.3.3 Patient reported outcome measures

Patient Health Questionnaire

The CR assessment often includes a brief screening for anxiety and depressive disorders, both of which are significant risk factors for patients suffering coronary artery disease associated with adverse cardiovascular outcomes independent of other risk factors.

The Patient Health Questionnaire-4 (PHQ-4) is a validated tool for screening anxiety and depressive disorders.²⁶ This instrument is a four item composite measure derived from the Generalized Anxiety Disorder-7 scale (GAD-7) and the Patient Health Questionnaire-9 (PHQ-9). Each of the four items on the PHQ-4 is scored using a four point scale with categories of high psychological distress being scored 9–12 points and mild psychological distress scoring between 3–5 points. A score of 0–2 points suggests minimal depression and anxiety.

A total of 2,760 paired data were available for analysis. Almost one third of patients (30%) demonstrated an improved PHQ-4 score at post assessment.

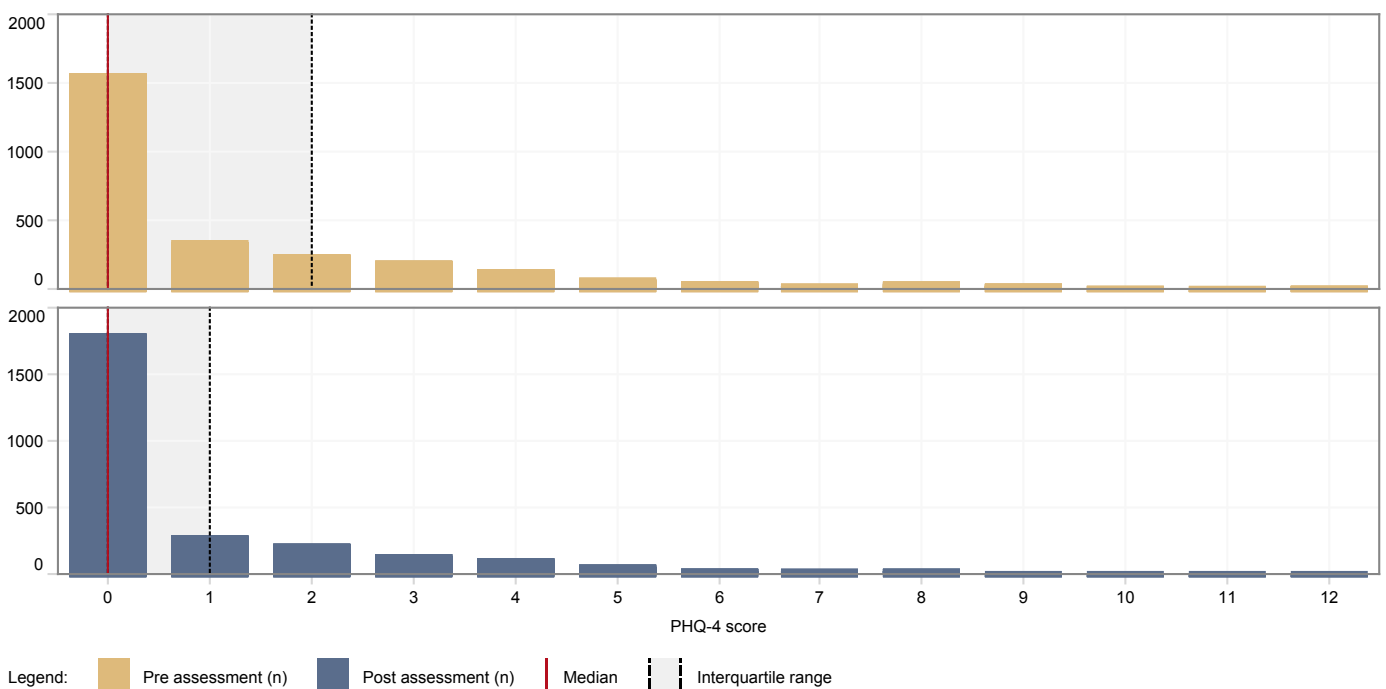


Figure 13: Comparison of pre assessment and post assessment PHQ-4 results

Table 14: Summary of PHQ-4 results

	Total analysed n	Pre assessment Mean ± SD	Post assessment Mean ± SD	Change in value Mean ± SD
Depression score (PHQ-2)	2,760	0.6 ± 1.2	0.5 ± 1.0	-0.1 ± 1.2
Anxiety score (GAD-2)	2,760	0.8 ± 1.4	0.6 ± 1.2	-0.2 ± 1.3
Overall score	2,760	1.4 ± 2.3	1.1 ± 2.0	-0.4 ± 2.1

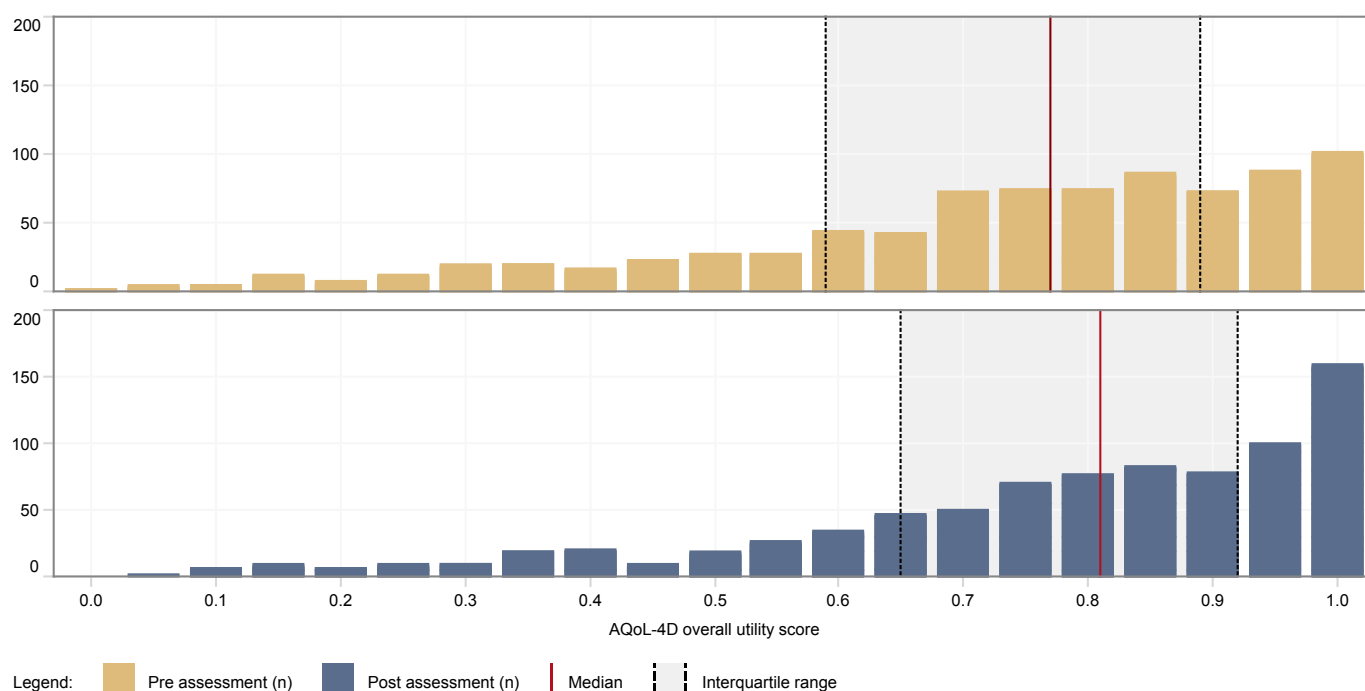
Table 15: Change in PHQ-4 results

	n (%)
Any improvement	833 (30.2)
No change	1,439 (52.1)
Any worse result	48 (17.7)
ALL	2,760 (100.0)

Assessment of Quality of Life

The Assessment of Quality of Life (AQoL-4D) is a multi-attribute utility instrument developed to assess health-related quality of life. It measures PROMS across four domains of health, scored individually, as well as providing an overall score. AQoL-4D utility scores range from 0.00–1.00, with scores closer to 1.00 indicating higher satisfaction of patients reporting the status of their own health.

For the 834 records available at the pre and post CR timeframes, the mean overall pre assessment AQoL-4D utility score was 0.71 which compares similarly to expected results for patients with a cardiovascular diagnosis.²⁷ This utility score improved to 0.76 at the post assessment stage, where 55% of patients demonstrated an improved overall utility score after CR intervention (Table 16 and Table 17).



Results rounded to 0.05 utility score

Figure 14: Comparison of pre assessment and post assessment AQoL-4D results

Table 16: Summary of AQoL-4D results

	Total analysed n	Pre assessment Mean ± SD	Post assessment Mean ± SD	Change in value Mean ± SD
Independent living	834	0.91 ± 0.16	0.94 ± 0.13	0.03 ± 0.16
Relationships	834	0.9 ± 0.17	0.91 ± 0.16	0.01 ± 0.17
Senses	834	0.94 ± 0.09	0.93 ± 0.09	<0.01 ± 0.10
Mental health	834	0.89 ± 0.12	0.91 ± 0.10	0.02 ± 0.13
Overall score	834	0.71 ± 0.23	0.76 ± 0.22	0.04 ± 0.23

Table 17: Change in AQoL-4D results

	n (%)
Any improvement	454 (54.4)
No change	72 (8.6)
Any worse result	308 (36.9)
ALL	834 (100.0)

Other patient reported outcomes

Any assessment by a CR clinician includes a component assessing for quality of life (QOL). However, the use of a long-form questionnaire (such as AQoL-4D) is often impractical or unwarranted. The assessment of patient reported QOL takes the form of an abbreviated questionnaire allowing patients to self-report their health-related status across three domains.

The questions asked include:

- *In general, how would you describe your health at present?*
- *In general, how would you describe your mood at present?*
- *How fit are you now compared with 6 months ago?*

The abbreviated questionnaire provides a gauge to whether the CR practitioner may need to apply the more detailed AQoL-4D assessment to better understand the status and needs of the individual patient.

Paired data on the condensed QOL survey were available for 1,839 assessments.

Self reported health

Over 40% of patients reported a health status of very good or excellent at post assessment, compared with 16% at the pre assessment phase. Overall, half of patients (54%) reported a feeling of improved health. Reductions in the numbers of patients reporting fair or poor health were observed with only 2% of patients reporting poor health at post assessment.

Decreases in self reported health status were reported by 9% of patients, however caution should be exercised when interpreting this result as there are many confounding factors which may affect the health status of a patient with what is often a newly diagnosed complex chronic disease.

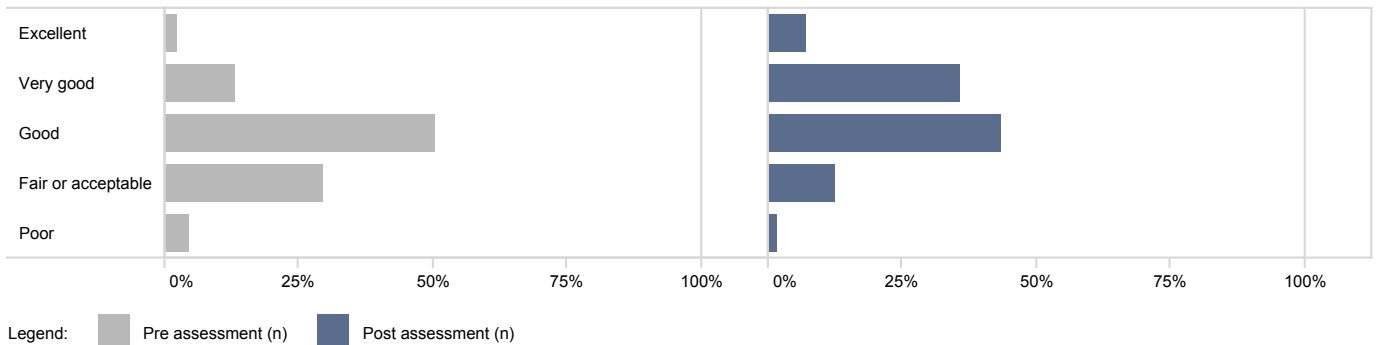


Figure 15: Comparison of patient reported health status at pre and post assessment

Table 18: Change in patient reported health status at pre and post assessment

	n (%)
Any improvement	986 (53.6)
No change	693 (37.7)
Any worse result	160 (8.7)
ALL	1,839 (100.0)

Self reported mood

Over half of patients (54%) reported an improved mood compared to the pre assessment stage. The proportion of patients reporting excellent mood scores at post assessment increased from 4% to 14%, while those with very good mood scores increased from 16% to 34%.

There were 11% of patients who reported a decrease in mood, however it is reassuring to see that overall, there was a decrease in the proportion of patients who reported fair or poor mood.

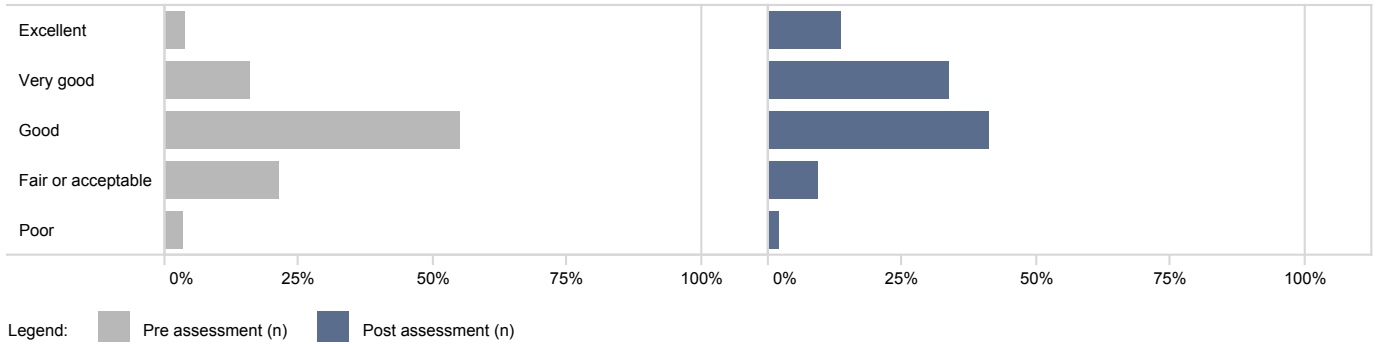


Figure 16: Patient reported change in mood at post assessment

Table 19: Patient reported change in fitness at post assessment

	n (%)
Any improvement	961 (52.3)
No change	676 (36.8)
Any worse result	202 (11.0)
ALL	1839 (100.0)

Self reported fitness

When asked to compare fitness levels in the six months prior to completing a cardiac rehabilitation program, over 50% of patients reported that their fitness improved. Decreases in fitness were reported by 18% of patients. This finding may warrant further investigation to explore the clinical background of these patients as there may be various factors contributing to their reported decrease in fitness.

Issues such as the development of significant cardiac dysfunction as a result of cardiac injury may explain a decline in fitness. Given the sample period is compared to experiences six months prior to completing CR, the patient's index cardiac event may also have occurred in this time and therefore such regression may not be unexpected.

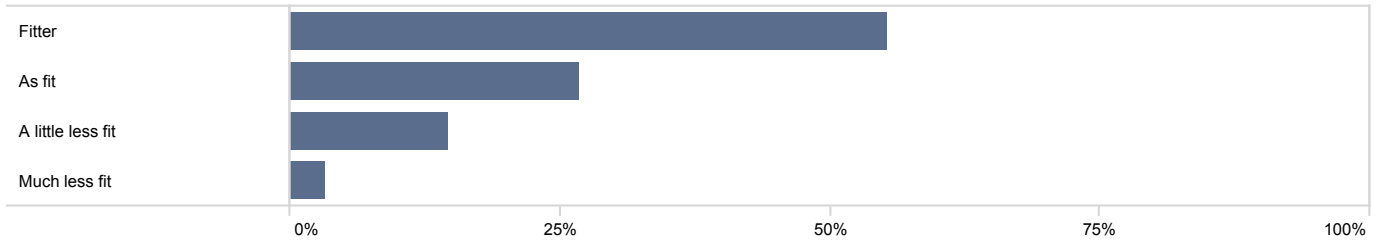


Figure 17: Comparison of patient reported fitness at pre and post assessment

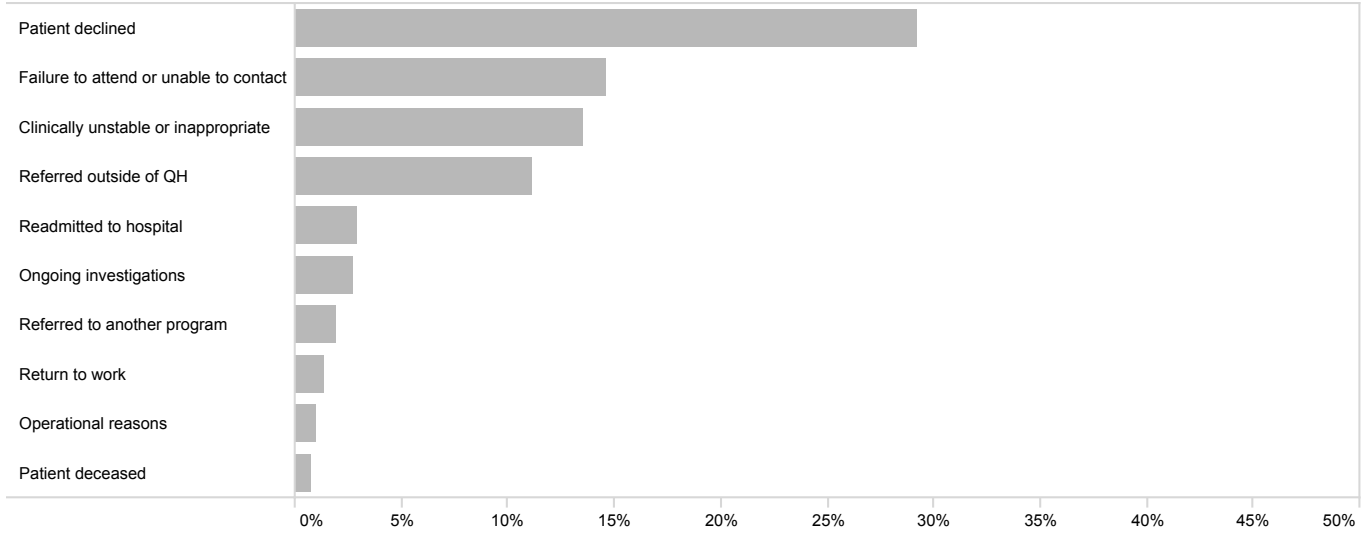
Table 20: Change in patient reported fitness at pre and post assessment

	n (%)
Fitter	1,017 (55.3)
As fit	492 (26.8)
A little less fit	268 (14.6)
Much less fit	62 (3.4)
ALL	1,839 (100.0)

6.4 Failure to participate

There are many reasons a patient may not participate in a CR program. In this cohort, the most common reasons for not participating in a CR program were that patients had declined (29%), had been uncontactable or failed to attend (15%), or were medically inappropriate to proceed (14%).

In some of these instances, the clinician may still provide opportunistic education and advice to these patients however this is difficult to incorporate into reporting.



Not displaying other reasons (21%)

Figure 18: Reasons for no pre assessment being conducted

7 Clinical presentation

7.1 Diagnosis

Patients attending a CR pre assessment have been grouped into a diagnosis category for the following analysis based on information provided on the referral to CR. The majority of assessments (66%) followed a previous diagnosis of ischaemic heart disease (IHD).

Table 21: Pre assessments by diagnosis category

Diagnosis category	n	%
Ischaemic heart disease*	4,930	66.0
Valvular disease	635	8.5
Other†	1,905	25.5
ALL	7,470	100.0

* STEMI, NSTEMI and angina

† Typically includes arrhythmia, congestive heart failure and any other diagnosis

7.2 Most recent procedure

The most common procedure preceding referral to CR was PCI, which had been documented for 39% of all referrals and approximately half (52%) of referrals for patients with IHD.

There were 11% of cases where the most recent procedure had not been identified. These cases can be attributed to missing data, or to patients presenting and subsequently being conservatively managed thus having no procedure applicable.

Table 22: Most recent procedure noted at pre assessment by diagnosis category

Most recent procedure	Ischaemic heart disease n (%)	Valvular disease n (%)	Other n (%)	ALL n (%)
PCI	2,570 (52.1)	5 (0.8)	315 (16.5)	2,890 (38.7)
Coronary angiogram	854 (17.3)	20 (3.1)	328 (17.2)	1,202 (16.1)
CABG	811 (16.5)	13 (2.0)	318 (16.7)	1,142 (15.3)
Valve procedure	16 (0.3)	485 (76.4)	91 (4.8)	592 (7.9)
CABG + valve procedure	64 (1.3)	67 (10.6)	35 (1.8)	166 (2.2)
Device procedure	16 (0.3)	1 (0.2)	119 (6.2)	136 (1.8)
Other	66 (1.3)	14 (2.2)	177 (9.3)	257 (3.4)
Not specified	533 (10.8)	30 (4.7)	522 (27.4)	1,085 (14.5)

7.3 Risk factors and comorbidities

The following risk factors and comorbidities are discussed with the patient through the assessment phase and are generally self reported by the patient. With all self reporting instances, it is important to note that sometimes responses are not accurately conveyed while the patient and clinician are in the establishment phase of their relationship. As a result, some of the risk factor metrics may be understated.

At the time of the pre assessment, 13% of patients were identified as current smokers (defined as smoking within 30 days), while 50% were classed as former smokers. Only one third of patients met the physical activity guidelines for their age and were sufficiently active. Furthermore, 20% of patients were classed as inactive, which is defined as only undertaking activities associated with daily living. Similarly, less than one quarter (20%) of patients were identified as having a BMI within the normal range.

Overall, 27% of patients had diabetes as a comorbidity with considerable variation observed between diagnosis categories, ranging from 18% for valvular disease to 28% in the IHD and other diagnosis categories. More than half of patients (63%) were identified as having hypertension.

The majority of patients (90%) had a history of abnormal cholesterol levels or had been prescribed lipid lowering therapy at the time of assessment. This ranged from 66% to 96% across diagnosis categories.

Abnormal cholesterol levels for patients with known cardiovascular disease include measures of:

- Total cholesterol $>4.0\text{mmol/L}$
- HDL $<1.0\text{mmol/L}$
- LDL $>2.0\text{mmol/L}$
- Triglycerides $>2.0\text{mmol/L}$.²⁸

Heart failure and LV dysfunction

Overall, there were 15% of patients assessed by outpatient CR who were documented as having heart failure. Of the patients documented to have heart failure, 85% were classed as having a reduced ejection fraction (LVEF $<50\%$). Of these, 32% had mild LV dysfunction, 35% with moderate LV dysfunction and 19% with severe LV dysfunction. The remainder (15%) were documented as having heart failure associated with a preserved ejection fraction (LVEF $\geq 50\%$).

Table 23: Summary of risk factors by diagnosis category

Risk factor	Ischaemic heart disease %	Valvular disease %	Other %	ALL %
Abnormal cholesterol	96.0	65.8	82.0	89.8
Activity level				
Sufficiently active	36.5	38.0	33.6	35.8
Insufficiently active	43.9	40.9	44.0	43.7
Inactive	19.6	21.1	22.5	20.5
Body mass index				
Normal range*	18.7	27.9	19.7	19.7
Overweight†	37.1	35.0	34.3	36.2
Obese‡	38.5	32.7	37.3	37.7
Morbidly obese§	5.0	3.3	8.0	5.6
Diabetes	27.9	18.4	27.5	27.0
Family history of CVD	49.1	32.8	47.7	47.4
Heart failure	12.2	14.7	21.8	14.8
Heart failure, LVEF				
Preserved function#	8.9	33.3	19.6	14.8
Mild dysfunction**	37.4	22.6	25.3	31.8
Moderate dysfunction††	38.6	26.2	31.0	34.8
Severe dysfunction‡‡	15.1	17.9	24.2	18.6
History of depression	27.9	23.7	31.7	28.5
Hypertension	62.8	55.7	66.4	63.1
Smoking status				
Current smoker§§	14.9	5.1	9.1	12.6
Former smoker	50.4	48.6	50.1	50.2
Never smoked	34.7	46.4	40.9	37.3

% from total complete data per case category

* BMI 18.5–24.9 kg/m²

† BMI 25.0–29.9 kg/m²

‡ BMI 30.0–39.9 kg/m²

§ BMI ≥40.0 kg/m²

|| Cardiovascular disease

LVEF ≥50%

** LVEF 40–49%

†† LVEF 30–39%

‡‡ LVEF <30%

§§ Within 30 days

7.4 Current medications

Over three quarters of patients were being treated with aspirin (82%) and lipid lowering medications (84%). As expected, there was variation in medication across diagnosis categories. Patients with IHD tended to use antiplatelet and sublingual nitrate medications more than patients with valvular disease, which is consistent with the different disease processes.

Table 24: Current medications by diagnosis category

Medications	IHD %	Valvular disease %	Other %	ALL %
Aspirin	89.7	62.0	68.0	81.8
ACEI/ARB	65.0	41.9	54.1	60.2
Antiplatelet	64.5	9.3	28.7	50.7
Anticoagulant	16.3	45.7	24.8	21.0
Beta blocker	66.2	47.9	60.3	63.1
Diabetic medications	22.1	15.5	22.6	21.7
Dual antiplatelet	60.0	6.6	23.2	46.1
Lipid lowering	91.1	57.4	73.7	83.8
Sublingual nitrate	60.4	5.7	23.8	46.5
Other	65.1	79.1	77.0	69.3

8 Clinical indicators

The CR clinical indicator program has been focused towards the timely referral and uptake to CR for admitted patients being discharged from public hospitals. This requires collaboration between the acute and outpatient services, each having their own targets (clinical indicator 1 and 2a respectively).

Overall system performance is measured through clinical indicator 3, which requires the acute and outpatient services to both meet their respective targets. For the purpose of this indicator any referrals crossing between HHSs are counted under both the referring and receiving HHS/organisation.

Since the previous report, the QCOR CR Committee has established a new clinical indicator (clinical indicator 2b) examining the proportion of patients who were referred from other settings and had an initial CR assessment completed within 28 days of the referral date. This indicator was developed to help ensure timely services are being provided to all clients, regardless of referral source or clinical history.

Table 25: Cardiac rehabilitation clinical indicators

#	Clinical indicator	Description
1	Timely referral – inpatients	Documented referral to CR within three days of discharge
2a	Timely assessment – inpatients	Initial CR pre assessment completed within 28 days of discharge
2b	Timely assessment – non-acute patients	Initial CR pre assessment completed within 28 days of referral date
3	Timely journey – inpatients	Composite of timely referral and assessment

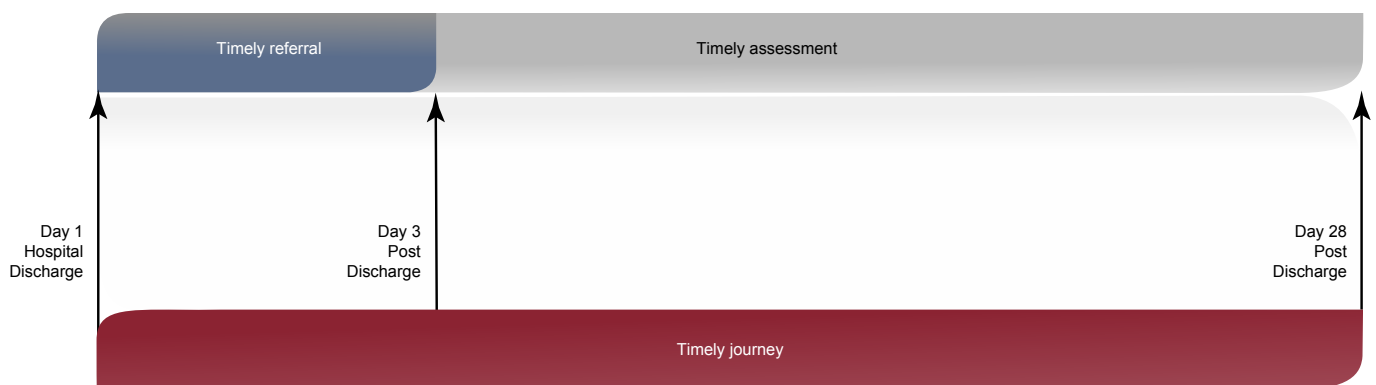


Figure 19: Timely referral, assessment and overall journey for inpatient referrals

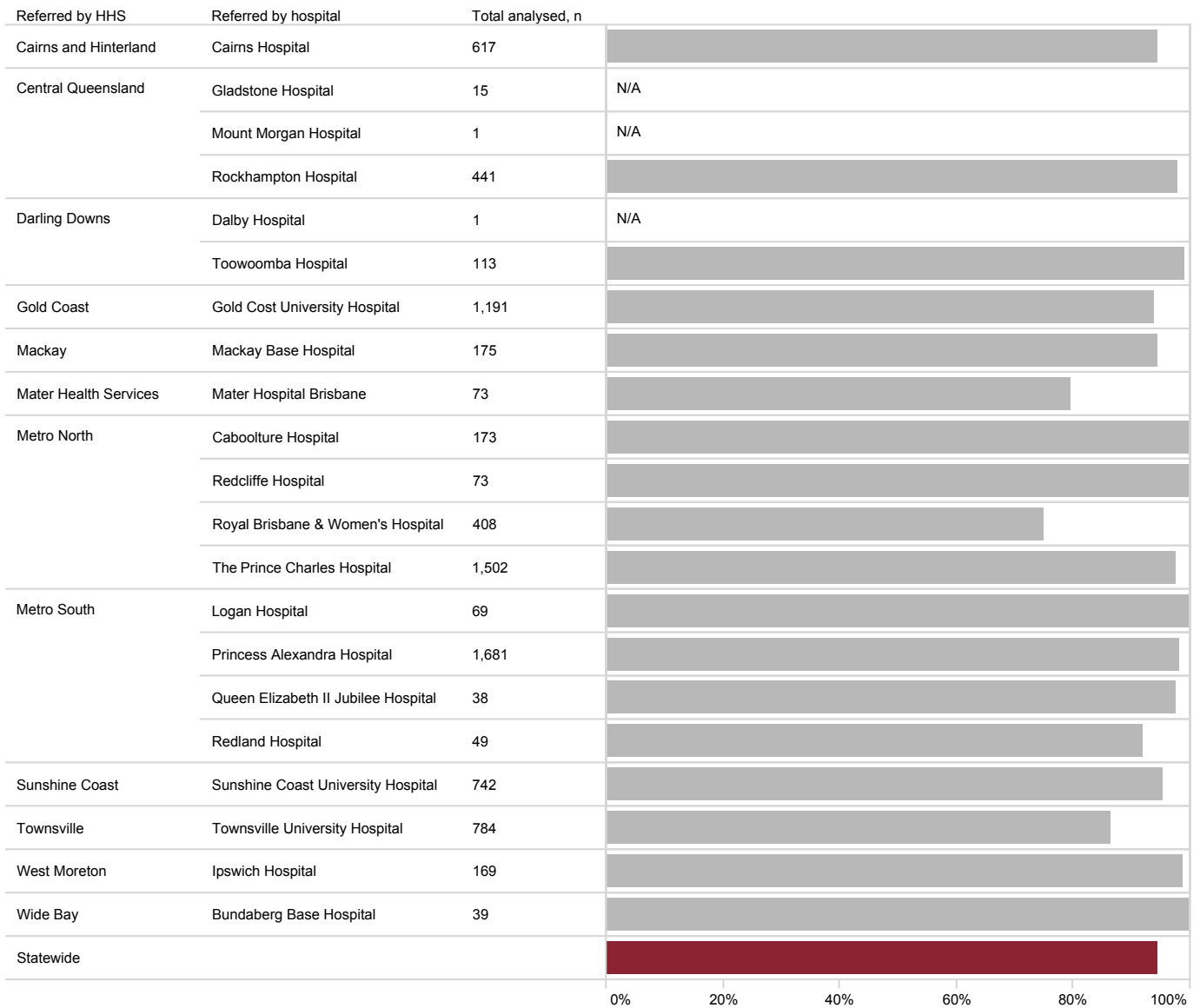
8.1.1 Timely referral

This indicator examines the proportion of inpatient referrals to CR originating from a public hospital which had been provided to the CR program in a timely manner. This requires the referral to be submitted to the outpatient program within three days of the patient being discharged from hospital.

Overall, performance is high with 94% of referrals contributed to QCOR being submitted within three days of discharge.

Table 26: Timely referrals by referring HHS

Referring HHS/organisation	Total inpatient referrals n	Total eligible for analysis n	Target met n (%)
Cairns and Hinterland	628	617	582 (94.3)
Central Queensland	501	457	445 (97.4)
Darling Downs	115	114	113 (99.1)
Gold Coast	1,206	1,191	1,117 (93.8)
Mackay	183	175	165 (94.3)
Mater Health Services	75	73	58 (79.5)
Metro North	2,174	2,156	2,016 (93.5)
Metro South	1,838	1,837	1,799 (97.9)
Sunshine Coast	793	742	707 (95.3)
Townsville	808	784	678 (86.5)
West Moreton	170	169	167 (98.8)
Wide Bay	40	39	39 (100.0)
Statewide	8,531	8,354	7,886 (94.4)



N/A: Not displayed due to <20 referrals eligible for analysis

Figure 20: Timely referrals by referring hospital

8.1.2 Timely assessment – inpatients

This indicator examines the proportion of referrals to CR which proceed to an assessment within 28 days of discharge. In order to retain focus on the performance of the outpatient CR program, referrals which are not provided in a timely manner (<3 days from discharge) have been excluded from the analysis. Further to this, other ineligibility criteria are outlined in Table 27. The exclusions are applied where information is available and has been documented in the application.

Overall, more than half of all patients (59%) are being assessed in a timely manner, however there was some variation across health services.

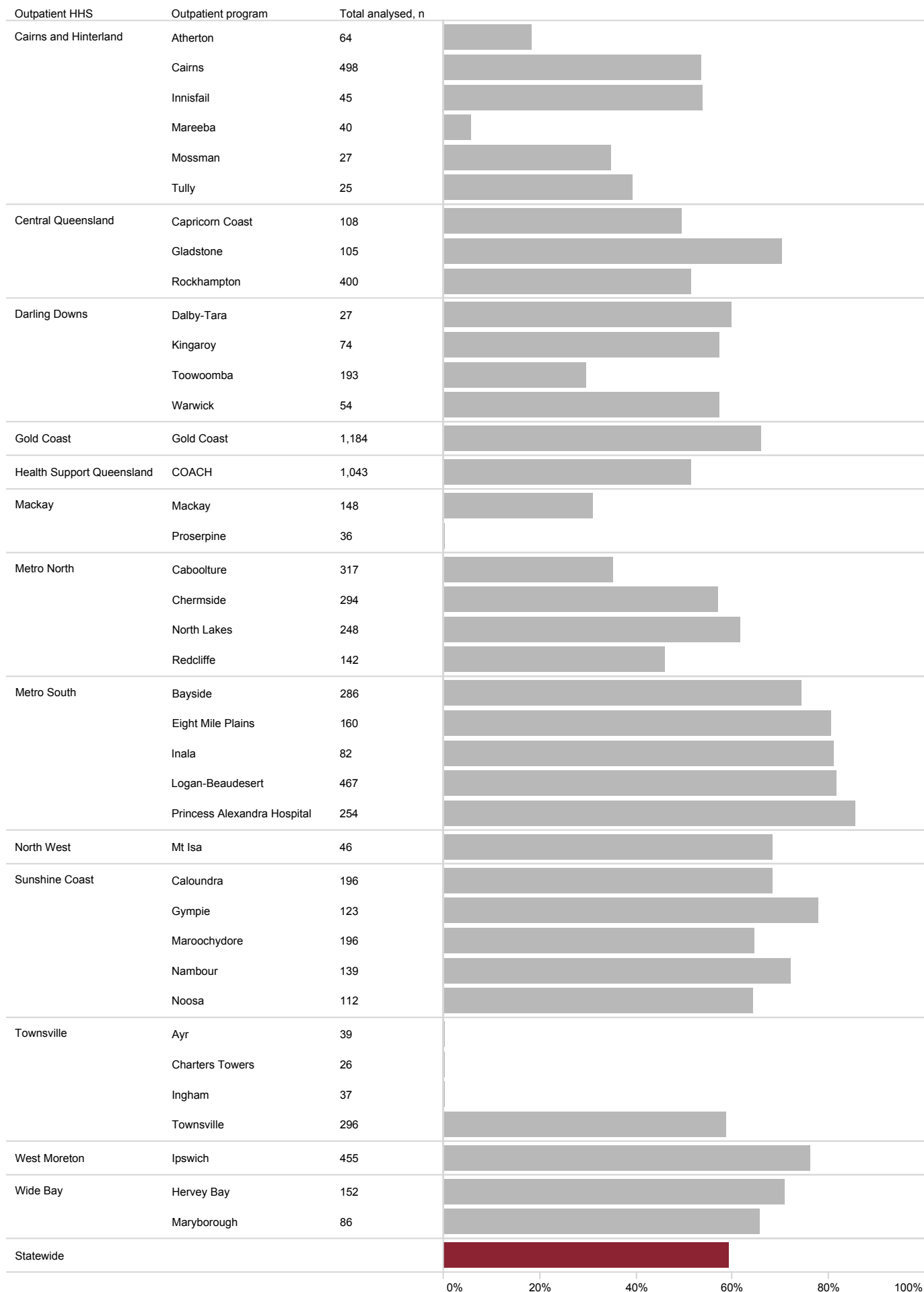
Table 27: Summary of referrals ineligible for timely assessment clinical indicator – inpatients

Summary	n
Not referred within three days of discharge	423
Referred outside of Queensland Health	369
Same day admission	177
Clinically unstable/inappropriate	126
Patient accepted onto existing program	94
Patient readmitted to hospital	94
Patient deceased	28
Total ineligible	1,311

Table 28: Timely assessment indicator by outpatient HHS – inpatients

Outpatient HHS/division	Total inpatient referrals n	Total eligible for analysis n	Target met n (%)
Cairns and Hinterland	710	595	274 (46.1)
Central Queensland	690	577	308 (53.4)
Central West	11	9	N/A
Darling Downs	389	355	142 (40.0)
Gold Coast	1,199	813	536 (65.9)
Health Support Queensland	1,060	872	449 (51.5)
Mackay	203	157	34 (21.7)
Metro North	1,011	943	469 (49.7)
Metro South	1,253	1,192	961 (80.6)
North West	48	38	26 (68.4)
South West	26	24	10 (41.7)
Sunshine Coast	809	673	464 (68.9)
Townsville	419	349	143 (41.0)
West Moreton	456	413	315 (76.3)
Wide Bay	247	210	146 (69.5)
Statewide	8,531	7,220	4,284 (59.3)

N/A: Not displayed due to <20 referrals eligible for analysis



Sites with <20 referrals for analysis not displayed

Figure 21: Timely assessment by outpatient program – inpatients

8.1.3 Timely assessment – non-acute patients

This indicator examines the proportion of referrals from the non-acute setting which proceed to an assessment within 28 days of referral. The majority of non-acute patients (61%) are being assessed in a timely manner, with some notable variation between health services.

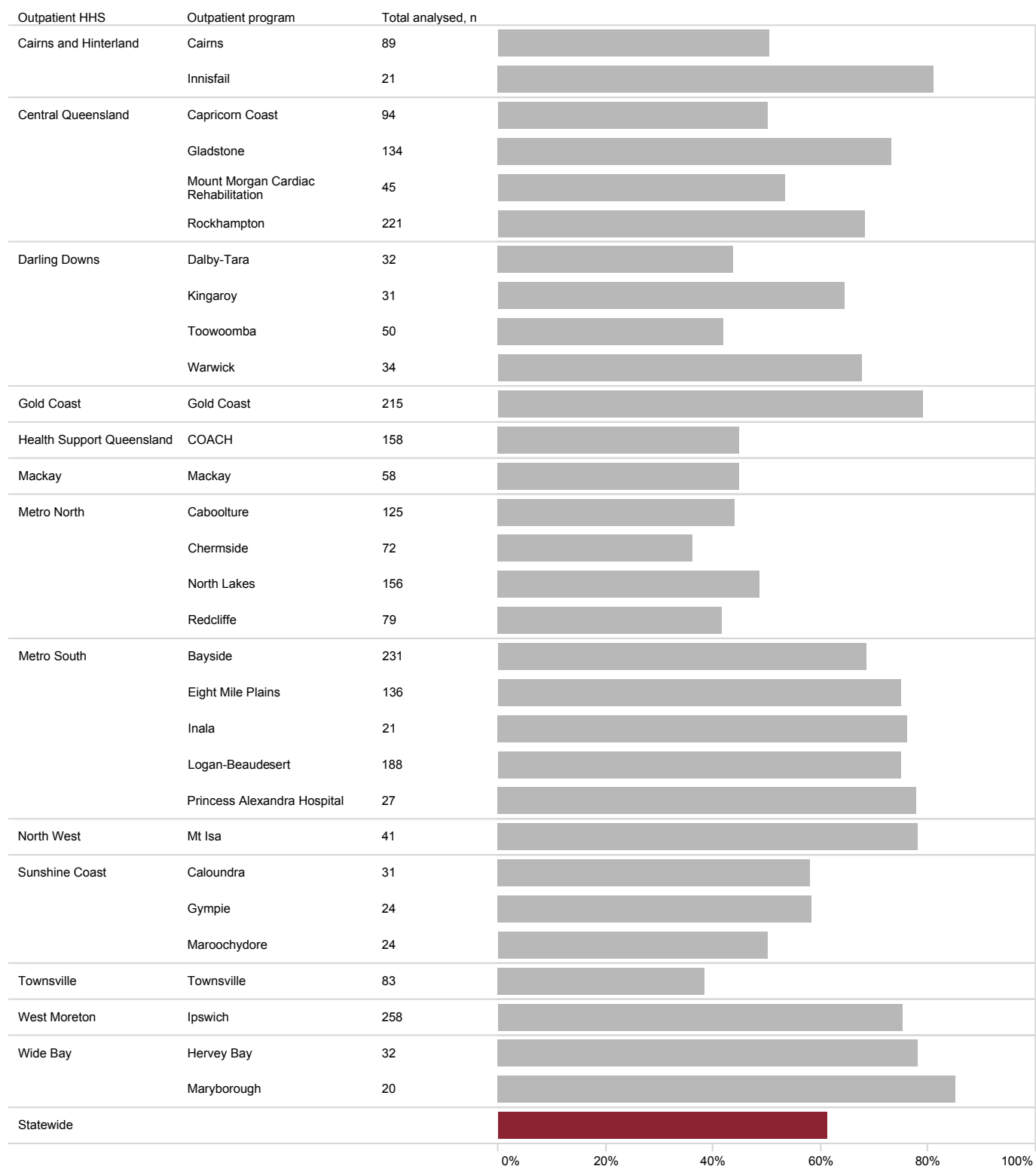
Table 29: Summary of referrals ineligible for timely assessment clinical indicator – non acute patients

Summary	n
Referred outside of Queensland Health	62
Patient accepted onto existing program	24
Patient readmitted to hospital	19
Clinically unstable/inappropriate	18
Patient deceased	3
Total ineligible	126

Table 30: Timely assessment indicator by outpatient HHS – non acute patients

Outpatient HHS/division	Total non acute referrals n	Total eligible for analysis n	Target met n (%)
Cairns and Hinterland	154	153	80 (52.3)
Central Queensland	510	497	321 (64.6)
Central West	12	11	N/A
Darling Downs	173	171	96 (56.1)
Gold Coast	257	215	170 (79.1)
Health Support Queensland	178	158	71 (44.9)
Mackay	74	68	26 (38.2)
Metro North	438	432	190 (44.0)
Metro South	616	603	438 (72.6)
North West	41	41	32 (78.0)
South West	14	12	N/A
Sunshine Coast	117	104	57 (54.8)
Townsville	115	112	32 (28.6)
West Moreton	261	258	194 (75.2)
Wide Bay	56	55	45 (81.8)
Statewide	3,016	2,890	1,770 (61.2)

N/A: Not displayed due to <20 referrals eligible for analysis



Sites with <20 referrals for analysis not displayed

Figure 22: Timely assessment by outpatient program – non acute patients

8.1.4 Timely journey

This patient-centric measure of overall system performance requires strong coordination and links between the referring acute and outpatient CR sites. It measures the proportion of eligible inpatient referrals submitted by the acute site within three days of discharge, as well as the ability of the receiving CR program to meet the target of completing a pre assessment within 28 days of discharge.

Referrals are excluded from the analysis for the reasons outlined in Table 31. The exclusions are applied where information is available and has been documented in the application.

It is important to note that for the purpose of this indicator, any referral which crosses between HHSs is counted against both participating services.

Table 31: Summary of referrals ineligible for timely journey clinical indicator – inpatients

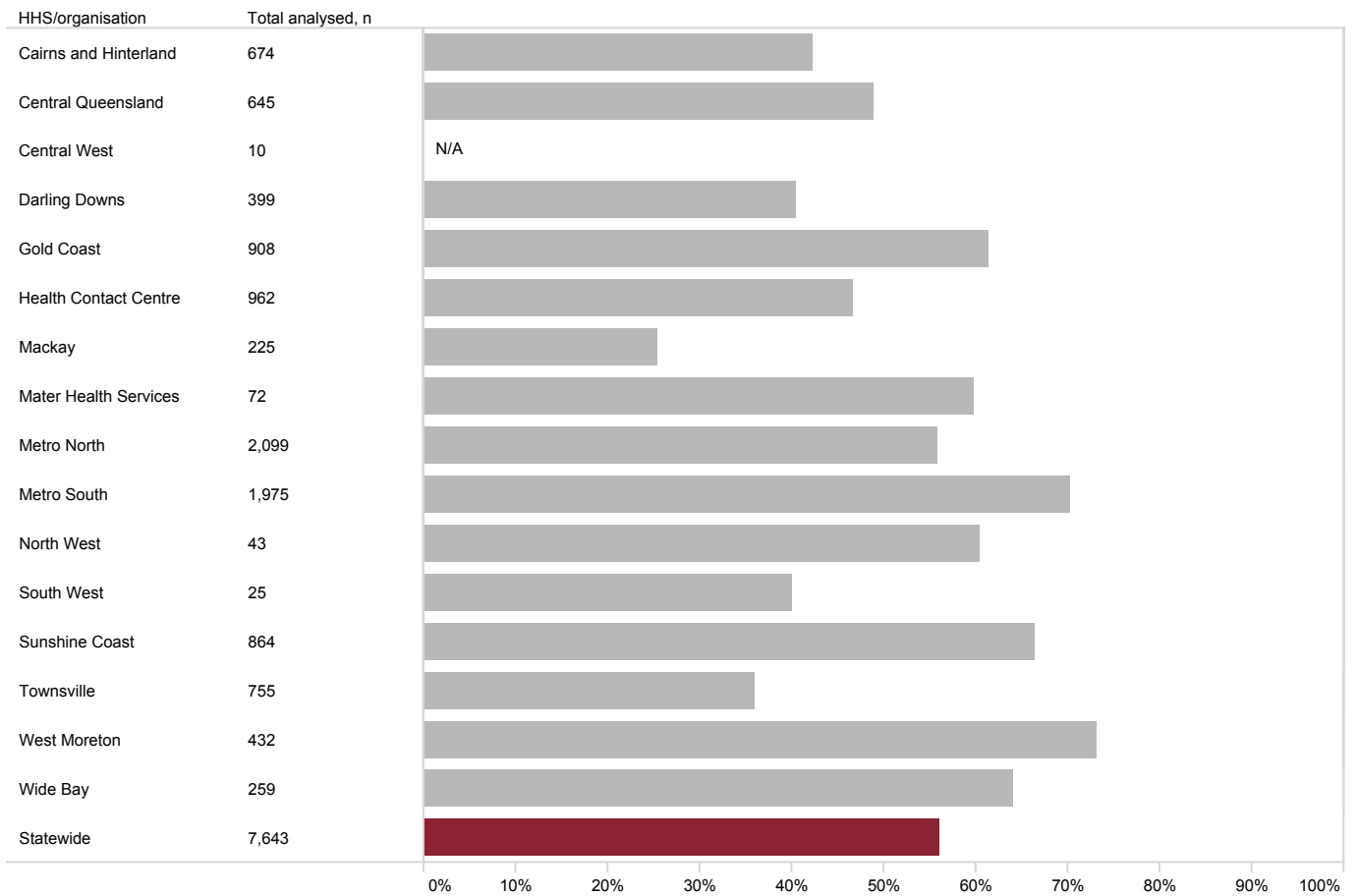
Summary	n
Referred outside of Queensland Health	369
Same day admission	177
Clinically unstable/inappropriate	126
Patient accepted onto existing program	94
Patient readmitted to hospital	94
Patient deceased	28
Total ineligible	888

Table 32: Timely journey indicator by participating HHS – inpatients

Participating HHS/ organisation	Total inpatient referrals* n	Total eligible for analysis n	Target met n (%)
Cairns and Hinterland	747	674	285 (42.3)
Central Queensland	739	645	316 (49.0)
Central West	11	10	N/A
Darling Downs	426	399	161 (40.4)
Gold Coast	1,247	908	557 (61.3)
Health Support Queensland	1,060	962	449 (46.7)
Mackay	261	225	57 (25.3)
Mater Health Services	75	72	43 (59.7)
Metro North	2,209	2,099	1,172 (55.8)
Metro South	2,041	1,975	1,386 (70.2)
North West	48	43	26 (60.5)
South West	26	25	10 (40.0)
Sunshine Coast	988	864	575 (66.6)
Townsville	814	755	272 (36.0)
West Moreton	459	432	316 (73.1)
Wide Bay	286	259	166 (64.1)
Statewide	8,531	7,643	4,284 (56.1)

N/A: Not displayed due to <20 referrals eligible for analysis

* Includes both incoming and outgoing referrals



N/A: Not displayed due to <20 referrals eligible for analysis

Figure 23: Timely journey indicator by participating HHS – inpatients

9 Declined referrals

An ongoing initiative has been to further define the subset of patients who did not uptake CR for whatever reason, with the aim to increase the level of detail available to describe the barriers to participation. The cohort of patients who had elected not participate in CR have been examined with an aim to identify common themes and opportunities to improve patient participation rates.

This does not include, for example, patients who did not attend CR due to being medically unsuitable to participate.

A limiting factor for this analysis is the amount of data available to describe this cohort, as this is limited to the information included on the initial referral only.

9.1 Age and gender

Patients most likely to decline CR participation are males aged 65 years to 69 years (12%). The largest group of females to decline CR were aged in the 70 years to 74 years category (6%). Patients who declined were older than patients who had taken up CR (70 years vs. 66 years).

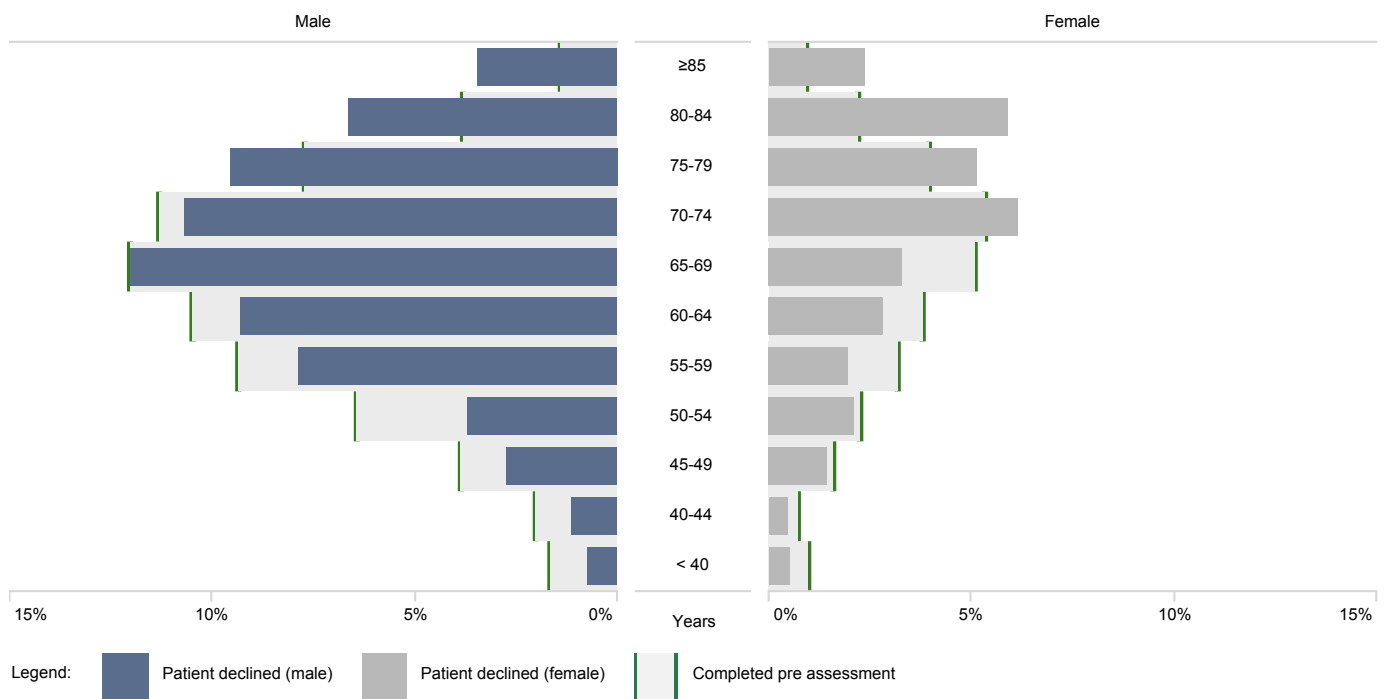


Figure 24: Patient CR program participation status by age group and gender

Table 33: Patient age (years) by program participation status

	Male Median (IQR)	Female Median (IQR)	ALL Median (IQR)
Patient declined	68 (61–76)	73 (63–80)	70 (61–78)
Fully assessed	65 (57–73)	68 (58–74)	66 (57–73)

Table 34: Patient gender by program participation status

Gender	Completed pre assessment n (%)	Patient declined n (%)
Male	5,225 (69.9)	767 (67.8)
Female	2,245 (30.1)	364 (32.2)

9.2 Diagnosis category

Of the patients who declined, 41% had a diagnosis of ischaemic heart disease and 4% valvular disease, while the majority (55%) had some other diagnosis.

By comparison, patients who had completed initial assessment via CR more highly represented by ischaemic heart disease and valvular heart disease (66% and 9% respectively).

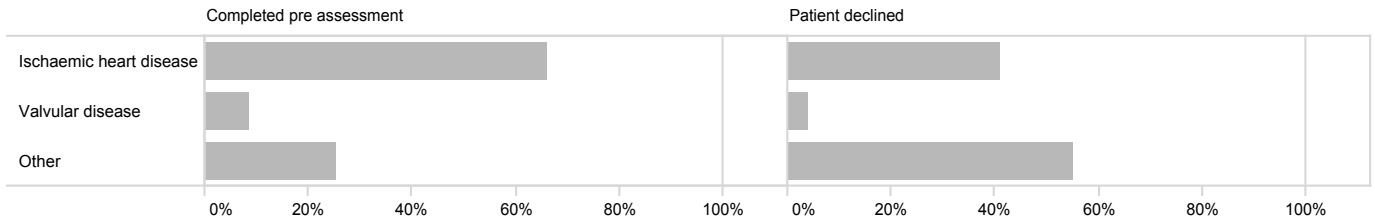


Figure 25: Proportion of cases by diagnosis category and program participation status

Table 35: Diagnosis category by program participation status

Diagnosis category	Completed pre assessment n (%)	Patient declined n (%)
Ischaemic heart disease	4,930 (66.0)	465 (41.1)
Valvular disease	635 (8.5)	44 (3.9)
Other	1,905 (25.5)	622 (55.0)
ALL	7,470 (100.0)	1,131 (100.0)

9.3 Most recent procedure

Overall, 22% of patients that elected not to participate in CR were recorded as having undergone PCI, while approximately 8% had undergone CABG (with or without a concomitant valve procedure). Almost half of patients (47%) who declined CR had no recent procedure specified. Care should be taken, however, when interpreting these findings as this data element is not always completed at the time of referral. Therefore, it may not fully represent the preceding patient medical history.

For the cohort that proceeded to assessment, their most recent procedure was more closely related to their participation status. This data suggests that patients who went on to uptake a CR program may be more likely to have undergone an invasive cardiac procedure prior to referral.

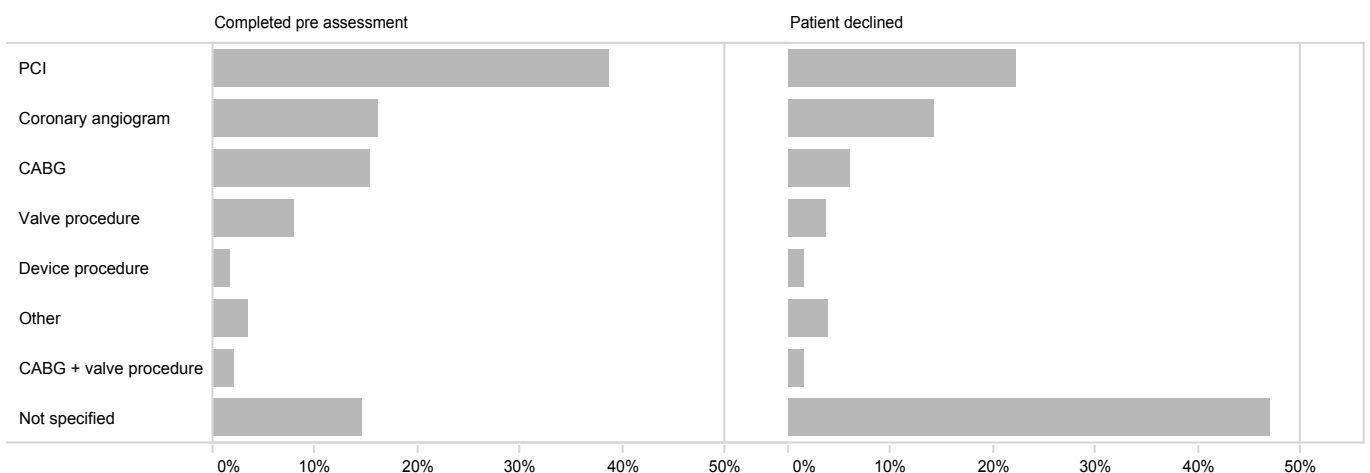


Figure 26: Proportion of cases by most recent procedure and program participation status

Table 36: Most recent procedure by program participation status

Most recent procedure	Completed pre assessment n (%)	Patient declined n (%)
PCI	2,890 (38.7)	250 (22.1)
Coronary angiogram	1,202 (16.1)	161 (14.2)
CABG	1,142 (15.3)	68 (6.0)
Valve procedure	592 (7.9)	41 (3.6)
CABG + valve procedure	166 (2.2)	18 (1.6)
Device procedure	136 (1.8)	18 (1.6)
Other	257 (3.4)	43 (3.8)
Not specified	1,085 (14.5)	532 (47.0)
ALL	7,470 (100.0)	1,131 (100.0)

9.4 Place of residence

Compared to patients who had taken up CR, a higher proportion of patients who elected not to participate resided in regional and remote areas of Queensland.

While there are many reasons a patient may wish not to participate in CR, this trend toward lower participation rates for patients in regional areas should be noted for service planning and model of care selection.

Table 37: Remoteness classification by program participation status

Remoteness area*	Completed pre assessment %	Patient declined %
Major Cities of Australia	54.2	45.4
Inner Regional Australia	29.0	28.5
Outer Regional Australia	13.8	23.0
Remote Australia	0.8	1.9
Very Remote Australia	2.2	1.2
ALL	100.0	100.0

Excludes missing data (0.5%)

* Classified by Australian Statistical Geography Standard remoteness area

10 Conclusions

This year's report reflects the effort and dedication of clinicians across 57 Queensland CR sites incorporating QCOR into their daily practice, including the addition of two newly established sites during the year.

Almost all sites offering public CR services in Queensland are directly entering data into QCOR at the time of assessment. Whilst a goal of the QCOR committee is for all sites to enter data into QCOR, it must be recognised that the vast level of collaboration and collegiality that has already been established through this endeavour is unprecedented for CR services in the state.

The evolution of the QCOR application over time has allowed increased detail for all CR activity, including inpatient phase one activity. One future focus of this Audit will be those patients who decline CR in the initial stages, with an exploration of the barriers and reasons for non-participation to occur.

The clinical quality indicator program for CR services continues to drive improvement with the journey of the patient and their experience at the forefront of all focus. By expanding on the formal Hospital and Health Service performance measure, the QCOR committee has moved to measure outcomes across all areas in CR.

Patient reported measures within this Audit show improvement in outcomes and quality of life which is reassuring for all staff that they're making a consistent and measurable difference to the lives of patients affected by cardiovascular disease. With further expansion and enhancement of the dataset, as well as a focus on in and out-of-hospital processes and reporting, there is room for further improvement and sophistication to be realised in this space.

Further enhancements of the QCOR application have improved collaboration between sites and primary carers with multiple forms of CR documentation now available in Queensland Health's 'The Viewer' platform. Primary care is known to be an important determinant of outcomes and hospital avoidance post-discharge and it is hoped with this greater level of visibility of CR interactions that patient care can be improved not only in hospital but long after discharge.

The future of CR services in Queensland Health holds great promise but would not be possible without the dedication and engagement of health professionals working day in day out to improve the lives of their fellow Queenslanders. By embracing this enthusiasm and drive for improvement there will no doubt be many more opportunities to effect change and excellence in the future.

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Cardiac Rehabilitation Audit

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Glossary

6MWT	Six Minute Walk Test	IHT	Inter-hospital Transfer
ACC	American College of Cardiology	IPCH	Ipswich Community Health
ACEI	Angiotensin Converting Enzyme Inhibitor	LAA	Left Atrial Appendage
ACP	Advanced Care Paramedic	LAD	Left Anterior Descending Artery
ACS	Acute Coronary Syndromes	LCX	Circumflex Artery
AEP	Accredited Exercise Physiologist	LGH	Logan Hospital
ANZSCTS	Australian and New Zealand Society of Cardiac and Thoracic Surgeons	LOS	Length of Stay
APC	Argon Plasma Coagulation	LV	Left Ventricle
AQoL	Assessment of Quality of Life	LVEF	Left Ventricular Ejection Fraction
ARB	Angiotensin II Receptor Blocker	LVOT	Left Ventricular Outflow Tract
ARF	Acute Rheumatic Fever	MBH	Mackay Base Hospital
ARNI	Angiotensin Receptor-Nepriylsin Inhibitors	MI	Myocardial Infarction
ASD	Atrial Septal Defect	MIH	Mt Isa Hospital
AV	Atrioventricular	MKH	Mackay Base Hospital
AVNRT	Atrioventricular Nodal Re-entry Tachycardia	MRA	Mineralocorticoid Receptor Antagonists
BCIS	British Cardiovascular Intervention Society	MSSA	Methicillin Susceptible Staphylococcus Aureus
BiV	Biventricular	MTHB	Mater Adult Hospital, Brisbane
BMI	Body Mass Index	NCDR	The National Cardiovascular Data Registry
BMS	Bare Metal Stent	NCR	National Cardiac Registry
BNH	Bundaberg Hospital	NOAC	Non Vitamin K Antagonist Oral Anticoagulants
BSSLTX	Bilateral Sequential Single Lung Transplant	NP	Nurse Practitioner
BVS	Bioresorbable Vascular Scaffold	NRBC	Non-Red Blood Cells
CABG	Coronary Artery Bypass Graft	NSTEMI	Non ST Elevation Myocardial Infarction
CAD	Coronary Artery Disease	OR	Odds Ratio
CBH	Caboolture Hospital	OOHCA	Out-of-Hospital Cardiac Arrest
CCL	Cardiac Catheter Laboratory	ORIF	Open Reduction Internal Fixation
CCP	Critical Care Paramedic	PAH	Princess Alexandra Hospital
CH	Cairns Hospital	PAPVD	Partial Anomalous Pulmonary Venous Drainage
CI	Clinical Indicator	PCI	Percutaneous Coronary Intervention
CR	Cardiac Rehabilitation	PDA	Patent Ductus Arteriosus
CRT	Cardiac Resynchronisation Therapy	PFO	Patent Foramen Ovale
CS	Cardiac Surgery	PHQ	Patient Health Questionnaire
CVA	Cerebrovascular Accident	QAS	Queensland Ambulance Service
DAOH	Days Alive and Out-of-Hospital	QCOR	Queensland Cardiac Outcomes Registry
DES	Drug Eluting Stent	QEII	Queen Elizabeth II Jubilee Hospital
DOSA	Day of Surgery Admission	QHAPDC	Queensland Hospital Admitted Patient Data Collection
DSWI	Deep Sternal Wound Infection	RBC	Red Blood Cells
ECG	12 lead Electrocardiograph	RBWH	Royal Brisbane & Women's Hospital
ECMO	Extracorporeal membrane oxygenation	RCA	Right Coronary Artery
ED	Emergency Department	RDH	Redcliffe Hospital
eGFR	Estimated Glomerular Filtration Rate	RHD	Rheumatic Heart Disease
EP	Electrophysiology	RKH	Rockhampton Hospital
FdECG	First Diagnostic Electrocardiograph	RLH	Redland Hospital
FTR	Failure to Rescue	SCCIU	Statewide Cardiac Clinical Informatics Unit
GAD	Generalized Anxiety Disorder	SCCN	Statewide Cardiac Clinical Network
GCCH	Gold Coast Community Health	SCUH	Sunshine Coast University Hospital
GCUH	Gold Coast University Hospital	SHD	Structural Heart Disease
GLH	Gladstone Hospital	STEMI	ST-Elevation Myocardial Infarction
GP	General Practitioner	STS	Society of Thoracic Surgery
GYH	Gympie Hospital	TAVR	Transcatheter Aortic Valve Replacement
HBH	Hervey Bay Hospital (includes Maryborough)	TMVR	Transcatheter Mitral Valve Replacement
HF	Heart Failure	TNM	Tumour, Lymph Node, Metastases
HFpEF	Heart Failure with Preserved Ejection Fraction	TPCH	The Prince Charles Hospital
HFrEF	Heart Failure with Reduced Ejection Fraction	TPVR	Transcatheter Pulmonary Valve Replacement
HFSS	Heart Failure Support Service	TUH	Townsville University Hospital
HHS	Hospital and Health Service	TWH	Toowoomba Hospital
HOCM	Hypertrophic Obstructive Cardiomyopathy	VAD	Ventricular Assist Device
HSQ	Health Support Queensland	VATS	Video Assisted Thoracic Surgery
IC	Interventional Cardiology	VCOR	Victorian Cardiac Outcomes Registry
ICD	Implantable Cardioverter Defibrillator	VF	Ventricular Fibrillation
IE	Infective Endocarditis	VSD	Ventricular Septal Defect

