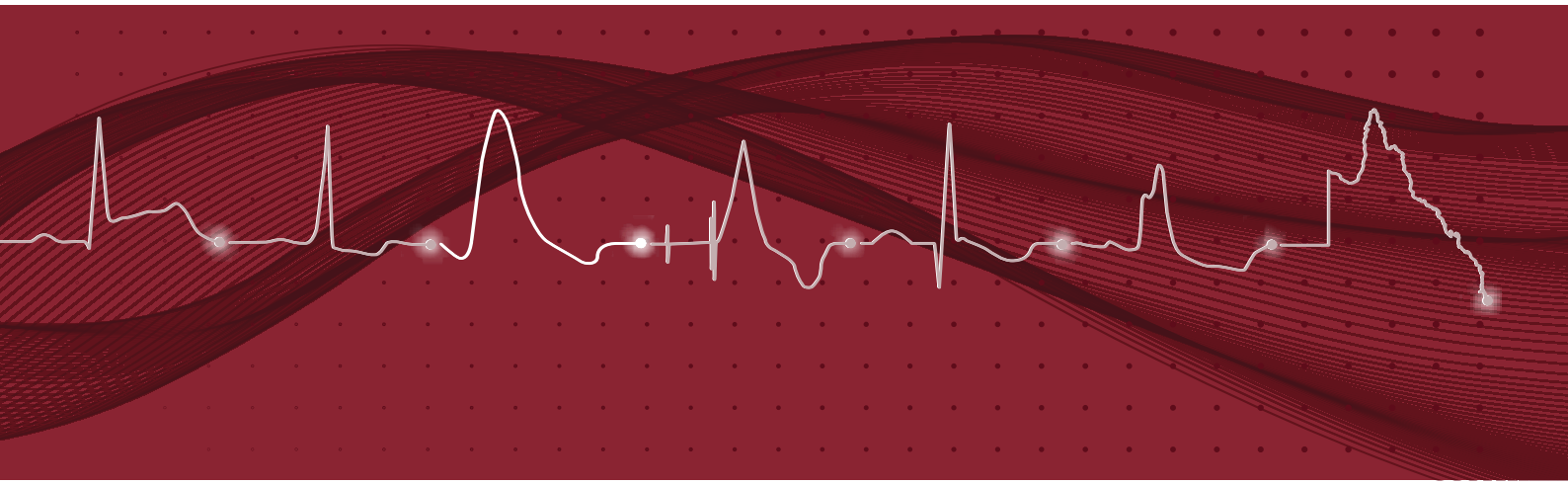
Queensland Cardiac Clinical Network

Queensland Cardiac Outcomes Registry
2021 Annual Report

Thoracic Surgery Audit



Queensland Cardiac Outcomes Registry
2021 Annual Report

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Contents

1 Message from the QCCN Chair

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

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

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

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

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

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

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

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

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

2 Acknowledgements

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

QCOR Interventional Cardiology Committee

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

QCOR Cardiothoracic Surgery Committee

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

QCOR Cardiac Rehabilitation Committee

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

Statewide Cardiac Clinical Informatics Unit

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

QCOR Electrophysiology and Pacing Committee

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

QCOR Heart Failure Support Services Committee

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

Queensland Ambulance Service

- Dr Tan Doan, PhD

3 Introduction

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

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

Goals and mission

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

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

The SCCIU team consists of:

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

* Principal contact officer/QCOR program lead

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

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

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

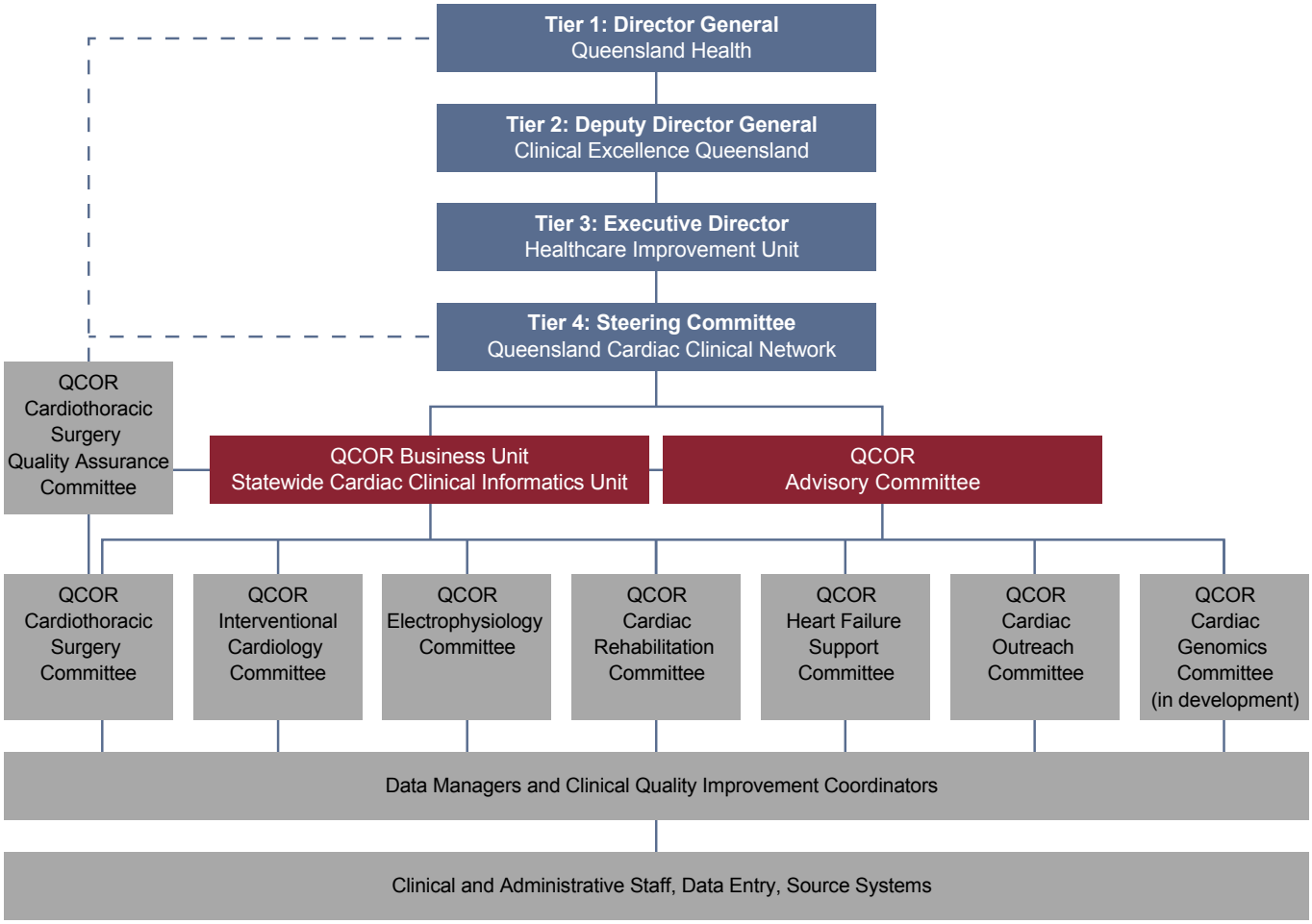


Figure 1: Governance structure

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

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

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

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

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

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

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

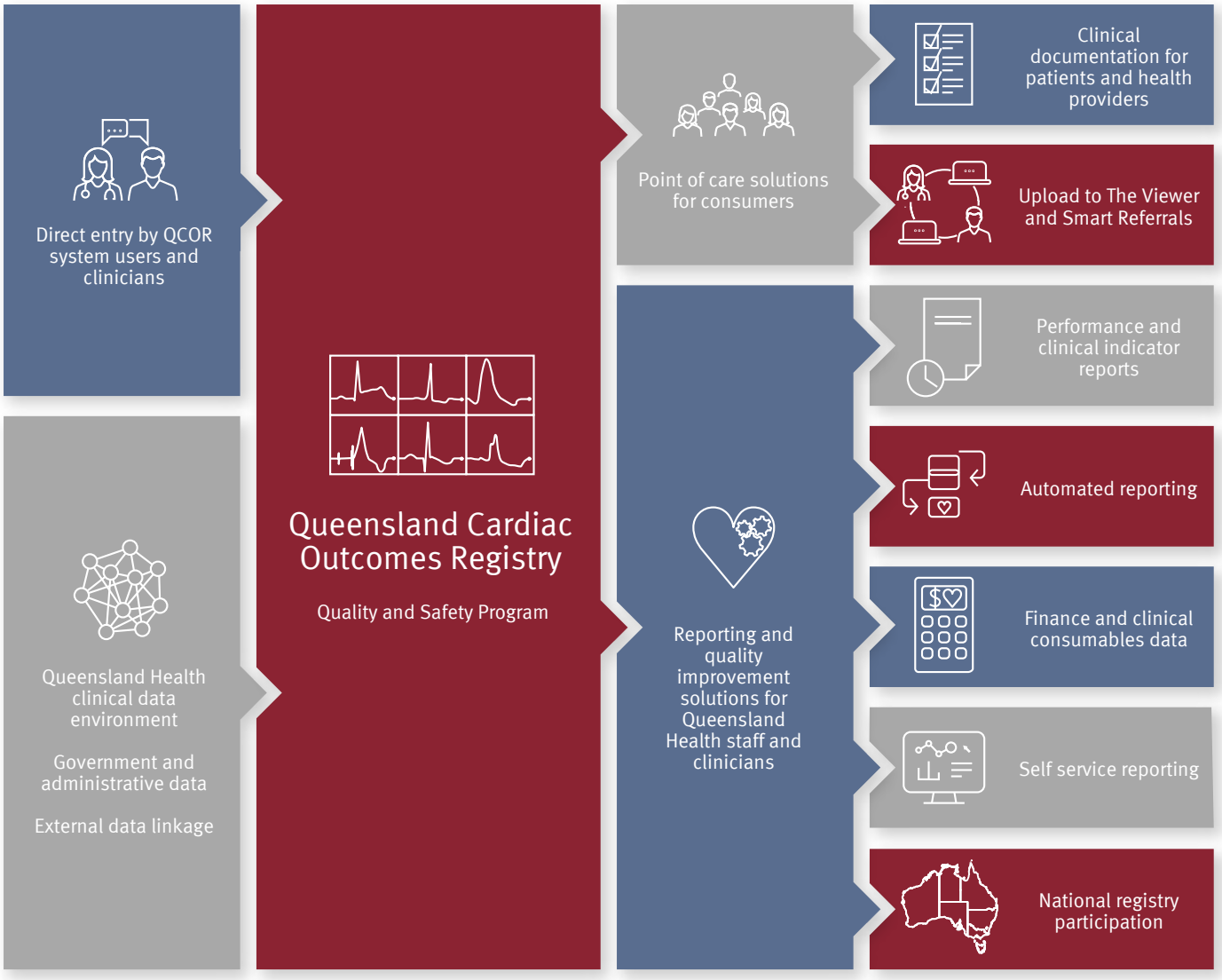
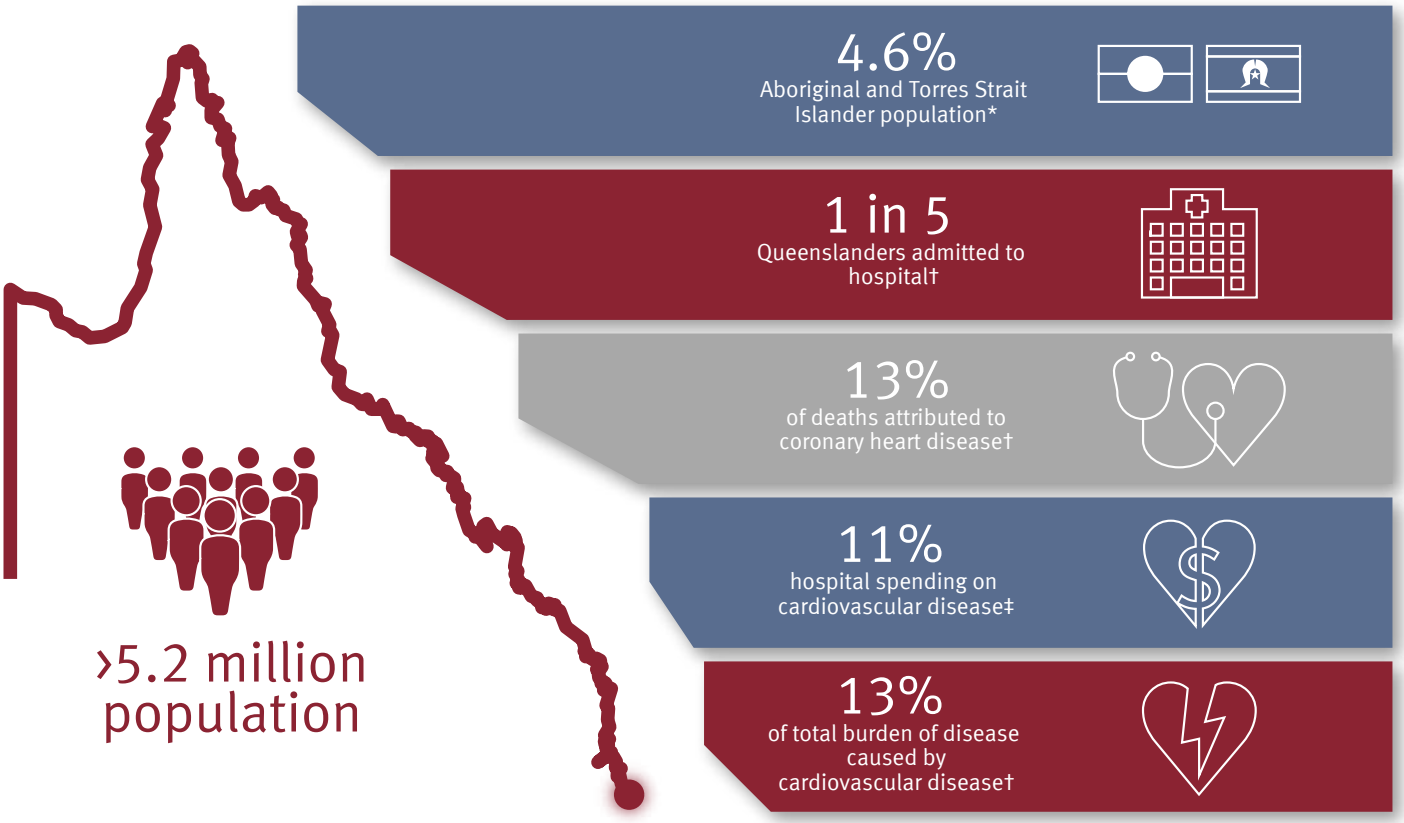


Figure 2: QCOR data flow

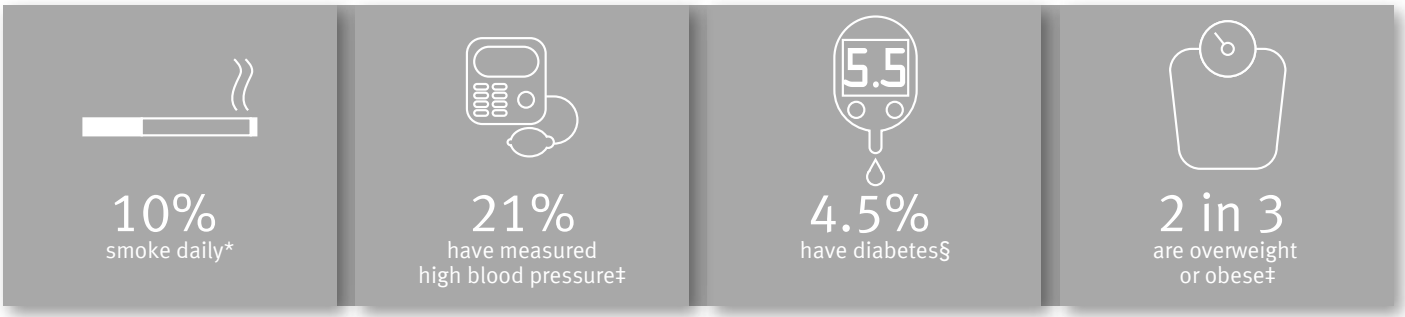
* The Australian Commission on Safety and Quality in Health Care (ACSQHC). Framework for Australian clinical quality registries. Sydney: ACSQHC; 2014.

Queensland Cardiac Outcomes Registry

The Health of Queenslanders



Comorbidities



Mortality

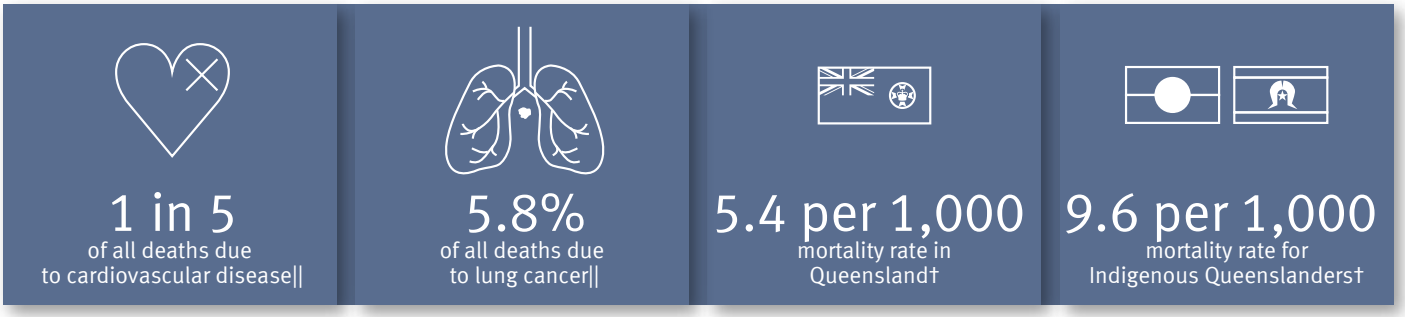


Figure 3: QCOR 2021 infographic

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

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

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

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

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

2021 Activity at a Glance

What's New?

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

Interventional Cardiology

4,894
percutaneous coronary interventions

485
structural heart disease interventions

239
transcatheter aortic valve replacements

15,443
total coronary procedures

Cardiothoracic Surgery

2,623
adult cardiac surgeries

1,067
adult thoracic surgeries

Electrophysiology & Pacing

5,269
electrophysiology and pacing procedures

3,500
cardiac implantable electronic device procedures

Heart Failure Support Services

6,326
heart failure support services referrals

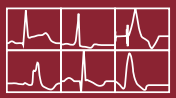
Cardiac Rehabilitation

10,647
cardiac rehabilitation referrals

Paediatric Cardiac Surgery

312
paediatric cardiac surgeries

Clinical Indicator Progress



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

0.3%
procedural tamponade rate for cardiac device and electrophysiology procedures

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

93%
of cardiac rehabilitation referrals within 3 days of discharge

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

4 Facility profiles

4.1 Townsville University Hospital

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

4.2 The Prince Charles Hospital

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

4.3 Royal Brisbane & Women's Hospital

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

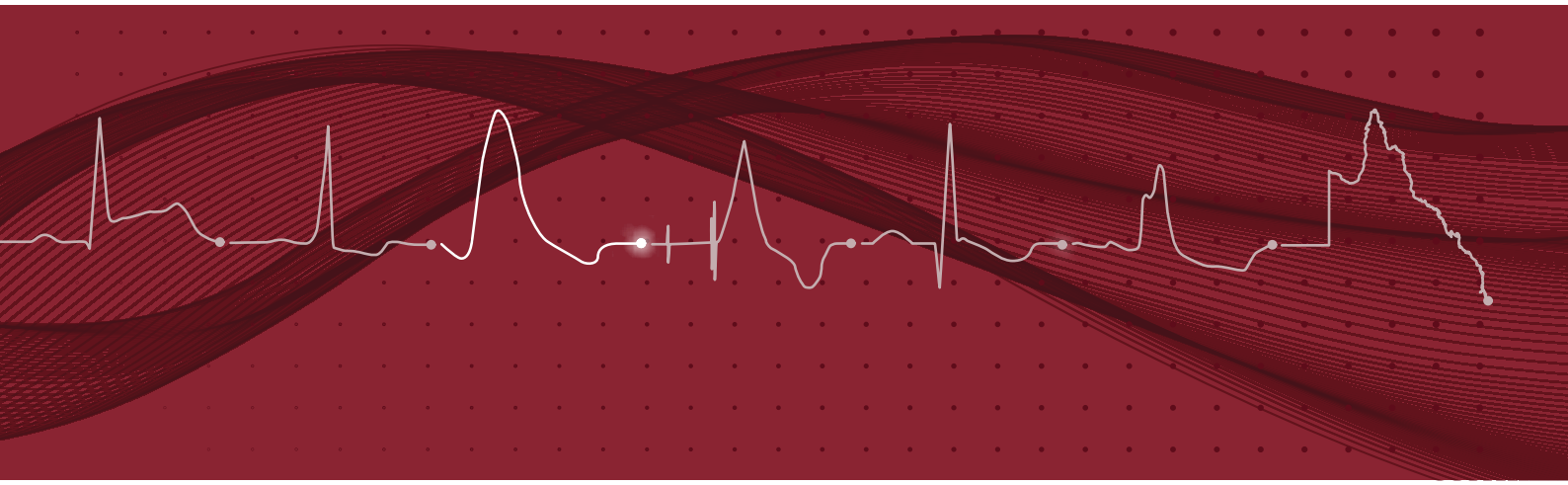
4.4 Princess Alexandra Hospital

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

4.5 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

Thoracic Surgery Audit



1 Message from the Chair

Over a thousand Queenslanders experienced thoracic surgery in 2021, some for lung cancer, some for other cancers that had metastasised, some for infection, and some for trauma.

Operating on the organ system responsible for oxygenation and fitness is not without risk. Getting patients through surgery without complications, in patients who have smoked or are currently smoking and are overweight or obese is part of the challenge of this specialty. Viewed in that context, the results in this report are excellent.

The upstaging and downstaging rate in primary lung cancer resections is perhaps the most pertinent finding in this report. Balancing the risks of surgery with the benefits of resecting lung cancer comes down to a calculation between the stage of cancer and the health of the patient. Putting patients through surgery who have an advanced cancer may not benefit them. The converse is that patients who are thought to be more advanced than they are, may be denied surgery that changes their survival. Lung cancer has gone through a revolution in staging with positron emission tomography scanning and endobronchial ultrasound, and the treatment itself is going through a dramatic change, with immunotherapy and stereotactic body radiation therapy. With more ways of staging cancer and more treatment options, putting as many Queenslanders as possible with lung cancer through potentially curative surgery is still our priority, and accurately staging patients, both preoperatively, and intraoperatively is part of the calculation of risk and benefit.

Paired with this is the low mortality rate, in which the safety of thoracic surgery in Queensland is excellent. The majority of risk in surgery comes from the underlying health of the patient, and the role of the surgical team is in the decision to operate, the technical performance of surgery and the management of the recovery phase and its risks. A low mortality rate can reflect safe decision making, meaning those at most risk are managed without surgery, in addition to the safe performance of procedures and in-hospital treatment. The counterpoint is the consideration that our surgical decision making is too conservative and that surgery should perhaps be offered to a wider array of patients at risk. This is a constant tension in surgical decision making and, knowing how our services function across the state allows us to make informed decisions about the actual risk in our units.

Dr Christopher Cole
Chair
QCOR Cardiothoracic Surgery Committee

2 Key findings

Key findings include:

- There were 1,067 thoracic surgical cases entered for 2021 across the five public thoracic surgery units in Queensland.
- The median age of patients undergoing thoracic surgery was 63 years of age, with 18% of patients aged under 40 years of age.
- One third of patients (33%) were within the normal body mass index (BMI) range, while patients classed as overweight or obese made up more than half of the patient cohort (61%) including 7% classed as morbidly obese.
- The proportion of Aboriginal and Torres Strait Islander patients undergoing thoracic surgery was 5.7% of the total cohort.
- Operations performed for preoperative diagnoses of primary lung cancer were undertaken in 27% of all cases, while pleural disease and other cancer diagnosis each accounted for 28% of all surgeries. Other thoracic surgery was performed in 17% of the cohort.
- Approximately two thirds of patients had some smoking history, including 22% who were current smokers at the time of surgery.
- Elective procedures accounted for 69% of the total surgeries performed, while 12% of cases were emergency operations. Of elective cases, half were performed on a day of surgery admission pathway.
- Lobectomy (80%) and lymph node sampling (76%) were the most common procedures performed on patients with an indication of primary lung cancer.
- Overall, 5% of all cases required a blood product transfusion.
- The median postoperative length of stay for thoracic surgery patients was 5 days.
- There were 123 cases having one or more new major morbidities recorded post procedure. Prolonged air leak greater than seven days accounted for over one quarter (25%) of all major morbidity types.
- Pathological upstaging occurred in 32% of primary lung cancer cases while 19% were downstaged postoperatively and 50% had no change to the preoperative staging classification.
- Unadjusted all-cause mortality at 30 days was 1.2%, increasing to 2.4% at 90 days. The other cancer indication group had the highest unadjusted mortality rates at 30 days and 90 days at 1.7% and 4.4% respectively.

3 Participating sites

There are five public thoracic surgery units in Queensland, all of which have participated in QCOR.

Four of the public sites offering thoracic surgery also performed cardiac surgery. The fifth public site, Royal Brisbane & Women's Hospital (RBWH), only offers thoracic surgery.

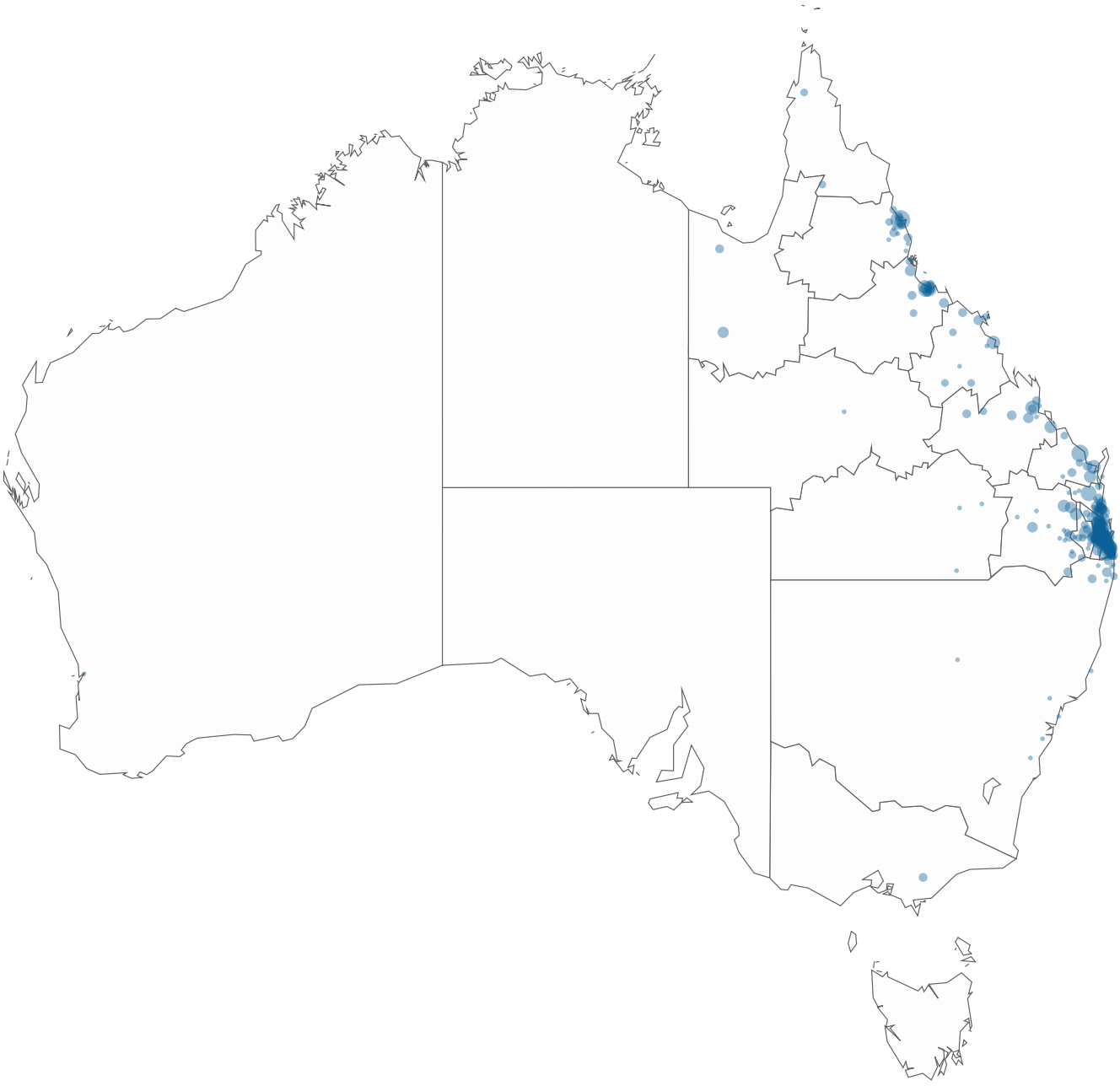


Figure 1: Thoracic surgery cases by residential postcode

Table 1: Participating sites

Acronym	Name
TUH	Townsville University Hospital
TPCH	The Prince Charles Hospital
RBWH	Royal Brisbane & Women's Hospital
PAH	Princess Alexandra Hospital
GCUH	Gold Coast University Hospital

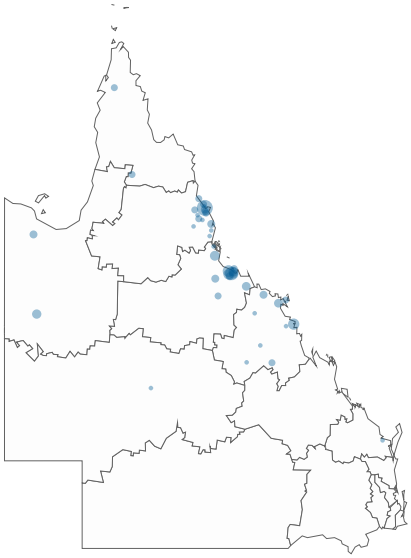


Figure 2: Townsville University Hospital

Figure 3: The Prince Charles Hospital

Figure 4: Royal Brisbane & Women's Hospital

Figure 5: Princess Alexandra Hospital

Figure 6: Gold Coast University Hospital

4 Case totals

4.1 Total surgeries

Patients undergoing thoracic surgery have been assigned an indication category of either primary lung cancer, other cancer, pleural disease or other indication for surgery.

Of the 1,067 cases performed across the five public thoracic surgery units in Queensland, over half of patients (54%) presented with an indication including some form of cancer. Diagnosis of primary lung cancer accounted for 27% and 28% had another cancer diagnosis.

Non cancer diagnoses accounted for 46% of the overall cases, including pleural disease (28%) or other non cancer indication (17%).

Table 2: Cases by site and indication category

SITE	Total n	Primary lung cancer n (%)	Other cancer* n (%)	Pleural disease† n (%)	Other‡ n (%)
TUH	151	42 (27.8)	46 (30.5)	44 (29.1)	19 (12.6)
TPCH	348	127 (36.5)	76 (21.8)	103 (29.6)	42 (12.1)
RBWH	95	37 (38.9)	23 (24.2)	21 (22.1)	14 (14.7)
PAH	319	43 (13.5)	113 (35.4)	93 (29.2)	70 (21.9)
GCUH	154	35 (22.7)	39 (25.3)	42 (27.3)	38 (24.7)
STATEWIDE	**1,067**	**284 (26.6)**	**297 (27.8)**	**303 (28.4)**	**183 (17.2)**

* Lung metastases, solitary lung lesion of uncertain aetiology, pleural malignancy or other thoracic cancer

† Pneumothorax, haemothorax, empyema or pleural thickening/nodules

‡ Chest wall disease, mediastinal disease, tracheal disease, oesophageal disease, infective focus or other diagnosis

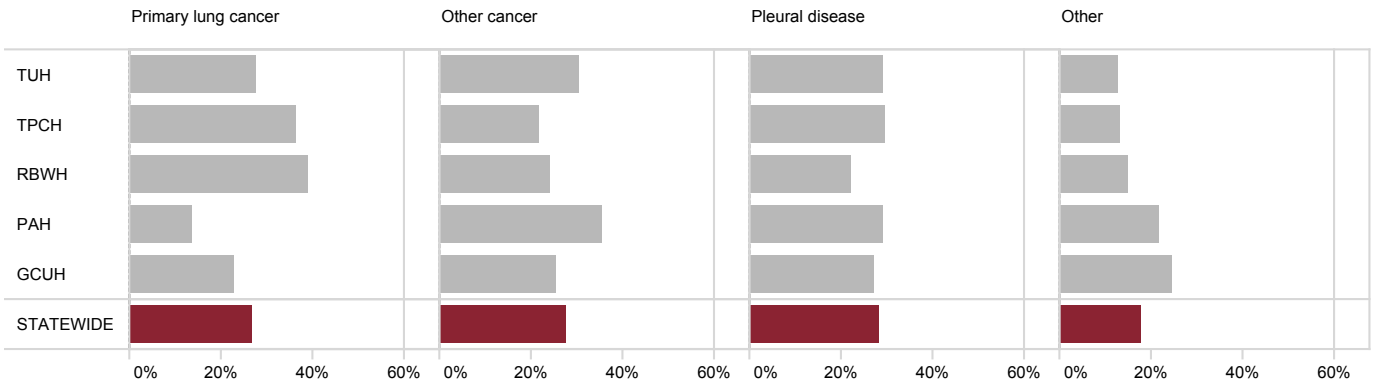


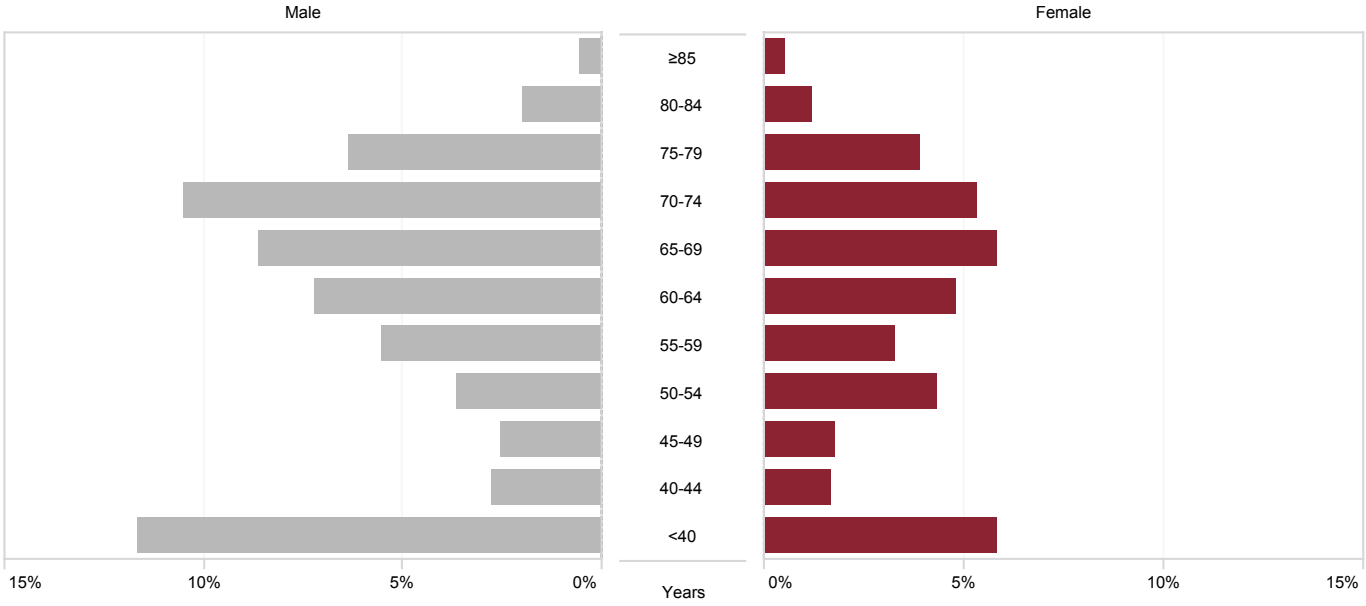
Figure 7: Proportion of cases by site and indication category

5 Patient characteristics

5.1 Age and gender

The median age for thoracic surgical patients was 63 years, while nearly one in five (18%) patients were less than 40 years of age at the time of surgery.

Whilst the majority of patients were male (61%), there was a nearly even distribution of cases between genders among patients with a preoperative cancer diagnosis. By contrast, three quarters of patients with pleural disease were male.



% of total (n=1,067)

Figure 8: Proportion of all cases by age group and gender

Table 3: Median age by gender and indication category

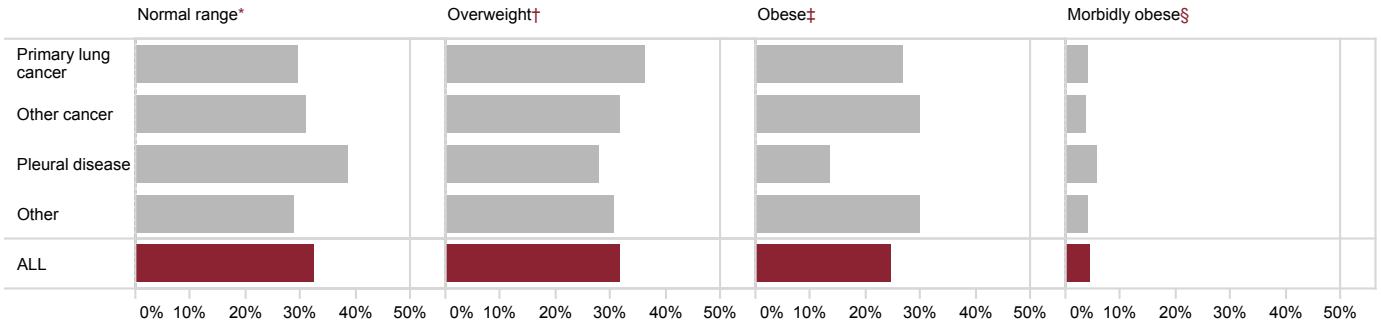
Indication	Male years	Female years	Total years
Primary lung cancer	71	67	70
Other cancer	65	61	64
Pleural disease	52	43	52
Other	59	53	58
All	**64**	**62**	**63**

Table 4: Proportion of cases by gender and indication category

Indication	Male n (%)	Female n (%)
Primary lung cancer	143 (50.4)	141 (49.6)
Other cancer	163 (54.9)	134 (45.1)
Pleural disease	228 (75.2)	75 (24.8)
Other	119 (65.0)	64 (35.0)
All	**653 (61.2)**	**414 (38.8)**

5.2 Body mass index

The majority of thoracic surgery patients (61%) were classed as overweight or obese, while 33% of patients had a body mass index (BMI) classed within the normal range. More than 7% of patients were classed as underweight.



Underweight category (BMI <18.5 kg/m^2) is not displayed (7.2%)

Excludes missing data (10.0%)

* BMI 18.5–24.9 kg/m^2

† BMI 25.0–29.9 kg/m^2

‡ BMI 30.0–39.9 kg/m^2

§ BMI ≥40.0 kg/m^2

Figure 9: Proportion of cases by BMI and indication categories

Table 5: BMI category by indication category

Indication	Underweight n (%)	Normal weight n (%)	Overweight n (%)	Obese n (%)	Morbidly obese n (%)
Primary lung cancer	9 (3.6)	73 (29.3)	90 (36.1)	67 (26.9)	10 (4.0)
Other cancer	10 (3.7)	85 (31.1)	87 (31.9)	81 (29.7)	10 (3.7)
Pleural disease	39 (14.0)	107 (38.5)	78 (28.1)	38 (13.7)	16 (5.8)
Other	11 (6.9)	47 (29.4)	49 (30.6)	46 (28.7)	7 (4.4)
All	**69 (7.2)**	**312 (32.5)**	**304 (31.7)**	**232 (24.2)**	**43 (4.5)**

Excludes missing data (10.0%)

5.3 Aboriginal and Torres Strait Islander status

The overall proportion of identified Aboriginal and Torres Strait Islanders undergoing thoracic surgery was 5.7%.

Table 6: Aboriginal and Torres Strait Islander status by indication category

Indication	Indigenous n (%)	Non-Indigenous n (%)
Primary lung cancer	14 (5.0)	267 (95.0)
Other cancer	19 (6.4)	276 (93.6)
Pleural disease	16 (5.3)	285 (94.7)
Other	11 (6.1)	170 (93.9)
All	**60 (5.7)**	**998 (94.3)**

Excludes missing data (0.8%)

6 Risk factors and comorbidities

6.1 Smoking history

Almost one quarter of patients (22%) were current smokers (defined as smoking within 30 days prior to surgery), while 41% of patients had a smoking history recorded. Only 24% of patients were identified as having never smoked. In 13% of cases, smoking status was unknown.

There was considerable variation for patients in the primary lung cancer category, where the majority (80%) were recorded as either current or former smokers.

Table 7: Smoking history by indication category

Indication	Current smoker n (%)	Former smoker n (%)	Never smoked n (%)	Unknown n (%)
Primary lung cancer	69 (25.2)	159 (58.0)	41 (15.0)	5 (1.8)
Other cancer	47 (16.5)	113 (39.6)	90 (31.6)	35 (12.3)
Pleural disease	84 (28.7)	94 (32.1)	66 (22.5)	49 (16.7)
Other	27 (16.6)	47 (28.8)	48 (29.4)	41 (25.2)
All	**227 (22.4)**	**413 (40.7)**	**245 (24.1)**	**130 (12.8)**

Excludes missing data (4.9%)

6.2 Respiratory disease

The majority of patients (75%) did not have respiratory disease, while around one quarter (23%) were recorded as having mild or moderate respiratory disease.

Table 8: Respiratory disease according to indication category

Indication	Mild* n (%)	Moderate† n (%)	Severe‡ n (%)
Primary lung cancer	41 (15.8)	39 (15.0)	3 (1.2)
Other cancer	32 (11.6)	24 (8.7)	4 (1.5)
Pleural disease	30 (10.6)	36 (12.8)	15 (5.3)
Other	12 (7.4)	11 (6.8)	2 (1.2)
All	**115 (11.7)**	**110 (11.2)**	**24 (2.5)**

Excludes missing data (8.6%)

* Patient is on chronic inhaled or oral bronchodilator therapy

† Patient is on chronic oral steroid therapy directed at lung disease

‡ Mechanical ventilation for chronic lung disease, pO_2 on room air ‹60 mmHg or pCO2 on room air ›50 mmHg

6.3 Diabetes

There were 15% of thoracic surgery patients recorded as having diabetes. The incidence of diabetes was similar across indication categories, ranging from 20% in the other thoracic indication category to 10% in the pleural disease cohort.

Table 9: Diabetes status by indication category

Indication	Diabetes n (%)	No diabetes n (%)
Primary lung cancer	49 (17.9)	224 (82.1)
Other cancer	39 (13.6)	247 (86.4)
Pleural disease	30 (10.3)	262 (89.7)
Other	32 (19.6)	131 (80.4)
All	**150 (14.8)**	**864 (85.2)**

Excludes missing data (5.0%)

6.4 Coronary artery disease

Overall, 11% of thoracic surgery patients were identified as having a preoperative history of coronary artery disease (CAD), while 12% of the cohort had an unknown CAD history.

Table 10: Coronary artery disease status by indication category

Indication	CAD n (%)	No CAD n (%)	Unknown n (%)
Primary lung cancer	44 (16.3)	176 (65.2)	50 (18.5)
Other cancer	23 (8.2)	230 (81.6)	29 (10.3)
Pleural disease	23 (7.9)	238 (82.1)	29 (10.0)
Other	22 (13.6)	125 (77.2)	15 (9.3)
All	**112 (11.2)**	**769 (76.6)**	**123 (12.3)**

Excludes missing data (5.9%)

6.5 Renal function

One third (33%) of patients had mild renal impairment at the time of surgery. Renal function has been determined using estimated glomerular filtration rate (eGFR) calculated from the creatinine measurement recorded preoperatively.

Table 11: Renal function by indication category

Indication	Normal* n (%)	Mild† n (%)	Moderate‡ n (%)	Severe§ n (%)
Primary lung cancer	90 (35.4)	112 (44.1)	49 (19.3)	3 (1.2)
Other cancer	143 (52.0)	97 (35.3)	31 (11.3)	4 (1.5)
Pleural disease	178 (64.0)	71 (25.5)	29 (10.4)	–
Other	99 (62.3)	38 (23.9)	19 (11.9)	3 (1.9)
All	**510 (52.8)**	**318 (32.9)**	**128 (13.3)**	**10 (1.0)**

Excludes missing data (13.4%)

* eGFR ≥90 mL/min/1.73 m^2

† eGFR 60–89 mL/min/1.73 m^2

‡ eGFR 30–59 mL/min/1.73 m^2

§ eGFR <30 mL/min/1.73 m^2

6.6 Cerebrovascular disease

Approximately 5% of patients were described as having a preoperative history of cerebrovascular disease. Of these patients, 4% were characterised by a reversible neurological deficit with a complete return of function within 72 hours while around 1% exhibited residual symptoms greater than 72 hours post onset.

Table 12: Cerebrovascular disease type by indication category

Indication	Reversible* n (%)	Irreversible† n (%)	No n (%)
Primary lung cancer	16 (5.8)	5 (1.8)	251 (91.6)
Other cancer	8 (2.8)	4 (1.4)	273 (95.5)
Pleural disease	10 (3.4)	2 (0.7)	280 (95.9)
Other	5 (3.0)	1 (0.6)	161 (96.4)
All	**39 (3.8)**	**12 (1.2)**	**965 (94.7)**

Excludes missing data (4.8%)

* Typically includes transient ischaemic attack

† Typically includes cerebrovascular accident

6.7 Peripheral vascular disease

The prevalence of peripheral vascular disease was 5% in patients undergoing thoracic surgery.

Table 13: Peripheral vascular disease status by indication category

Indication	Yes n (%)	No n (%)
Primary lung cancer	16 (5.8)	258 (94.2)
Other cancer	13 (4.6)	271 (95.4)
Pleural disease	9 (3.1)	283 (96.9)
Other	8 (4.9)	154 (95.1)
All	**46 (4.5)**	**966 (95.5)**

Excludes missing data (5.2%)

6.8 Previous interventions

6.8.1 Previous thoracic surgery

There were 13% of patients with a history of prior thoracic surgery, ranging from 8% in the primary lung cancer group to 19% in the pleural disease category.

Table 14: Previous thoracic surgery by indication category

Indication	Yes n (%)	No n (%)
Primary lung cancer	22 (8.3)	242 (91.7)
Other cancer	25 (8.9)	255 (91.1)
Pleural disease	56 (19.4)	233 (80.6)
Other	23 (14.4)	137 (85.6)
All	**126 (12.7)**	**867 (87.3)**

Excludes missing (6.9%)

6.8.2 Previous pulmonary resection

Overall, 6% of patients had undergone a previous pulmonary resection operation.

Table 15: Previous pulmonary resection surgery by indication category

Indication	Yes n (%)	No n (%)
Primary lung cancer	15 (5.5)	256 (94.5)
Other cancer	12 (4.2)	273 (95.8)
Pleural disease	25 (8.6)	266 (91.4)
Other	10 (6.2)	151 (93.8)
All	**62 (6.2)**	**946 (93.8)**

Excludes missing data (5.3%)

7 Care and treatment of patients

7.1 Admission status

Over two thirds of all cases (69%) were classed as elective, while emergency admissions accounted for 12% of cases.

An indication of pleural disease was noted in 66% of all emergency cases and 57% of all urgent cases.

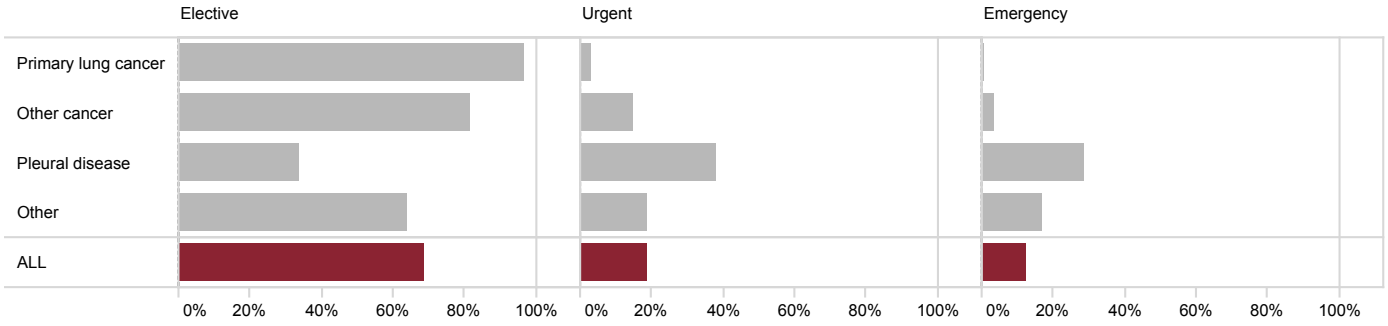


Figure 10: Admission status by indication category

Table 16: Admission status by indication category

Indication	Total n	Elective n (%)	Urgent n (%)	Emergency n (%)
Primary lung cancer	284	274 (96.5)	8 (2.8)	2 (0.7)
Other cancer	297	242 (81.5)	44 (14.8)	11 (3.7)
Pleural disease	303	102 (33.7)	115 (38.0)	86 (28.4)
Other	183	116 (63.4)	35 (19.1)	32 (17.5)
All	**1,067**	**734 (68.8)**	**202 (18.9)**	**131 (12.3)**

7.1.1 Elective day of surgery admissions

Of the 738 elective cases, half were recorded as day of surgery admissions (DOSA).

Table 17: Day of surgery admissions by indication category

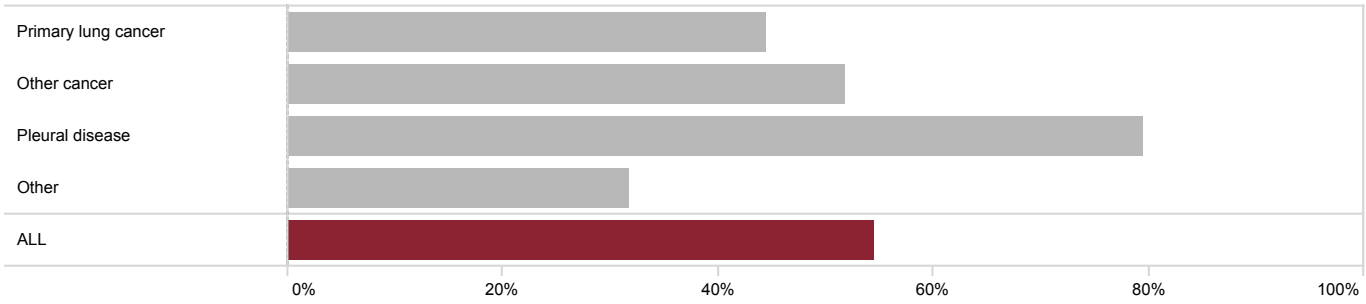
Indication	DOSA n (%)
Primary lung cancer	110 (40.1)
Other cancer	135 (55.8)
Pleural disease	48 (47.1)
Other	70 (60.3)
All	**363 (49.5)**

7.2 Surgical technique

7.2.1 Video-assisted thoracic surgery

Overall, 53% of cases utilised video-assisted thoracic surgery (VATS), including 79% of cases in the pleural disease category.

Of procedures undertaken through VATS, 35% utilised 3 ports for the operation.



Excludes missing data (1.1%)

Figure 11: Proportion of cases utilising VATS by indication category

Table 18: VATS cases by number of ports used and indication category

Indication	1 port n (%)	2 ports n (%)	3 ports n (%)	≥4 ports n (%)
Primary lung cancer	26 (21.0)	60 (48.4)	37 (29.8)	1 (0.8)
Other cancer	43 (28.7)	62 (41.3)	41 (27.3)	4 (2.7)
Pleural disease	67 (28.0)	74 (31.0)	98 (41.0)	–
Other	15 (31.3)	13 (27.1)	19 (39.6)	1 (2.1)
All	**151 (26.9)**	**209 (37.3)**	**195 (34.8)**	**6 (1.1)**

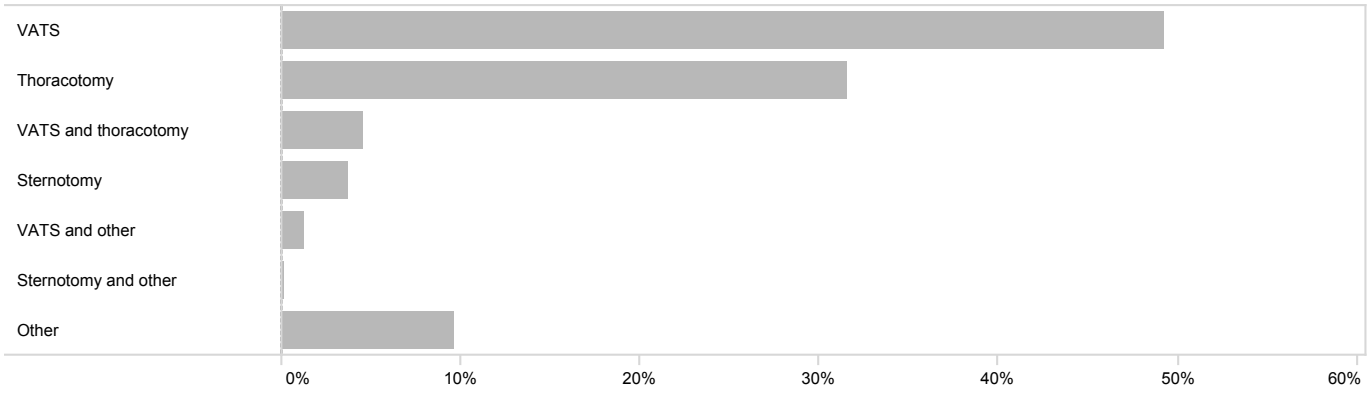
Excludes missing data (1.1%)

7.2.2 Incision type

Approximately half of all surgeries (49%) were solely video assisted, while 32% of the total surgeries were performed via thoracotomy.

Thoracotomy access was more likely for patients presenting with a cancer diagnosis, where the most common approaches were by thoracotomy only (41%), VATS only (40%), or VATS and thoracotomy (7%).

Use of sternotomy accounted for 4% of overall cases.



Excludes missing data (3.1%)

Figure 12: Proportion of all cases by incision type

Table 19: Incision type by indication category

Incision type	Primary lung cancer n (%)	Other cancer n (%)	Pleural disease n (%)	Other n (%)	Total n (%)
VATS	89 (31.4)	138 (47.4)	235 (77.8)	45 (28.5)	507 (49.0)
Thoracotomy	155 (54.8)	82 (28.2)	53 (17.5)	38 (24.1)	328 (31.7)
VATS and thoracotomy	31 (11.0)	7 (2.4)	5 (1.7)	4 (2.5)	47 (4.5)
Sternotomy	1 (0.4)	29 (10.0)	2 (0.7)	6 (3.8)	38 (3.7)
VATS and other	4 (1.4)	6 (2.1)	1 (0.3)	2 (1.3)	13 (1.3)
Sternotomy and other	–	1 (0.3)	–	–	1 (0.1)
Other	3 (1.1)	28 (9.6)	6 (2.0)	63 (39.9)	100 (9.7)
All	**283 (100.0)**	**291 (100.0)**	**302 (100.0)**	**158 (100.0)**	**1,034 (100.0)**

Excludes missing data (3.1%)

7.3 Surgery types

Thoracic surgery cases will often involve a number of procedures undertaken in combination. For patients with an indication of primary lung cancer, there was an average of 2.0 procedures per operation with a lobectomy being the most frequently performed procedure type (80%).

Wedge resection (22%) and lobectomy (20%) were the most common procedures performed in the other cancer cohort, while pleural disease was commonly treated with pleural drainage and pleurodesis (43% and 41% respectively).

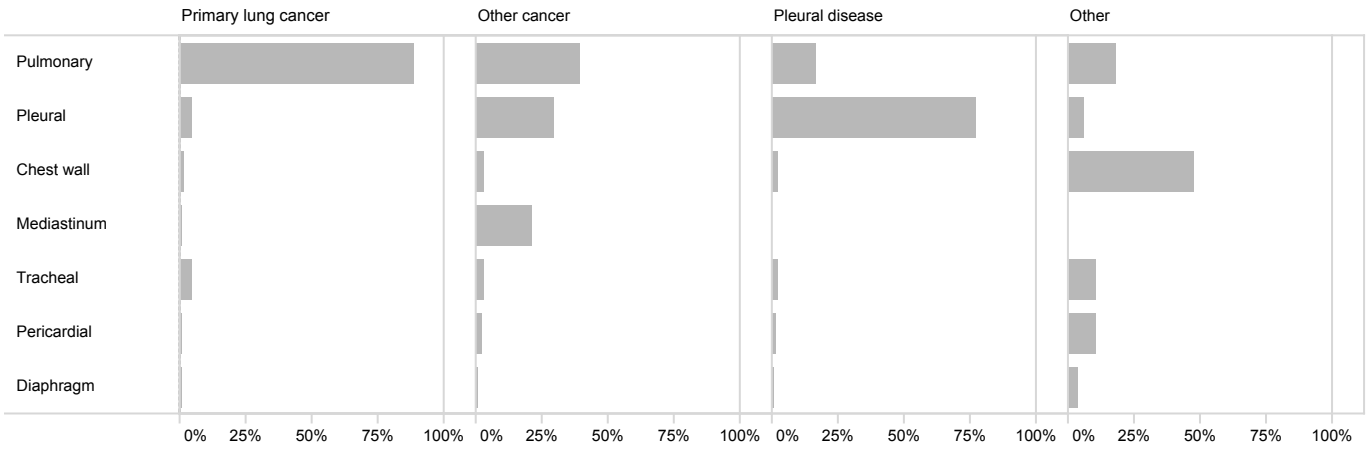


Figure 13: Proportion of procedure types by thoracic structure and indication category

Table 20: Surgical procedures for primary lung cancer

	n (%)
Lobectomy	226 (79.6)
Lymph node sampling	216 (76.1)
Wedge resection	29 (10.2)
Bronchoscopy	19 (6.7)
Segmentectomy	10 (3.5)
Lymph node dissection	9 (3.2)
Pleural drainage	8 (2.8)
Pleurodesis	8 (2.8)
Pneumonectomy	7 (2.5)
Pleural biopsy	6 (2.1)
Bilobectomy	5 (1.8)
Rib resection	4 (1.4)
Endobronchial ablation	3 (1.1)
Sleeve resection	3 (1.1)
Decortication	2 (0.7)
ORIF* ribs	2 (0.7)
Bronchial repair	1 (0.4)
Chest wall biopsy	1 (0.4)
Planned surgery abandoned	1 (0.4)
Thymectomy	1 (0.4)
Other	7 (2.5)
All	**284 (100.0)**

* Open reduction internal fixation

Table 21: Surgical procedures for other cancer

	n (%)
Wedge resection	64 (21.5)
Lobectomy	60 (20.2)
Pleural biopsy	53 (17.8)
Lymph node sampling	51 (17.2)
Pleural drainage	43 (14.5)
Pleurodesis	39 (13.1)
Resection mediastinal mass	30 (10.1)
Thymectomy	25 (8.4)
Mediastinoscopy	17 (5.7)
Bronchoscopy	13 (4.4)
Sympathectomy	11 (3.7)
Decortication	8 (2.7)
Pericardial window	6 (2.0)
Segmentectomy	5 (1.7)
Open biopsy	5 (1.7)
Bilobectomy	4 (1.3)
Chest wall resection	4 (1.3)
Rib resection	4 (1.3)
Chest wall reconstruction	3 (1.0)
Endobronchial ablation	3 (1.0)
Lymph node dissection	3 (1.0)
Chest wall biopsy	2 (0.7)
Plication	2 (0.7)
Planned surgery abandon	1 (0.3)
Pneumonectomy	1 (0.3)
Other	10 (3.4)
All	**297 (100.0)**

Table 22: Surgical procedures for pleural disease

	n (%)
Pleural drainage	130 (42.9)
Pleurodesis	125 (41.3)
Decortication	100 (33.0)
Pleural biopsy	87 (28.7)
Wedge resection	69 (22.8)
Clot evacuation	31 (10.2)
Pleural washout	28 (9.2)
Bullectomy	23 (7.6)
Bronchoscopy	13 (4.3)
Air leak control	9 (3.0)
Pericardial window	5 (1.7)
Rib resection	2 (0.7)
Lung volume reduction	2 (0.7)
Lymph node sampling	2 (0.7)
Great vessel repair	1 (0.3)
Pleural tent	1 (0.3)
Other	19 (6.3)
All	**303 (100.0)**

Table 23: Surgical procedures for all other surgeries

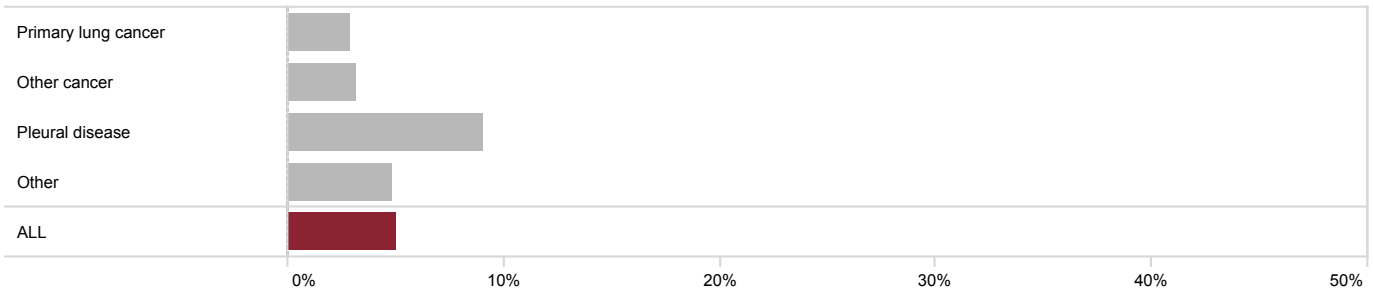
	n (%)
ORIF* ribs	24 (13.1)
Wedge resection	18 (9.8)
Sternal wiring/plating procedure	17 (9.3)
Bronchoscopy	15 (8.2)
Rib resection	12 (6.6)
Nuss bar procedure	12 (6.6)
Lobectomy	9 (4.9)
Pericardial window	9 (4.9)
Chest wall reconstruction	6 (3.3)
Lymph node sampling	6 (3.3)
Chest wall resection	5 (2.7)
Decortication	5 (2.7)
Sternal debridement	5 (2.7)
Plication	5 (2.7)
CIED# procedure	4 (2.2)
Hernia repair	4 (2.2)
Muscle flap	4 (2.2)
Open biopsy	4 (2.2)
Pectus repair	4 (2.2)
Washout procedure	4 (2.2)
Pericardial drainage	3 (1.6)
Chest wall biopsy	2 (1.1)
Clot evacuation	2 (1.1)
Endobronchial ablation	2 (1.1)
Great vessel repair	2 (1.1)
Hydatid cyst	2 (1.1)
Tracheobronchial stent	2 (1.1)
Sternectomy	2 (1.1)
Cardiopulmonary bypass	1 (0.5)
Chyle leak control	1 (0.5)
Pleural biopsy	1 (0.5)
Pleural drainage	1 (0.5)
Pneumonectomy	1 (0.5)
Removal of foreign body	1 (0.5)
Tracheoesophageal fistula repair	1 (0.5)
Tracheal repair	1 (0.5)
Other	43 (23.5)
All	**183 (100.0)**

* Open reduction internal fixation

\# Cardiac implantable electronic device

7.4 Blood product usage

Approximately 5% of all thoracic surgical cases required blood product usage. Just over 1% of patients were transfused with both red blood cell (RBC) and non-red blood cell products (NRBC). Overall, 9% of patients diagnosed with pleural disease required some blood product transfusion.



Excludes missing data (5.4%)

Figure 14: Proportion of cases requiring blood product transfusion

Table 24: Blood product types used by indication category

Indication	RBC and NRBC n (%)	RBC only n (%)	NRBC only n (%)	No blood products used n (%)
Primary lung cancer	2 (0.7)	6 (2.2)	–	265 (97.1)
Other cancer	5 (1.8)	4 (1.4)	–	275 (96.8)
Pleural disease	5 (1.7)	19 (6.6)	2 (0.7)	262 (91.0)
Other	2 (1.2)	6 (3.7)	–	156 (95.1)
All	**14 (1.4)**	**35 (3.5)**	**2 (0.2)**	**958 (94.9)**

Excludes missing data (5.4%)

8 Clinical outcomes

8.1 Length of stay

The median postoperative length of stay for thoracic surgery patients was five days, which ranged from three days to eleven days across indication categories.

For primary lung cancer cases the median post operative length of stay was five days, which compares similarly to results published through the Queensland Lung Cancer Quality Index.[43]

Table 25: Postoperative length of stay by indication category

Indication	Median days	Interquartile range days
Primary lung cancer	5	4–7
Other cancer	4	3–6
Pleural disease	5	3–11
Other	3	2–7
All	**5**	**3–8**

8.2 Major morbidity

There were 123 cases (12%) having one or more new major morbidities recorded post procedure. The incidence rate of major morbidity ranged from 15% in the primary lung cancer and pleural disease groups to 7% in the other indication category.

An air leak lasting greater than seven days occurred postoperatively in 2.9% of thoracic surgeries.

Table 26: New major morbidity by diagnosis category

Indication	Yes n (%)	No n (%)
Primary lung cancer	41 (15.0)	232 (85.0)
Other cancer	25 (8.8)	260 (91.2)
Pleural disease	45 (15.4)	247 (84.6)
Other	12 (7.3)	153 (92.7)
All	**123 (12.1)**	**892 (87.9)**

Excludes missing data (4.7%)

Table 27: Type of major morbidity

Major morbidity type	n (%)
Air leak >7days	31 (2.9)
Air leak 3–7days	25 (2.3)
Atrial fibrillation	25 (2.3)
Wound infection	21 (2.0)
Reoperation	14 (1.3)
Pneumonia	13 (1.2)
Pulmonary embolism	4 (0.4)
Bronchopleural fistula	2 (0.2)
Other major morbidity	13 (1.2)

Excludes missing data (4.7%)

8.3 Primary lung cancer outcomes

8.3.1 Final histopathology

In patients with a preoperative suspicion of primary lung malignancy, adenocarcinoma (69%) was the most common lung cancer according to final histopathology, followed by squamous cell carcinoma (16%).

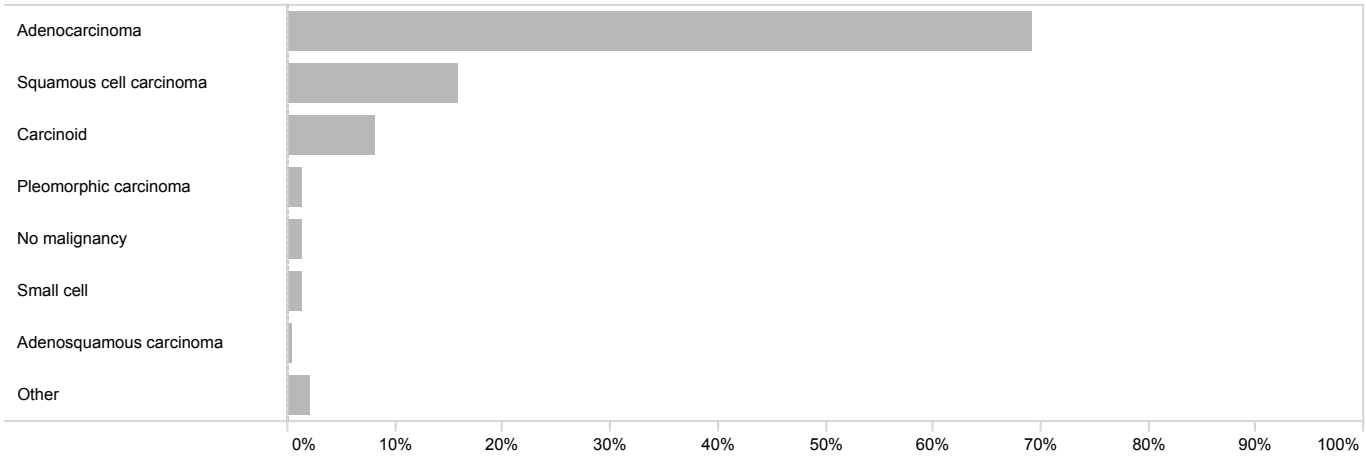


Figure 15: Proportion of primary lung cancer cases by final histopathology

Table 28: Final histopathology results for primary lung malignancy

Histopathology	n (%)
Adenocarcinoma	196 (69.0)
Squamous cell carcinoma	45 (15.8)
Carcinoid	23 (8.1)
Pleomorphic carcinoma	4 (1.4)
Small cell	4 (1.4)
Adenosquamous carcinoma	2 (0.7)
No malignancy	4 (1.4)
Other	6 (2.1)
All	**284 (100.0)**

Excludes missing data (4.9%)

8.3.2 Stage classification

The tumour-node-metastasis (TNM)[44] staging classification system has been used to categorise lung cancer cases into stages of severity. Primary lung malignancy patients are clinically staged in the preoperative period as well as pathologically staged postoperatively. Assessing cancer staging plays an important role in guiding treatment options for patients. It is important to note that these cases below are the cohort of primary lung cancer patients who proceeded to surgical intervention.

Tumours graded Ia2 (22%) and Ib (22%) were the most common postoperative pathological TNM classification for primary lung malignancy, followed by Ia3 (19%). Preoperatively diagnosed stage four cancers (1.3%) are the least likely malignancy to proceed to surgery when compared with other cancer stages.

Table 29: Primary lung malignancy by preoperative clinical classification

Clinical classification	n (%)
Ia1	12 (5.3)
Ia2	61 (26.9)
Ia3	46 (20.3)
Ib	49 (21.6)
IIa	12 (5.3)
IIb	24 (10.6)
IIIa	18 (7.9)
IIIb	2 (0.9)
IVa	2 (0.9)
IVb	1 (0.4)
All	**227 (100.0)**

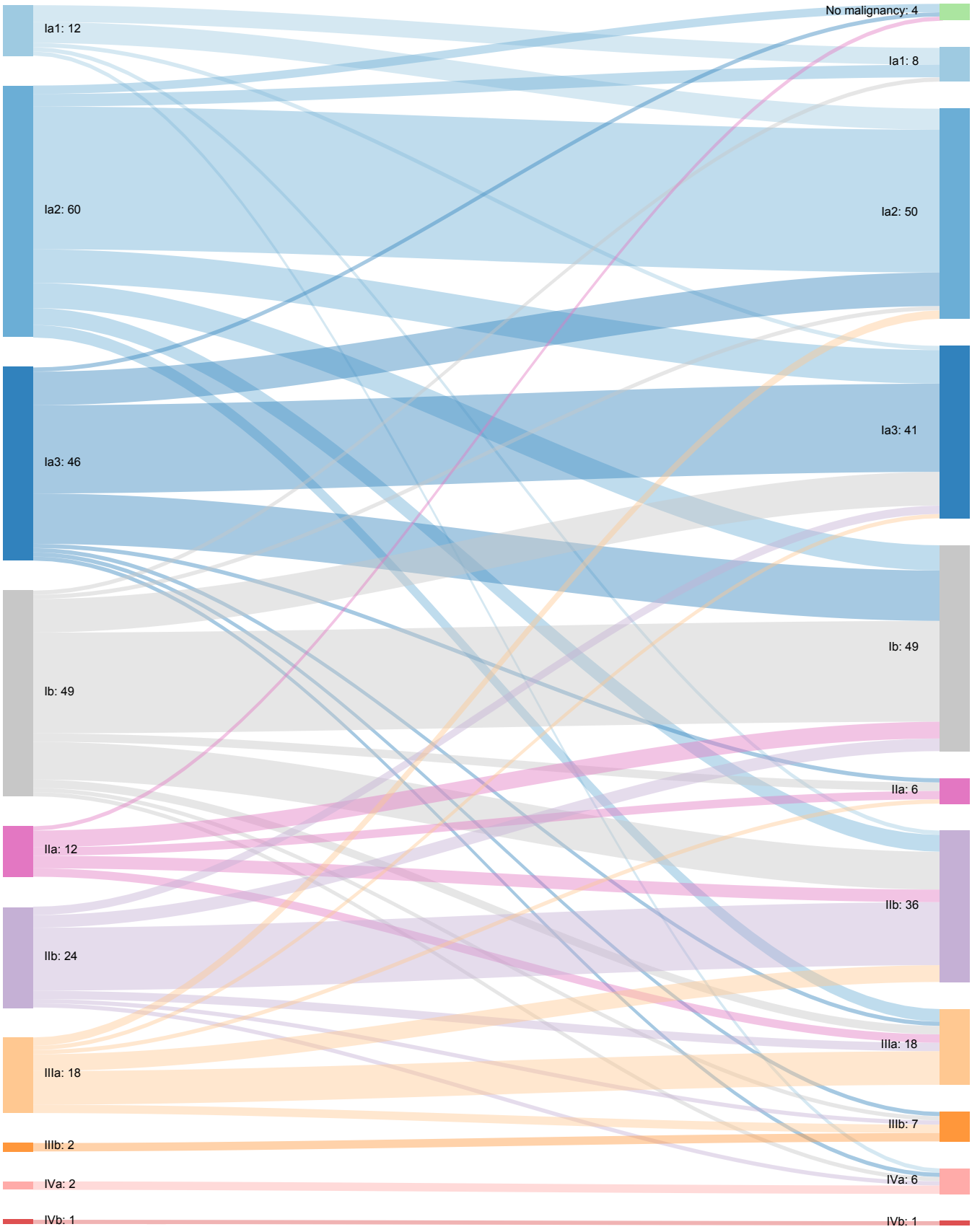
Excludes missing data (20.1%)

Table 30: Primary lung malignancy by postoperative pathological classification

Pathological classification	n (%)
Ia1	8 (3.5)
Ia2	50 (22.0)
Ia3	42 (18.5)
Ib	49 (21.6)
IIa	6 (2.6)
IIb	36 (15.9)
IIIa	18 (7.9)
IIIb	7 (3.1)
IVa	6 (2.6)
IVb	1 (0.4)
No malignancy	4 (1.8)
All	**227 (100.0)**

Excludes missing data (20.1%)

Of the 227 primary lung cancer procedures with complete data, pathological upstaging occurred in 32% of cases while 19% were downstaged postoperatively and 50% had no change to the preoperative staging classification.



Excludes missing data (20.1%)

Figure 16: Primary lung cancer cases by clinical and pathological TNM classification

8.4 Unadjusted all-cause mortality

The unadjusted all-cause mortality rate within 30 days of all thoracic surgery was 1.2%, increasing to 2.4% at 90 days. Mortality rates at 90 days for malignancy related surgeries are higher than the overall group, though caution should be used when interpreting these results due to small patient volumes in this cohort.

Survival following thoracic surgery is influenced by many factors which are not always directly related to the operation itself. Outcomes of thoracic surgery for cancer can be affected by how advanced the malignancy is. Within this cohort, approximately 3% of lung cancers are postoperatively classified as stage IV, which is associated with an inherently high short-term mortality rate.

Table 31: All-cause unadjusted mortality up to 90 days post surgery

Indication	Total cases n	Death in 30 days n (%)	Death in 90 days n (%)
Primary lung cancer	284	3 (1.1)	5 (1.8)
Other cancer	297	5 (1.7)	13 (4.4)
Pleural disease	303	4 (1.3)	5 (1.7)
Other	183	1 (0.5)	3 (1.6)
All	**1,067**	**13 (1.2)**	**26 (2.4)**

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Thoracic Surgery Audit

43 Queensland Government. *Queensland Lung Cancer Quality Index, Indicators of safe, quality cancer care, Lung cancer care in public and private hospitals, 2011-2016*. Queensland Health, Brisbane, 2020.

44 Detterbeck, F. C., Boffa, D. J., Kim, A. W., & Tanoue L. T. (2017). The eighth edition lung Cancer stage classification. *Chest. 151*(1), 193–203. https://doi.org/10.1016/j.jtcvs.2017.08.138

Glossary

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

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

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