Statewide Cardiac Clinical Network Clinical Informatics Unit

Queensland Cardiac Outcomes Registry (QCOR)
Interventional Cardiology
2015 Annual Report

Queensland Government

Authors

This collaborative report was produced by: Statewide Cardiac Clinical Informatics Unit (SCCIU), audit lead for the Queensland Cardiac Outcomes Registry (QCOR) for and on behalf of the Statewide Cardiac Clinical Network (SCCN).

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For Queensland Health employees, this report is available online at http://qheps.health.qld.gov.au/caru/networks/cardiac/default.htm

For external parties, hard copies can be requested by contacting the SCCIU at the email address below.

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Acknowledgments

We would especially like to thank the Statewide Cardiac Clinical Network (SCCN) for their continued funding and support, the contribution of all Queensland Health participating Cardiac Catheter Laboratory Units and the individual nurses, allied health professionals and clinicians who collect data and participate in the QCOR program.

We would also like to thank the staff of the Statewide Cardiac Clinical Informatics Unit who provided clinical informatics support and the Health Statistics Unit, Statistics and Data Governance Branch for providing administrative data to QCOR clinical data.

Without these contributions, the annual report could not present credible analysis, or to facilitate the assessment and monitoring of the standard of PCI procedures in Queensland.

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1 Message from the SCCN Chair

The publication of this report represents a major milestone in the development and activities of the Statewide Cardiac Clinical Network (SCCN). It is the first in a planned series of patient reports detailing the cardiac care of patients in public hospitals in Queensland.

Clinicians in their daily activities are habitually focused on the safety and outcomes of their treatments. Angioplasty operators for decades have kept individual records of their angioplasty procedures. Institutions also have been in the habit of conducting annual morbidity mortality reviews, usually based on operator reported outcomes of procedures. Individual and institutional sensitivities however have often hampered sharing of information across multiple institutions.

The registry that supports provision of the current report commenced enrolment in late 2012 and with step wise installation across the state in public cathlabs during 2013 has now with strong clinician support, sufficient maturity and confidence to report specific outcomes from 3484 angioplasty procedures conducted in 7 of the 8 public hospitals in Queensland in calendar year 2015.

The cooperation across institutions which is required to produce such a report, builds on the desire for collaboration and improvement which has developed in the Statewide Cardiac Clinical Network, whose primary aim is to facilitate the provision of appropriate, timely, equitable cardiac care to the patients of Queensland with both acute and chronic cardiac conditions. This spirit of cooperation has clearly served to breakdown for the most part inter-institutional rivalries and personal protectiveness about the results of cardiac interventions. To state that this report embodies a significant maturation of clinician behaviour in public hospitals in Queensland is clearly an understatement, and it represents a development which is worthy of significant pride across the state.

Dr Paul Garrahy,
Chair,
Statewide Cardiac Clinical Network (SCCN)

2 Executive Summary

The Queensland Cardiac Outcomes Registry (QCOR) was officially established in 2015, after three years of development work by the Statewide Cardiac Clinical Network in collaboration with Cardiac clinicians, nurses and allied health professional members of the Cardiac Data Steering Committee.

This inaugural audit describes key aspects of the care and treatment of cardiac patients receiving percutaneous coronary interventions during 2015.

Key findings include:

- There are eight public Cardiac Catheter Laboratories across Queensland, of which seven participate in QCOR's quality and safety program.
- Queensland presents challenges to the provision of tertiary level cardiac services, with more than 50% of the population living outside the capital, and 25% living outside the South East region.
- In 2015, 11113 cases were performed. Of these, 3484 were percutaneous coronary interventions.
- The proportion of 'indigenous patients' demonstrates a stepwise gradient based on geographical area with the highest proportions found in the north of the state and the lowest in the south east corner.
- Almost half of PCI patients (40%) were classed as obese or morbidly obese, highlighting the temporal trend for increasing BMI in our population.
- The majority of PCI cases (77.3%) were non-elective highlighting the acute and often complex case mix.
- Statewide, radial access was used in 45.1% of cases, but there is large variation across facilities.
- Drug eluting stents were used in 67.9% of cases ranging between 42.3 and 92.2% across sites.
- NSTEMI PCI cases represented 27.0% of all PCI cases, with median times to angiography of 51 hours. Patients presenting to a non PCI capable facility have a median wait to coronary angiography of 24 hours longer than those who present directly to a PCI capable facility (68 vs 44).
- There were 1022 PCI cases following presentation with STEMI in 2015, of which around three-quarters were managed by primary PCI.
- During 2015, there were 29 deaths in STEMI patients, the majority (n=27) occurring during the index admission.
- Median door to device time for STEMI patients presenting within six hours of symptom onset was 37 mins (range 33 to 46).
- IN STEMI patients, Interhospital transfers accounted for only 4.7% of PCI cases.
- Median time to reperfusion for STEMI patients presenting within six hours of symptom onset was 95 min (range 82 to 107).
- Unadjusted all-cause 30-day PCI mortality by admission status: elective, urgent, emergent and salvage was 0.5, 1.0, 3.5 and 23.8% respectively.
- Statewide, there were no reported cerebrovascular accidents, tamponade or requirement for emergency cardiac surgery due to a procedural complication. The incidence of coronary artery perforation was 0.3% and in-lab mortality was very low at 0.2%.
- Radiation doses were found to be under the safe radiation level in 97.6% of cases across the state.

3 Introduction

In 2007, the Statewide Cardiac Clinical Network (SCCN) commissioned a study, the Adult Cardiac Service Quality Information Systems (ACQIS) project, to elicit the views of its clinicians regarding the information needs of adult cardiac services in Queensland. Specifically, the project focused on information management challenges facing cardiac service delivery.

The study identified key priority areas to improve the quality, safety, effectiveness and efficiency of cardiac care in Queensland and in 2009, the SCCN mandated the establishment of a multi-year health informatics program, the Cardiac Information Solutions Program (CISP), tasked with resolving information management barriers to the provision of safe, effective and efficient cardiac clinical care within Queensland.

To date, CISP has delivered system capability across a number of cardiac specialties ranging from vendor point of care clinical applications providing decision support at the individual patient level to bespoke in-house applications supporting clinical audit for cardiac service specialties.

With Statewide cardiac clinical systems in place, vast amounts of clinical data have been captured and consolidated. In addition to clinical data collected by specialist Cardiac systems, relevant administrative data, to complement existing clinical data collections, are sourced to reduce the requirement for capture of administrative data by clinicians. Together these data are collectively known as the Queensland Cardiac Outcomes Registry.

By providing a set of clinical data that are comprehensive, trusted and provide deep insights into the quality and safety of Cardiac Care across Queensland, clinicians and their multidisciplinary teams, armed with valid and robust data, meaningful clinical indicators and a commitment to a quality and safety agenda, are well prepared to thrive and lead the way.

QCOR is an exciting initiative supporting a clinician led and managed quality and safety program, and serves as a model for the establishment of other Disease registries within the public health sector environment.

4 QCOR

4.1 The Statewide Cardiac Clinical Network

The Statewide Cardiac Clinical Network (SCCN) acts in an overarching capacity under which three main areas of work fall: The Cardiac Information Solutions Program (CISP), responsible for system infrastructure to support data collection; The Queensland Cardiac Outcomes Registry, supported by the Statewide Cardiac Clinical Informatics Unit (SCCIU); and the statewide cardiac specialty craft groups. Each of these groups and their roles under the SCCN are described in the following sections.

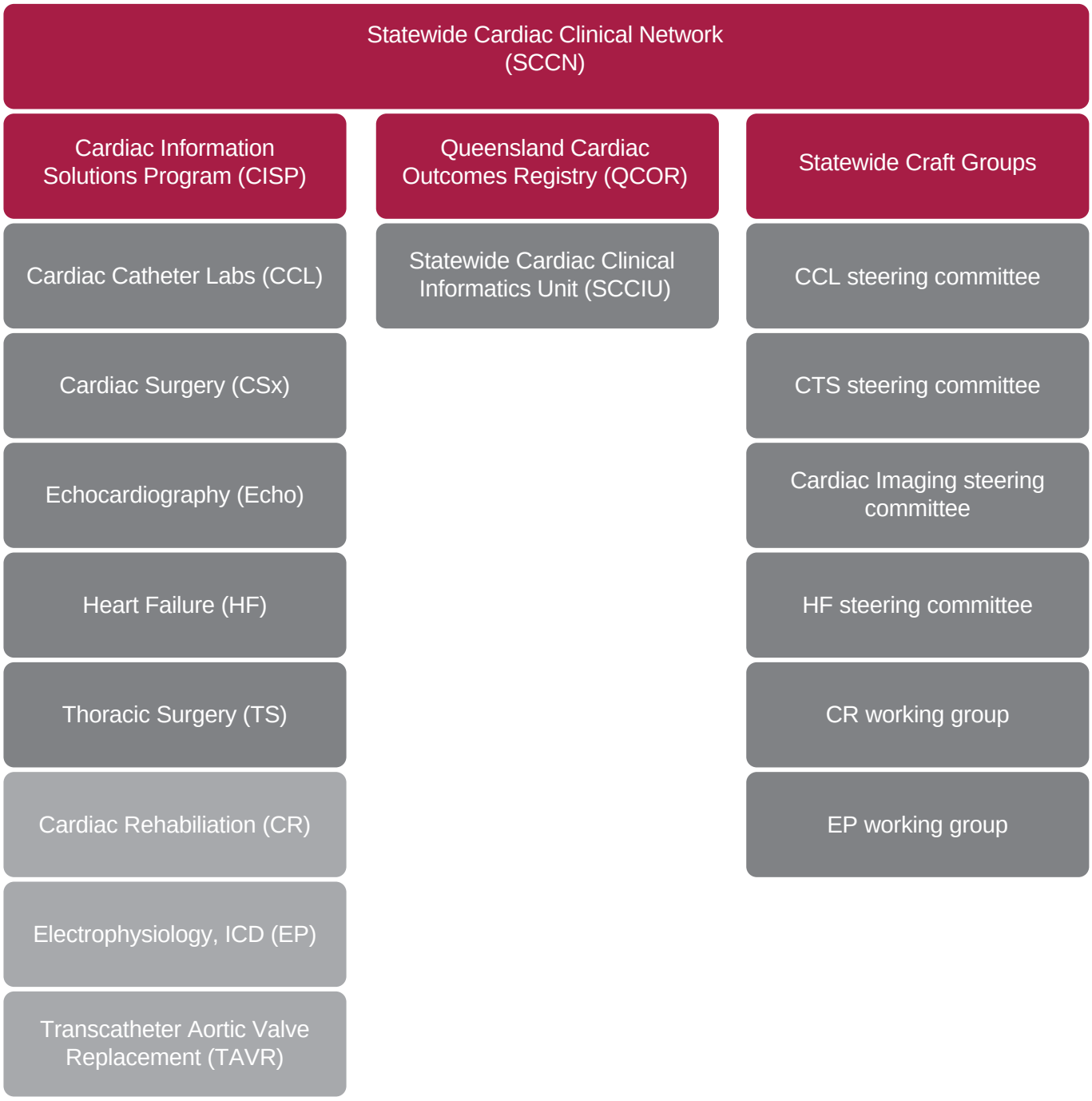

Figure 1: Statewide Cardiac Clinical Network

4.2 Data collection

Since 2012, CISP has delivered and will deliver system capability across a number of cardiac specialties. These systems include vendor point of care clinical applications providing decision support at the individual patient level and bespoke in-house built applications developed specifically to support cardiac performance measurement.

Table 1: Current QCOR data collections

Module	Module Name	Participating Sites (n)
1	Diagnostic and Interventional Cardiology	7
2	Cardiac Surgery	3
3	Heart Failure	24
4	Thoracic Surgery	4
5	Echocardiography	3

Table 2: Future QCOR data collections

Module	Module Name
1	Electrophysiology, ICDs and ablations
2	TAVR
3	Cardiac Rehabilitation

The data from each of these systems, once captured, are transmitted to the QCOR registry to support reporting along with relevant administrative data and clinical data from the Queensland Ambulance Service.

4.3 Clinical governance

Each craft group participating in QCOR has its own working group/steering committee responsible for developing a clinical indicator program.

The SCCN is currently working to establish two approved Quality Assurance Committees under Part 6, of the Hospital and Health Boards Act 2011 to facilitate the participation of clinicians and administrators responsible for the management and delivery of cardiac services in the peer review of the safety and quality of cardiac services and service improvement.

Once established, working group/steering committees will commence benchmarking activities to manage, evaluate, monitor and plan cardiac services.

4.4 Data governance

A cardiac wide data governance model was initially developed by the Interventional Cardiology craft group, agreed after wider consultation with other craft areas and ratified by the SCCN in 2014 as a Cardiac-wide model encompassing all QCOR modules.

Figures 2 and 3 provide an overview of the process for requesting local, multisite and statewide data/reports.

Verbal requests are suitable when an individual clinician requests his/her own data. For all other requests, written applications must be made.

All requests are recorded in a statewide register and audited by the relevant craft group steering committee.

A 'request for information' (RFI) manual documents processes and procedures for accessing data and can be requested by contacting the SCCIU.

4.4.1 Local data request

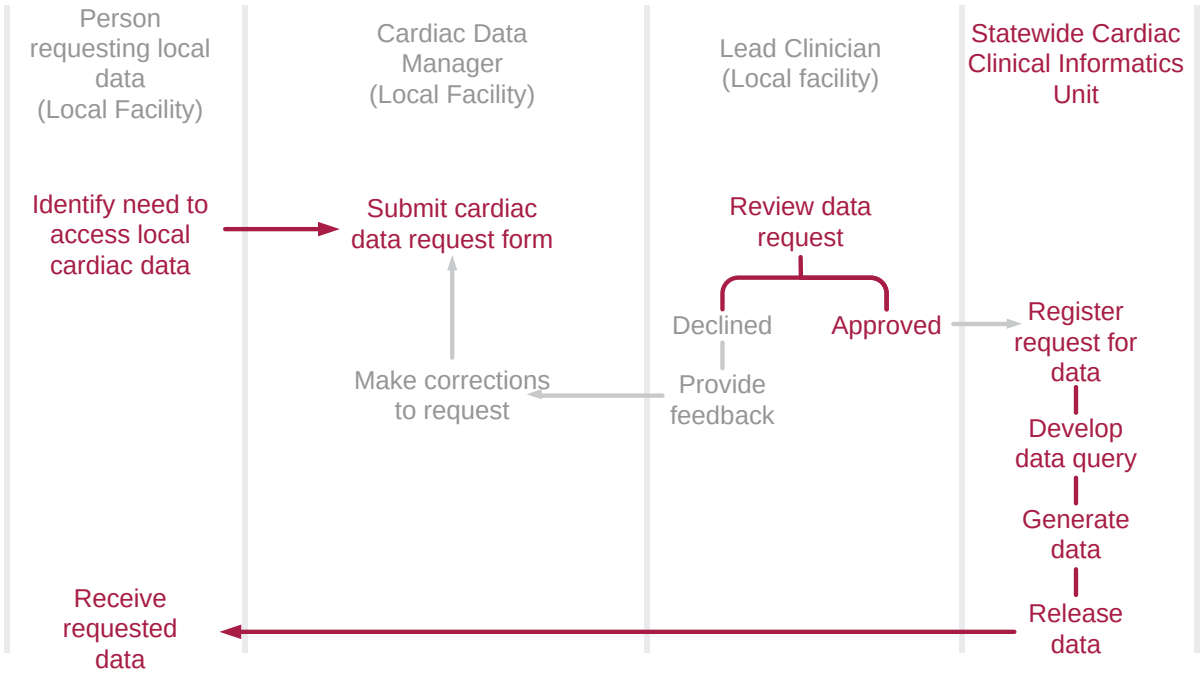

Figure 2: Procedure for local data/report requests

4.4.2 Multisite/statewide data request

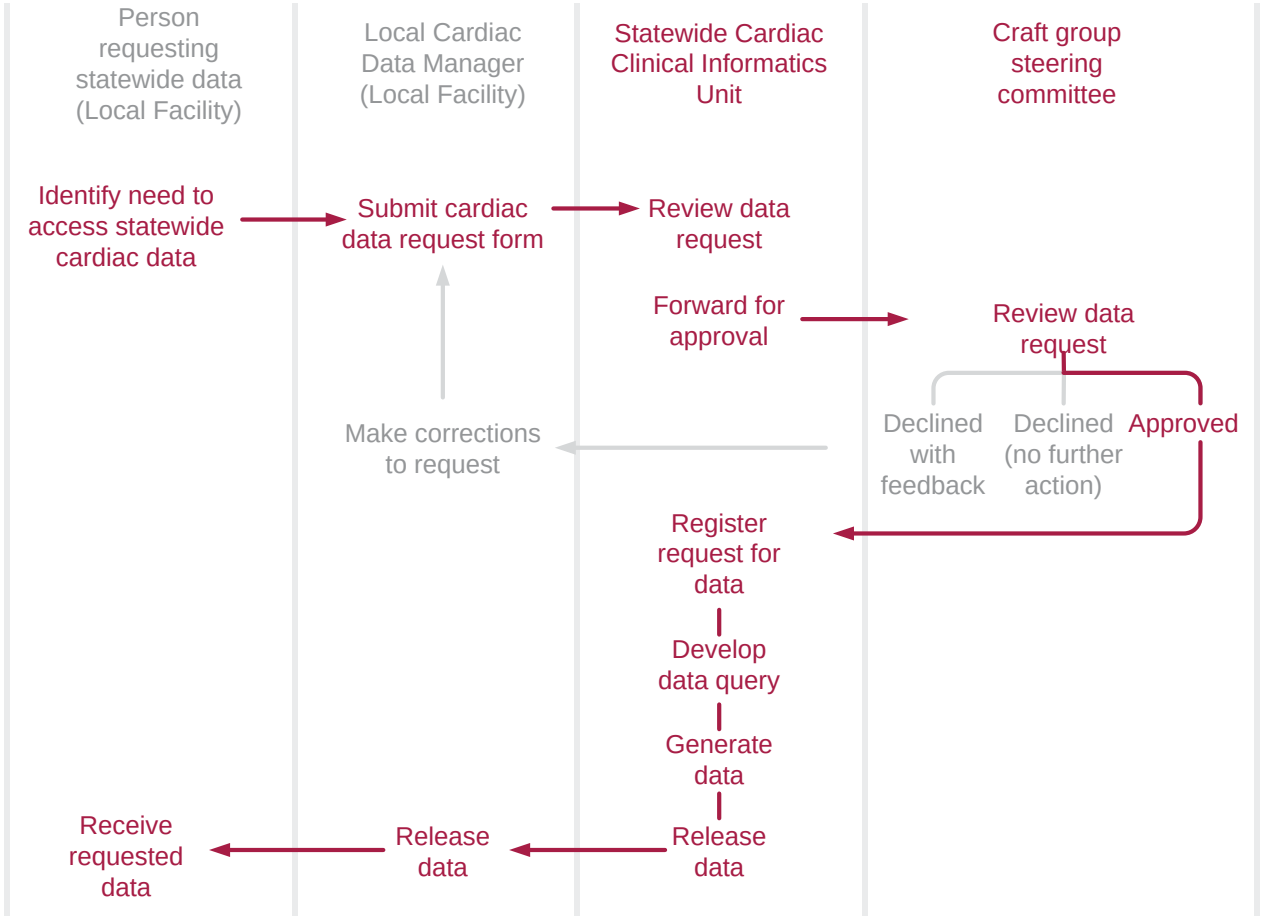

Figure 3: Procedure for multisite/statewide data/report requests

4.5 Operational unit

The Statewide Cardiac Clinical Informatics Unit (SCCIU) was established as a clinician-led clinical informatics service leveraging off accurate and timely electronic health data resources to support all stages of clinical informatics, but provides greatest value in the transformation of QCOR data into clinically meaningful information/knowledge to inform service planning and delivery. The SCCIU employs four full time staff members (see figure 4).

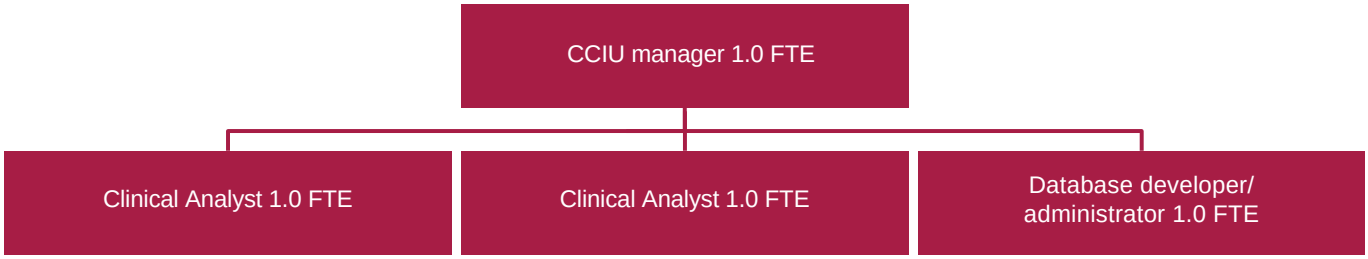

Figure 4: SCCIU operational structure

The SCCIU provides a suite of reports utilising QCOR data for a range of stakeholders including clinicians, administrators and external registries. These reports are broadly categorised into the following areas:

Table 3: SCCIU reporting catalogue

Report Type	Report Content
Operational	Monthly operational reports provide summary level detail for a variety of clinically relevant information.
Clinical Indicators	Quarterly clinician developed clinical process and outcome measures
Morbidity and Mortality (M&M)	Quarterly reports detailing relevant information to support Cardiac M&M meetings
Data audits	Monthly standardised audit reports for action by site based clinical informaticians
Hospital KPI	Monthly 30-day unplanned cardiac readmission, Length of Stay, Resource utilisation
ANZSCTS (in development)	Australian and New Zealand Society for Cardio-Thoracic Surgeons National Clinical Quality Registry
ACOR (in development)	Australasian Cardiac Outcomes Registry
Compliance reporting (in development)	Australian Commission for Safety and Quality in Health Care; Acute Coronary Syndrome (ACS) Clinical Care Guidelines
Financial reporting	Consumables

4.6 Data quality

The success of the QCOR program relies on valid and accurate data. To this end, in 2014, the SCCN provided short term funding (18-months) to establish Clinical Informaticians at each major CCL facility.

The purpose of these roles was to:

- Improve and maintain data quality
- Participate in the CCL working group to develop a suite of standardised clinical reports

Over the 18-month period, a significant improvement in data quality was observed, with completion rates for data to support the clinical indicator program nearing 95%, up from around 20% at the start of the period.

In addition, a suite of clinical and hospital performance metrics were developed, reporting on cardiac clinical processes and outcomes, described in section 9.

At the end of the funding period, a recommendation was made to each Health and Hospital Service to establish positions to ensure ongoing data quality. Two distinct roles, data managers or clinical quality improvement coordinators (cQIC), have been created, with sites choosing which role best suits their needs and resource allocation.

Data managers act as a 'second sweep' utilising weekly audit reports sent out by the Statewide Cardiac Clinical Informatics Unit to resolve data quality issues. These roles are filled by both administrative staff and/or clinical staff depending on the hospital.

Clinical quality improvement coordinators (cQIC) are designated 'clinical' roles and are open to nursing and allied health professionals. These roles, whilst also acting as a 'second sweep', play a vital role, using quality improvement methodologies, in identifying poor processes of care, identifying strategies for improvement, implementing these strategies and evaluating outcomes.

Table 4 highlights the importance of these roles by demonstrating high compliance rates for all analyses reported in this 2015 report.

Table 4: Data completion rates by report section (%)

Site	CH (%)	TTH (%)	MBH (%)	NGH (%)	RBWH (%)	PAH (%)	GCUH (%)	ALL (%)
PATIENT CHARACTERISTICS								
Age	99.8	100.0	100.0	100.0	100.0	99.9	99.8	99.9
Gender	99.8	100.0	100.0	100.0	100.0	100.0	99.8	99.9
Ethnicity	99.0	99.5	98.8	99.8	98.9	99.4	99.0	99.3
Body mass index	91.5	33.6	99.4	97.8	85.1	100.0	71.4	84.3
CARE AND TREATMENT								
Admission status	99.3	97.3	99.4	98.0	97.0	100.0	88.9	97.0
Access route	97.1	90.6	99.4	99.0	99.7	99.2	97.5	97.7
Stent type	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
PCI success rate								
NSTEMI	91.1	87.2	100.0	80.9	90.7	91.3	93.2	90.2
STEMI	100.0	77.3	66.7	94.4	100.0	98.3	89.9	95.0
OUTCOMES								
30 day unadjusted mortality	100.0	100.0	100.0	100.0	100.0	100.0	100.0	95.0
STEMI time to reperfusion	100.0	77.3	66.7	94.4	100.0	98.3	89.9	95.0
NSTEMI time to angiogram	89.9	93.6	99.1	81.0	94.5	81.5	94.2	88.5
MACE	96.3	81.6	100.0	93.0	100.0	93.0	74.3	89.9
Radiation dose › safe limit	91.7	99.3	100.0	97.4	99.7	100.0	99.3	98.4

Legend: CH Cairns Hospital; TTH The Townsville Hospital; MBH Mackay Base Hospital; NGH Nambour General Hospital; RBWH The Royal Brisbane and Women's Hospital; PAH The Princess Alexandra Hospital; GCUH The Gold Coast University Hospital

5 Total caseloads

5.1 Total cases by category

In 2015, 11,113 diagnostic and interventional cardiology cases were performed across the state at the seven participating public cardiac catheter suites (see section 6 for further details on participating sites).

Of the total cases, 3484 (31.4%) were percutaneous coronary interventions (PCI) and these cases are the subject of this report.

Table 5: Procedure counts by case type

Site	PCI cases (n)	TOTAL cases (n)	% of PCI cases (%)
Cairns Hospital	412	1190	34.6
The Townsville Hospital	408	1542	26.5
Mackay Base Hospital	169	726	23.3
Nambour General Hospital	508	1347	37.7
Royal Brisbane and Women's Hospital	369	1456	25.3
The Princess Alexandra Hospital	1013	3070	33.0
The Gold Coast University Hospital	605	1782	34.0
ALL	**3484**	**11,113**	**31.4**

6 Participating sites

In 2015, there were eight public Cardiac Catheter Laboratories spread across metropolitan and regional Queensland. Seven of these participate in the Queensland Cardiology Outcomes Registry (QCOR), Interventional Cardiology Audit. The Prince Charles Hospital is not a contributor to the Statewide Interventional Cardiology Quality and Safety program.

Table 5.1: Participating sites

Site number	Site name	Location
1	Cairns Hospital	Regional
2	The Townsville Hospital	Regional
3	Mackay Base Hospital	Regional
4	Nambour General Hospital	Regional
5	Royal Brisbane and Women's Hospital	Metropolitan
6	The Princess Alexandra Hospital	Metropolitan
7	The Gold Coast University Hospital	Metropolitan

6.1 Statewide

Patients came from a wide geographical area with the majority of patients residing on the Eastern Seaboard (see figure 5).

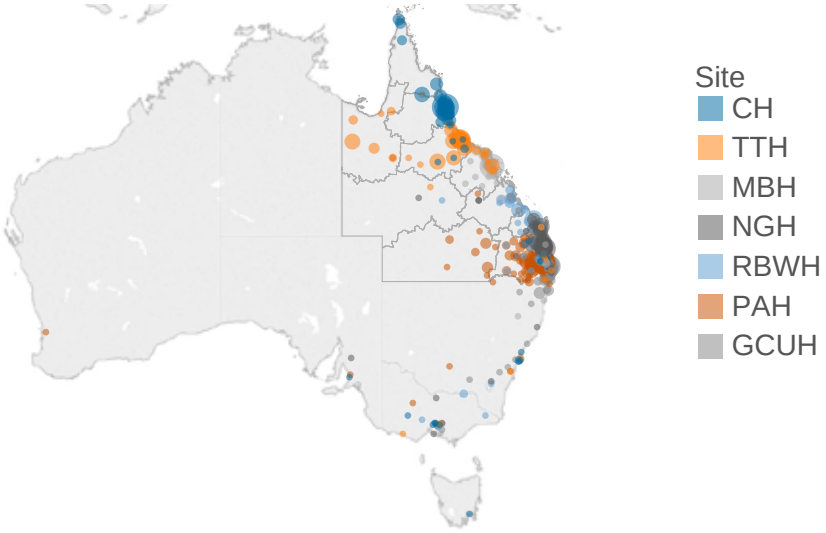

Figure 5: PCI cases by residential postcode

With the exception of the Royal Brisbane and Women's Hospital, more than half of patients were seen at their local Health and Hospital Service (61.9 to 93.0%).

Table 6: Proportion of cases with residential postcodes within and outside treating Health and Hospital Service (HHS) boundaries (%)

Site	Within HHS (%)	Outside HHS (%)
Cairns Hospital	83.4	16.6
The Townsville Hospital	72.2	27.8
Mackay Base Hospital	93.0	7.0
Nambour General Hospital	76.9	23.1
Royal Brisbane and Women's Hospital	47.7	52.3
The Princess Alexandra Hospital	61.9	38.1
The Gold Coast University Hospital	74.3	25.7

Sections 6.2 to 6.8 provide further information on each of the participating hospitals.

6.2 Cairns Hospital

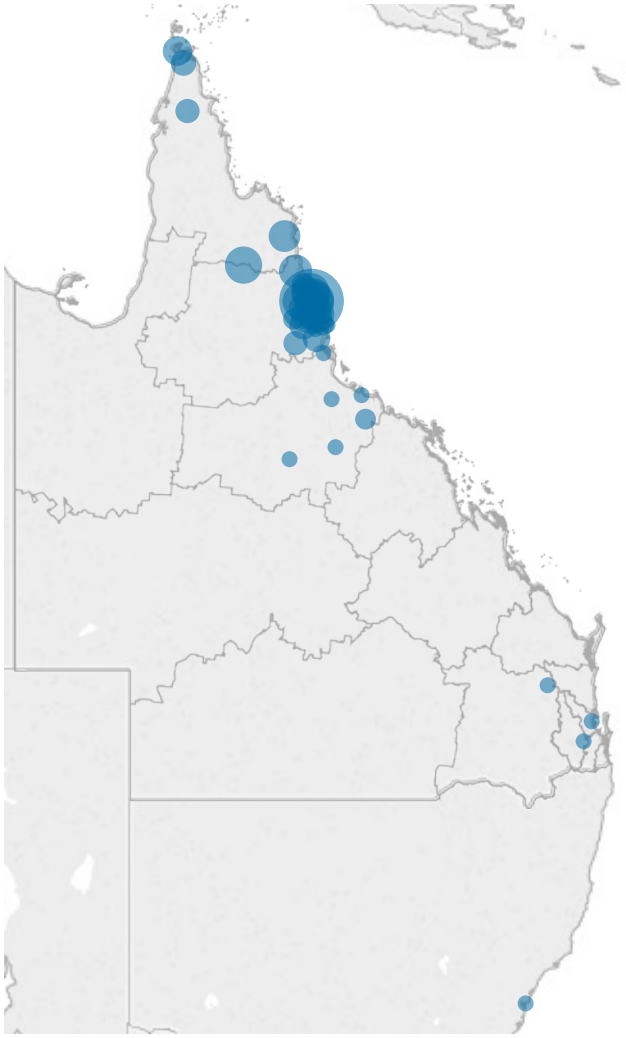

Figure 6: Cairns Hospital

- Referral Hospital for both Cairns and Cape York and Torres Health Services, serving a population of approximately 280,000
- Public tertiary level cardiac services provided at Cairns Hospital include:
  - Coronary Angiography
  - Percutaneous Coronary Intervention
  - Structural Heart Intervention
  - Pacemaker Implantations
- One cardiac catheter laboratory with a dedicated service commencing in 2010
- 24/7 PCI service available since April 2015
- 3.6 FTE Consultant Cardiologists, of which 2.3 FTE are Interventional Cardiologists

6.3 The Townsville Hospital

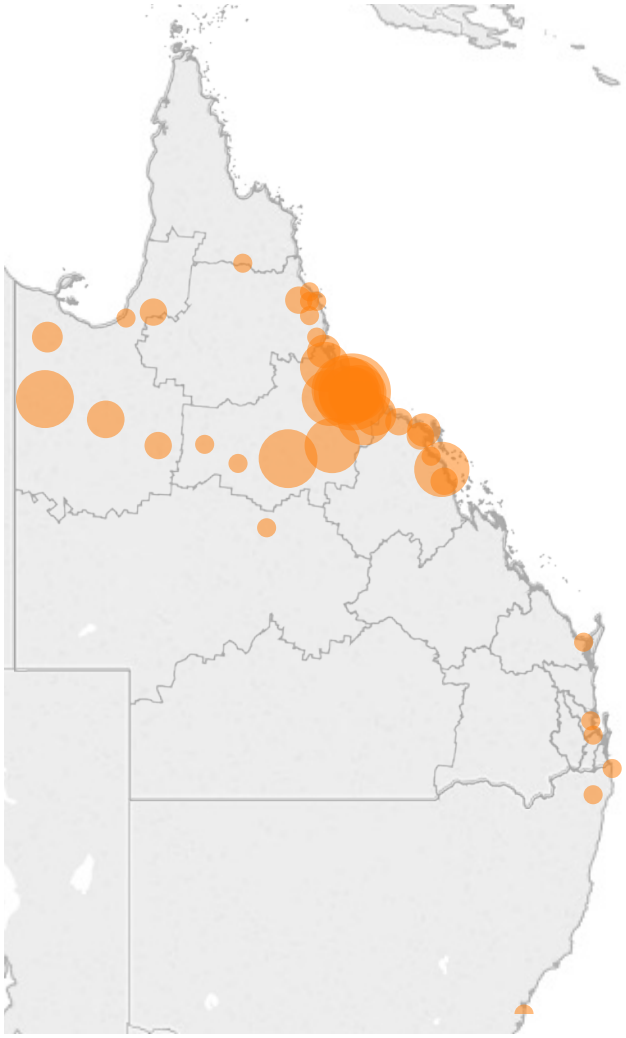

Figure 7: The Townsville Hospital

- Referral Hospital for Townsville and North West Health Services, serving a population of approximately 295,000
- Public tertiary level cardiac services provided at The Townsville Hospital include:
  - Coronary Angiography
  - Percutaneous Coronary Intervention
  - Structural Heart Intervention
  - Electrophysiology
  - ICD, CRT and Pacemaker Implantation
  - Cardiac Surgery
- Two cardiac catheter laboratories with a dedicated service commencing in 1994
- 24/7 PCI service available since March 2016
- 6.6 FTE Consultant Cardiologists, of which 2.7 FTE are Interventional Cardiologists

6.4 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 cardiac services provided at Mackay Base Hospital include:
  - Coronary Angiography
  - Percutaneous Coronary Intervention
  - ICD and Pacemaker Implantation
- One cardiac catheter laboratory with a dedicated service commencing in 2014
- 2.1 FTE Consultant Cardiologists, of which 1.6 FTE are Interventional Cardiologists

6.5 Nambour General Hospital

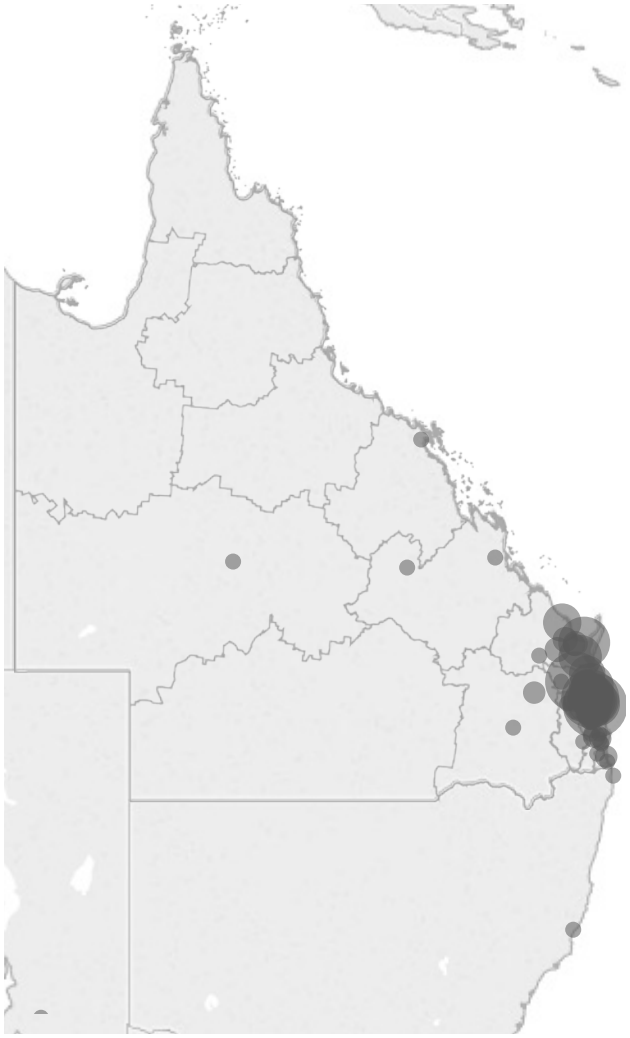

Figure 9: Nambour General Hospital

- Referral Hospital for Sunshine Coast and Wide Bay regions, serving a population of approximately 350,000
- Public tertiary level cardiac services provided at Nambour General Hospital include:
  - Coronary Angiography
  - Percutaneous Coronary Intervention
  - Structural Heart Intervention
  - Electrophysiology
  - ICD, CRT and Pacemaker Implantation
- One cardiac catheter laboratory with a dedicated service commencing in 2012
- 24/7 PCI service available since September 2012
- 7.5 FTE Consultant Cardiologists, of which 2.5 FTE are Interventional Cardiologists

6.6 The Royal Brisbane and Women's Hospital

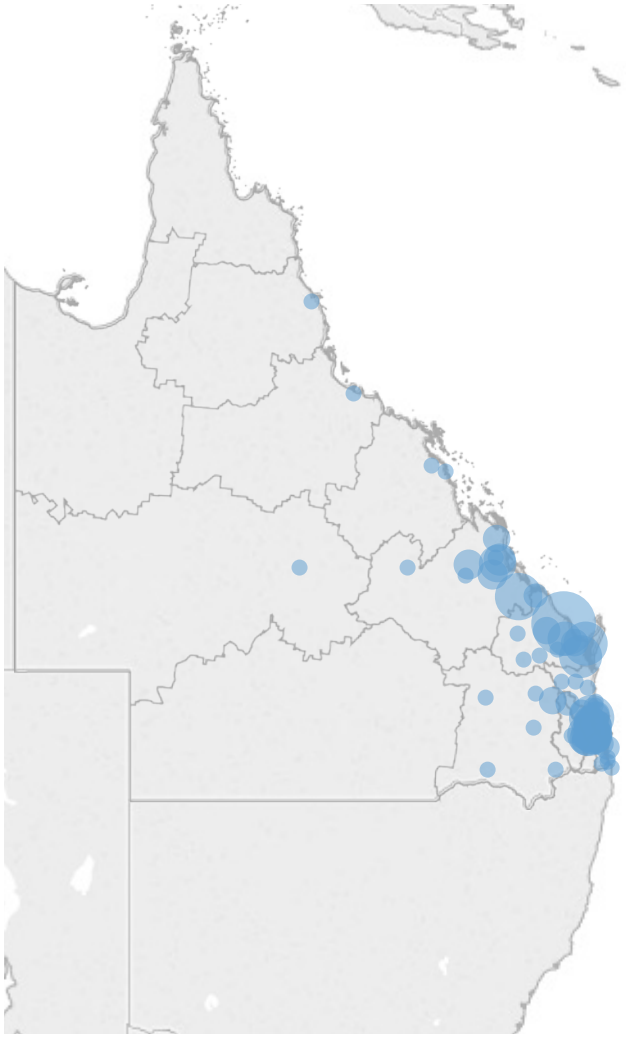

Figure 10: The Royal Brisbane and Women's Hospital

- Referral Hospital for Metro North, Wide Bay and Central Queensland, serving a population of approximately 900,000 (shared referral base with The Prince Charles Hospital)
- Public tertiary level cardiac services provided at The Royal Brisbane and Women's Hospital include:
  - Coronary Angiography
  - Percutaneous Coronary Intervention
  - Electrophysiology
  - ICD, CRT and Pacemaker Implantation
- Two cardiac catheter laboratories with a dedicated service commencing in 1997
- 24/7 PCI service available since 1997, with Primary PCI the sole reperfusion therapy for acute STEMI since 2006
- 11 FTE Consultant Cardiologists, of which 3.6 FTE are Interventional Cardiologists

6.7 The Princess Alexandra Hospital

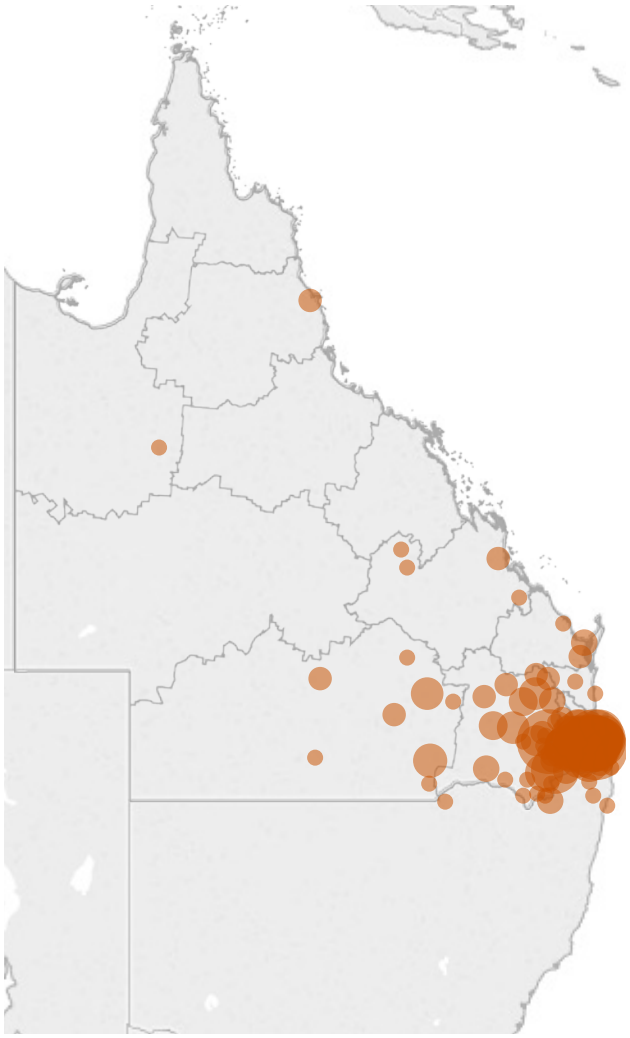

Figure 11: The Princess Alexandra Hospital

- Referral Hospital for Metro South and the South West regions, serving a population of approximately 1,000,000
- Public tertiary level cardiac services provided at The Princess Alexandra Hospital include:
  - Coronary Angiography
  - Percutaneous Coronary Intervention
  - Structural Heart Intervention
  - Electrophysiology
  - ICD, CRT and Pacemaker Implantation
  - Cardiac Surgery
- Three cardiac catheter laboratories with a dedicated service commencing in 1998.
- 24/7 PCI service available since November 1998
- 11.5 FTE Consultant Cardiologists, of which 3.6 FTE are Interventional Cardiologists

6.8 The Gold Coast University Hospital

Figure 12: The Gold Coast Hospital

- Referral Hospital for Gold Coast and Northern New South Wales regions, serving a population of approximately 700,000
- Public tertiary level cardiac services provided at The Gold Coast University Hospital and Health Service include:
  - Coronary Angiography
  - Percutaneous Coronary Intervention
  - Structural Heart Intervention
  - Electrophysiology
  - ICD, CRT and Pacemaker Implantation
  - Cardiac Surgery
- Funded for one lab only until May 2016, when second lab opened for 3 days / week (one day of which is for EP studies)
- 24/7 PCI service available since 2006
- 8.25 FTE Consultant Cardiologists, of which 5 FTE are Interventional Cardiologists

7 Patient characteristics

7.1 Community profile

The estimated resident population (ERP) of Queensland in September 2015 was 4,792,906 persons, representing 20.1% of Australia's total population. Population growth was 1.2% with over half this occurring from natural increase and one third occurring from net overseas migration[1].

Life expectancy at birth in Queensland is below the national average (79.6 years males, 84.1 years females) and standardised death rate is higher (5.6 deaths per 1000 people)[1].

Compared to the national average, Queensland has higher rates of ischaemic heart disease mortality in both men and women (ranking highest of all states in female mortality), higher rates of smoking, higher rates of obesity and sedentary lifestyle, and higher rates of hypertension in males[1].

Queensland also has more hospital separations (431 per 1000 people) and fewer public hospital beds (2.5 per 1000 population) than the national average[1].

Queensland presents challenges to the provision of tertiary level cardiac services. Geographically, it is the world's 6th largest sub-national entity and home to 10 of Australia's largest cities. It is less centralised than most of the Australian states with more than 50% of the population living outside the capital, and 25% living outside the South East region[1].

7.2 Ethnicity

Ethnicity is an important determinant of health with a particular impact on the development of cardiovascular disease. It's recognised the ATSI population have a higher incidence and prevalence of coronary artery disease.

The increased proportion of ATSI patients identified in the northern HHS's (CH, 22.1% and TTH, 13.3%) reflects the resident population within these districts and should be noted for future service provision and planning.

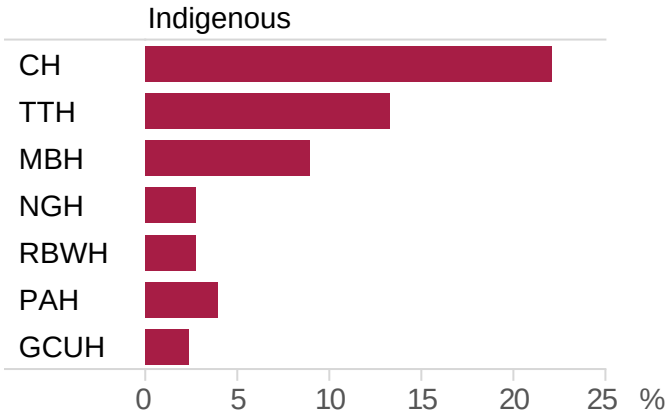

Figure 13: Proportion of Indigenous patients (%)

7.3 Age and gender

Age is an important risk factor for developing cardiovascular disease. The median age of patients undergoing angiography was consistent between HHS. The median age for females was higher due to both proportionally less patients ‹40 years age and greater proportion ›=80 years age.

Table 7: Median age by gender

Site	Male (yrs)	Female (yrs)	All (yrs)
CH	63.0	63.1	63.0
TTH	62.0	63.2	62.4
MBH	61.0	65.3	61.8
NGH	64.0	68.3	65.0
RBWH	62.6	65.9	63.3
PAH	60.6	62.8	60.9
GCUH	64.8	69.1	66.0
ALL	**62.3**	**65.8**	**63.1**

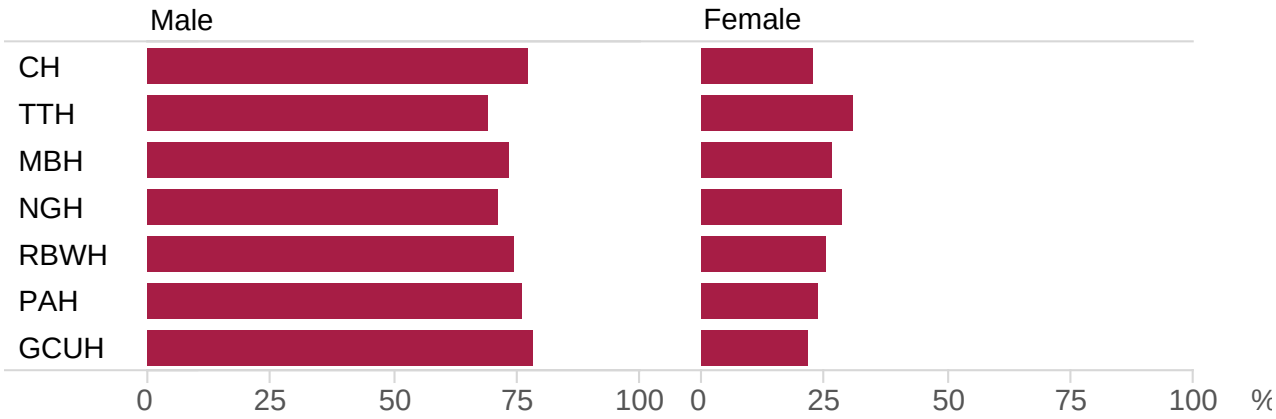

Figure 14: Proportion of cases by gender (%)

7.4 Body mass index (BMI)

There is a temporal trend for increasing BMI within our population. Patients across the state displayed similar trends in obesity, with around one-quarter of patients (22.4%) within the normal range and up to 40% classed as obese or morbidly obese.

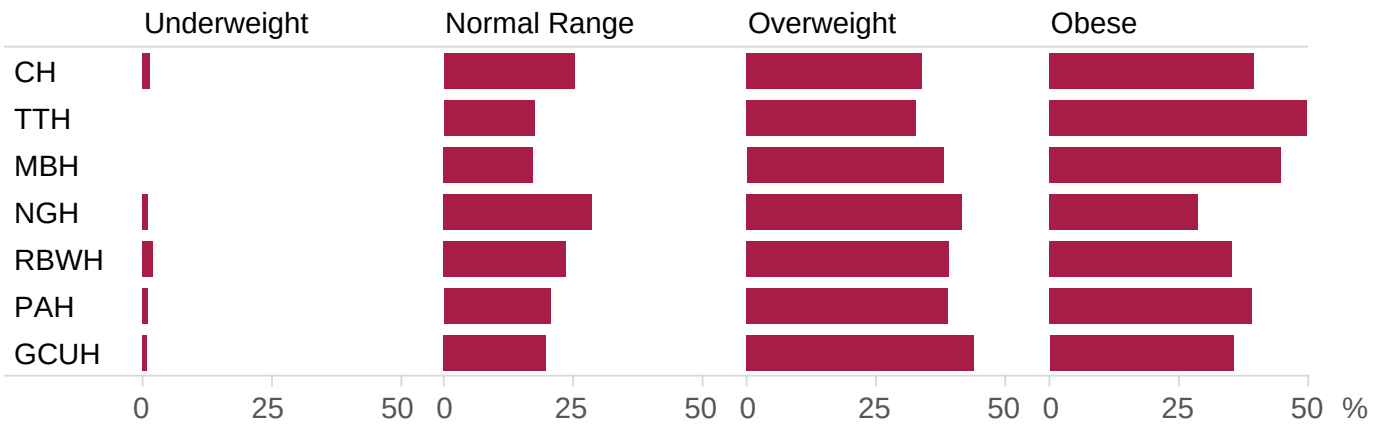

Figure 15: Proportion of cases by Body Mass Index category (%)

8 Care and treatment of PCI patients

8.1 Admission status

A total of 3484 PCI procedures were performed in 2015 by the seven contributing cardiology centres across Queensland. The annual case volume varied significantly between facilities, with Mackay Base Hospital performing 169 PCI cases and The Princess Alexandra Hospital, the largest centre performing 1013 PCI cases.

Patients were classified into admission status defined by the National Cardiovascular Data Registry (NCDR) as follows[3]:

Table 8: Diagnostic Cath Status

Status	Definition
Elective	The procedure can be performed on an outpatient basis or during a subsequent hospitalisation without significant risk of infarction or death. For stable inpatients, the procedure is being performed during this hospitalisation for convenience and ease of scheduling and NOT because the patient's clinical situation demands the procedure prior to discharge.
Urgent[1]	The procedure is being performed on an inpatient basis and prior to discharge because of significant concerns that there is risk of ischemia, infarction and/or death. Patients who are outpatients or in the emergency department at the time the cardiac catheterisation is requested would warrant an admission based on their clinical presentation.
Emergency[2]	The procedure is being performed as soon as possible because of substantial concerns that ongoing ischemia and/or infarction could lead to death. "As soon as possible" refers to a patient who is of sufficient acuity that you would cancel a scheduled case to perform this procedure immediately in the next available room during business hours, or you would activate the on call team were this to occur during off-hours.
Salvage[3]	The procedure is a last resort. The patient is in cardiogenic shock at the start of the procedure. Within the last ten minutes prior to the start of the procedure the patient has also received chest compressions for a total of at least sixty seconds or has been on unanticipated extracorporeal circulatory support (e.g. extracorporeal membrane oxygenation, cardiopulmonary support)

[1] Typically includes NSTEMI

[2] Typically includes STEMI

[3] Haemodynamically unstable

The majority (77.3%) of PCI cases detailed in this report were classed as urgent, emergent or salvage PCI highlighting the acute and often complex case mix. Despite published definitions, the percentage distribution varied considerably between institutions, as classification of cases is arbitrary and operator dependent.

Across the state, participating sites generally had a relatively small proportion of PCIs in the elective setting, with the exception of Mackay Base Hospital. Mackay only recently commenced its PCI program and initially continued to refer its complex PCI cases outside the health service district for treatment.

Table 9: Admission status (n, %)

Site	Case count	Elective (%)	Urgent (%)	Emergent (%)	Salvage (%)
CH	409	20.3	57.9	19.1	2.7
TTH	397	19.4	68.0	12.3	0.3
MBH	168	50.6	45.2	3.6	0.6
NGH	498	13.9	55.4	30.7	0.0
RBWH	358	18.4	56.7	24.9	0.0
PAH	1013	22.4	52.7	24.5	0.4
GCUH	538	29.9	35.5	33.8	0.7
ALL	**3381**	**22.7**	**52.9**	**23.8**	**0.6**

(103 cases (3.0%) invalid due to missing admission status)

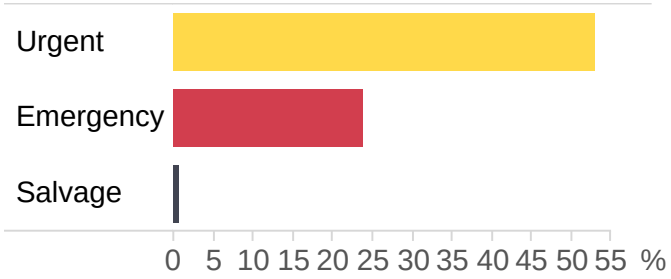

Figure 16: Statewide admission status excluding electives (%)

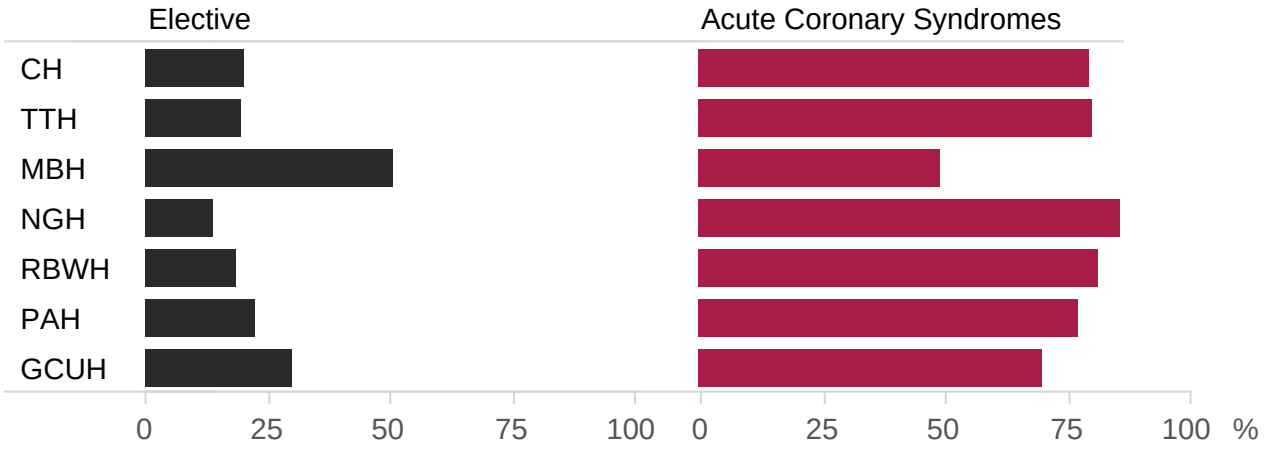

Figure 17: Proportion of acute coronary syndrome cases and elective cases (%)

8.2 Access route

Statewide 45.1% of PCI were via the radial approach, 49.4% femoral, 3.0% used both radial and femoral access, 0.2% other and 2.3% not coded.

There is a large variation in the use of this approach between different PCI centres (18.9% to 75.7%).

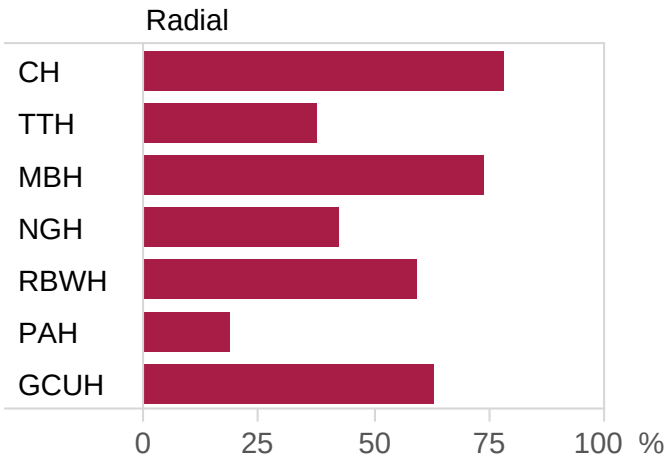

Figure 18: Access route – Radial approach (%)

8.3 Stents

8.3.1 Stent type

Stents are grouped into one of four different types – drug-eluting stents (DES), bare metal stents (BMS), covered stents (CS) and bioresorbable vascular scaffolds (BVS).

In 2015 drug eluting stents were used in 67.9% of cases (range by centre 42.3 - 92.2%, Figure 19), bare metal 30.8%, BVS 0.8% and CS 0.1%.

Across all centres 1.5 stents on average were used per PCI case (Table 10).

Table 10: Stent type by PCI case (%)

Site	DES (%)	BMS (%)	BVS (%)	COVERED (%)	Mean number of stents per procedure
CH	83.0	17.0	0.0	0.0	1.6
TTH	79.5	19.8	0.5	0.2	1.6
MBH	92.2	7.8	0.0	0.0	1.3
NGH	77.8	18.1	3.8	0.3	1.4
RBWH	81.2	12.9	1.3	0.0	1.6
PAH	42.3	57.7	0.0	0.0	1.4
GCUH	70.5	29.2	0.2	0.1	1.4
ALL	**67.9**	**30.8**	**0.8**	**0.1**	**1.5**

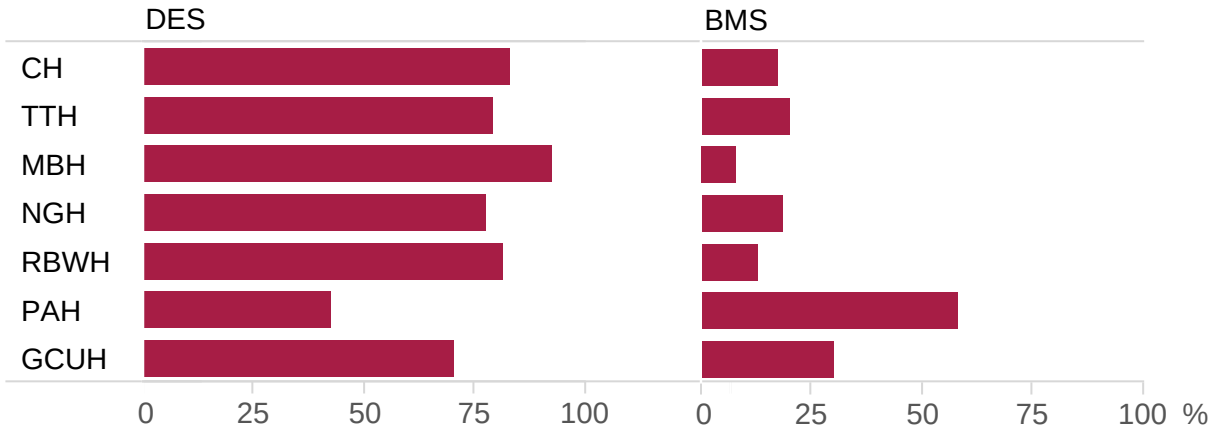

Figure 19: Proportion of cases using DES and BMS (%)

8.4 PCI success rate

Out of 3484 cases 97.4% were successful procedures. Of these cases 96.2% involved stent deployment, and 3.8% balloon angioplasty only.

8.5 NSTEMI

8.5.1 Case load

Of all diagnostic cases performed in cardiac catheter suites during 2015, 2138 (19.2%) were classed as NSTEMI.

NSTEMI cases accounted for 27.0% of all PCI cases statewide, with slight variations across sites ranging from 19.5% at the Gold Coast University Hospital to 38.3% of PCI cases at Cairns Hospital.

Table 11: NSTEMI cases (n)

Site	NSTEMI Diagnostic cases (n)	NSTEMI PCI cases (n)	PCI (n)	PCI cases (%)
CH	276	158	412	38.3
TTH	267	86	408	21.1
MBH	117	53	169	31.4
NGH	332	131	508	25.8
RBWH	330	140	369	37.9
PAH	558	255	1013	25.2
GCUH	258	118	605	19.5
ALL	**2138**	**941**	**3484**	**27.0**

Similar to the overall cohort, NSTEMI patients treated by PCI were predominantly male (74.5%). There was a geographical gradient down the Queensland coastline in percentage of patients with Aboriginal and Torres Strait Islander status (see figure 21).

8.5.2 Demographics

Table 12: Median age by gender

Site	Male (yrs)	Female (yrs)	All (yrs)
CH	63.7	63.2	63.4
TTH	55.6	59.8	57.8
MBH	60.7	62.2	60.7
NGH	64.7	70.1	66.5
RBWH	62.8	62.9	62.9
PAH	61.1	62.3	61.2
GCUH	61.6	70.6	63.8
ALL	**62.1**	**64.4**	**62.6**

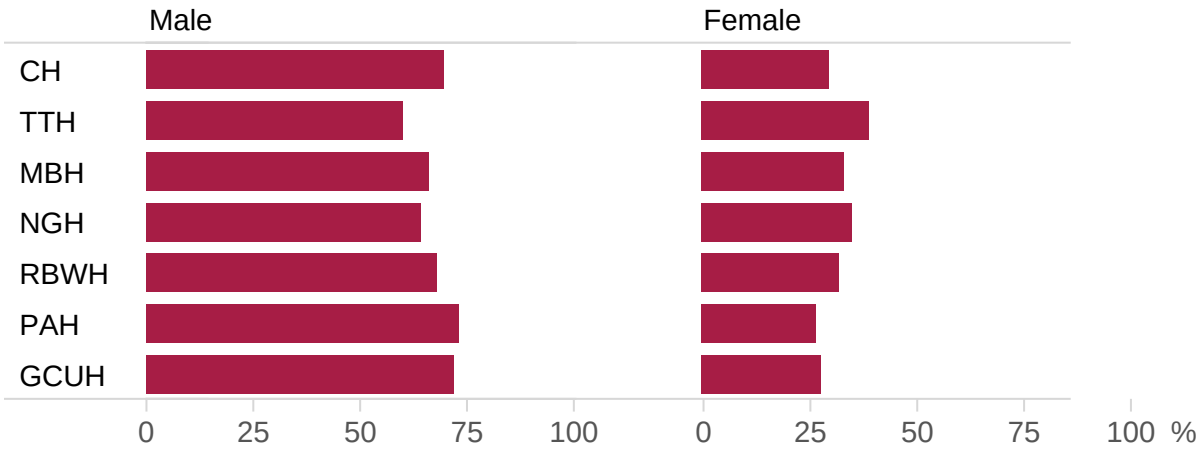

Figure 20: Proportion of cases by gender (%)

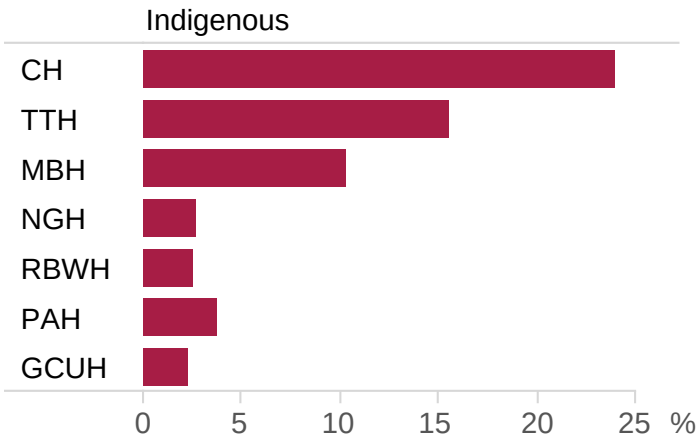

Figure 21: Proportion of Indigenous patients (%)

8.5.3 Admission source

Table 13: Admission source to treating facility (n, %)

Site	Case count	Direct to PCI facility (%)	Interhospital transfer (%)
CH	239	81.2	18.8
TTH	227	71.4	28.6
MBH	99	78.8	21.2
NGH	245	65.3	34.7
RBWH	294	30.6	69.4
PAH	423	40.2	59.8
GCUH	189	79.9	20.1
ALL	**1716**	**58.6**	**41.1**

8.5.4 Hospital performance – Time to Angiography

A key clinical quality indicator for this registry centres around time to coronary angiography for patients presenting to hospital with a NSTEMI. National and International guidelines recommend coronary angiography should be offered and performed within 72 hours of diagnosis[4]. The overall outcome of this indicator is presented later, however a major barrier often cited in achieving this target is the time taken to transfer patients from non-PCI capable facilities to the accepting facility. There are multiple reasons delays can occur including capacity constraints and transfer logistics.

Compared with patients presenting directly to a PCI capable facility, patients presenting to a non-PCI capable facility have a median wait to coronary angiography of 24 hours longer (44 vs 68 hrs) and are less likely to have angiography performed within the target timeframe of 72 hours (74.6% vs 54.9%).

Table 14: Median time to angiography - Direct to PCI facility (hours)

Site	Case count	25th percentile	Median (hrs)	75th percentile	% met 72 hour target
CH	194	24	53	94	62.9
TTH	162	28	46	79	72.8
MBH	78	25	49	89	66.7
NGH	160	19	24	47	92.5
RBWH	90	22	33	66	78.9
PAH	170	24	47	76	73.5
GCUH	151	23	46	72	75.5
ALL	**1005**	**22**	**44**	**73**	**74.6**

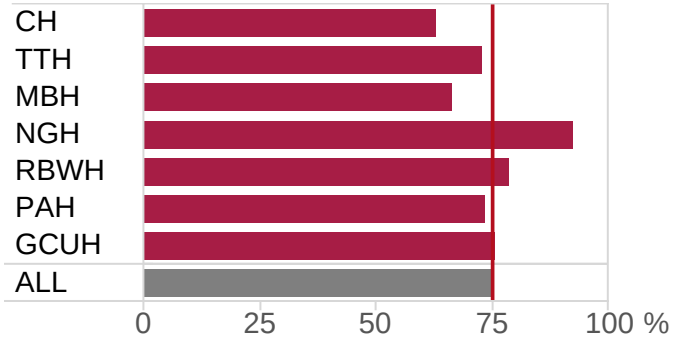

Figure 22: Proportion of NSTEMI direct presenters meeting target of 72 hours (%)

Table 15: Median time to angiography – Interhospital transfers (hours)

Site	Case count	25th percentile	Median (hrs)	75th percentile	% met 72 hour target
CH	45	34	70	98	55.6
TTH	65	54	78	121	46.2
MBH	21	27	56	108	66.7
NGH	85	24	35	56	88.2
RBWH	204	46	77	117	45.1
PAH	253	46	73	110	49.8
GCUH	38	24	46	73	73.7
ALL	**711**	**41**	**68**	**108**	**54.9**

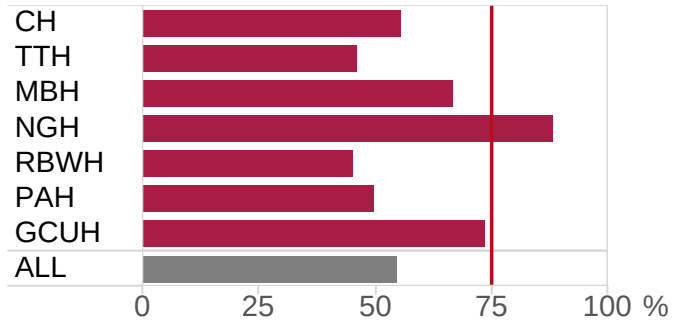

Figure 23: Proportion of NSTEMI IHT presenters meeting target of 72 hours (%)

These data highlight the need for overall system improvement, incorporating a district-wide strategy for referring and transferring patients who require coronary angiography following NSTEMI.

8.6 PCI following presentation with STEMI

8.6.1 Clinical presentation and early outcomes

Acute STEMI is a recognised medical emergency in which time to treatment is critical to both short and long term outcomes. PCI-capable hospitals have therefore developed rapid triage and transfer systems to fast-track STEMI patients into the cardiac catheterisation laboratory for rapid reperfusion (primary PCI). It is important to recognise there remain a large proportion of patients who are not treated with any form of reperfusion therapy; however this element of care is outside the scope of this registry.

Three-quarters of cases were managed by primary PCI with 13% presenting after 12 hours (late presenters).

The need for public education therefore remains important in the overall reperfusion strategy. Nearly a quarter of reperfusion-eligible patients received fibrinolysis; of these, a fifth required rescue PCI because lysis was unsuccessful.

Table 16: Number of cases by STEMI presentation (n)

Site	Case count	‹ 6 hrs (n)	6-12 hrs (n)	Late Presentation (n)	Rescue (failed lysis) (n)	Post successful lysis (n)
CH	110	52	4	13	11	30
TTH	85	22	6	18	7	32
MBH	18	3	1	9	2	3
NGH	205	133	9	12	8	43
RBWH	81	51	8	11	1	10
PAH	351	197	24	52	15	63
GCUH	172	124	14	17	7	10
ALL	**1022**	**582**	**66**	**132**	**51**	**191**

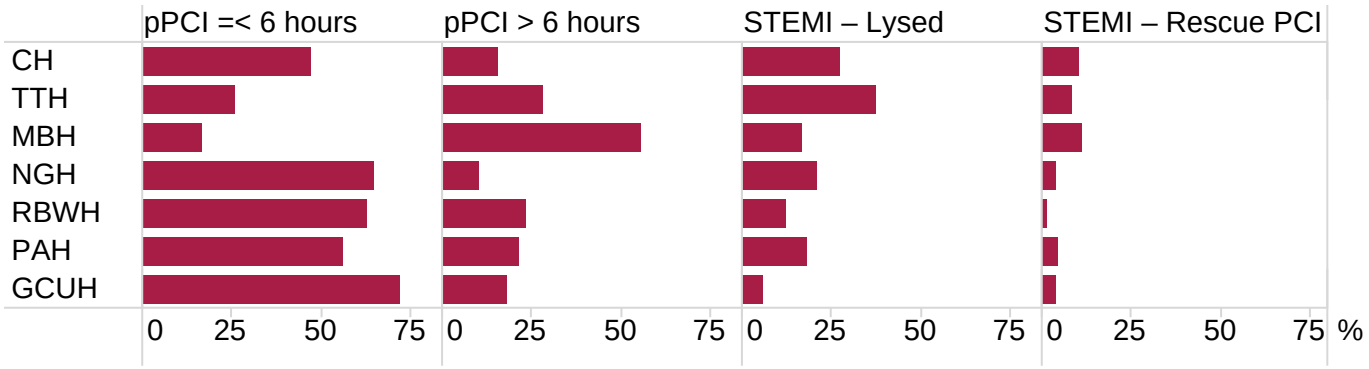

Figure 24: Proportion of cases by STEMI presentation (%)

8.6.2 Demographics

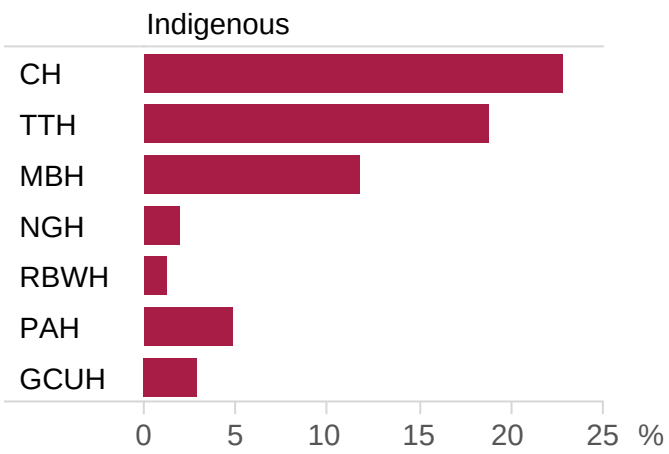

Figure 25: Proportion of Indigenous patients (%)

8.6.3 Outcomes

8.6.3.1 All STEMI categories

Table 17: STEMI mortality (n)

Site	Case count	In Lab (n)	In Hospital (n)	Post discharge to 30 days (n)	TOTAL (n)
CH	110	1	4	0	5
TTH	85	1	2	0	3
MBH	18	1	0	0	1
NGH	205	2	4	1	7
RBWH	81	0	2	0	2
PAH	351	1	5	1	7
GCUH	172	0	4	0	4
ALL	**1022**	**6**	**21**	**2**	**29**

8.6.3.2 STEMI presentation within 6 hours from symptom onset

Table 18: STEMI mortality for patients presenting within six hours of symptom onset (n)

Site	Case count (n)	In Lab (n)	In Hospital (n)	Post discharge to 30 days (n)	TOTAL (n)
CH	52	0	3	0	3
TTH	22	0	0	0	0
MBH	3	1	0	0	1
NGH	133	1	2	1	4
RBWH	51	0	1	0	1
PAH	197	0	3	0	3
GCUH	124	0	3	0	3
ALL	**582**	**2**	**12**	**1**	**15**

8.6.4 Door to Device – STEMI presentation within 6 hours of symptom onset

The time between PCI hospital arrival and reperfusion ('door to device time') is currently the accepted measure of PCI hospital system performance in STEMI. Historically, hospitals have worked to a goal of ‹ 90 minutes, although more recent guidelines have shortened this target time to ‹ 60 minutes[4,5,6].

In 2015, there were 582 primary PCI cases presenting within 6 hours of symptom onset, of which 532 were analysed after excluding cases where a valid case delay was documented, for example patients who were haemodynamically unstable or required intubation. Of these, median door to device times are presented below for the 429 cases presenting within 6 hours of symptom onset in whom timestamps for both arrival at the first hospital (in the case of an inter-hospital transfer, n=20) or PCI capable hospital (direct presenters, n=409) and the time of first device application were recorded (table 19).

Results demonstrate, in the majority of cases (78.7%), the participating PCI facilities are meeting a target door to device time of 60 minutes, with a Statewide median time of 37 mins (range 33 to 46 mins).

Table 19: Median time from arrival at first hospital to device for STEMI patients presenting within six hours of symptom onset (mins)

Site	Case count	25th percentile	Median (mins)	75th percentile	% met 60 min target
CH	42	25	34	47	90.7
TTH	17	26	42	59	76.5
MBH	1				
NGH	100	22	46	73	69.0
RBWH	44	29	42	60	75.0
PAH	130	29	37	53	80.0
GCUH	95	26	33	49	83.5
ALL	**429**	**26**	**37**	**56**	**78.7**

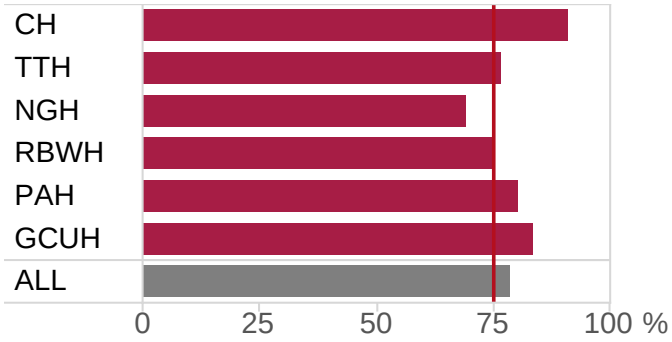

Figure 26: Proportion meeting door-to-device target ‹ 60 min

* MBH excluded as n=1

Interhospital transfer (IHT) numbers for primary PCI were very low, representing 4.7% of cases overall.

9 Outcomes

9.1 Clinical Quality Indicators

The Clinical Quality Indicators outlined in this document have been selected through a consensus process by members of the QCOR Interventional Cardiology steering committee after consideration of the indicators utilized in the US NCDR, the Canadian CV Society Quality Indicator for PCI program, VCOR, and the UK's National Audit of PCI.

The percentage of missing data for each indicator by site is outlined in the compliance table at the front of this report.

The Clinical Quality Indicators reported on by the QCOR are:

- Unadjusted all-cause 30-day mortality post PCI.
- Proportion of STEMI patients presenting within six hours of symptom onset, who received an intervention within 90 minutes of first diagnostic ECG.
- Proportion of NSTEMI patients who received angiography within 72 hours of first hospital admission.
- Proportion of major in-lab events post PCI (perforation requiring intervention, death, tamponade, emergency Coronary Artery Bypass Graft or stroke)
- Proportion of cases where total entrance dose exceeded the high dose threshold (HDT) (5Gy).

9.2 Unadjusted 30-day all-cause PCI mortality

This includes all patients who died within 30 days of the PCI procedure, including after discharge from hospital, but within 30 days of the procedure. Unadjusted mortality remains a relatively crude measurement and 2 different risk-adjustment tools are currently being validated within the registry. It is anticipated that future annual publications will report on risk-adjusted mortality.

30-day mortality has been reported by admission status only at this point, and the low incidence in each category makes statistical interpretation difficult. It does demonstrate a clear, and appropriate, stepwise gradient in mortality from elective -› urgent -› emergent -› salvage across all institutions, with percent mortality by admission status of 0.5, 1.0, 3.5 and 23.8% respectively.

Mortality, whether adjusted or unadjusted, should be used as the most unequivocal basis for confidential continuous quality improvement activities. The main goal should not be public accountability per se, but rather determination of best practice, benchmarking, and regional or system-wide improvement.

Table 20: All-cause unadjusted mortality post PCI by admission status (% of total cases)

Site	Case count	Elective %	Urgent %	Emergent %	Salvage %	Total Deaths
CH	412	0.0	1.3	1.3	36.4	8
TTH	408	0.0	0.7	6.1	0.0	5
MBH	169	0.0	0.0	16.7	0.0	1
NGH	508	0.0	1.0	3.3		8
RBWH	369	1.5	0.5	7.9		9
PAH	1013	0.4	1.3	2.0	25.0	14
GCUH	605	1.2	1.2	3.3	0.0	11
ALL	**3484**	**0.5**	**1.0**	**3.5**	**23.8**	**56**

9.3 STEMI < 6 hours from symptom onset – Time to reperfusion

Although door to device time is important for monitoring and improving hospital system performance, the most critical factor for patient outcome is the total ischaemic time from symptom onset to successful reperfusion. The exact time of symptom onset is often difficult to ascertain, and the time between symptom onset and call for help is primarily a patient-dependent factor. Therefore STEMI guidelines worldwide now advocate first medical contact (FMC) to device as an important modifiable and objective measure of overall STEMI system performance.

Both the European and American STEMI guidelines recommend a goal FMC to device time < 90 minutes. For patients who present initially to a non-PCI hospital then transfer to a PCI facility (inter-hospital transfer), the accepted FMC to device target window is < 120 minutes[4,5,6]. It is widely recognised that these targets are ambitious and difficult to achieve.

Achieving these times requires efficient coordination of care within and between the ambulance service and transferring/receiving hospitals. Accepted strategies to improve reperfusion times include onsite ambulance pre-hospital ECG, paramedic activation of the PCI lab and an immediate response of the on call PCI team operational within 30 minutes of alert. System improvement requires timely data feedback to all members of the STEMI care team. As a QCOR clinical quality indicator for this inaugural report, the time of the first ECG diagnostic of STEMI has been agreed to signify time of first medical contact. The reason for this decision is twofold: firstly, we have found inconsistency in the definition of FMC between pre-hospital and hospital sectors (which has since been rectified and scheduled for implementation in the 2016 report) and secondly, data for 1st diagnostic ECG has been recorded quite reliably.

Of the 509 primary PCI cases presenting within six hours of symptom onset in whom timestamps for 1st diagnostic ECG and time of first device application were accurately recorded, results are presented below (table 21).

Overall, the median time to reperfusion was 95 minutes for the state, with individual sites documenting times between 82 to 107 minutes. These results suggest that overall, Queensland public facilities are approaching the ambitious benchmark of 90 minutes from time of first medical contact/first diagnostic ECG to device.

Table 21: Median time to reperfusion for STEMI patients presenting within six hours of symptom onset (mins)

Site	Case count	25th percentile	Median (mins)	75th percentile	% met 90 min target
CH	48	64	82	107	60.4
TTH	17	64	98	142	41.2
MBH	2				
NGH	118	82	95	116	43.2
RBWH	49	72	86	104	51.0
PAH	177	89	107	136	27.7
GCUH	98	71	88	103	56.1
ALL	**509**	**79**	**95**	**118**	**42.6**

Whilst the median time to reperfusion seems favourable, the recommended time to reperfusion is not being met for over half of patients presenting to Queensland facilities, with only 42.6% of patients receiving timely reperfusion.

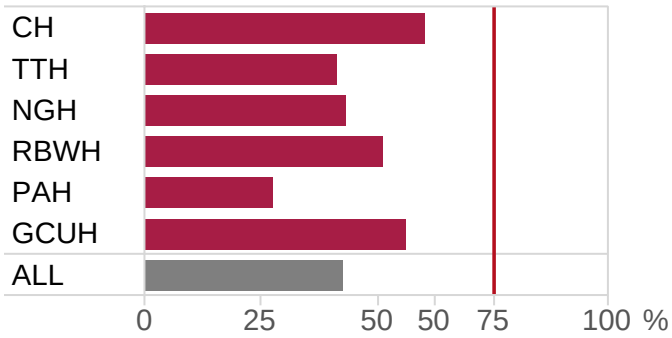

Figure 27: Proportion meeting time to reperfusion target of 90 min

*Excludes MBH (n = 2)

Figure 28 highlights the large variation within and across facilities.

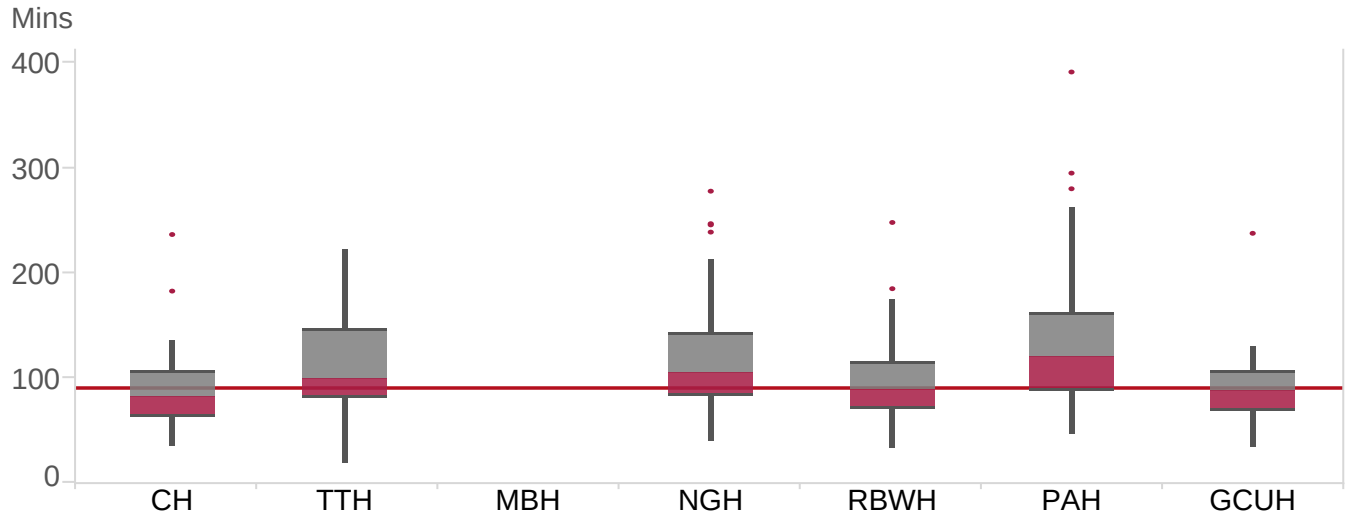

Figure 28: Time to reperfusion for STEMI patients presenting within 6 hours of symptom onset

These results highlight the importance of the QCOR quality assurance program. Overall, these data do not permit more in-depth analysis of factors contributing to the observed delay in achieving reperfusion however a number of possible explanations are explored below.

9.3.1 Data quality

Time to reperfusion is calculated using timestamps documented in the CCL clinical software. Pre hospital data are entered by hospital staff and not electronically transferred between systems, for example by incoming emergency transport (Queensland Ambulance Service). Manual data entry therefore, will undoubtedly be susceptible to some degree of human error.

QCOR and Queensland Ambulance Service have embarked on a comprehensive data sharing programme which will facilitate detailed ongoing feedback on performance at all steps in the reperfusion journey to identify areas for ongoing improvement.

9.3.1 Pre-hospital notification processes

The Queensland Ambulance Service (QAS) has mandated pre-hospital ECG acquisition and interpretation by all Critical Care Paramedics (CCPs) since 2000 and for Advanced Care Paramedics (ACPs) since 2010. The QAS has an operational paramedic workforce exceeding 3,000, with all CCPs and ACPs currently interpreting ECGs and diagnosing STEMIs. Direct field referral for PCI and pre-hospital fibrinolysis by CCPs began in 2008 (CCPs represent 8% of the paramedic workforce). The QAS is expanding the capability for ACPs to directly refer for PCI, without the requirement for a CCP on scene. This training will be completed by 1 January 2017 and is expected to improve response times for primary PCI by 20-30 minutes, particularly in metropolitan areas. In areas outside designated PCI referral, ACP practice has been expanded to include pre-hospital fibrinolysis. This expansion of practice will also be complete by 1 January 2017.

There may be other pre-hospital factors operational, e.g. total distance travelled/time of day delays which will be the focus of further study.

9.3.3 Hospital processes

Some hospital processes vary across the state depending on factors including the time of day, or the requirement of some patients to transit via the Emergency Department for example.

Differing processes may explain some variation; however this would appear to have had minimal impact, as when looking at door to device times, all sites were similar in the time taken to treat patients once they arrived at the PCI capable facility.

QCOR will continue to evaluate and monitor this indicator, with a view to improving the outcomes for STEMI patients and report our findings in the 2016 annual report.

9.4 NSTEMI – Time to angiography

Coronary Angiography is important in determining the extent and severity of coronary disease with both quality of life and prognostic implications in patients presenting with non-ST elevation acute coronary syndromes. National and international guidelines recommend that coronary angiography should be offered and performed within 72hrs of diagnosis[3]. This duration is reduced to 24hrs for those deemed to be at high risk (as predicted by a validated risk score) of recurrent events. For this indicator, the consensus of the steering committee was that the recommended treatment timeframe for analysis should be 72hrs for all non-ST elevation acute coronary syndromes as a risk prediction score has not been applied universally.

In 2015, 2138 patients presented with NSTEMI. Of these, 1716 cases were available for analysis.

Table 22: Time to angiography

Site	Case count	25th percentile	Median (hrs)	75 percentile	% met 72 hr target
CH	239	27	56	95	61.5
TTH	227	33	55	94	65.2
MBH	99	25	51	91	66.7
NGH	245	20	27	48	91.0
RBWH	294	35	65	107	55.4
PAH	423	37	63	98	59.3
GCUH	189	23	46	72	75.1
ALL	**1716**	**27**	**51**	**89**	**66.4**

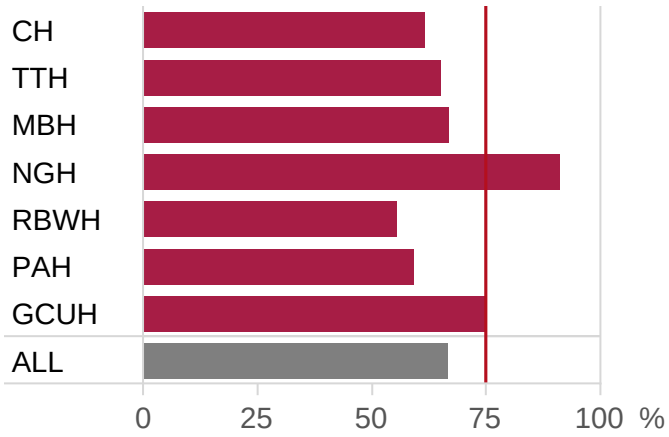

Figure 29: Proportion meeting time-to-angiography target of 72 hours

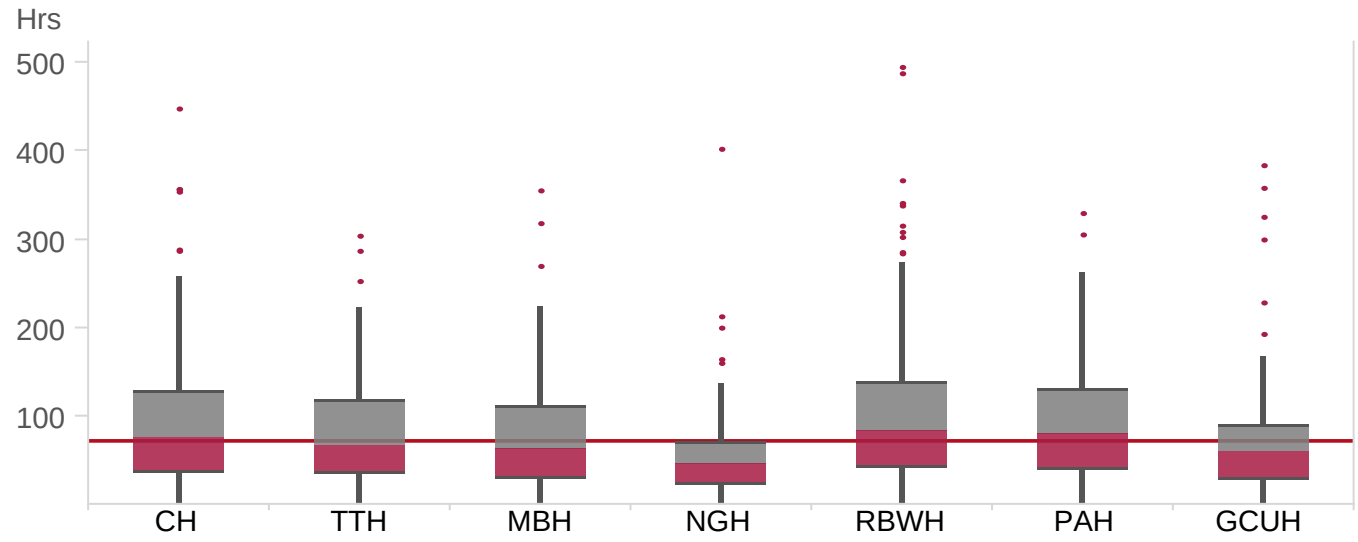

Figure 30: Time to angiography

9.5 Major adverse cardiac events

Analysed as both a composite end-point, and as individual events, this indicator examines in lab complications. Statewide, there were no reported cerebrovascular accidents, tamponade or requirement for emergency cardiac surgery due to a procedural complication, in any of the seven participating sites. The rates of coronary artery perforation (0.3%), and in-lab death (0.2%) were also very low.

Whilst these figures provide reassurance about the safety of cardiac cath lab procedures in Queensland in 2015, caution must be applied before extrapolating these data to non-participating sites as a participation bias may exist. The 7 participating sites represent less than 50% of hospitals with cardiac cath labs in Queensland and with this perspective, the reassuring safety data reported here may not be applicable to all sites with cardiac cath labs, particularly those that do not participate in any formal transparent data registry.

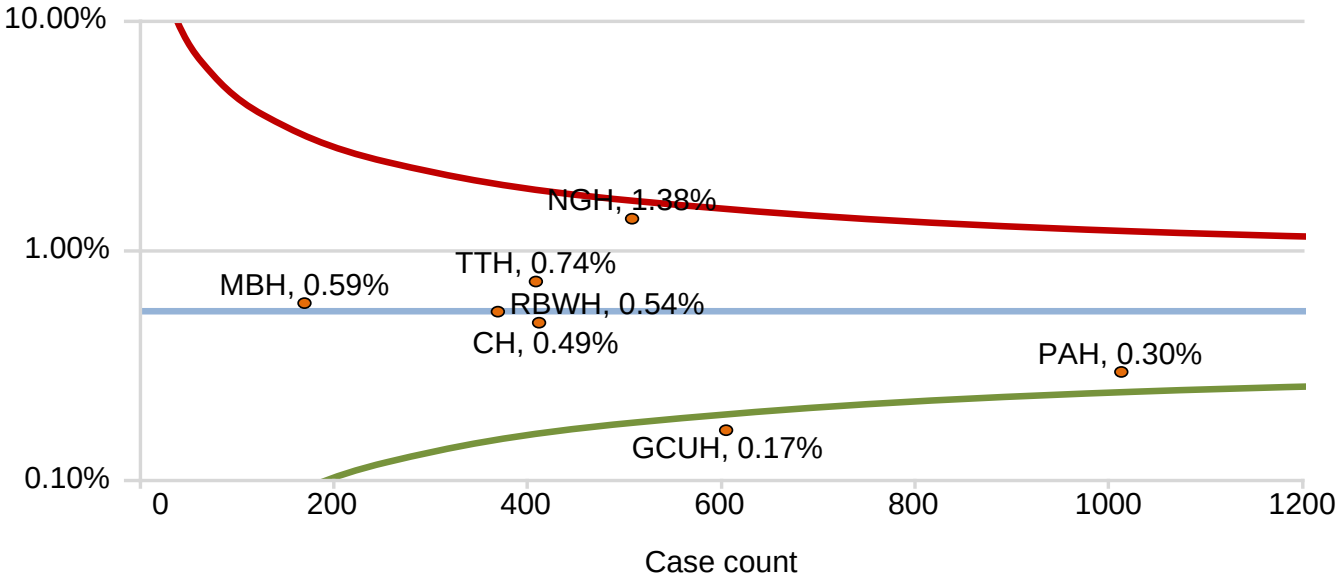

Figure 31: Major adverse cardiac events

9.6 Safe radiation doses

Cath Lab staff and patients are exposed to ionizing radiation during almost all cardiac procedures performed in the Cath Lab. Whilst ionizing radiation is known to cause both delayed and deterministic (non-delayed) effects, the probability of effect is thought to be dose-related. Conservative thresholds are applied and monitored throughout Queensland, but as the complexity of procedural work undertaken by interventional cardiologists increases, along with the increase in patients with a large body weight, it is increasingly important to remain vigilant about radiation safety. This indicator examines the proportion of cases exceeding the high dose threshold of 5Gy.

Table 23: Proportion of cases meeting the safe dose threshold by case type (%)

Site	Diagnostic only procedures	PCI procedures
CH	100.0	99.2
TTH	99.6	98.1
MBH	100.0	98.8
NGH	99.9	98.8
RBWH	99.5	96.7
PAH	99.5	95.3
GCUH	99.6	99.4
ALL	**99.7**	**97.6**

10 Funding

The QCOR program is currently funded through the Statewide Cardiac Clinical Network. This funding stream has been secured until the end of the 2016/17 financial year.

Sustainable funding beyond June 30, 2017 is currently being investigated. A range of opportunities are being looked at, including but not limited to:

- State Government
- Queensland Health (in-house) software development/licensing
- Private Health insurers

11 Research

The primary aim of QCOR is to provide outcomes data for the care and treatment of cardiac patients across Queensland. The information gathered is used to compare against existing standards of care. Research differs in that it generates new knowledge from registries with large numbers of patients and a significant volume of data. Robust governance processes and standard ethics procedures will still apply.

In 2015, data were supplied for the following quality assurance and improvement proposals:

- Stent type and outcomes in STEMI ‹ 6 hours
- Outcomes for Bare Metal vs Drug Eluting Stents
- Outcomes after PCI with rotational atherectomy in non-surgical vs surgical centres
- Cost benefit of same day PCI
- Appropriate vascular closure device usage
- Time of TIMI III flow vs “first device time” in STEMI

12 Future plans

This inaugural report for QCOR represents the collaborative efforts of a dedicated team of researchers, administrators and clinicians. Almost all public hospital cardiology units in Queensland submit their data to QCOR. This work occurs against a backdrop of increased focus on optimising patient centred care, excellence of quality clinical outcomes, and rural/regional-metropolitan disparities.

Efforts are ongoing to continually improve data quality and ensure the most relevant and informative data are collected.

QCOR is also engaging with all PCI facilities in the state with the ultimate aim of a comprehensive statewide cardiac outcomes registry to achieve the best possible outcomes for Queenslanders.

13 Glossary

A&TSI	Aboriginal and Torres Strait Islander
ACOR	Australasian Cardiac Outcomes Registry
ACQIS	Adult Cardiac Service Quality Informations System
ACS	Acute Coronary Syndromes
ANZSCTS	Australian and New Zealand Society of Cardiac and Thoracic Surgeons
BMI	Body Mass Index
BMS	Bare Metal Stent
CABG	Coronary Artery Bypass Graft
CCL	Cardiac Catheter Laboratory
CH	Cairns Hospital
CISP	Cardiac Information Solutions Program
cQIC	Clinical Quality Improvement Coordinator
CS	Covered Stent
CV	Cardiovascular
CVA	Cerebrovascular Accident
DES	Drug Eluting Stent
ECG	Electrocardiography
ERP	Estimated Resident Population
FFR	Fractional Flow Reserve
FMC	First Medical Contact
GCHHS	Gold Coast Health and Hospital Service
GCUH	Gold Coast University Hospital
HDT	High Dose Threshold
HHS	Hospital and Health Service
ICD	Implantable Cardiac Device
IVUS	Intravascular Ultrasound
KPI	Key Performance Indicator
LAD	Left Anterior Descending Artery
MACE	Major Adverse Cardiac Event
MBH	Mackay Base Hospital
MHHS	Mackay Hospital and Health Service
MI	Myocardial Infarction
MNHHS	Metro North Health and Hospital Service
MSHHS	Metro South Health and Hospital Service
NCDR	The National Cardiovascular Data Registry
NGH	Nambour General Hospital
NSTEMI	Non ST-Elevation Myocardial Infarction
OCT	Optical Coherence Tomography
PAH	The Princess Alexandra Hospital
PCI	Percutaneous Coronary Intervention
QAS	Queensland Ambulance Service
QCOR	Queensland Cardiac Outcomes Registry
QI	Quality Improvement
RBWH	The Royal Women's and Brisbane Hospital
RCA	Right Coronary Artery
RFI	Request for Information
SCCIU	Statewide Cardiac Clinical Informatics Unit
SCCN	Statewide Cardiac Clinical Network
SCHHS	Sunshine Coast Health and Hospital Service
STEMI	ST-Elevation Myocardial Infarction
TAVR	Transcatheter Aortic Valve Replacement
TPCH	The Prince Charles Hospital
TTH	The Townsville Hospital
VCOR	Victorian Cardiac Outcomes Registry
VMO	Visiting Medical Officer

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