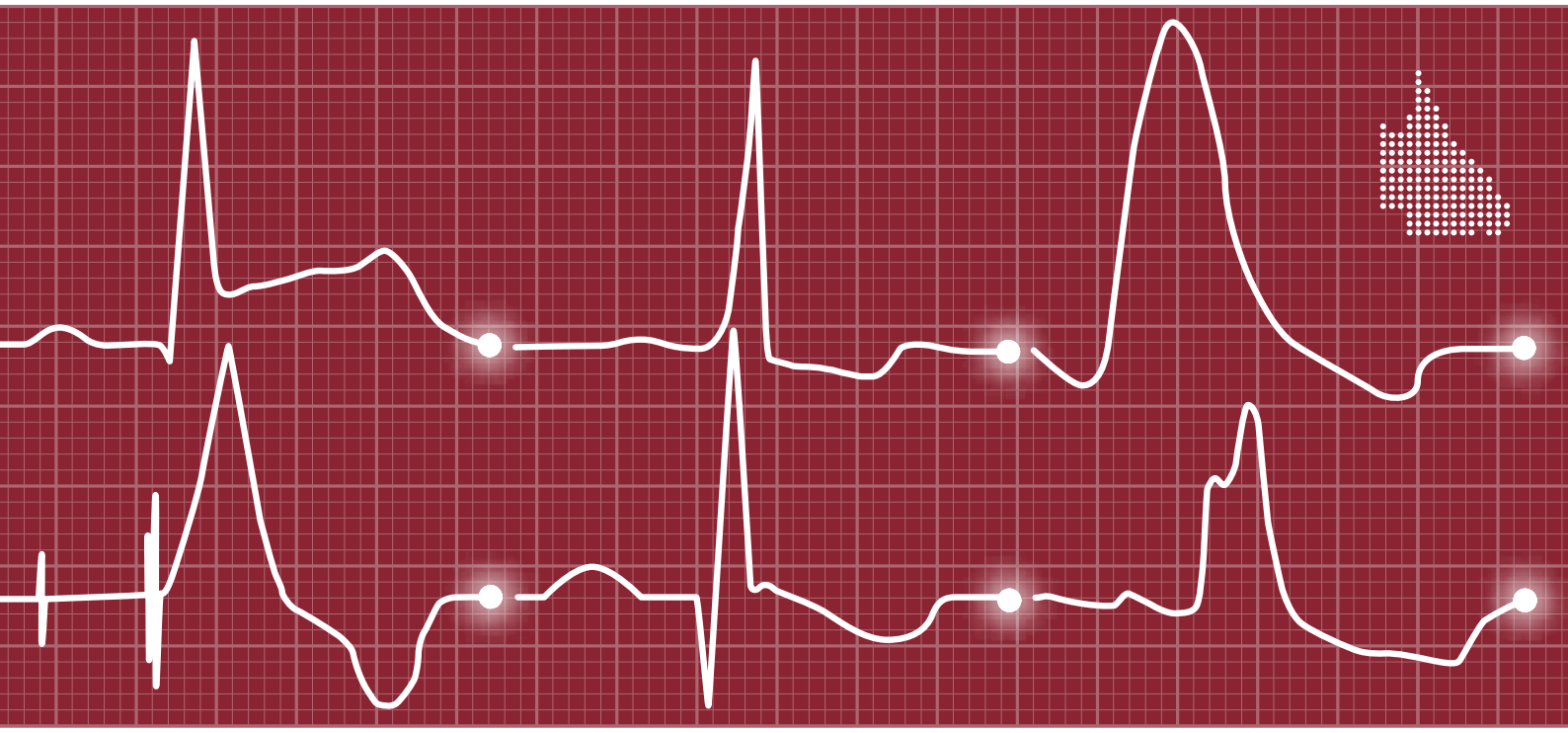
Queensland Cardiac Clinical Network

Queensland Cardiac Outcomes Registry

2022 Annual Report

Thoracic Surgery Audit



Queensland Cardiac Outcomes Registry 2022 Annual Report

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For more information contact:
Queensland Cardiac Clinical Network,
Department of Health, GPO Box 48,
Brisbane QLD 4001,
email scciu@health.qld.gov.au

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1 Message from the Queensland Cardiac Clinical Network Chair

It is with great pleasure that we present the Annual Report of the Queensland Cardiac Outcomes Registry. This report serves as a testament to the relentless pursuit of excellence in cardiovascular care within the Queensland region. The data, analyses, and insights presented here reflect the collective efforts of our passionate team, whose commitment to improving patient outcomes remains unwavering.

QCOR remains one of the most comprehensive clinician-led clinical registries in the country, incorporating modules reporting on interventional cardiology, cardiac surgery, thoracic surgery, electrophysiology and pacing, cardiac rehabilitation and heart failure support services. Through rigorous data collection, innovative research endeavours, and collaborative efforts, we have made significant strides in enhancing patient outcomes, advancing medical knowledge, and fostering a healthier future for our community.

We continue to keenly await the delivery of a contemporary statewide cardiovascular information system for diagnostic and interventional cardiology and echocardiography. Following a successful procurement process, the platform for a forward-thinking, all-encompassing solution has been laid and throughout the process to date, the collegiality and cooperation of cardiac clinicians throughout the state has once again been exemplified.

In the era of expanding datasets and advanced analytics, our commitment will be to translating the knowledge gained from this program into information supporting patient safety and quality initiatives. We are looking forward to expanded capability for data collection and analysis to become part of real-time care delivery, recognising always the patient as the focus of our efforts. We trust that this report will serve as a valuable for knowledge exchange, and ultimately, better cardiovascular outcomes for our community.

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 Statewide Cardiac Clinical Network. This would not be possible without the tireless work of clinicians in contributing quality data and providing quality patient care, while the contributions of QCOR committee members and others who had provided writing or other assistance with this year's Annual Report is also gratefully acknowledged.

QCOR Interventional Cardiology Committee

- Dr Sugeet Baveja, Townsville University 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 Rishendran Naidoo, Metro North Hospital and Health Service
- Dr Anil Prabhu, The Prince Charles Hospital
- Dr Andrie Stroebel, Gold Coast University Hospital
- Dr Christopher Cole, Princess Alexandra Hospital (Chair)

QCOR Electrophysiology and Pacing Committee

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- A/Prof John Hill, Princess Alexandra Hospital
- Dr Paul Martin, Royal Brisbane & Women's Hospital
- Dr Caleb Mengel, Toowoomba Hospital
- Dr Sachin Nayyar, Townsville University Hospital
- Dr Kevin Ng, Cairns Hospital
- Dr Robert Park, Gold Coast University Hospital
- Dr Russell Denman, The Prince Charles Hospital (Chair)

QCOR Cardiac Rehabilitation Committee

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

QCOR Heart Failure Support Services Committee

- Ms Melanie Burgess, Ipswich Hospital
- Dr Wandy Chan, The Prince Charles Hospital
- Ms Deepali Gupta, Queen Elizabeth II Hospital
- Ms Annabel Hickey, Statewide Heart Failure Services Coordinator
- Dr Rita Hwang, PhD, Princess Alexandra Hospital
- Ms Sophie Lloyd, Royal Brisbane & Women's Hospital
- Ms Menaka Louis, Gold Coast Hospital and Health Service
- Ms Kellie Mikkelsen, Redcliffe Hospital
- Ms Melissa Moore, Townsville University Hospital
- Ms Rachelle Mulligan, Princess Alexandra Hospital
- Ms Louvaine Wilson, Toowoomba Hospital
- Prof John Atherton, Royal Brisbane & Women's Hospital (Chair)

Statewide Cardiac Clinical Informatics Unit

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

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 5 of the *Hospital and Health Boards Regulation 2023* 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.

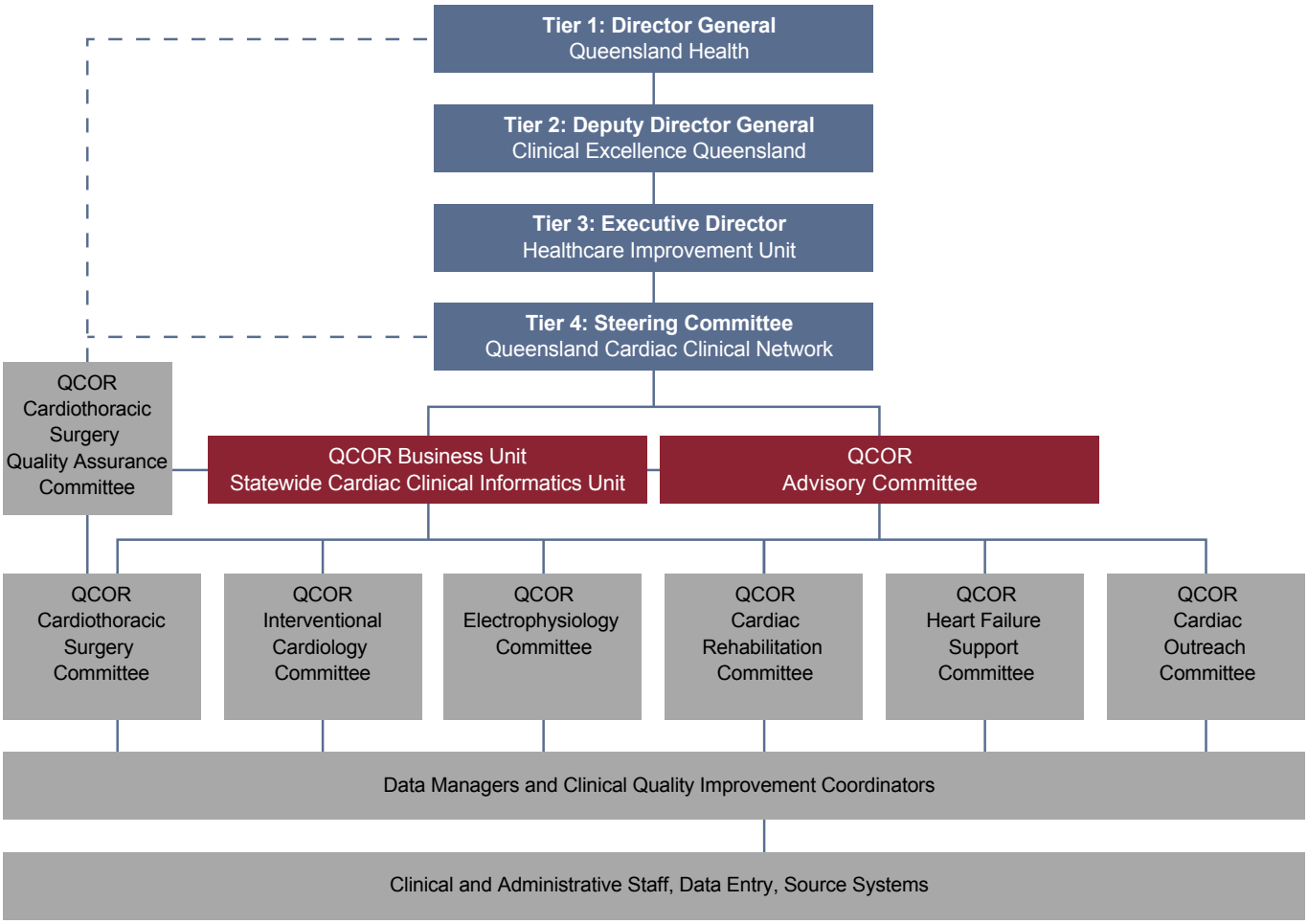


Figure 1: Governance structure

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 subsequent frameworks 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.

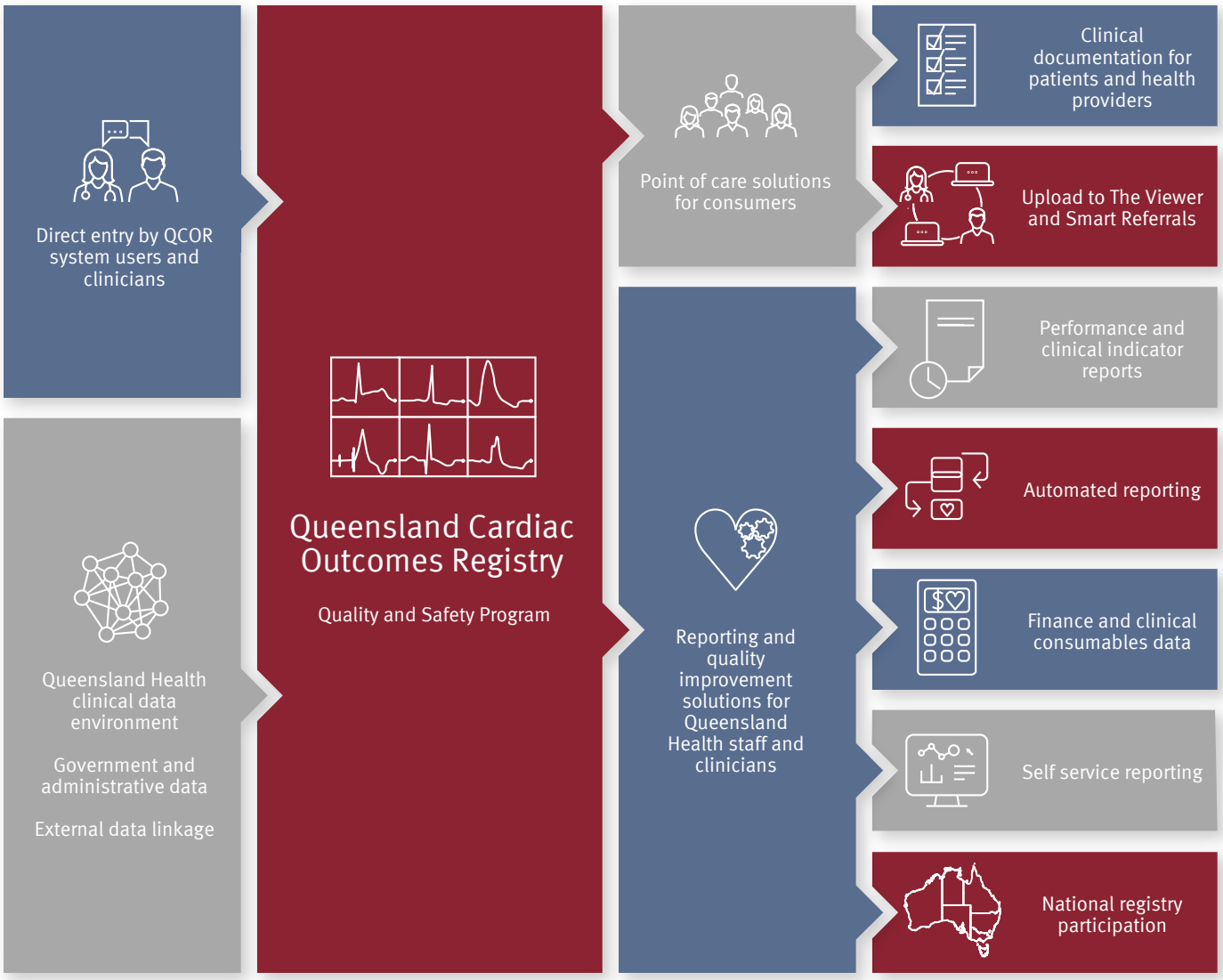
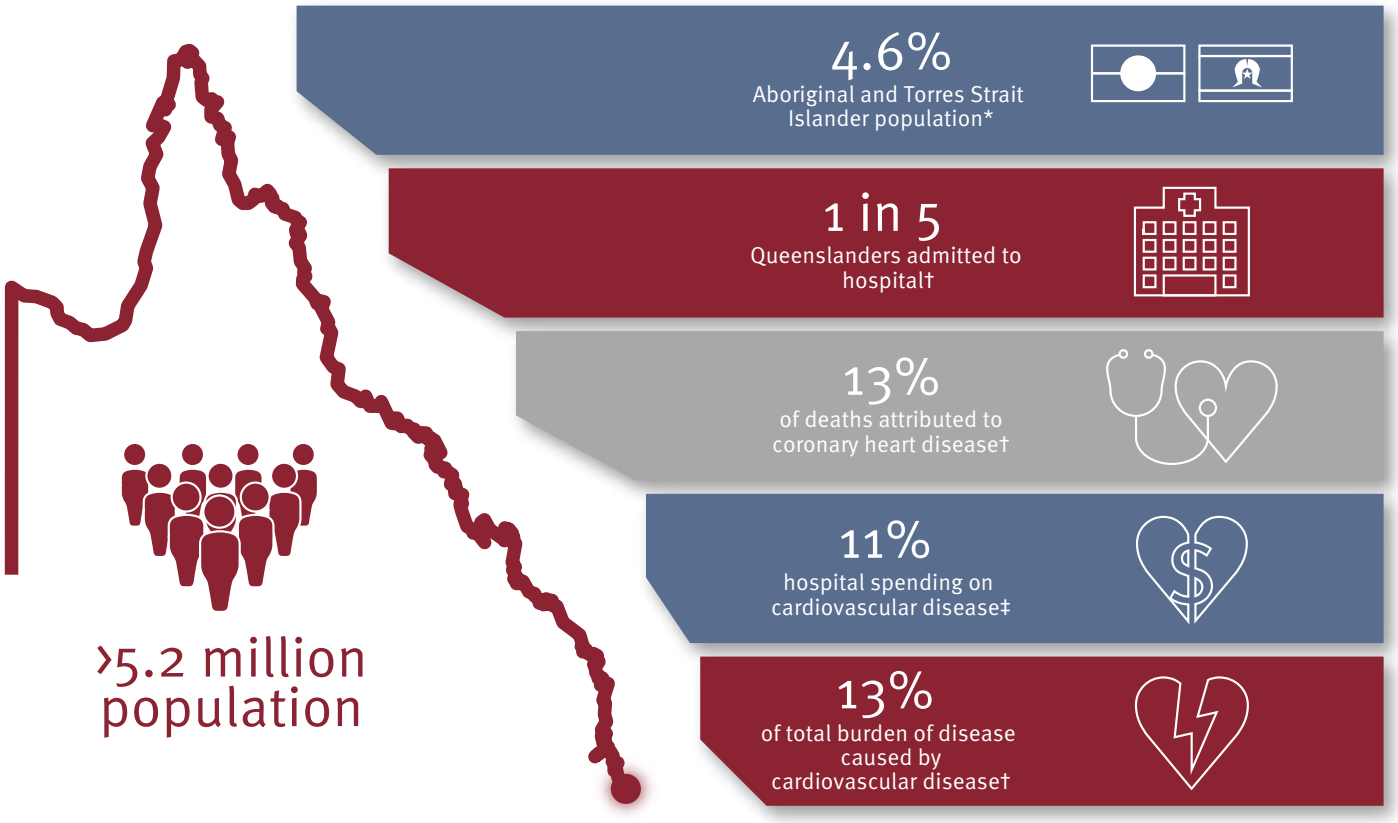


Figure 2: QCOR data flow

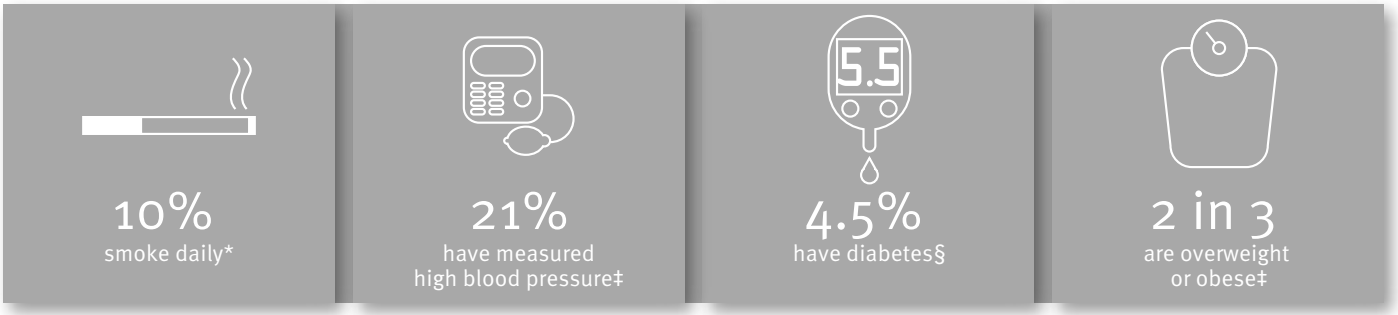
* The Australian Commission on Safety and Quality in Health Care (ACSQHC). Framework for Australian clinical quality registries. Sydney: ACSQHC; 2014

Queensland Cardiac Outcomes Registry

The Health of Queenslanders



Comorbidities



Mortality

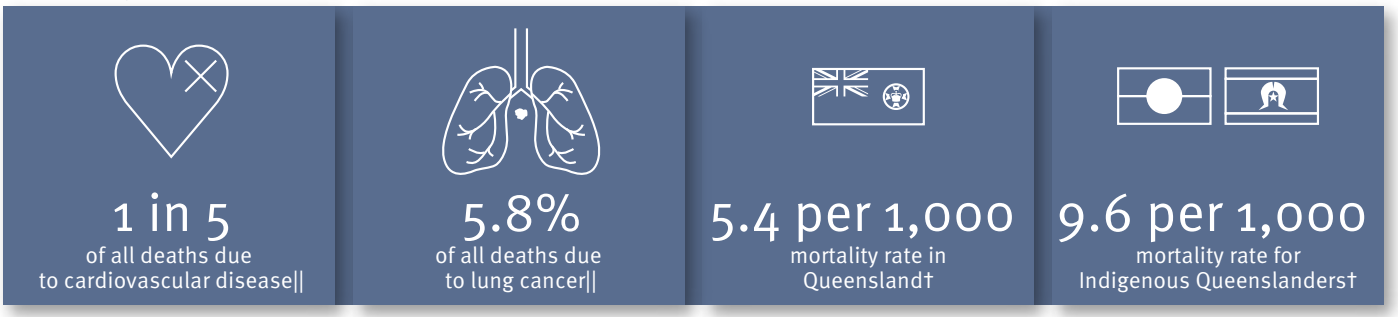


Figure 3: QCOR 2022 infographic

* 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

2022 Activity at a Glance

What's New?

- Cardiac Surgery health equity spotlight
- Cardiac Rehabiliation expanded outcomes audit
- Heart Failure Support Services SGLT2 inhibitor indicator
- Interventional Cardiology adjunct devices review

Interventional Cardiology

4,818
percutaneous coronary interventions

617
structural heart disease interventions

335
transcatheter aortic valve replacements

14,769
total coronary procedures

Cardiothoracic Surgery

2,230
adult cardiac surgeries

918
adult thoracic surgeries

Electrophysiology & Pacing

5,305
electrophysiology and pacing procedures

3,611
cardiac implantable electronic device procedures

Heart Failure Support Services

6,438
heart failure support services referrals

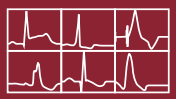
Cardiac Rehabilitation

9,317
cardiac rehabilitation referrals

Paediatric Cardiac Surgery

292
paediatric cardiac surgeries

Clinical Indicator Progress



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

0.2%
procedural tamponade rate for cardiac device and electrophysiology procedures

92%
of patients referred to a heart failure support service on an ACEI, ARB or ARNI at discharge

92%
of cardiac rehabilitation referrals within 3 days of discharge

1.5%
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 Service

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 & 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 & 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

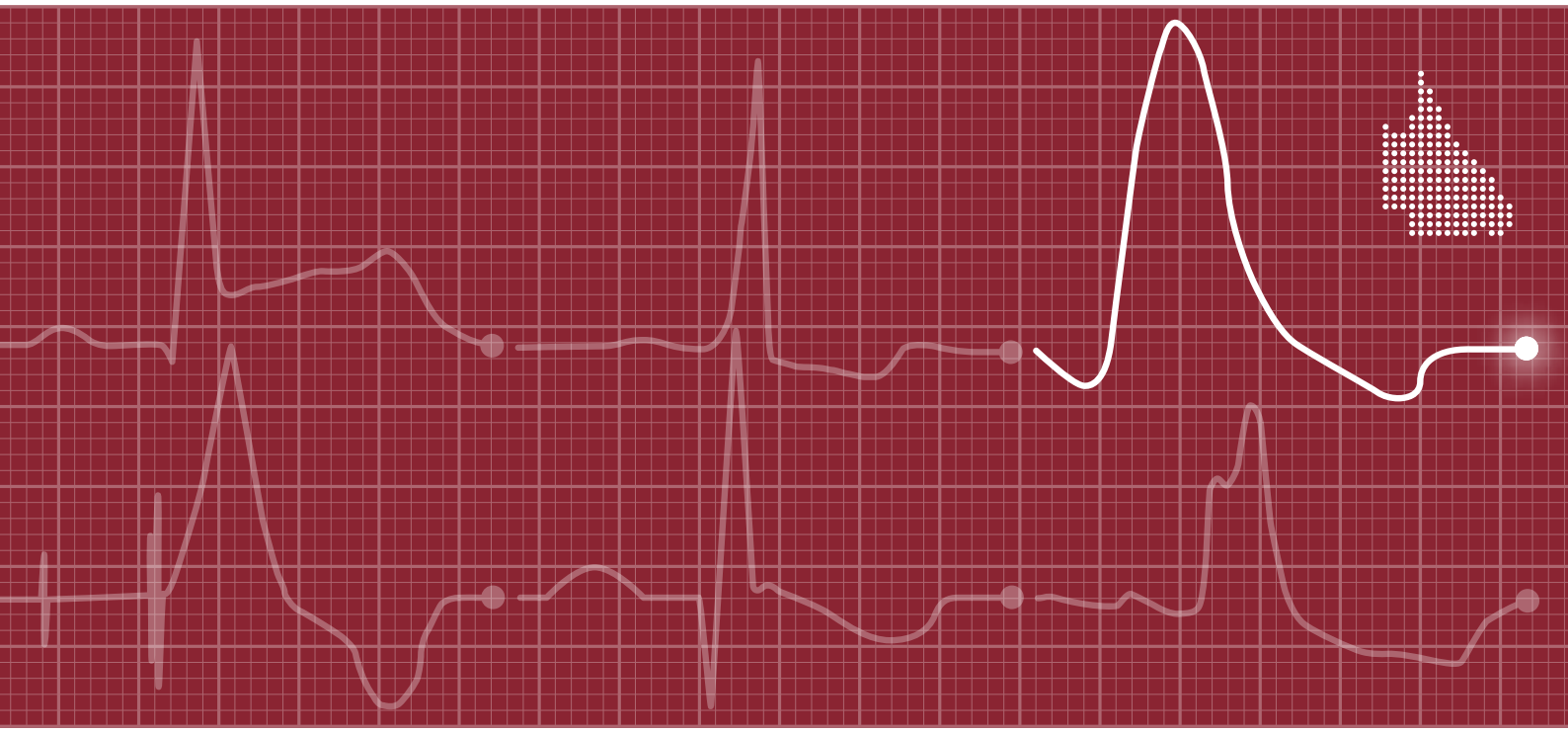
4.4 Princess Alexandra Hospital

- 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 Service

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

In 2022, the number of patients undergoing thoracic surgery also declined, as in cardiac surgery, but not to the same degree. This may be a year-on-year variation but may reflect the different nature of thoracic surgery.* Surgery is generally for cancer resections that involve time-dependent procedures or for urgent inpatient conditions such as infections and effusions. A smaller proportion of cases can be delayed for long periods such as in cardiac surgery. The cases that can be delayed on the waiting list in thoracic surgery can be delayed for much longer, but overall, are a smaller percentage of the overall conditions treated than in cardiac surgery.

In addition, thoracic surgery is less resource-demanding on hospitals, in that cardiac surgery requires intensive care to manage patients, whereas thoracic surgery, like a lot of general surgery, does not routinely involve intensive care. Many units perform both cardiac and thoracic surgery, and so when there is reduced intensive care access for cardiac cases, the same teams often then utilise theatre space for thoracic surgery, given that patients do not often require admission to intensive care after surgery.

Within the Quality Assurance Committee, we have seen the development by Dr Ian Smith, of statistical analysis for performance in thoracic surgery. This is an important step as this is completely novel in the world of thoracic surgery.

The river plot demonstrating the changes in staging from pre to postoperative is a fascinating area. Small changes based on pathological measurement compared to radiological measurement of the size of tumours is a minor change, but significant upstaging, by detection of involved mediastinal nodes is a significant change, as are operations on more advanced stages that are found to be less advanced than predicted. This is interesting as the role of neo-adjuvant immunotherapy is expanded and surgery for IIIA disease is further encouraged.

The mortality rate across the state is exceptionally low. The data has been used to demonstrate the safety in our older patients†, as well as the marked difference, particularly in the low numbers of Aboriginal and Torres Strait Islander patients who have surgery for lung cancer.

Dr Christopher Cole
Chair
QCOR Cardiothoracic Surgery Committee

* Kirk, F., Crathern, K., Chang, S., Yong, M. S., He, C., Hughes, I., Yadav, S., Lo, W., Cole, C., Windsor, M., Naidoo, R., & Stroebel, A. (2023). The influence of the COVID-19 pandemic on lung cancer surgery in Queensland. *ANZ Journal of Surgery, 93*(6), 1536–1542. https://doi.org/10.1111/ans.18465

† Kirk, F., Chang, S., Yong, M. S., He, C., Hughes, I., Yadav, S., Lo, W., Cole, C., Windsor, M., Naidoo, R., & Stroebel, A. (2023). Thoracic Surgery and the Elderly; Is Lobectomy Safe in Octogenarians? *Heart, Lung and Circulation, 32*(6), 755–762. https://doi.org/10.1016/j.hlc.2023.03.005

2 Key findings

Key findings include:

- There were 918 thoracic surgical cases entered for 2022 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.
- Nearly one third of patients (31%) 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 (64%) including 5% classed as morbidly obese.
- The proportion of Aboriginal and Torres Strait Islander patients undergoing thoracic surgery was 5.0% of the total cohort.
- Operations performed for preoperative diagnoses of primary lung cancer were undertaken in 28% of all cases, while pleural disease accounted for 28% of all surgeries. A diagnosis of other thoracic cancer was reported in 30% of surgeries while other thoracic surgery was performed in 17% of the cohort.
- Approximately two thirds of patients had some smoking history, including 24% who were current smokers at the time of surgery.
- Elective procedures accounted for 69% of the total surgeries performed, while 11% of cases were emergency operations. Of elective cases, 43% were performed on a day of surgery admission pathway.
- Lobectomy (81%) and lymph node sampling (80%) 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 103 cases having one or more new major morbidities recorded post procedure. Reoperation occurred in nearly one third (33%) of patients with a recorded major morbidity.
- Pathological upstaging occurred in 37% of primary lung cancer cases while 16% were downstaged postoperatively and 46% had no change to the preoperative staging classification.
- Unadjusted all-cause mortality at 30 days was 1.0%, increasing to 2.6% at 90 days. The other thoracic surgery group had the highest unadjusted mortality rates at 30 days and 90 days at 3.0% and 4.5% 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

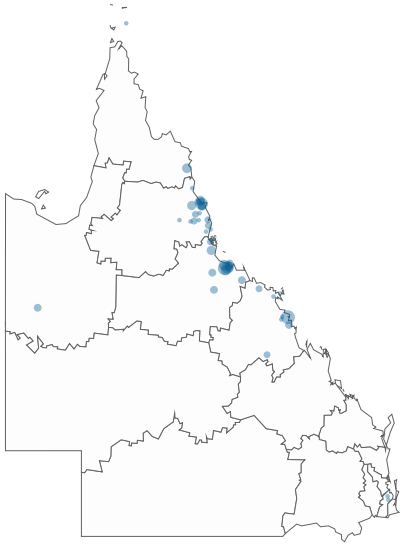


Figure 2: Townsville University Hospital

Figure 3: The Prince Charles Hospital

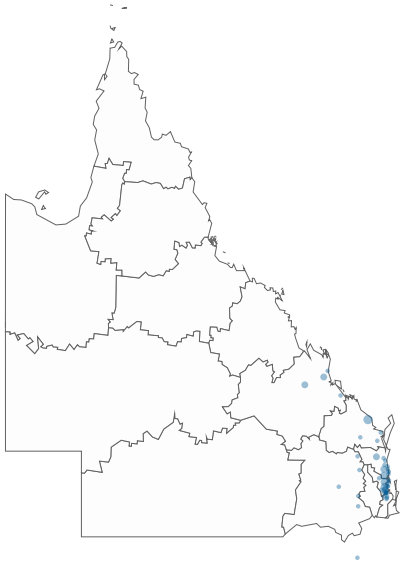


Figure 4: Royal Brisbane & Women's Hospital

Figure 5: Princess Alexandra Hospital

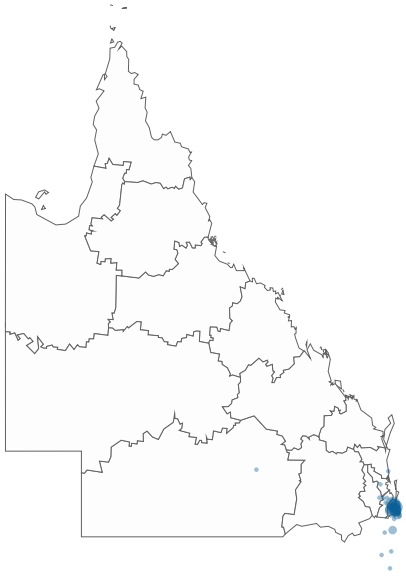


Figure 6: Gold Coast University Hospital

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 918 cases performed across the five public thoracic surgery units in Queensland, over half of patients (58%) presented with an indication including some form of cancer. Diagnosis of primary lung cancer accounted for 28% and 30% had another cancer diagnosis.

Non cancer diagnoses accounted for 43% of the overall cases, including pleural disease (28%) or other non cancer indication (15%).

Table 2: Cases by site and indication category

SITE	Total n	Primary lung cancer n (%)	Other cancer* n (%)	Pleural disease† n (%)	Other‡ n (%)
TUH	163	42 (25.8)	64 (39.3)	41 (25.2)	16 (9.8)
TPCH	287	96 (33.4)	92 (32.1)	72 (25.1)	27 (9.4)
RBWH	63	29 (46.0)	20 (31.7)	9 (14.3)	5 (7.9)
PAH	236	52 (22.0)	47 (19.9)	85 (36.0)	52 (22.0)
GCUH	169	36 (21.3)	50 (29.6)	49 (29.0)	34 (20.1)
STATEWIDE	**918**	**255 (27.8)**	**273 (29.7)**	**256 (27.9)**	**134 (14.6)**

* 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

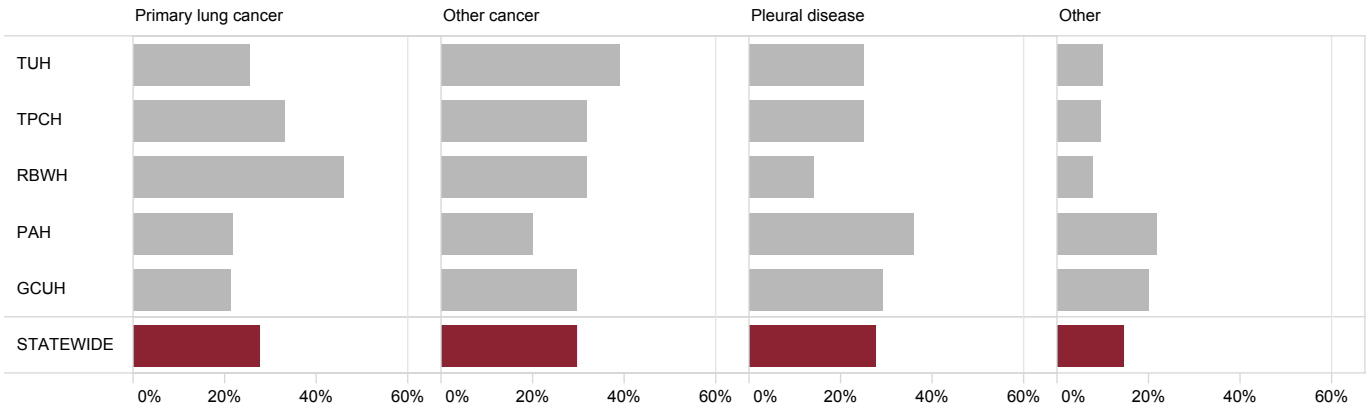


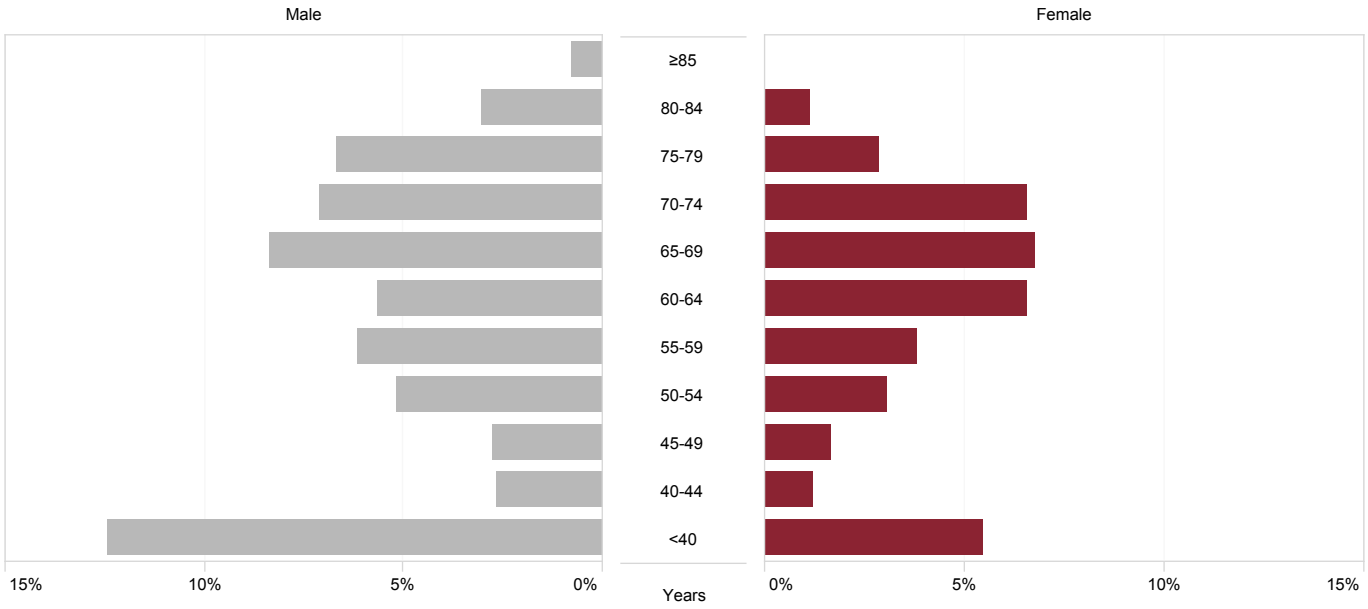
Figure 7: Proportion of cases by site and indication category

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, over three quarters of patients with pleural disease were male (76%).



% of total (n=918)

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

Table 3: Median age by gender and indication category

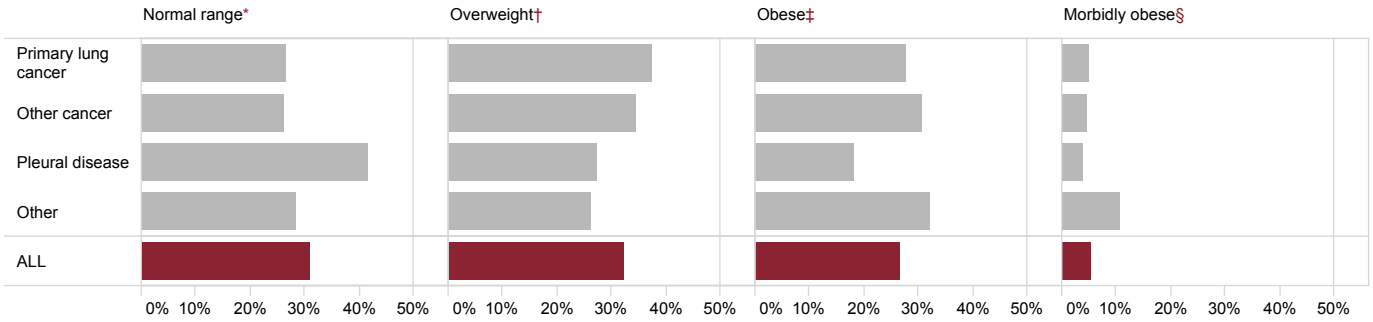
Indication	Male years	Female years	ALL years
Primary lung cancer	69	66	68
Other cancer	66	64	65
Pleural disease	51	44	48
Other	59	58	59
ALL	**61**	**64**	**63**

Table 4: Proportion of cases by gender and indication category

Indication	Male n (%)	Female n (%)
Primary lung cancer	124 (48.4)	131 (51.4)
Other cancer	150 (55.1)	123 (45.1)
Pleural disease	194 (75.8)	62 (24.2)
Other	94 (70.1)	40 (29.9)
ALL	**562 (61.2)**	**356 (38.8)**

5.2 Body mass index

Nearly two thirds of thoracic surgery patients (64%) were classed as overweight or obese, while 31% of patients had a body mass index (BMI) classed within the normal range. More than 5% of patients were classed as underweight.



Underweight category (BMI <18.5 kg/m²) is not displayed (7.2%)

Excludes missing data (10.0%)

* BMI 18.5–24.9 kg/m²

† BMI 25.0–29.9 kg/m²

‡ BMI 30.0–39.9 kg/m²

§ BMI ≥40.0 kg/m²

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 (3.5)	67 (26.4)	95 (37.5)	70 (27.6)	12 (4.7)
Other cancer	12 (4.4)	71 (26.3)	93 (34.3)	83 (30.7)	12 (4.4)
Pleural disease	23 (9.3)	103 (41.7)	67 (27.1)	45 (18.2)	9 (3.6)
Other	4 (3.1)	37 (28.2)	34 (26.0)	42 (32.1)	14 (10.7)
ALL	**48 (5.3)**	**278 (30.8)**	**289 (32.0)**	**240 (26.6)**	**47 (5.2)**

Excludes missing data (1.7%)

5.3 Aboriginal and Torres Strait Islander status

The overall proportion of identified Aboriginal and Torres Strait Islanders undergoing thoracic surgery was 5.0%.

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

Indication	Indigenous n (%)	Non-Indigenous n (%)
Primary lung cancer	14 (5.5)	241 (94.5)
Other cancer	10 (3.7)	263 (96.3)
Pleural disease	18 (7.1)	237 (92.9)
Other	4 (3.0)	130 (97.0)
ALL	**46 (5.0)**	**871 (95.0)**

Excludes missing data (0.1%)

6 Risk factors and comorbidities

6.1 Smoking history

Almost one quarter of patients (24%) were current smokers (defined as smoking within 30 days prior to surgery), while 42% of patients had a smoking history recorded. Only 26% of patients were identified as having never smoked. In 7% of cases, smoking status was unknown.

There was considerable variation for patients in the primary lung cancer category, where the majority (81%) 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	70 (27.5)	138 (54.1)	42 (16.5)	4 (1.6)
Other cancer	40 (14.8)	134 (49.6)	85 (31.4)	12 (4.4)
Pleural disease	93 (36.9)	66 (26.2)	71 (28.2)	22 (8.7)
Other	18 (13.6)	45 (34.1)	42 (31.8)	27 (20.5)
ALL	**221 (24.3)**	**383 (42.1)**	**240 (26.4)**	**65 (7.2)**

Excludes missing data (1.0%)

6.2 Respiratory disease

The majority of patients (74%) did not have respiratory disease, while approximately one quarter (24%) 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	58 (24.0)	38 (15.7)	4 (1.7)
Other cancer	33 (12.6)	18 (6.9)	7 (2.7)
Pleural disease	16 (6.6)	28 (11.5)	3 (1.2)
Other	16 (12.9)	6 (4.8)	2 (1.6)
ALL	**123 (14.1)**	**90 (10.3)**	**16 (1.8)**

Excludes missing data (5.1%)

* 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 pCO_2 on room air ›50 mmHg

6.3 Diabetes

There were 13% of thoracic surgery patients recorded as having diabetes. The incidence of diabetes was varied across indication categories, ranging from 17% in the other thoracic indication category to 6% in the pleural disease cohort.

Table 9: Diabetes status by indication category

Indication	Diabetes n (%)	No diabetes n (%)
Primary lung cancer	38 (14.9)	216 (85.0)
Other cancer	40 (14.8)	231 (85.2)
Pleural disease	15 (6.0)	237 (94.0)
Other	22 (16.7)	110 (83.3)
ALL	**115 (12.7)**	**794 (87.3)**

Excludes missing data (1.0%)

6.4 Coronary artery disease

Overall, 13% of thoracic surgery patients were identified as having a preoperative history of coronary artery disease (CAD), while 13% 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	32 (12.7)	189 (75.3)	30 (11.9)
Other cancer	30 (11.5)	192 (73.3)	40 (15.3)
Pleural disease	25 (10.3)	181 (74.8)	36 (14.9)
Other	28 (21.4)	95 (72.5)	8 (6.1)
ALL	**115 (13.0)**	**657 (74.2)**	**114 (12.9)**

Excludes missing data (3.5%)

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	93 (38.6)	103 (42.7)	44 (18.3)	–
Other cancer	124 (47.5)	98 (37.5)	40 (15.3)	–
Pleural disease	164 (71.0)	49 (21.2)	13 (5.6)	5 (2.2)
Other	71 (58.7)	35 (28.9)	13 (10.7)	2 (1.7)
ALL	**452 (52.9)**	**285 (33.4)**	**110 (12.9)**	**7 (0.8)**

Excludes missing data (7.0%)

* eGFR ≥90 mL/min/1.73 m²

† eGFR 60–89 mL/min/1.73 m²

‡ eGFR 30–59 mL/min/1.73 m²

§ eGFR <30 mL/min/1.73 m²

6.6 Cerebrovascular disease

Approximately 4% 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 less than 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	9 (3.5)	2 (0.8)	243 (95.7)
Other cancer	15 (5.6)	1 (0.4)	255 (94.1)
Pleural disease	3 (1.2)	1 (0.4)	248 (98.4)
Other	5 (3.8)	2 (1.5)	125 (94.7)
ALL	**32 (3.5)**	**6 (0.7)**	**871 (95.8)**

Excludes missing data (1.0%)

* 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 (6.3)	238 (93.7)
Other cancer	15 (5.6)	256 (94.4)
Pleural disease	6 (2.4)	246 (97.6)
Other	4 (3.0)	128 (97.0)
ALL	**41 (4.5)**	**868 (95.5)**

Excludes missing data (1.0%)

6.8 Previous interventions

6.8.1 Previous thoracic surgery

There were 14% 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	20 (8.0)	229 (92.0)
Other cancer	33 (12.5)	233 (87.5)
Pleural disease	48 (19.1)	203 (80.9)
Other	21 (16.0)	110 (84.0)
ALL	**122 (13.6)**	**775 (86.4)**

Excludes missing (2.3%)

6.8.2 Previous pulmonary resection

Overall, 5% 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	10 (4.0)	240 (96.0)
Other cancer	15 (5.5)	256 (94.5)
Pleural disease	14 (5.6)	235 (94.4)
Other	4 (3.0)	128 (97.0)
ALL	**43 (4.8)**	**859 (95.2)**

Excludes missing data (1.7%)

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 11% of cases.

An indication of pleural disease was noted in 64% of all emergency cases and 63% of all urgent cases.

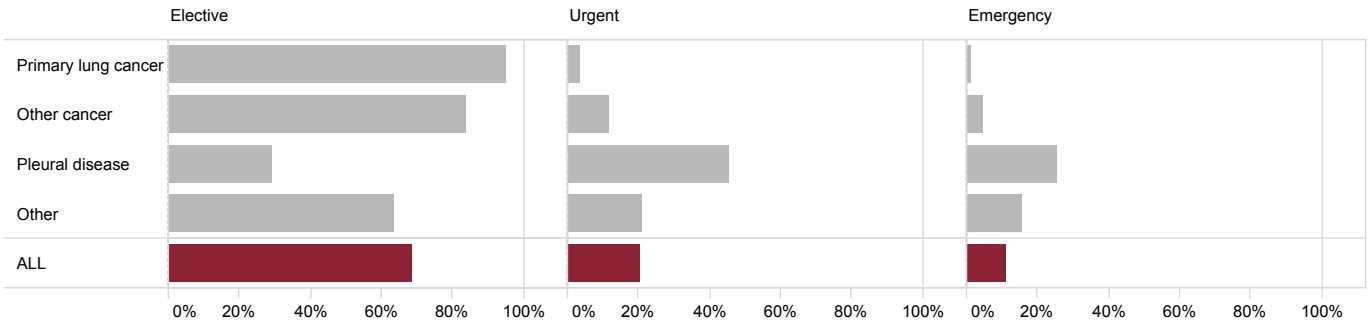


Figure 10: Admission status by indication category

Table 16: Admission status by indication category

Indication	ALL n	Elective n (%)	Urgent n (%)	Emergency n (%)
Primary lung cancer	255	243 (95.3)	9 (3.5)	3 (1.2)
Other cancer	273	229 (83.9)	32 (11.7)	12 (4.4)
Pleural disease	256	74 (28.9)	117 (45.7)	65 (25.4)
Other	134	85 (63.4)	28 (20.9)	21 (15.7)
ALL	**918**	**631 (68.7)**	**186 (20.3)**	**101 (11.0)**

7.1.1 Elective day of surgery admissions

Of the 631 elective cases, 43% were recorded as day of surgery admissions (DOSA).

Table 17: Day of surgery admissions by indication category

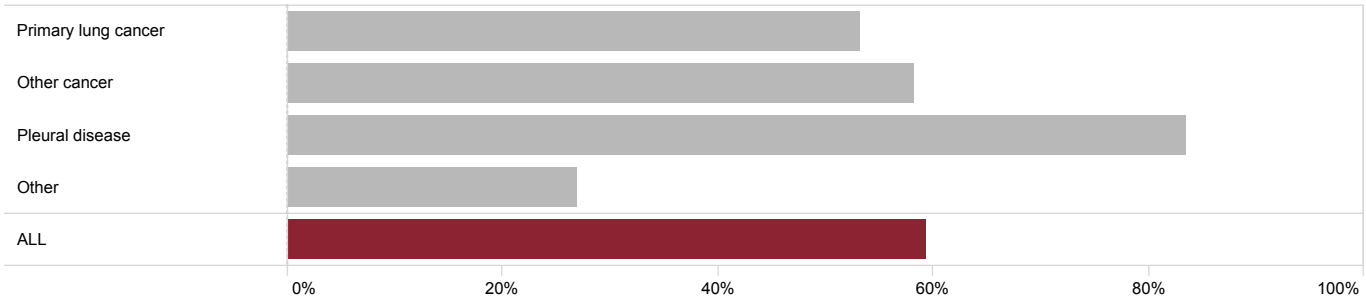
Indication	DOSA n (%)
Primary lung cancer	95 (39.1)
Other cancer	97 (42.4)
Pleural disease	30 (40.5)
Other	49 (57.6)
ALL	**271 (42.9)**

7.2 Surgical technique

7.2.1 Video-assisted thoracic surgery

Overall, 59% of cases utilised video-assisted thoracic surgery (VATS), including 83% of cases in the pleural disease category.

Of procedures undertaken through VATS, 38% utilised 3 ports for the operation.



Excludes missing data (0.2%)

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	35 (26.1)	50 (37.3)	46 (34.3)	3 (2.2)
Other cancer	42 (26.6)	48 (30.4)	62 (39.2)	6 (3.8)
Pleural disease	69 (32.4)	62 (29.1)	80 (37.6)	2 (0.9)
Other	5 (13.9)	11 (30.6)	16 (44.4)	4 (11.1)
ALL	**151 (27.9)**	**171 (31.6)**	**204 (37.7)**	**15 (2.8)**

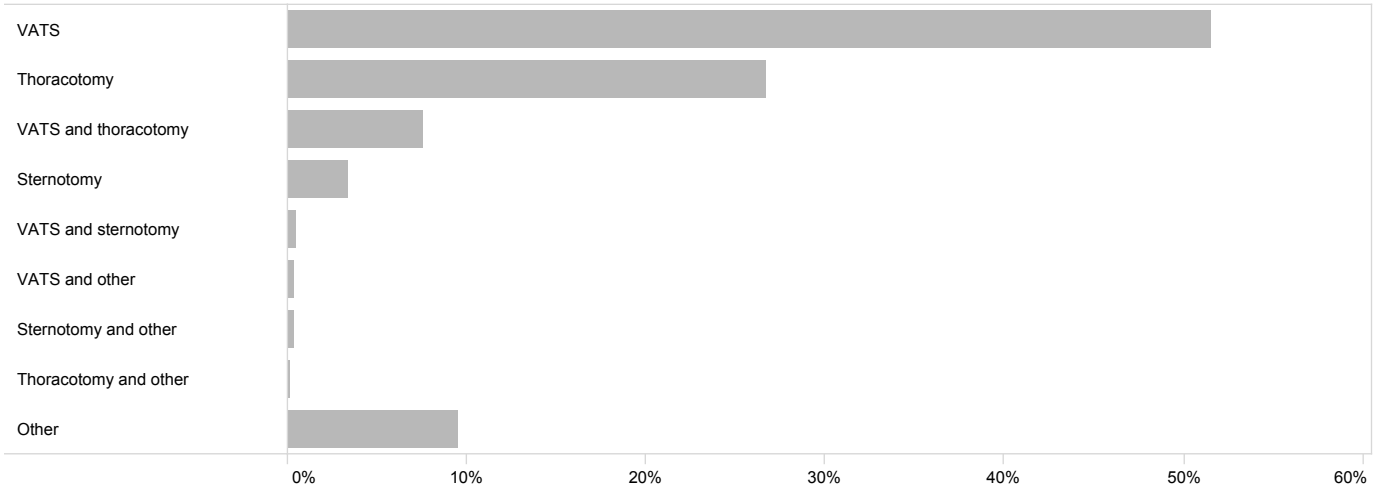
Excludes missing data (0.2%)

7.2.2 Incision type

Over half of all surgeries (52%) were solely video assisted, while 27% of the total surgeries were performed via thoracotomy.

Video-assisted thoracoscopy access was more likely for patients presenting with a cancer diagnosis, where the most common approaches were by VATS only (44%), thoracotomy only (36%), or VATS and thoracotomy (7%).

Use of sternotomy accounted for 4% of overall cases.



Excludes missing data (1.4%)

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	94 (37.2)	137 (51.1)	202 (79.5)	34 (26.2)	467 (51.6)
Thoracotomy	113 (44.7)	72 (26.9)	29 (11.4)	28 (21.5)	242 (26.7)
VATS and thoracotomy	40 (15.8)	18 (6.7)	10 (3.9)	–	68 (7.5)
Sternotomy	2 (0.8)	21 (7.8)	2 (0.8)	6 (4.6)	31 (3.4)
VATS and sternotomy	–	3 (1.1)	–	1 (0.8)	4 (0.4)
VATS and other	1 (0.4)	–	1 (0.4)	1 (0.8)	3 (0.3)
Sternotomy and other	–	1 (0.4)	1 (0.4)	1 (0.8)	3 (0.3)
Thoracotomy and other	–	–	1 (0.4)	–	1 (0.1)
Other	3 (1.2)	16 (6.0)	8 (3.1)	59 (45.4)	86 (9.5)
ALL	**253 (100.0)**	**268 (100.0)**	**254 (100.0)**	**130 (100.0)**	**905 (100.0)**

Excludes missing data (1.4%)

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 2.1 procedures per operation with a lobectomy being the most frequently performed procedure type (81%).

Lymph node sampling (33%) and lobectomy (28%) were the most common procedures performed in the other cancer cohort, while pleural disease was commonly treated with pleurodesis and pleural drainage (45% and 44% respectively).

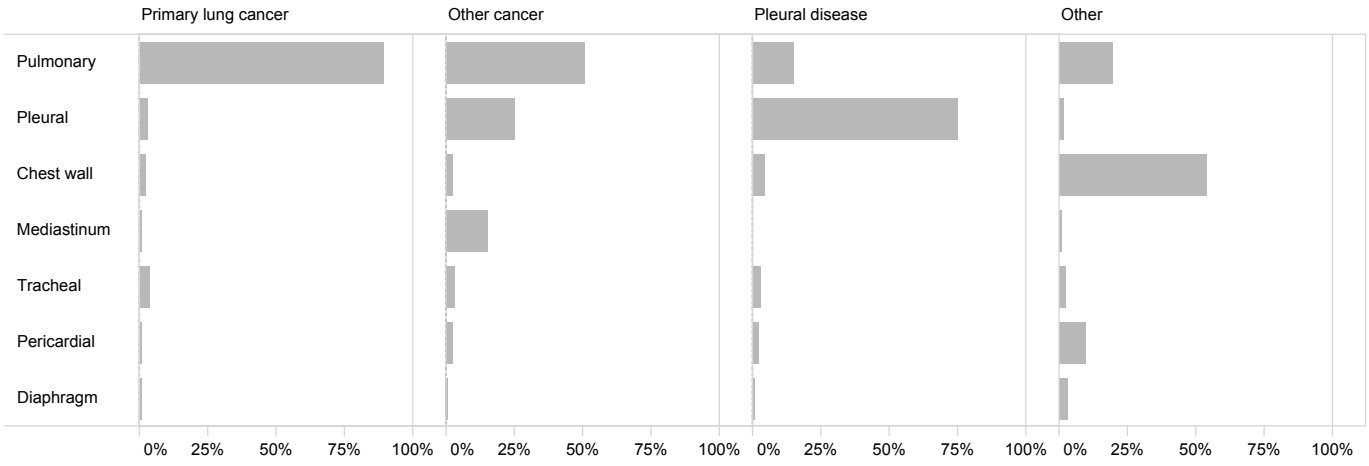


Figure 13: Proportion of procedure types by thoracic structure and indication category

Table 20: Surgical procedures for primary lung cancer

	n (%)
Lobectomy	206 (80.8)
Lymph node sampling	204 (80.0)
Wedge resection	28 (11.0)
Bronchoscopy	18 (7.1)
Lymph node dissection	18 (7.1)
Bilobectomy	6 (2.4)
Pleural drainage	6 (2.4)
Segmentectomy	6 (2.4)
Pleurodesis	5 (2.0)
Pleural biopsy	4 (1.6)
Pneumonectomy	4 (1.6)
Rib resection	4 (1.6)
Cardiopulmonary bypass	2 (0.8)
Muscle flap	2 (0.8)
Planned surgery abandon	2 (0.8)
Chest wall reconstruction	2 (0.8)
Open biopsy	1 (0.4)
Pericardial window	1 (0.4)
Diaphragmatic reconstruction	1 (0.4)
Other	10 (3.9)
Total	**255 (100.0)**

Table 21: Surgical procedures for other cancer

	n (%)
Lymph node sampling	90 (33.0)
Lobectomy	77 (28.2)
Wedge resection	67 (24.5)
Pleural biopsy	40 (14.7)
Pleural drainage	38 (13.9)
Pleurodesis	32 (11.7)
Resection mediastinal mass	26 (9.5)
Thymectomy	19 (7.0)
Segmentectomy	15 (5.5)
Bronchoscopy	13 (4.8)
Mediastinoscopy	17 (6.2)
Decortication	6 (2.2)
Pericardial window	6 (2.2)
Chest wall resection	4 (1.5)
Lung biopsy	3 (1.1)
Lymph node dissection	3 (1.1)
Air leak control	2 (0.7)
Pneumonectomy	2 (0.7)
Rib resection	2 (0.7)
Sympathectomy	2 (0.7)
Pericardial biopsy	2 (0.7)
Bullectomy	1 (0.4)
Cardiopulmonary bypass	1 (0.4)
Chest wall reconstruction	1 (0.4)
Clot evacuation	1 (0.4)
Endobronchial ablation	1 (0.4)
ORIF* ribs	1 (0.4)
Planned surgery abandon	1 (0.4)
Plication	1 (0.4)
Tracheal resection	1 (0.4)
Pericardiocentesis	1 (0.4)
Other	21 (7.7)
Total	**273 (100.0)**

* Open reduction internal fixation

Table 22: Surgical procedures for pleural disease

	n (%)
Pleurodesis	115 (44.9)
Pleural drainage	113 (44.1)
Decortication	85 (33.2)
Pleural biopsy	58 (22.7)
Wedge resection	47 (18.4)
Haematoma evacuation	26 (10.2)
Bullectomy	19 (7.4)
Bronchoscopy	14 (5.5)
Pleural washout	14 (5.5)
Air leak control	8 (3.1)
Pleural tent	5 (2.0)
Chyle leak control	3 (1.2)
Lobectomy	3 (1.2)
ORIF* ribs	3 (1.2)
Drainage of chest wall collection	3 (1.2)
Repair of bleeding artery	4 (1.6)
Pericardial effusion drainage	3 (1.2)
Removal of foreign body	3 (1.2)
Blebectomy	3 (1.2)
Pericardial window	3 (1.2)
Rib Resection	3 (1.2)
Bilobectomy	2 (0.8)
Sternal plating	2 (0.8)
Pericardial biopsy	2 (0.8)
Lung volume reduction	1 (0.4)
Muscle flap	1 (0.4)
Open biopsy	1 (0.4)
Other	15 (5.9)
Total	**256 (100.0)**

* Open reduction internal fixation

Table 23: Surgical procedures for all other surgeries

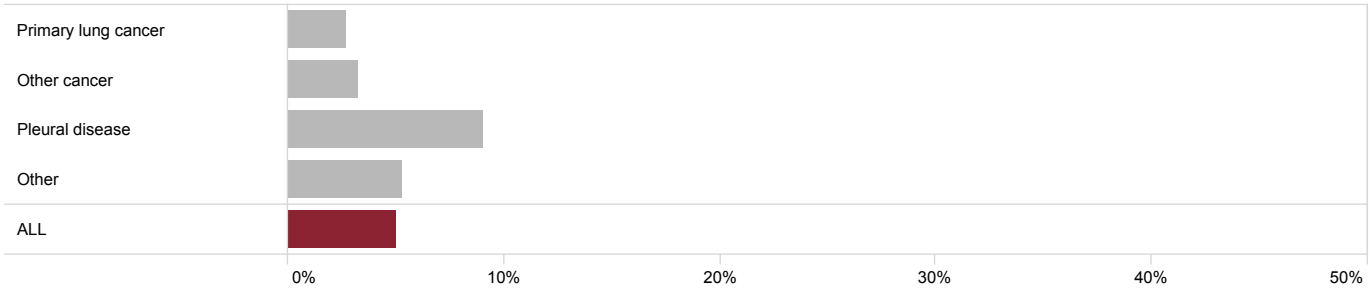
	n (%)
Sternal wiring/plating procedure	22 (16.4)
CIED# procedure	14 (10.4)
Washout procedure	11 (8.2)
Wedge resection	11 (8.2)
Chest wall resection/reconstruction	10 (7.5)
Lobectomy	10 (7.5)
ORIF* ribs	10 (7.5)
Rib resection	9 (6.7)
Pericardial window	9 (6.7)
Lymph node sampling	8 (6.0)
Nuss bar procedure	8 (6.0)
Chest wall closure (sternotomy/thoracotomy)	5 (3.7)
Chest wall debridement	4 (3.0)
Rib plating/fixation	4 (3.0)
Epicardial left atrial appendage exclusion	3 (2.2)
Diaphragmatic plication	3 (2.2)
Decortication	2 (1.5)
Bronchoscopy	2 (1.5)
Hernia repair	2 (1.5)
Open biopsy	2 (1.5)
Removal of foreign body	2 (1.5)
Air leak control	1 (0.7)
Bronchial repair	1 (0.7)
Cardiac denervation	1 (0.7)
Chest wall biopsy	1 (0.7)
Muscle flap	1 (0.7)
Pericardial cyst resection	1 (0.7)
Sternectomy	1 (0.7)
Tracheoesophageal fistula repair	1 (0.7)
Sympathectomy	1 (0.7)
Other	5 (3.7)
Total	**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 (0.3%)

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	1 (0.4)	6 (2.3)	–	248 (97.3)
Other cancer	2 (0.7)	5 (1.8)	2 (0.7)	264 (96.7)
Pleural disease	4 (1.6)	19 (7.5)	–	232 (90.9)
Other	4 (3.0)	3 (2.3)	–	125 (94.7)
ALL	**11 (1.2)**	**33 (3.6)**	**2 (0.2)**	**869 (95.0)**

Excludes missing data (0.3%)

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 seven 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.[47]

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	4–9
Other	4	2–10
ALL	**5**	**3–7**

8.2 Major morbidity

There were 103 cases (11%) having one or more new major morbidities recorded post procedure. The incidence rate of major morbidity ranged from 14% in the primary lung cancer group to 9% in the other cancer and other indication category.

Approximately 4% of all patients undergoing thoracic surgery required reoperation.

Table 26: New major morbidity by diagnosis category

Indication	Yes n (%)	No n (%)
Primary lung cancer	35 (13.7)	219 (85.9)
Other cancer	24 (8.8)	240 (87.9)
Pleural disease	32 (12.5)	216 (84.4)
Other	12 (9.0)	118 (88.1)
ALL	**103 (11.2)**	**793 (86.4)**

Excludes missing data (2.4%)

Table 27: Type of major morbidity

Major morbidity type	n (%)
Reoperation	34 (3.7)
Air leak >7days	23 (2.5)
Atrial fibrillation	22 (2.4)
Wound infection	17 (1.9)
Pneumonia	14 (1.5)
Pulmonary embolism	6 (0.7)
Lung torsion	1 (0.1)
Other major morbidity	32 (3.5)

Excludes missing data (2.4%)

8.3 Primary lung cancer outcomes

8.3.1 Final histopathology

In patients with a preoperative suspicion of primary lung malignancy, adenocarcinoma (68%) was the most common lung cancer according to final histopathology, followed by squamous cell carcinoma (18%).

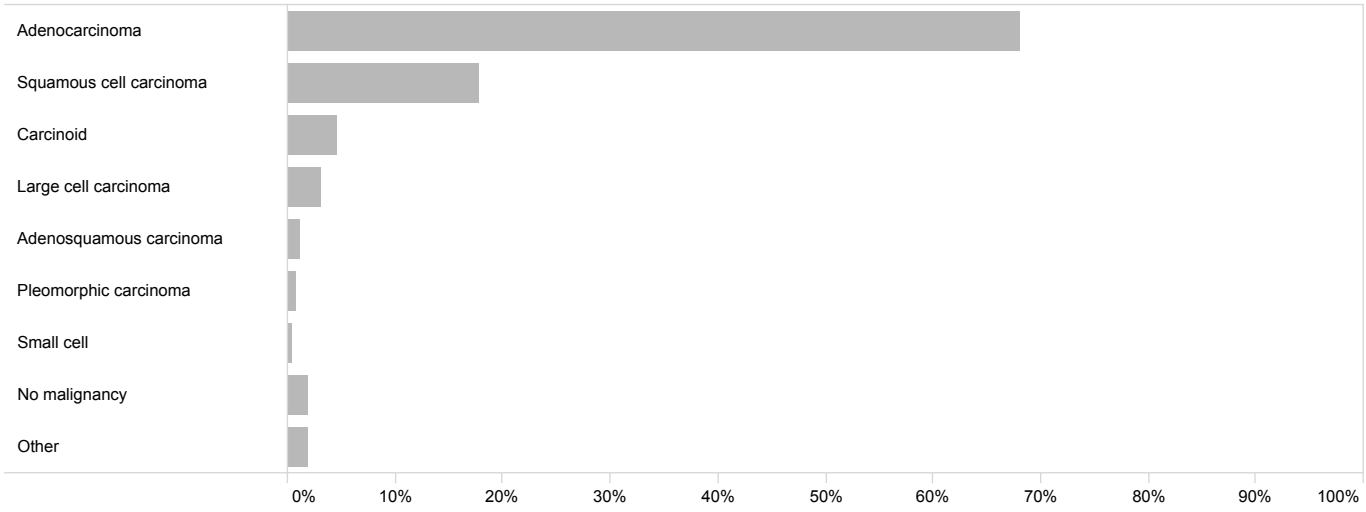


Figure 15: Proportion of primary lung cancer cases by final histopathology

Table 28: Final histopathology results for primary lung malignancy

Histopathology	n (%)
Adenocarcinoma	173 (68.1)
Squamous cell carcinoma	45 (17.7)
Carcinoid	12 (4.7)
Large cell carcinoma	8 (3.1)
Adenosquamous carcinoma	3 (1.2)
Pleomorphic carcinoma	2 (0.8)
Small cell	1 (0.4)
No malignancy	5 (2.0)
Other	5 (2.0)
ALL	**254 (100.0)**

NB: Excludes planned surgery abandoned case (n=1)

8.3.2 Stage classification

The tumour-node-metastasis (TNM)[48] 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 Ib (23%) were the most common postoperative pathological TNM classification for primary lung malignancy, followed by Ia2 (18%) and Ia3 (18%). Preoperatively diagnosed stage four cancers (2.9%) 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	14 (5.9)
Ia2	64 (26.8)
Ia3	63 (26.4)
Ib	38 (15.9)
IIa	12 (5.0)
IIb	25 (10.5)
IIIa	14 (5.9)
IIIb	2 (0.8)
IVa	5 (2.1)
IVb	2 (0.8)
Total	**239 (100.0)**

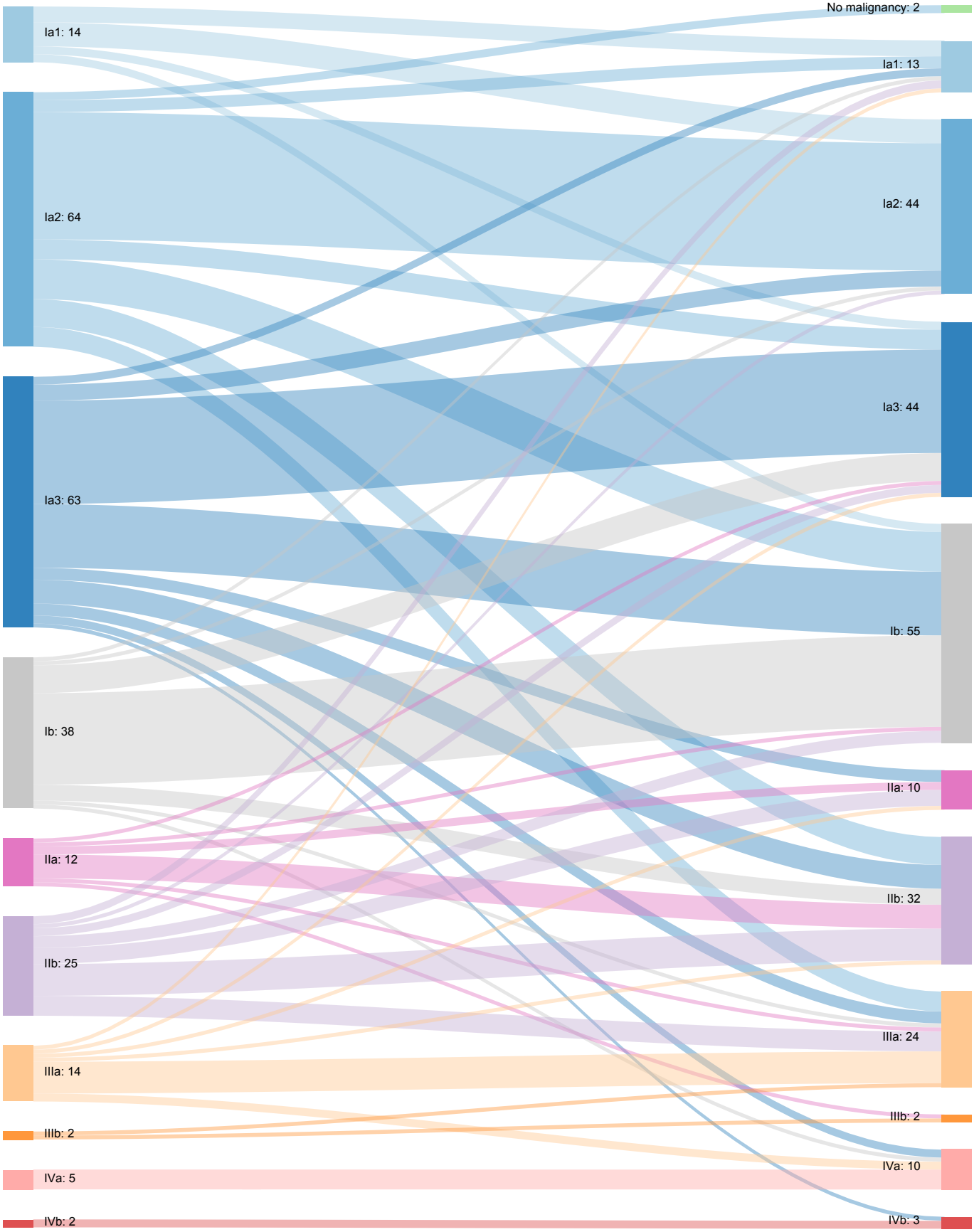
Excludes missing data (6.3%)

Table 30: Primary lung malignancy by postoperative pathological classification

Pathological classification	n (%)
Ia1	13 (5.4)
Ia2	44 (18.4)
Ia3	44 (18.4)
Ib	55 (23.0)
IIa	10 (4.2)
IIb	32 (13.4)
IIIa	24 (10.0)
IIIb	2 (0.8)
IVa	10 (4.2)
IVb	3 (1.3)
No malignancy	2 (0.8)
Total	**239 (100.0)**

Excludes missing data (6.3%)

Of the 239 primary lung cancer procedures with complete data, pathological upstaging occurred in 37% of cases, while 16% were downstaged postoperatively. Less than half (46%) of cases had no change to the preoperative staging classification.



Excludes missing data (6.3%)

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 1.0%, increasing to 2.6% 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 a malignancy is. Within this cohort, approximately 5% 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

Category	Total cases n	Death in 30 days n (%)	Death in 90 days n (%)
Primary lung cancer	255	1 (0.4)	6 (2.4)
Other cancer	273	3 (1.1)	9 (3.3)
Pleural disease	256	2 (0.8)	4 (1.6)
Other	134	4 (3.0)	6 (4.5)
ALL	**918**	**9 (1.0)**	**24 (2.6)**

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Thoracic Surgery Audit

47 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.

48 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
ARB	Angiotensin II Receptor Blocker
ARNI	Angiotensin Receptor-Neprilysin Inhibitors
ASD	Atrial Septal Defect
AV	Atrioventricular
AVNRT	Atrioventricular Nodal Re-entry Tachycardia
AVRT	Atrioventricular Re-entrant Tachycardia
BCIS	British Cardiovascular Intervention Society
BiV	Biventricular
BMI	Body Mass Index
BNH	Bundaberg Hospital
BSSLTx	Bilateral Sequential Single Lung Transplant
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
CNC	Clinical Nurse Consultant
COVID-19	Coronavirus disease 2019
CPB	Cardiopulmonary Bypass
CR	Cardiac Rehabilitation
CRT	Cardiac Resynchronisation Therapy
CS	Cardiac Surgery
CVA	Cerebrovascular Accident
CVD	Cardiovascular Disease
DAOH	Days Alive and Out of Hospital
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	Generalised Anxiety Disorder
GC	Genetic Counsellor
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
HOCM	Hypertrophic Obstructive Cardiomyopathy
IC	Interventional Cardiology
ICD	Implantable Cardioverter Defibrillator
IE	Infective Endocarditis
IER	Index of Economic Resources
IEO	Index of Education and Occupation
IHD	Ischaemic Heart Disease
IHT	Inter hospital Transfer
IPCH	Ipswich Community Health
IQR	Inter Quartile Range
IRSAD	Index of Relative Socioeconomic Advantage and Disadvantage
IRSD	Index of Relative Socioeconomic Disadvantage
IVDU	Intravenous Drug Use
LAA	Left Atrial Appendage
LAD	Left Anterior Descending Artery
LCX	Circumflex Artery
LGH	Logan Hospital
LMCA	Left Main Coronary Artery
LOS	Length Of Stay
LV	Left Ventricle

LVEF	Left Ventricular Ejection Fraction
LVOT	Left Ventricular Outflow Tract
MDT	Multidisciplinary Team Meeting
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
NCS	Networked Cardiac Services
NN	Nurse Navigator
NP	Nurse Practitioner
NRBC	Non-Red Blood Cells
NSTEMI	Non-ST Elevation Myocardial Infarction
OOHCA	Out of Hospital Cardiac Arrest
ORIF	Open Reduction Internal Fixation
PAH	Princess Alexandra Hospital
PCI	Percutaneous Coronary Intervention
PDA	Patent Ductus Arteriosus
PFO	Patent Foramen Ovale
PHQ	Patient Health Questionnaire
PICU	Paediatric intensive care unit
PPM	Permanent Pacemaker
PROMS	Patient Reported Outcome Measures
QAC	Quality Assurance Committee
QAS	Queensland Ambulance Service
QCCN	Queensland Cardiac Clinical Network
QCGP	Queensland Cardiology Genomics Project
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
RVOT	Right Ventricular Outflow Tract
SAVR	Surgical Aortic Valve Replacement
SCCIU	Statewide Cardiac Clinical Informatics Unit
SCUH	Sunshine Coast University Hospital
SEIFA	Socioeconomic Indexes for Areas
SGLT2	Sodium-Glucose Cotransporter-2
SHD	Structural Heart Disease
SIR	Standardised Incidence Ratio
SMoCC	Self Management of Chronic Conditions
STEMI	ST-Elevation Myocardial Infarction
STS	Society of Thoracic Surgery
SVT	Supraventricular Tachycardia
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
TTE	Transthoracic echocardiogram
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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