



Victorian Lung Cancer Registry
SUMMARY REPORT 2012-2022

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BACKGROUND

1. Lung Cancer

In 2021, lung cancer remained the fifth most commonly diagnosed cancer in Australia and the leading cause of cancer death in both men and women [1]. With very high symptom burden and mortality, lung cancer is the biggest contributor to Australia's overall cancer burden, as calculated by disability adjusted life years (DALYs) [2]. Although overall age-standardised incidence has fallen slightly in Australia, attributable to reduction in tobacco smoking over previous decades, an increasing number of non-smokers (mainly women) are now being diagnosed with lung cancer [3,4]. A recently published article using data from the Victorian Cancer Registry (2001-2018) and statistical model forecasting lung cancer incidence, estimated that lung cancer rates are expected to reach 2515 cases for men and 1909 cases for women in 2028, a corresponding 44% and 41% increase from 2018 [5].

The rising incidence of lung cancer, existing evidence of significant, unwarranted variation in practice and the rising complexity of lung cancer care, demand our urgent attention to facilitate quality initiatives to reduce the burden of this disease.

Overall treatment costs are set to steeply increase over coming years with the recent PBS listing of novel, expensive targeted therapies and immunotherapies for advanced patients. For instance, Nivolumab, the first immunotherapy drug approved by the FDA in 2015 for the treatment of lung cancer, can cost over \$250,000 for a 2-year course [6].

The growing complexity in the management of patients with lung cancer is creating significant challenges to the implementation of best-practice. Costs related to the failure in monitoring or implementing measures to improve best practice (in terms of the human and societal costs, as well as the cost-effectiveness of care) are enormous.

2. Clinical Quality Registries

With ongoing advances in medicine and technology, as well as increasing demand for health services, an aging population, rising health care costs, and limited resources, there has been an unsurprising emergence of evidence of variations within clinical practice.

As a result, monitoring the quality of health care is of vital importance to the sustainability of the health sector. It is also of increasing interest to consumers, providers, regulators, and payers.

Clinical quality registries (CQRs) provide one of the most effective means of not only engaging clinicians in measuring the quality of care provided across entire populations, but also through benchmarking of risk-adjusted indicators measuring compliance with best practice. Ultimately, they drive improvements in the delivery of high-quality care. Where CQRs have been introduced at a state or national level, registries have become one of the most clinically valued tools for continuous quality improvement. Australian examples of how CQRs have demonstrated success in quality improvement can be found in the management of:

- 1) stroke, where reporting of quality indicators has resulted in a nine-fold improvement in compliance with guidelines over a six-year period;
- 2) trauma, where a CQR has contributed to a 30% reduction in 30-day mortality over a ten-year period; and,
- 3) prostate cancer, where a CQR has been associated with improved appropriateness and effectiveness of care over a four-year period.

Furthermore, a recent evaluation of the cost-effectiveness of Australian CQRs identified that registries provide significant value for money when appropriately implemented and matured. The Australian Commission on Safety and Quality in Health Care (ACSQHC) has advocated for the development of CQRs, particularly in key high burden areas, including cancer. CQRs can assist in translating knowledge into practice by summarising and achieving consensus on the evidence underpinning best-practice, and then monitoring compliance by clinicians, clinical units, and hospitals with optimal practice (Appendix A).

Finally, the Commonwealth has recently published a national policy on CQRs, highlighting the importance of these database tools in optimising high-quality care and facilitating research (<https://www.aihw.gov.au/reports/australias-health/clinical-quality-registries>).

THE VICTORIAN LUNG CANCER REGISTRY (LUNG CANCER REGISTRY)

The Lung Cancer Registry (hereafter referred to as the “Lung Cancer Registry”) is a CQR first established in 2012 to measure the quality of care for patients diagnosed with lung cancer in Victoria, and to provide a comprehensive data repository regarding the care and outcomes of patients. The processes required to launch the Lung Cancer Registry involved establishing a broad, multidisciplinary governance structure, including engagement from consumers, which was tasked with defining what diagnostic and treatment paradigms constituted evidence-based, best practice. The Lung Cancer Registry complies with the framework developed by ACSQHC for CQRs. The Lung Cancer Registry monitors a suite of quality indicators that provide the means to measure the real-world implementation of agreed diagnostic, management, and treatment pathways in order to assess their relationship with both clinical and patient-reported outcomes. Subsequently, this enables the identification of patterns of care and/or specific practices associated with better outcomes attributable to improved compliance with best practice guidelines for the management of lung cancer. A minimum dataset ([Appendix B](#)) and consensus set of clinical quality indicators (QIs) spanning the spectrum of care from diagnosis to end-of-life care ([Appendix C](#)) were developed, which are being used to measure compliance with best practice.

Opt-out rates for the Lung Cancer Registry are between 3-4%, ensuring good population capture.

Data is collected from all eligible patients (who do not opt-out of the Lung Cancer Registry) from health institutions and practices across Victoria. These QIs are then correlated with clinical outcomes and, after risk adjustment, the data is provided back to participating institutions in order to drive improvements in quality of care. A list of participating health services is provided in [Appendix D](#). The 2019 Annual Report has been published and data collection is effectively complete for the 2020

calendar year, with quality indicators about to be sent to all participating health services. The Lung Cancer Registry aims to capture clinical-level data (that is sufficiently detailed to inform clinical practice) within the first 6 months of diagnosis.

1. Lung Cancer Registry Governance

The Lung Cancer Registry operates within a National Mutual Agreement (NMA) ethics approved protocol (HREC/16/Alfred/84) and is managed by a governance structure consistent with the framework developed by ACSQHC. The Lung Cancer Registry is governed by a Steering Committee, comprising of consumer representatives, thoracic physicians and surgeons, radiation oncologists, medical oncologists, a palliative care physician, a cancer nurse, a pharmacist, epidemiologists, and a member of the Victorian Cancer Registry (VCR). Associate Professor Robert Stirling is the Coordinating Principal Investigator and the Steering Committee Chair and Professor John Zalberg is the academic lead and the data custodian. The current serving steering committee is provided in [Appendix E](#).

2. Lung Cancer Registry Research Platform

As a CQR, the Lung Cancer Registry provides a data spine ideal for related research projects and provides the opportunity for vital additional research into lung cancer. It is well suited to research focussing on improving quality of care, including:

- Implementation research
- Health service utilisation
- Economic studies and value-based health care
- Data linkage studies,
- Registry-based randomised clinical trials

These registries are also capable of playing a pivotal role in translational research, including biobanking, identification of molecular or phenotypic sub-types that alter prognosis or predict for response/resistance to therapy, as well as many other areas of fundamental research.

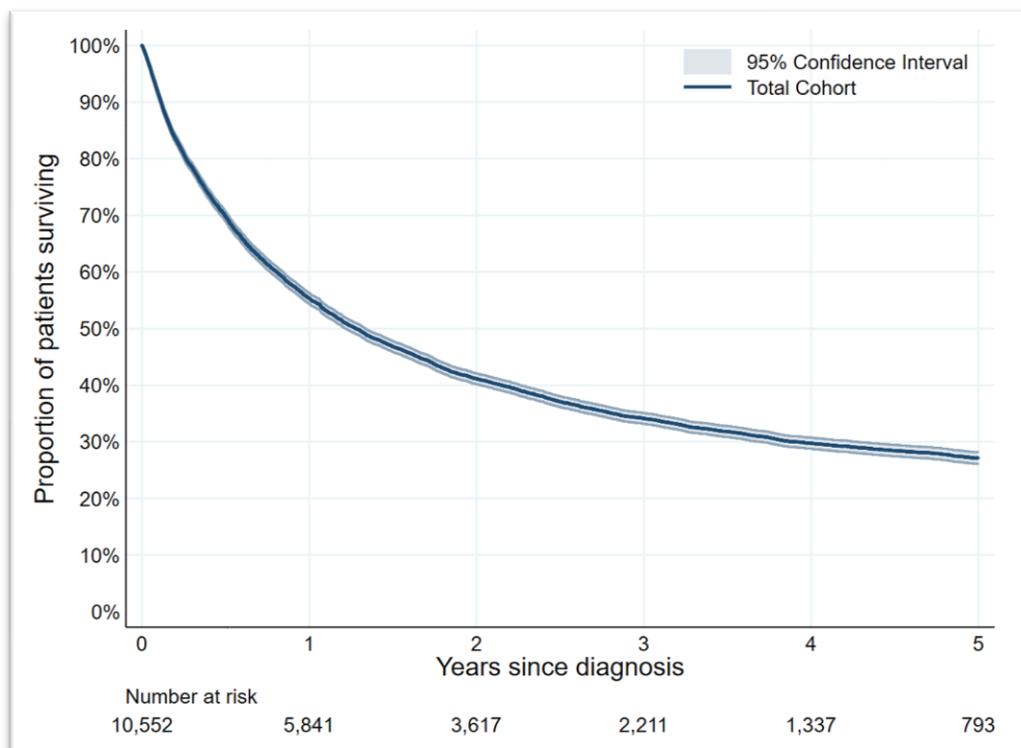
3. Lung Cancer Registry Impact

The Lung Cancer Registry aims to provide the following impact:

1. Providing stakeholders with risk adjusted reports in near real time.
2. Informing hospital governance bodies of organisational performance in lung cancer care.
3. Facilitating site specific quality improvement projects.
4. Providing crucial assurance to consumers, clinicians and governance stakeholders around performance quality

The Lung Cancer Registry currently has over 15,000 consented participants. In the published 2019 Annual Report (including patients diagnosed in 2019) some key findings included:

- Multi-disciplinary meetings (MDM). Over 2/3 (67%) of patients were presented to an MDM. This shows a steady improvement in overall performance previously reported by the Lung Cancer Registry (see Figure 3 below).
- Treatment. Anti-cancer treatment was delivered to 84% of patients, 27% underwent resection, 50% radiotherapy, and 50% had systemic anti-cancer treatment.
- Supportive care. Evidence of supportive care screening to measure psych-social distress remains disappointingly low at 31%, with a wide variance between health services (2-79%). With each Quality Indicator Report sent to health services, underperformance in any quality indicator (such as this) is highlighted for the health service principal investigator.
- Survival analysis. Health services are provided with quality indicators that measure mortality after resection (QI 14,15) and mortality within 30 days of starting chemotherapy (QI 19) (Appendix C). The Lung Cancer Registry also provides aggregated survival data, with the Kaplan-Meier estimate median survival time for patients diagnosed from 2011-2019 of 1.28 years [CI 1.218-1.336] and 1-year survival after diagnosis, 55.4% [CI 54.4-56.3] and 5-year survival after diagnosis, 27.1% [CI 26.1-28.2].



- Equitable care. The Lung Cancer Registry uses the Australian Bureau of Statistics (ABS) Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) to provide additional

indicators related to timeliness and access to care stratified by socioeconomic status. In 2019, the time interval from referral to diagnosis by socio-economic status showed the most advantaged group (91-100% decile) had the highest proportion of patients with rapid diagnosis (within 28 days of referral), 74.3%, and the more disadvantaged group (21-30% decile) had the lowest proportion of patients with rapid diagnosis (61.1%) $\text{Chi}^2 p=0.02$.

A higher proportion of patients from Metropolitan Private hospitals were resected within 14 days of diagnosis compared with patients from Metropolitan public or Regional hospitals (71.6% vs 52.8% vs 45.7% respectively) and a higher proportion of regional patients have delayed time to resection (>14 days) compared to metropolitan public and metropolitan private hospitals (54.2% compared to 47.1% and 28.3% respectively), $\text{Chi}^2 p=0.02$. Analysis using IRSAD shows the most advantaged patients (91-100% decile) had a higher proportion of patients resected within 14 days, when compared with the most disadvantaged (1-10% decile), (58.3% vs 2.5%, although this was not statistically significant ($\text{Chi}^2 p=0.26$)).

Longitudinal Change

The Lung Cancer Registry started in 2012, and it has expanded since then to capture approximately 90% of all newly diagnosed primary lung cancer cases in Victoria from 2018. **Figures 1-5** illustrate the longitudinal change in the total cohort mean for a select number of the Lung Cancer Registry's quality indicators.

Figure 1. Quality Indicator (QI) 5: Proportion of Patients with Documented Screening for Supportive Care

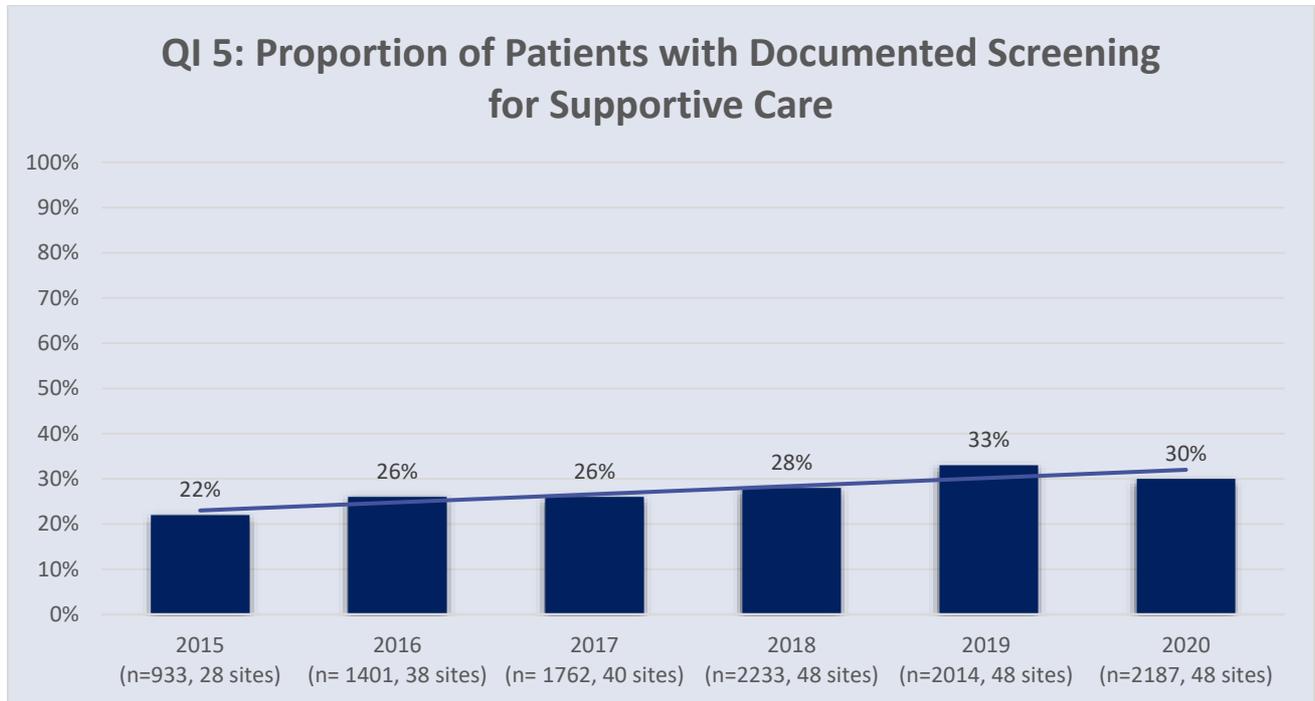


Figure 2. QI 6: Proportion of Patients with Documented ECOG Performance Status

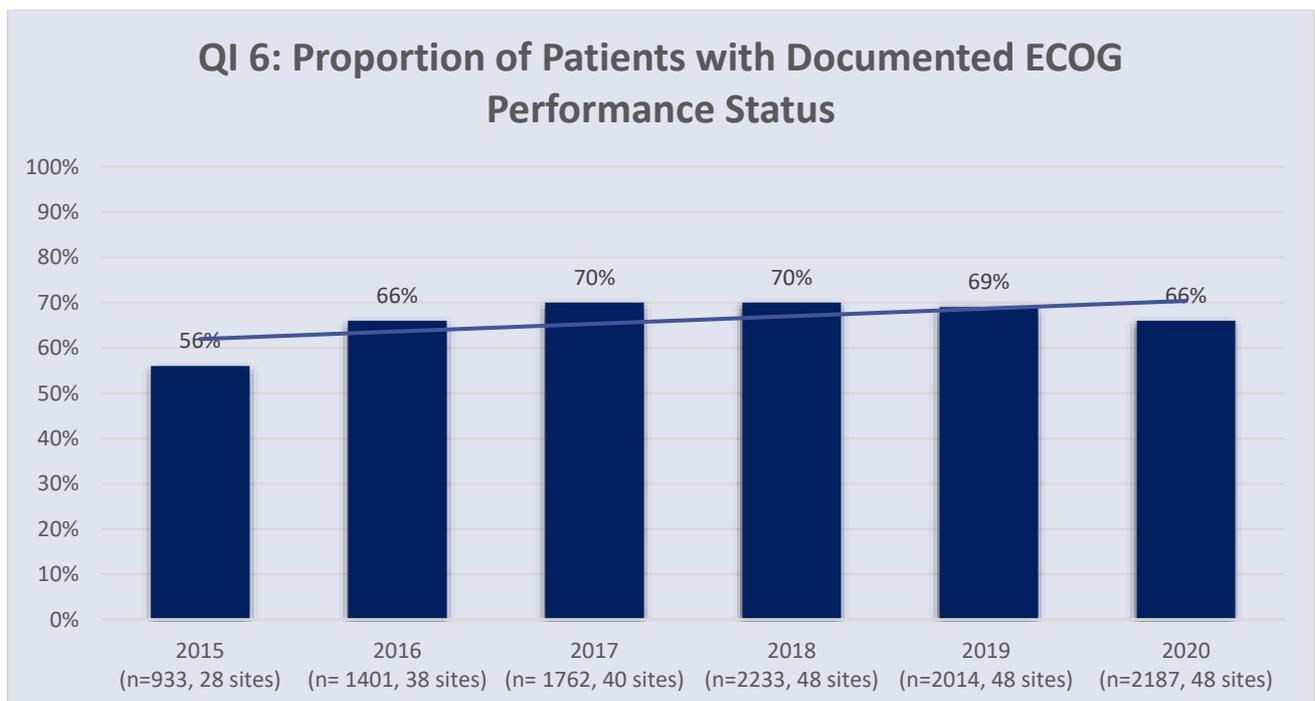


Figure 3. QI 9: Proportion of Patients with Documented Presentation at a Lung Multidisciplinary Meeting (MDM)

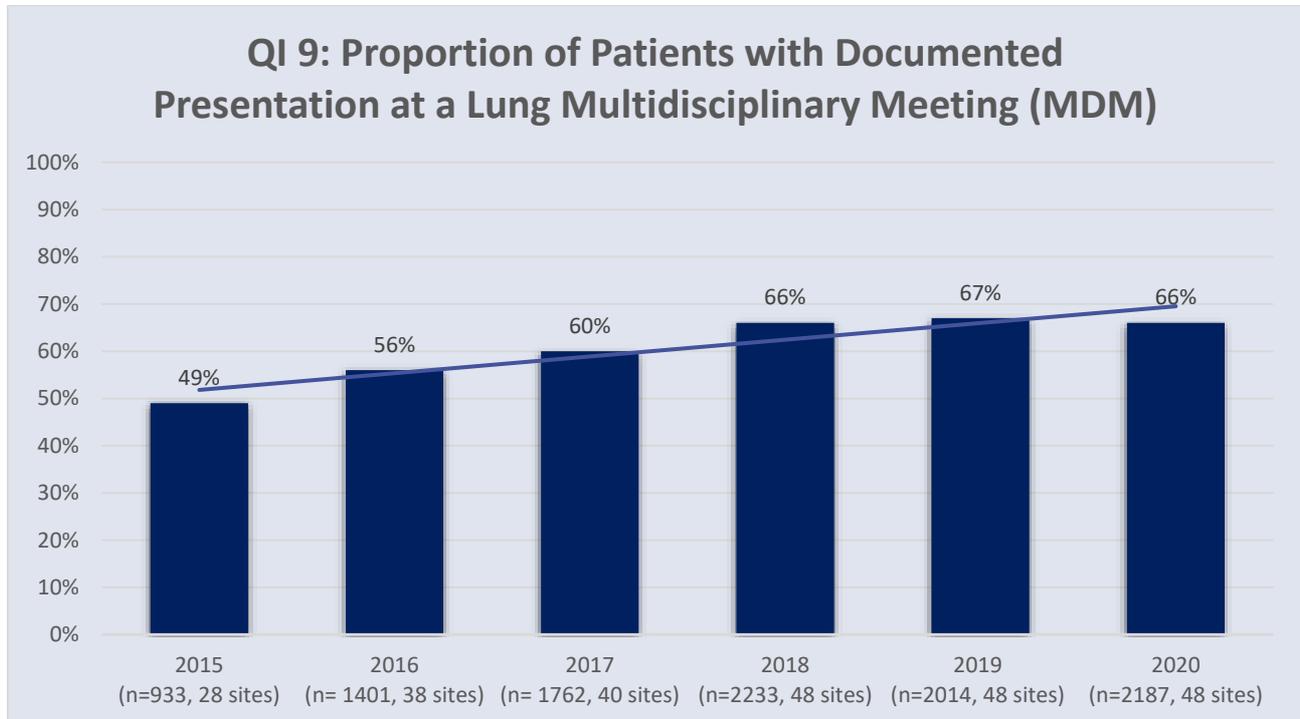


Figure 4. QI 10: Proportion of Patients Undergoing Resection with Clearly Documented PET Scan

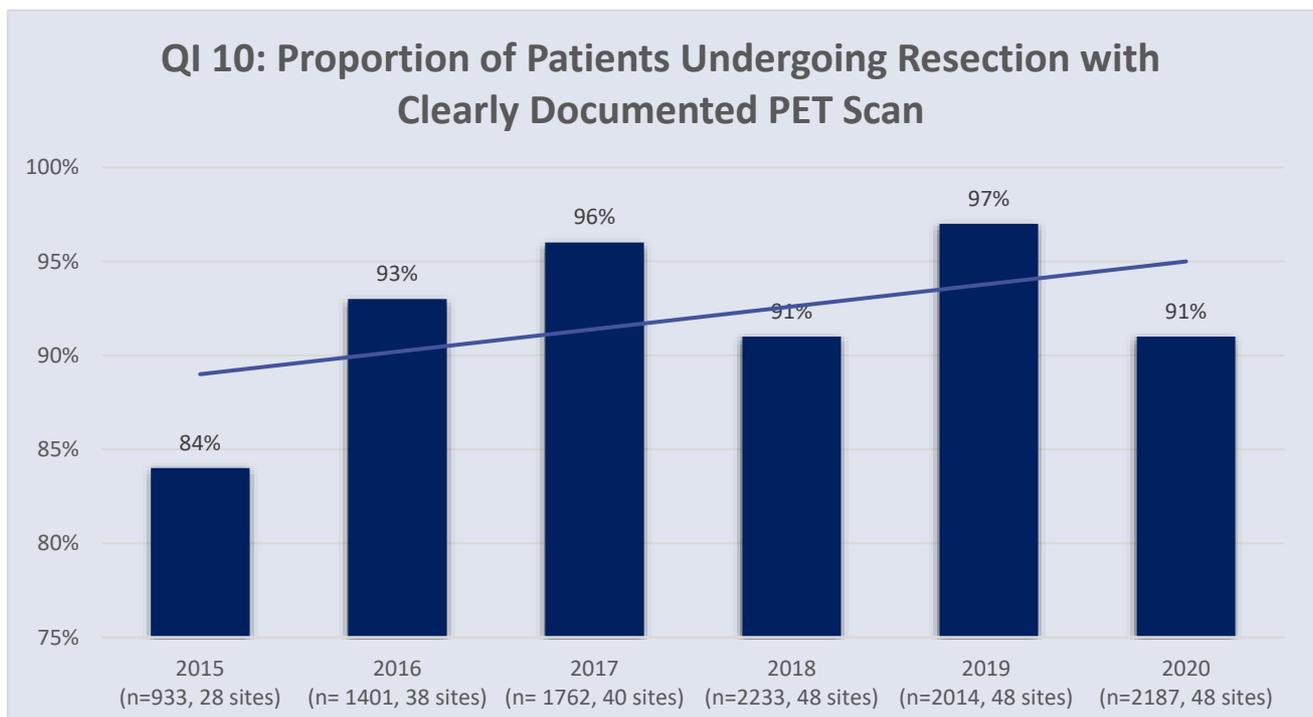


Figure 5. QI 12: Proportion of Patients with Confirmed Tissue Diagnosis (Malignant Cytology or Histology)

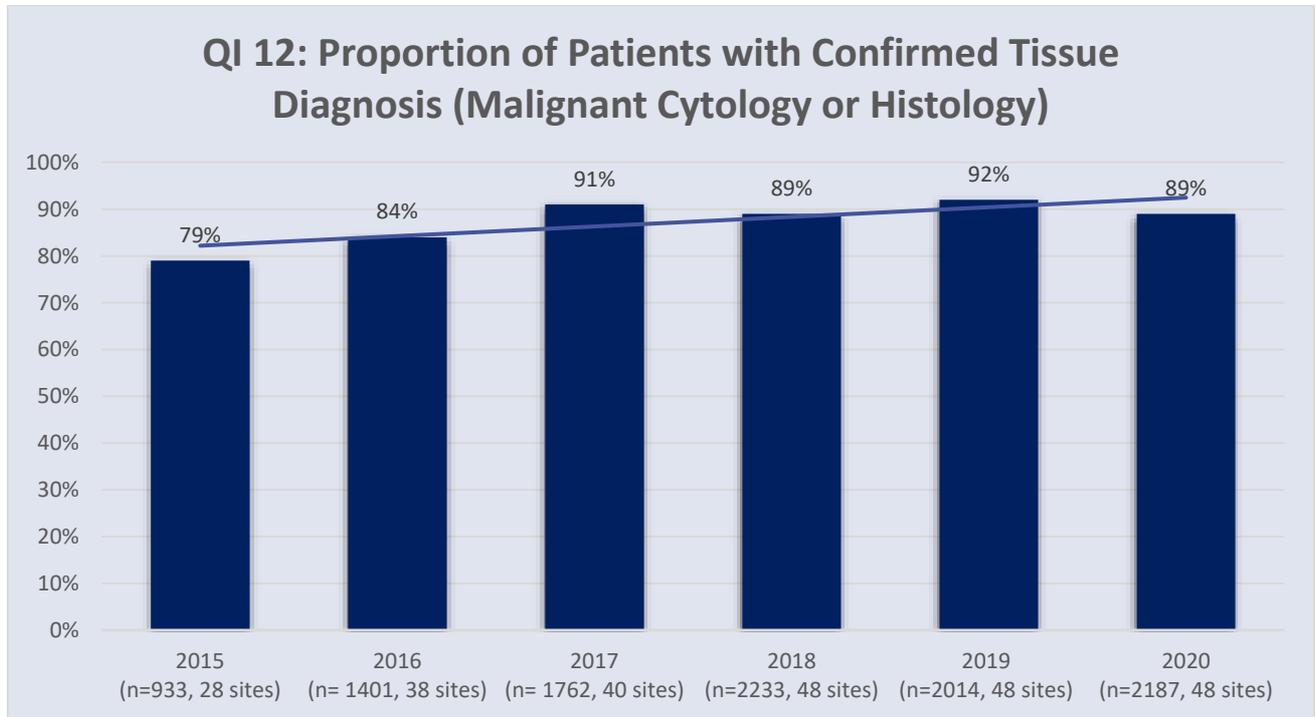
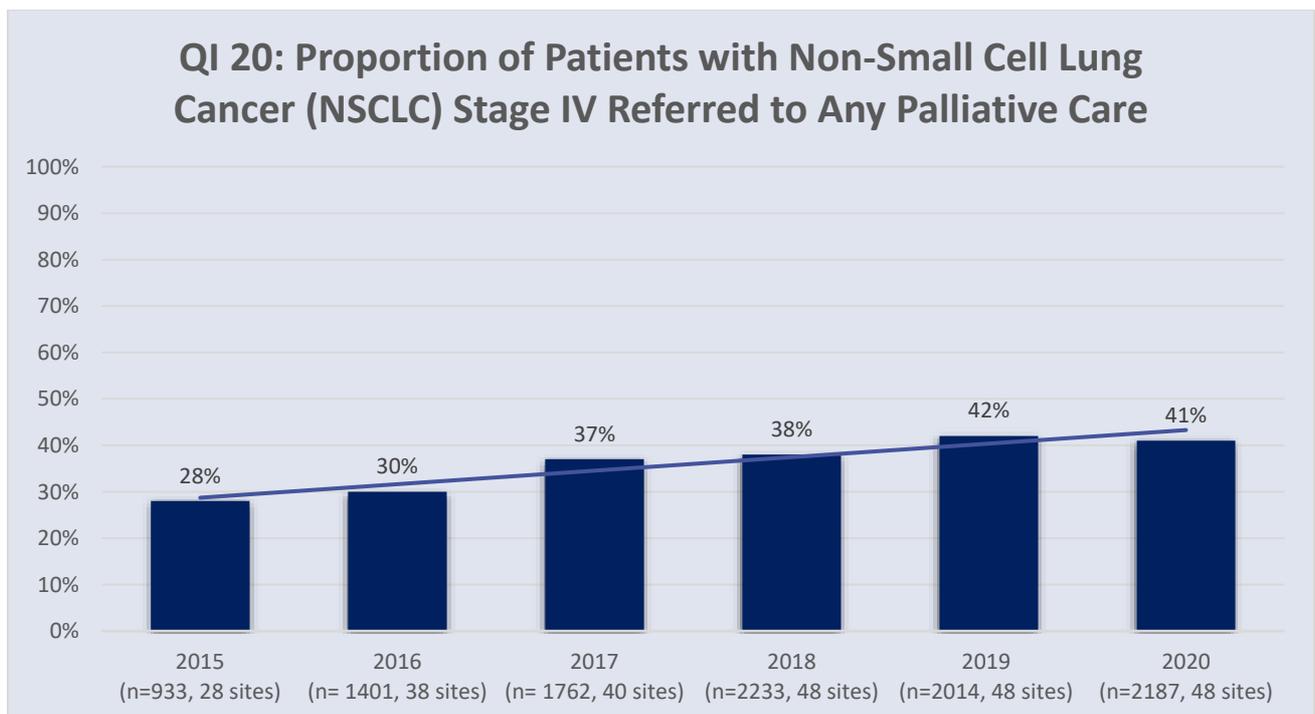


Figure 6. QI 20: Proportion of Patients with NSCLC (Stage IV) Referred to Any Palliative Care



Variation in Care

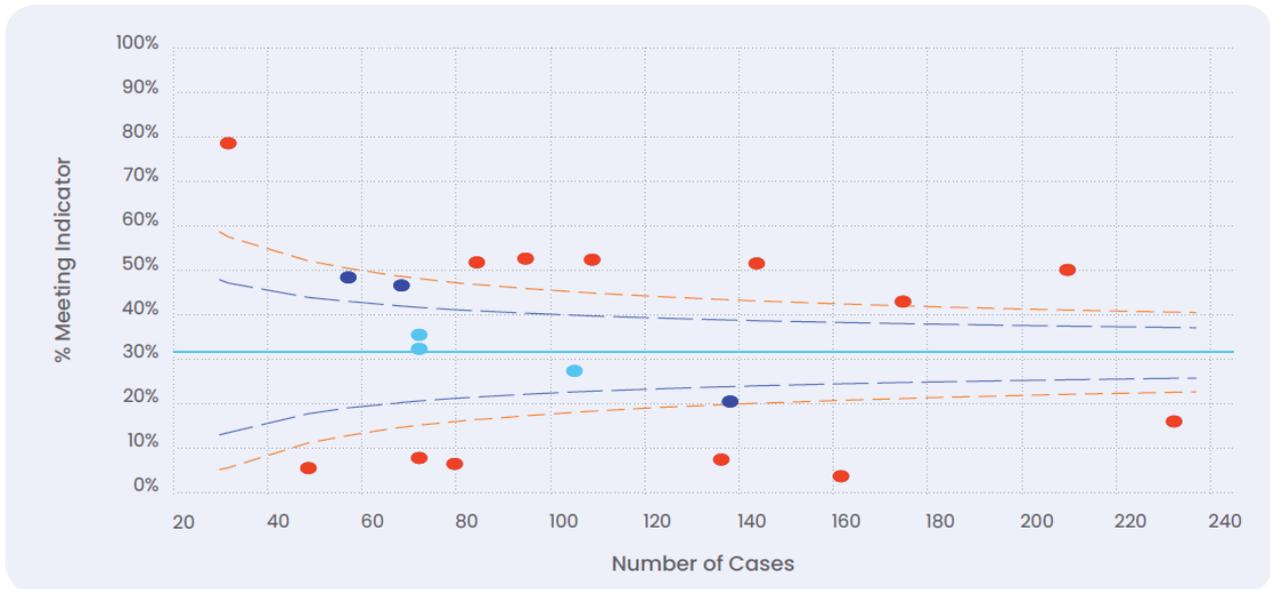
The Lung Cancer Registry uses Funnel plots to show health service performance in meeting best practice care relative to other health services and hospital peers. The Lung Cancer Registry data is risk-adjusted for variables such as sex, age, and clinical stage to account for potential confounders and therefore represents **unwarranted variation**, being that variation in processes and outcomes of care that are not determined by the patient's healthcare needs and preferences.

When interpreting funnel plots, the horizontal axis (x-axis) measures the number of patients at the recruiting hospital. The vertical axis (y-axis) measures the proportion of patients achieving the indicator outcome. The blue line represents the pooled average for all health services combined. The Funnel Plot has dashed lines representing confidence intervals. Dots falling outside the 99.8% control limits are deemed statistical outliers, however clinical judgement surrounding the reported indicator must. In the Lung Cancer Registry Funnel Plots dots are coloured to represent the health service performance: red dots (outside 3SD, 99.8% control limit), dark blue dots (within 3SD, 99.8% control limit), light blue dots (within 2SD, 95% control limit).

Variation in care can also be presented using Odds Ratio (OR) tables to show comparative health service performance. The OR Tables show the odds of patients receiving best practice care when compared to care delivered by other health services. For example, for QI 5 Proportion of patients with documented screening for supportive care (SCS), site 11 patients are 80% more likely to receive SCS when compared with other participating sites. This analysis enables site specific evaluation of barriers and facilitators to quality indicator outcomes.

VLCR 2019 Annual Report Funnel Plot

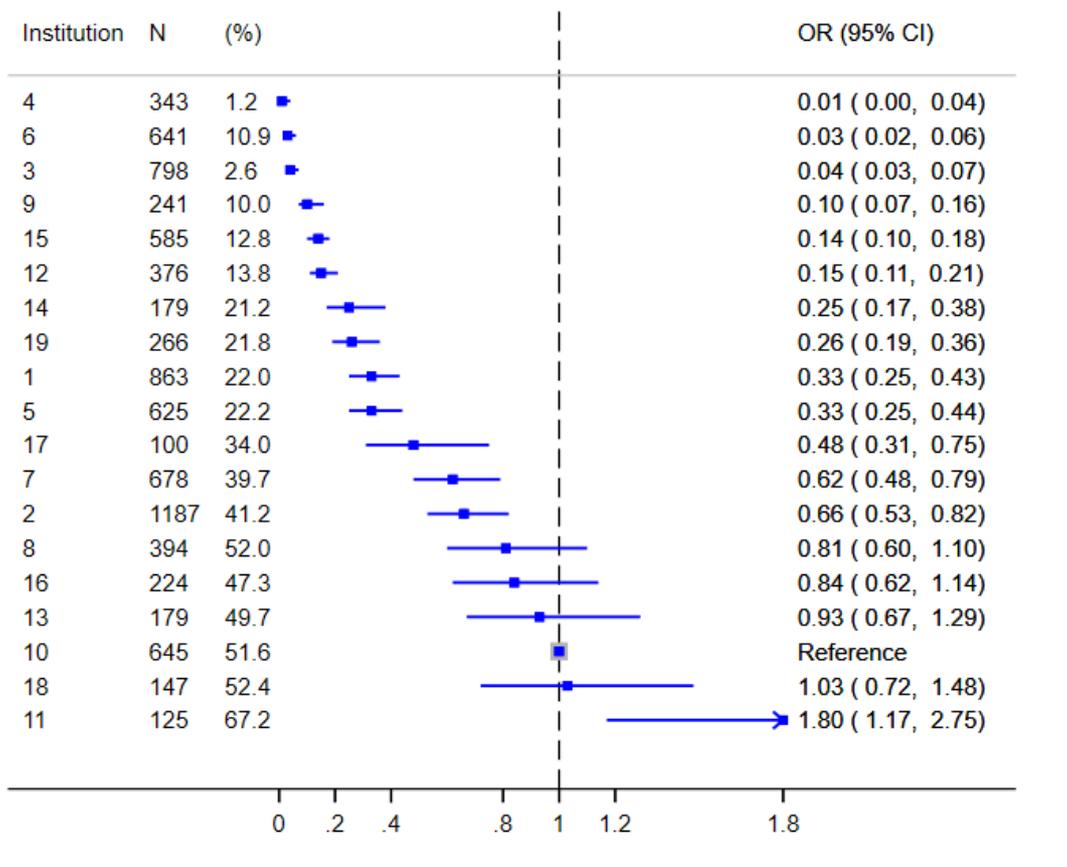
Figure 20 Proportion of patients with documented screening for supportive care (Quality Indicator 5)



N= 2114. Total cohort mean 31%

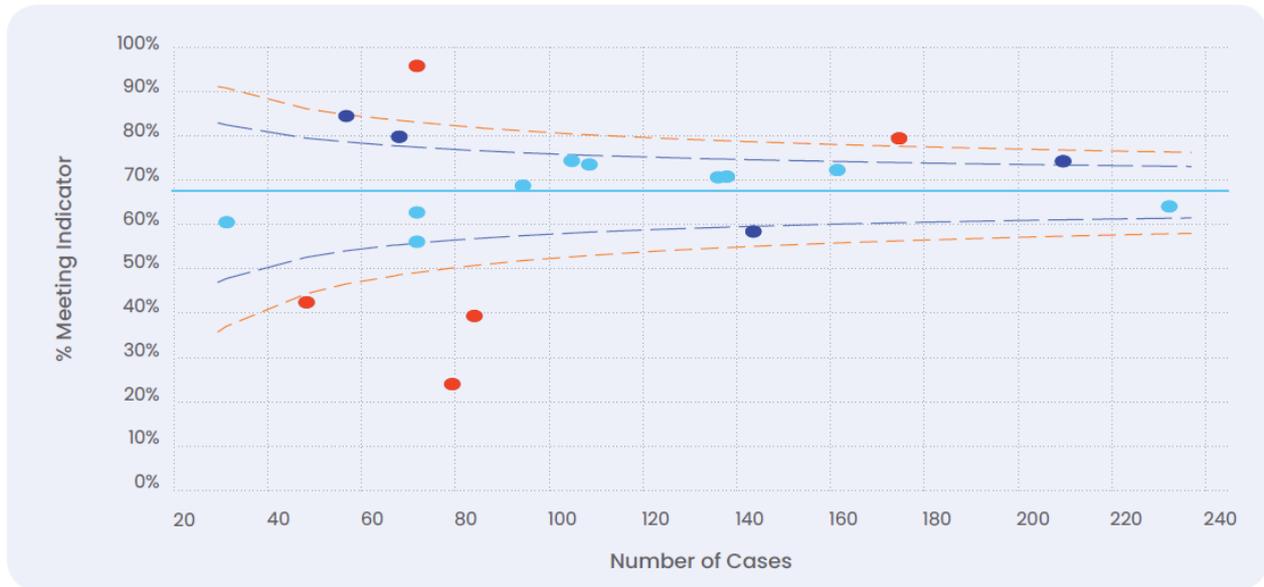
VLCR 2016-2019: OR Table

Proportion of patients with documented screening for supportive care



VLCCR 2019 Annual Report Funnel Plot

Figure 24 Proportion of patients with presentation at a lung cancer multidisciplinary (MDM) documented (Quality Indicator 9)



N = 2,114. Total cohort mean 69%.

VLCCR 2016-2019: OR Table

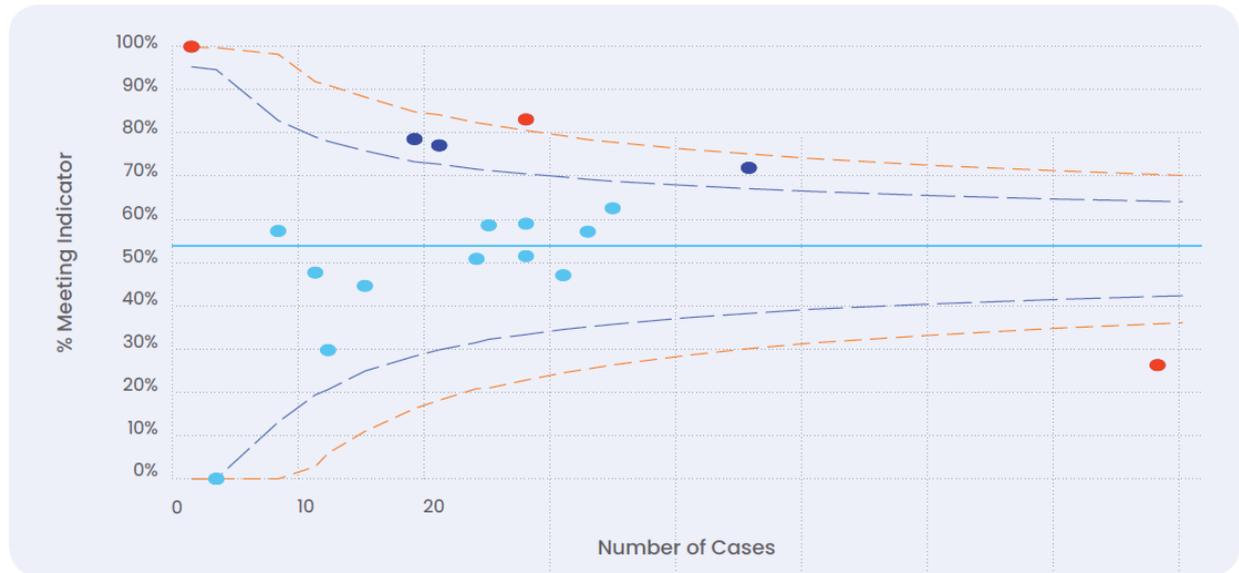
Proportion of patients with presentation at a lung cancer multidisciplinary meeting (MDM)

Institution	N	(%)	OR (95% CI)
6	644	27.0	0.09 (0.07, 0.13)
5	627	23.8	0.13 (0.10, 0.17)
8	394	46.4	0.24 (0.17, 0.33)
4	343	56.9	0.25 (0.17, 0.34)
11	125	58.4	0.33 (0.22, 0.51)
13	179	59.8	0.35 (0.25, 0.51)
9	241	67.2	0.49 (0.35, 0.68)
16	224	70.1	0.56 (0.39, 0.79)
1	863	66.0	0.58 (0.43, 0.77)
2	1191	71.1	0.68 (0.52, 0.89)
3	799	76.7	0.71 (0.53, 0.95)
7	679	74.2	0.73 (0.54, 0.97)
12	376	75.8	0.75 (0.55, 1.01)
18	147	76.9	0.79 (0.51, 1.22)
15	585	77.9	0.84 (0.64, 1.11)
10	645	80.8	Reference
19	266	82.0	1.08 (0.75, 1.56)
14	179	85.5	1.72 (1.05, 2.83)
17	100	92.0	2.74 (1.29, 5.79)

Lung Can

VLCR 2019 Annual Report Funnel Plot

Figure 23 Proportion of patients with NSCLC where time from diagnosis to surgical resection is within 14 days (Quality Indicator 3)



N = 450. Total cohort mean 54%.

Note: Surgical resection includes pneumonectomy, lobectomy, segmentectomy and wedge resection. The use of this funnel plot to identify potential outliers must be made with caution due to small numbers.

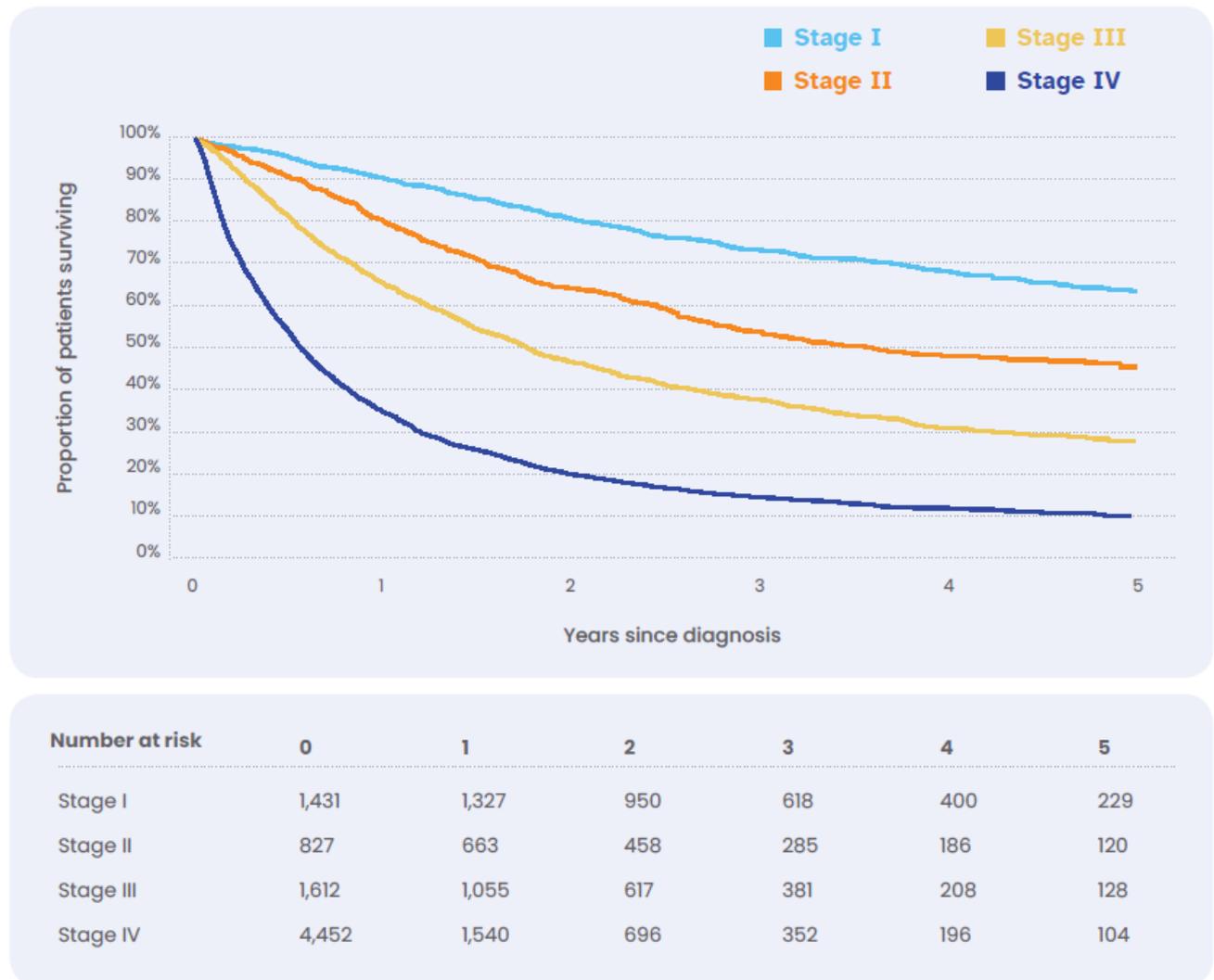
VLCR 2016-2019: OR Table

Proportion of patients with NSCLC where time from diagnosis to surgical resection within 14 days

Institution	N	(%)	OR (95% CI)
H14	43	30.2	0.10 (0.03, 0.36)
H8	133	45.1	0.16 (0.07, 0.37)
H9	71	39.4	0.23 (0.09, 0.60)
H13	101	64.4	0.24 (0.11, 0.52)
H15	20	15.0	0.29 (0.18, 0.48)
H17	43	44.2	0.33 (0.15, 0.76)
H11	133	54.1	0.42 (0.13, 1.29)
H16	211	34.6	0.44 (0.21, 0.91)
H18	32	37.5	0.51 (0.22, 1.21)
H7	193	69.9	0.54 (0.31, 0.96)
H10	24	29.2	0.65 (0.38, 1.11)
H3	328	72.6	1.07 (0.63, 1.80)
H6	277	76.9	1.19 (0.67, 2.10)
H19	27	48.1	1.23 (0.62, 2.45)
H2	230	77.4	1.33 (0.80, 2.23)
H4	292	68.5	1.83 (1.03, 3.25)
H5	216	80.6	1.96 (1.14, 3.36)

Survival Analysis

Figure 7 VLCR survival analysis by stage 2011-2019



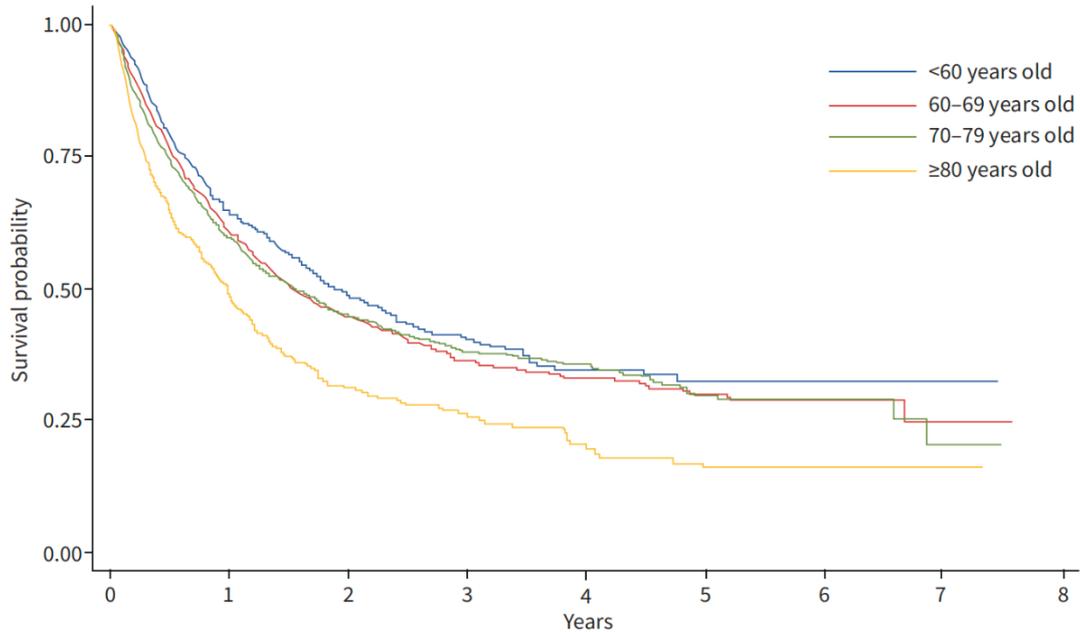
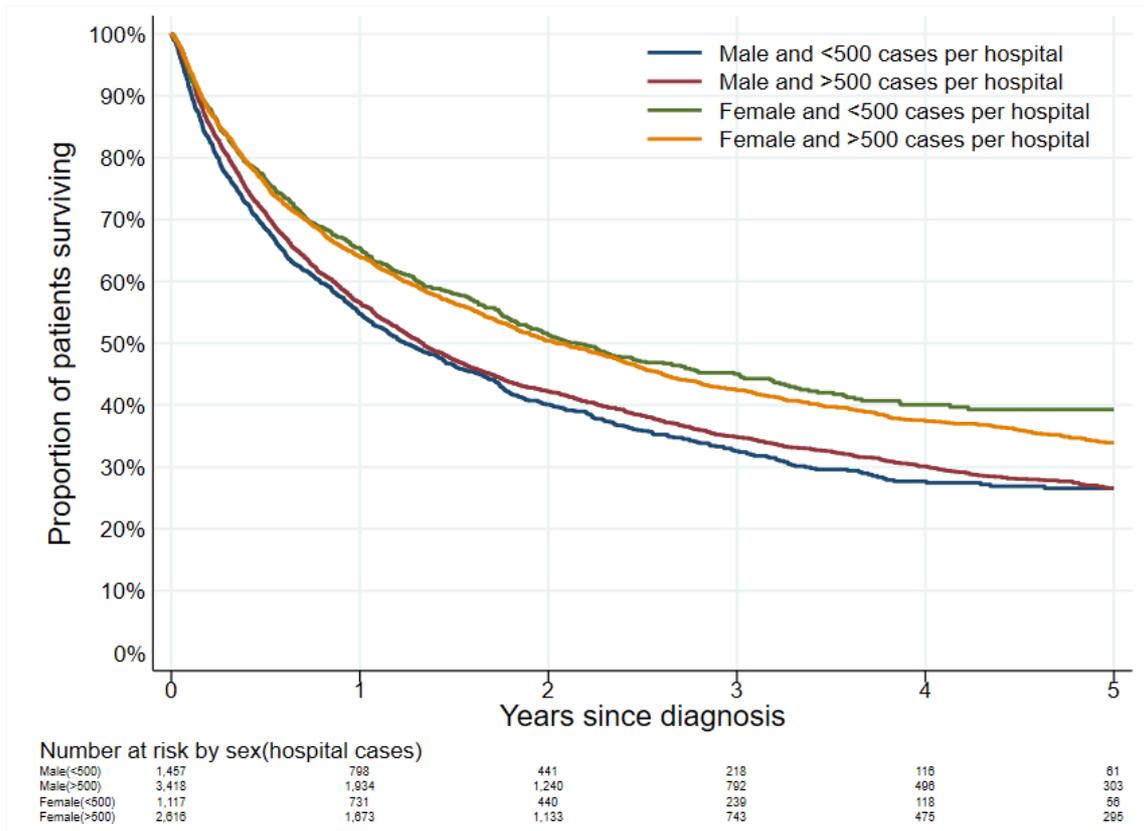


FIGURE 1 Kaplan-Meier estimate of the probability of survival among patients diagnosed with lung cancer, stratified by age.

4. Lung Cancer Registry Reach

All patients newly diagnosed with primary lung cancer, regardless of stage, that have been diagnosed, treated or managed at a participating site are recruited to the Registry using an opt-out approach. The Lung Cancer Registry currently has approximately 90% population coverage in Victoria across 66 hospitals, and receives notifications via an extract of the Victorian Admission Episode Data (VAED) set from each participating site. The Lung Cancer Registry performs a regular reconciliation with the Victorian Cancer Registry to assess case ascertainment completeness at each site. Sites not captured by the Lung Cancer Registry contribute <1% of new cases of lung cancer within Victorian.

5. Regional Hospitals and Clinician Engagement

The Lung Cancer Registry includes public and private regional hospitals in Victoria. The engagement of clinicians at regional centres is key to the identification of evidence-practice gaps enabling clinical champions to perform gap analysis and address service redesign. A significant proportion of regional patients receive some element of their cancer care in either regional private health services or metropolitan centres. Complete data capture is therefore essential and highlights the need for comprehensive data capture from private health services and data linkage between regional and metropolitan centres. The Lung Cancer registry plays a critical role in confirmation of quality of care and outcomes for patients treated in regional and remote centres.

6. Lung Cancer Registry Benchmarked Annual and Site Reports

The Lung Cancer Registry provides health services with Annual Quality Indicator (QI) Reports that include 20 benchmarked QIs to assess performance so that each health service can see how they are performing on each QI compared to other (deidentified) health services ([Appendix C](#)). The QI report allows hospitals to identify areas of poor performance and implement strategies to improve the provision of quality care. These reports are developed by a bio-statistician using Stata software. The Lung Cancer Registry also provides publicly available Annual Reports of aggregate data. Annual reports can be accessed online from <https://LungCancerRegistry.org.au/index.php/researchreports/>

7. Lung Cancer Registry Research Projects

The Lung Cancer Registry supports related research using clinical and administrative data collected within the database platform. Prospective researchers are encouraged to review the Lung Cancer Registry minimum dataset and submit a request for data release, which is approved by the Lung Cancer Registry steering committee in line with the governance process.

In addition to supporting related research by clinicians and other researchers, the Lung Cancer Registry is a key asset that has enabled additional research studies which have attracted their own

funding as well as academic personnel, including PhD scholars. A selection of related studies is listed below and further described in ([Appendix G, H](#)).

1. **Lung Cancer Redesign Project (2016-17).** Registry data provided a baseline measure of lung cancer care, and prospective data collection and analysis enabled clinical teams in selected Monash Partners hospitals to monitor improvement in quality indicators of interest to the hospital redesign teams. Quality Indicators reviewed in the study included timeliness of care, MDM presentation, and supportive care screening.
2. **Precision Medicine (2017-current).** The Lung Cancer Registry works with multiple industry organisations to assess and monitor the impact of novel therapies delivered in a “real world” setting. The collaborations use Lung Cancer Registry collected data, Monash University biostatisticians, and lung cancer clinician guidance to deliver projects that inform the clinical community of changes in survival and other clinical outcomes following novel treatments.
3. **Building a Value-based Health Care Model (VbHC) for lung cancer (2019-current).** The goal of value-based healthcare (VbHC) is to increase the relative value that can be derived from the resources available for a given population, measuring outcomes that are patient-centred in value rather than simply based on activity for a given process. The Lung Cancer Registry is piloting the development of a VbHC model in selected Victorian hospitals to describe optimal treatment at each stage of lung cancer. This pilot will collect and analyse patient reported outcome measures, clinical measures, and survival. Health economists will be responsible for assisting with the collation of costs related to health services delivered to patients.
4. **Fast Healthcare Interoperability Resources (FHIR) project (2019-current).** This project to piloting “a proof of concept” to use FHIR technology to automate the integration of hospital data from two major Victorian hospitals into two Victorian CQRs (Lung Cancer Registry and Prostate Cancer Outcome Registry (PCOR)), managed by the School of Public Health and Preventive Medicine at Monash University. Once established, the FHIR technology will allow the integration of real-time clinical data from hospital medical records, into multiple CQR database platforms.
5. **Interstate collaborative project reviewing surgical indicators (2019-current).** This project will combine state-based data sets, with an opportunity to assemble a larger dataset with the capacity for describing the broader surgical treatment of Australian lung cancer patients. The study is a retrospective, observational study investigating the management and outcomes of patients newly diagnosed with Non-Small Cell Lung Cancer (NSCLC) in Victoria, Queensland, New South Wales, and Western Australia, who have had a surgical resection.
6. **Surveillance, Patterns of Recurrence and Survivorship in Early Stage Lung Cancer Patients- Pilot Study (2019-2020)** This study was conducted to observe the patterns of surveillance of early-stage non-small cell lung cancer (NSCLC) patients and their impact on the detection of recurrence/new disease, retreatment, and survival. The study found that despite the variation in routine surveillance protocols, patients with a documented follow-up protocol at Alfred Health were shown to have improved survival.
7. **Outcomes and survival in lung cancer surgery: A comparison of the Victorian Lung Cancer Registry and the Danish Lung Cancer Registry (2019-2020).** The Lung Cancer Registry worked with the Danish LC CQR (with a similar population size) to investigate and benchmark lung cancer surgery clinical outcomes. This study found that although the resection rate was slightly lower in Victoria, a higher proportion of Victorian patients underwent

sub lobar resection (29.8% vs 11.9%). The 30- and 90-day mortality was 1.3% and 2.6% in Victoria, compared to 1.4% and 2.8% in Denmark with no difference in overall survival ($p=0.10$) or risk-adjusted survival (HR: 1.07 (95% CI: 0.95-1.20); $p=0.27$).

8. **Development of a benchmarked surgical performance checklist.** This research project is combining clinical and surgical data collected by the Lung Cancer Registry and by ANZTHOR (a clinician led surgical database managed by BioGRID) to analyse pre-operative, intra-operative and post-operative care. This study aims to develop a benchmarked “checklist for best practice surgical care” for health services and clinicians to monitor surgical care and outcomes delivered by their institutions
9. **Patterns of care of Stage III NSCLC in Victoria.** The Lung Cancer Registry provided clinical data and led a data linkage project with CVDL to extract Victorian Radiotherapy Minimum Dataset (VRMDS) to support a PhD study investigating NSCLC Stage III patterns of care. The study found that a third of NSCLC stage III patients diagnosed from 2011-2019 did not receive radical treatment and strategies to facilitate radical treatment and better support decisions making between increasing multimodality options are required.
10. **Examining impact of COVID pandemic on lung cancer diagnosis and stage presentation in Victoria (2021-current).** This project is using data collected by Lung Cancer Registry and the Victorian Cancer Registry, linked to administrative data from the DHHS to provide a comparison of diagnostic and management trends for primary lung cancer in 2020 Q2-3 (first peak of COVID cases) with 2018-2019 Q2-3. This analysis will include multiple measures including clinical stage at presentation to determine if there have been stage migration due to delays in diagnosis.
11. **Australian-New Zealand Lung Cancer Registry Protocol (ANZLCR) (2021-current).** This project is bringing together key stakeholders from Australia and New Zealand to develop a bi-national lung cancer CQR model. The protocol paper includes objectives of the ANZLCR to measure and report benchmarked outcomes reflecting quality of care, describe unwarranted variation in care, provide a data infrastructure for data-driven improvements in lung cancer care and develop a clinical data repository to support research. The ANZLCR protocol includes the suggestion to re-define a revised set of quality indicators using a DELPHI process, as well as establish a truly national governance and management structure for a bi-national lung cancer CQR.

8. Future Directions

To provide a more comprehensive assessment of the quality of care in the management of lung cancer across the country, the Lung Cancer Registry aims to extend data collection to include the routine collection of patient-reported measures (PRMS) (including patient-reported outcomes (PROs) and patient-reported experiences (PREs)), followed by expanding the registry to other States and Territories within Australia.

Patient-Reported Measures

The addition of routine collection of PRMs will significantly increase the value of the Lung Cancer Registry. It will complement the clinical data, allowing for a more comprehensive assessment of the impact of compliance (or otherwise) on key outcomes and quality of care. This will be achieved by the routine implementation of a pilot set of patient-reported QIs, developed through a formal consensus process with consumer involvement, and will allow for the addition of patient-reported data in annual benchmarked site clinical reports. PRMs provide a way of systematically measuring factors such as depression, anxiety, distress, pain, fatigue, and quality of life in patients across different time points after their diagnosis. PRMs can also demonstrate important differences in care that are not necessarily reflected in clinical outcomes. Routine collection of PRMs provides an opportunity for the Lung Cancer Registry to refer participants to needed resources and support services they may not otherwise be aware of or think to utilise. In 2021, the Lung Cancer Registry worked with Lung Foundation Australia's lung cancer patient advocacy group to conduct research identifying "what patients' value most" in their care experience. This research project will assist in developing a Value-Based Health Care Model for lung cancer ([Appendix G, Lung Cancer Registry Projects](#)).

National Expansion

There is empirical evidence that clinical practice varies both nationally and internationally with regard to the management of lung cancer. Therefore, expanding the Lung Cancer Registry to other states across Australia via a staggered rollout plan would provide an opportunity to improve the quality of care throughout the country. As lung cancer is the fifth most common cancer with the highest mortality rate, a national registry will provide a platform to enable research and training/educational opportunities, as well as facilitate the opportunity to link with international registries and outcomes databases.

In addition to current linkages with participating hospitals, the Victorian Agency for Health Information (VAHI), and the VCR, the Lung Cancer Registry plans to link with other state-based cancer and epidemiological registries. The governance structure of the Lung Cancer Registry would expand to include representatives from each state/territory and a committee will be established that enables cross-state engagement and data linkage by including multidisciplinary representatives, such as clinicians and experts in the field of data linkage, health service research, health economics, and biostatistics. This committee will also have a strong consumer involvement with the Lung Cancer Registry, partnering with charity and support group organisations across Australia.

As the Lung Cancer Registry extends beyond Victoria, providing a national framework for improving quality of care and enabling research in this debilitating condition, it may become eligible for national funding included as part of the new Federal Government policy addressing the need and role/function of outcome databases and CQRs. A national registry of this type will also be critical as screening for lung cancer in at-risk individuals comes on stream. National expansion will enable the Lung Cancer Registry to meet the criteria outlined in the Commonwealth policy, ensuring a much greater likelihood that it will receive ongoing funding and support. [[Appendix G](#) includes a description of a protocol paper being developed for a bi-national lung cancer CQR]

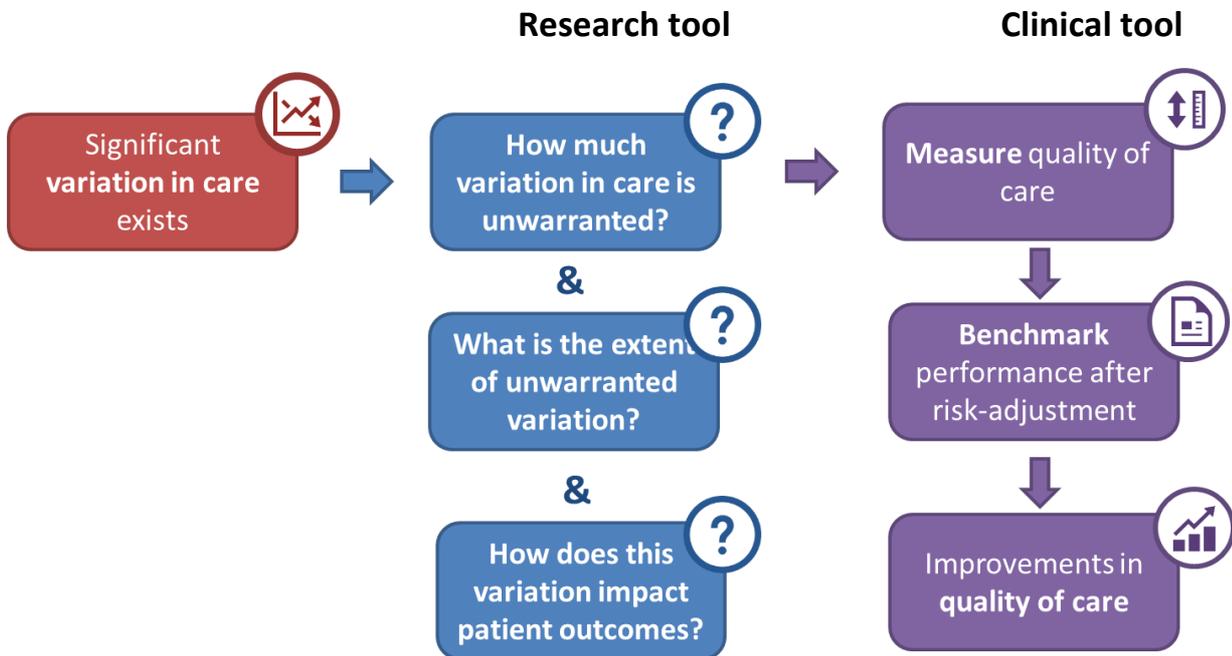
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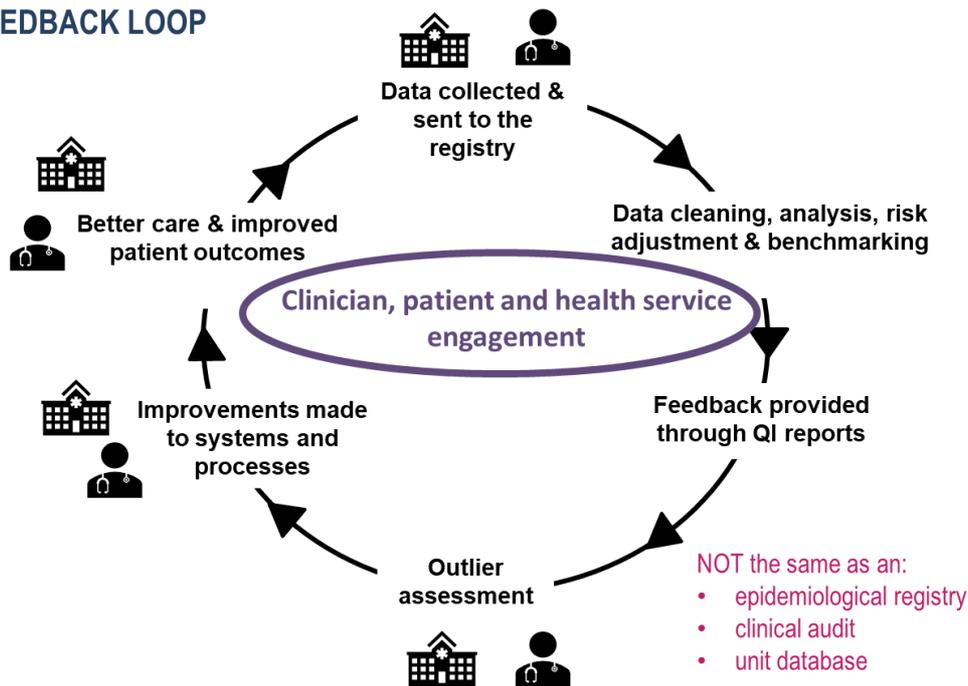
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Appendix A: CQRs as a Clinical and Research to Measure and Improve Quality of Care



FEEDBACK LOOP



Footnote: Feedback loop figure adapted from ACSQHC Clinical Outcome Feedback loop <https://www.safetyandquality.gov.au/our-work/indicators-measurement-and-reporting/national-arrangements-clinical-quality-registries>

Appendix B: Lung Cancer Registry List of Data Items

Participant details	Risk factors at diagnosis	Diagnosis (continued)
<ul style="list-style-type: none"> Title First Name Middle name(s) Surname Recruiting hospital MRN at recruiting hospital Date of birth Sex DVA number (if applicable) Country of birth Preferred language Indigenous status Phone numbers Email address Postal address Residential address at time of diagnosis/eligibility assessment Next of kin or emergency contact details GP details Deceased status Date of death 	<ul style="list-style-type: none"> Comorbidities <i>[history of Diabetes, Renal disease, Heart disease, Other neoplastic disease, Alcohol abuse, Respiratory disease or COPD]</i> Weight loss Smoking status, Pack years ECOG score <p style="text-align: center;">Diagnosis</p> <ul style="list-style-type: none"> Date of referral to investigate suspicious lung mass. Type and date of first specialist (<i>respiratory physician, radiation or medical oncologist, surgeon, palliative care physician, other</i>) Mode of diagnosis (<i>histology cytology, clinical, death certificate</i>) Date of diagnosis from the first positive notification of primary lung cancer from pathology test (histology or cytology) or clinical test Diagnosing health service Morphology type Lung cancer type (NSCLC, SCLC, Other) 	<ul style="list-style-type: none"> Type and date of clinical test used to determine clinical stage at diagnosis: <i>[CXR, CT, PET, Bronchoscopy, EBUS, CT-guided biopsy, Mediastinoscopy]</i> Clinical TNM at diagnosis (IASLC 7th edition 2012-2017, 8th edition 2018-current) Location of the tumour (right, left or bilateral) Discussion at a multidisciplinary team meeting (y/n) Date earliest multidisciplinary team meeting discussion Supportive care screening completed (y/n) and date of screening <p style="text-align: center;"><u>Molecular profiling: test date and result</u></p> <ul style="list-style-type: none"> EGFR ALK PDL1 (aka PD-1) ROS1 KRAS MET HER2 BRAF PIK3CA RET MEK1 NRAS

Treatment – Surgery	Treatment – Radiotherapy *	Treatment – Chemotherapy / targeted and immunotherapies *
<p>First surgery and subsequent surgery collected.</p> <ul style="list-style-type: none"> Type of surgery [Wedge resection, Segmentectomy, Lobectomy, Pneumonectomy] Surgery declined (y/n) Surgery intent (Curative, non-curative) Surgery date Surgery approach (VATS, Open) Surgeon name Surgery Institution Pathological TNM at surgery (IASLC 7th edition 2012-2017, 8th edition 2018-current) Number of lymph nodes dissected Margins described (present, clear, equivocal) Laterality of tumour 	<p>First and subsequent radiotherapy collected</p> <ul style="list-style-type: none"> Radiotherapy performed (y/n/declined) Radiotherapy start date Radiotherapy end date Radiotherapy intent (Palliative Adjuvant Radical) Radiotherapy type Radiotherapy site (chest, brain, other) Radiotherapy institution Radiation oncologist name <p>* subsequent radiotherapy is obtained via data linkage from CVDL VRMDS reports</p>	<p>Platinum Agents [Carboplatin Cisplatin Docetaxel Etoposide Etoposide Phosphate]</p> <p>Non-Platinum Agents [Gemcitabine Paclitaxel Pemetrexed Vinorelbine Vincristine Adriamycin]</p> <p>Targeted Agents (checkpoint inhibitors) Afatinib Alectinib Atezolizumab Bevacizumab Brigatinib Ceritinib Crizotinib Cetuximab Dabrafenib Duravalumab Entrectinib Erlotinib Gefitinib Iorlatinib Nivolumab Osimertinib Pembrolizumab</p> <p>* subsequent treatment is obtained via pharmacy data linkage from selected sites</p>

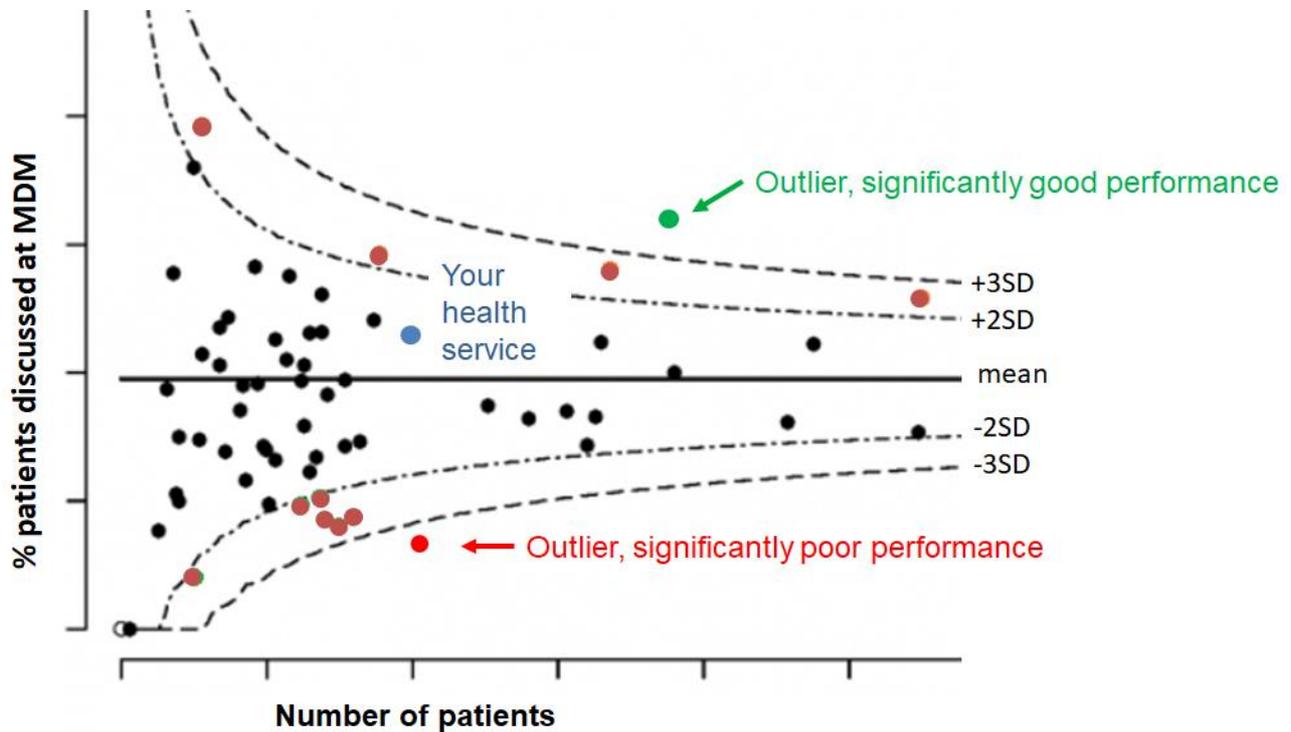
Appendix C: Lung Cancer Registry Quality Indicators Summary

Ref.#	Quality Indicator	Description
No.	Numerator	Denominator
Timeliness Indicators		
1	Number of patients where time from referral date to diagnosis is ≤ 28 days	Number of patients in Registry with a referral date available
2	Number of patients where time from diagnosis date to first treatment date (any intent) is ≤ 14 days	Number of patients in Registry receiving any intent anti-cancer treatment with a defined date
3	Number of patients with NSCLC where time from diagnosis date to surgical resection date is ≤ 14 days	Number of NSCLC patients in Registry undergoing surgical resection with defined dates available.
4	Number of patients where time from referral date to first treatment (any intent) is ≤ 42 days	Number of patients in Registry undergoing anti-cancer treatment with referral and treatment date available.
Documentation in Medical Records Indicators		
5	Number of patients with documented screening for supportive care	Number of patients in Registry
6	Number of patients with documented ECOG status	Number of patients in Registry
7	Number patients with clearly documented cTNM staging	Number of patients with NSCLC in Registry
8	Number of patients with NSCLC undergoing surgical resection with clearly documented pTN	Number of patients with NSCLC who have undergone surgical resection
9	Number of patients with documented presentation at a lung MDM	Number of patients in Registry
10	Number of patients undergoing resection with clearly documented PET scan	Number of patients undergoing resection
Tissue Diagnosis Indicator		
11	Number of NSCLC patients undergoing surgical resection where cTN agrees with pTN	Number of patients with NSCLC undergoing surgical resection with cTN and pTN available
12	Number of patients with confirmed tissue diagnosis (malignant cytology or histology)	Number of patients in Registry
Treatment Indicators*		

Ref.#	Quality Indicator	Description
13	Number of patients with NSCLC (clinical stage I,II) who have had surgical resection	Number of patients with NSCLC
14	Number of patients with NSCLC (clinical stage I or II) and resection with ≥ 5 lymph nodes dissected	Number of patients with NSCLC (clinical stage I or II) who have undergone surgical resection
15	Number of patients with NSCLC who have had a surgical resection and died within 30 days of surgery.	Number of patients with NSCLC who have undergone surgical resection
16	Number of patients with NSCLC who have had a surgical resection and died within 90 days of surgery.	Number of patients with NSCLC who have undergone surgical resection
17	Number of patients receiving anti-cancer treatment (surgery, radiotherapy, chemotherapy, immunotherapy or targeted therapy)	Total number of patients in Registry
18	Number of patients with NSCLC (stage IIIB, IIIC or IV) who have ECOG (0-1) and have commenced chemotherapy, immunotherapy or targeted therapy	Number of patients with NSCLC (stage IIIB, IIIC, IV) + ECOG (0-1)
19	Number of patients with NSCLC (pathological stage II, III) receiving platinum chemotherapy after resection	Number of patients with NSCLC (pathological stage II, III) who have undergone a surgical resection
20	Number of patients with lung cancer where time from the start date of chemotherapy, immunotherapy or targeted therapy to death date is ≤ 30 days.	Number of patients receiving chemotherapy, immunotherapy or targeted therapy with treatment dates available
Palliative care Indicator		
21	Number of patients with NSCLC (stage IV) referred to palliative care ≤ 8 weeks of diagnosis	Number of patients with NSCLC (stage IV)

* Treatment indicators are currently under review, with molecular profiling and radiotherapy indicators to be included in the near future.

Appendix D: Example Funnel Plot from a Benchmarked Report



Appendix E: Lung Cancer Registry Steering Committee

Name	Organisation and Title
Stirling, A/Professor Robert (Steering Group Chairman)	Coordinating Principal Investigator Victorian Lung Cancer Registry. Consultant Physician, Department of Allergy Immunology & Respiratory Medicine, The Alfred Hospital.
Zalberg, Professor John	Academic lead Victorian Lung Cancer Registry. Tony Charlton Chair of Oncology, Alfred Health. Head, Cancer Research Program, School of Public Health and Preventive Medicine, Monash University.
Alexander, Dr Marliese	Senior pharmacist and Research Fellow, Peter MacCallum Cancer Centre (PMCC)
Atkin, Dr Nicola	Palliative Care Physician, PMCC
Briggs, Dr Lisa	Consumer Representative
Briggs, Dr Peter	Medical Oncologist, Monash Health
Conron, Dr Matthew	Director, Department Respiratory and Sleep Medicine, St Vincent's Melbourne
Duffy, Ms Mary	Nurse Coordinator, Lung Services, PMCC

Evans, Professor Sue	Director, Victorian Cancer Registry, Melbourne
Harden, Dr Susan	Thoracic radiation oncologist PMCC, Senior Research Fellow, Victorian Lung Cancer Registry
Irving, Professor Louis	Director, Respiratory and Sleep Medicine, Royal Melbourne Hospital
John, A/Professor Tom	Medical Oncologist, Translational Researcher PMCC
Langton A/ Professor David	Respiratory & Sleep Physician, Frankston Hospital
Lesage, Jacqueline	Consumer representative
MacManus, Professor Michael	Associate Research Director, Department of Radiation Oncology, PMCC
Martin, Dr Cathy	Research Fellow – Biostatistics, Monash University
Millar, Professor Jeremy	Deputy Chair, Cancer Council Australia. Research Director, Radiation Oncology, Alfred Health
Mitchell, A/Professor Paul	Director, North-Eastern Melbourne Integrated Cancer Service, President, Australasian Lung Cancer Trials Group, Olivia Newton-John Cancer and Wellness Centre
Olesen, Dr Inger	Medical Oncologist, Geelong Hospital.
Richardson. A/Professor Gary	Director of Oncology Clinics Victoria, Director of Cabrini Academic Haematology & Oncology Services.
Wood, Mr Tom	Consumer representative
Wright, A/Professor Gavin	Director of Surgical Oncology, St Vincent's Hospital Melbourne.

Appendix F: Lung Cancer Registry Participating Health Services

Victorian Health Services	
Ethics and governance approved	
<i>[**ethics approved and data collection to commence in 2021/22]</i>	
<p>Alfred Health</p> <ul style="list-style-type: none"> • Alfred Hospital • Caulfield Hospital • Sandringham Hospital <p>Albury Wodonga Health</p> <ul style="list-style-type: none"> • Border Cancer Hospital • Albury Hospital <p>Austin Health</p> <ul style="list-style-type: none"> • Heidelberg repat • Royal Talbot • Olivia-Newton John Cancer Centre <p>Ballarat Health Services</p> <p>Barwon Health</p> <p>Bendigo Health</p> <p>Cabrini Health</p> <ul style="list-style-type: none"> • Cabrini Hospital Malvern • Cabrini Brighton • Cabrini Prahran <p>Eastern Health</p> <ul style="list-style-type: none"> • Box Hill Hospital • Maroondah Hospital • Peter James Centre • Angliss Hospital • Healesville Hospital • Wantirna Health <p>Epworth HealthCare</p> <ul style="list-style-type: none"> • Epworth Eastern • Epworth Freemasons • Epworth Richmond • Epworth Geelong • Epworth Camberwell <p>Goulburn Valley Health</p> <p>**Genesis Care Victoria</p> <p>Latrobe Regional Hospital</p>	<p>Monash Health</p> <ul style="list-style-type: none"> • Monash Medical Centre • Casey Hospital • Dandenong Hospital • Moorabbin Hospital <p>Northern Health</p> <p>Peninsula Health</p> <ul style="list-style-type: none"> • Frankston Hospital • Rosebud Hospital <p>Peter MacCallum Cancer Centre</p> <p>**Ramsay Health</p> <ul style="list-style-type: none"> • Peninsula Private • Mitcham Hospital • Shepparton Private • Border Cancer Hospital • Warringal Hospital <p>Royal Melbourne Hospital</p> <ul style="list-style-type: none"> • Royal Park • City Campus <p>South West Healthcare</p> <ul style="list-style-type: none"> • Warrnambool • Portland Hamilton <p>**St John of God</p> <ul style="list-style-type: none"> • Ballarat • Berwick • Bendigo • Geelong • Warrnambool <p>St Vincent's Hospital Melbourne</p> <ul style="list-style-type: none"> • St Vincent's Public Hospital • Caritas • St Georges Hospital <p>St Vincent's Private Hospital</p> <ul style="list-style-type: none"> • Fitzroy • East Melbourne <p>Western Health</p> <ul style="list-style-type: none"> • Sunshine Hospital • Footscray Hospital

Tasmania and South Australia	
Ethics Approved	Applications in progress
Royal Hobart Hospital (governance pending)	Lyell McKewin Hospital
Launceston Hospital (governance pending)	Canberra Hospital (legal agreement pending)
Royal Adelaide Hospital (governance pending)	

Appendix G: Lung Cancer Registry projects

Projects using LUNG CANCER REGISTRY data, Monash University statisticians and lung cancer clinicians

Lung Cancer Redesign Project (2016-17).

The Lung Cancer Registry worked with the DHHS and Integrated Cancer Services in metropolitan and regional Victoria to implement a quality redesign project. This project targeted quality improvement in lung cancer management, specifically focusing on timeliness from referral and diagnosis to treatment, Multi-Disciplinary meeting (MDM) presentation and supportive care screening. Redesign strategies were employed at participating hospitals after identifying areas for improvement and by targeting process sustainability through enhanced team engagement and capacity building. The Lung Cancer Registry was used as the platform to collect consistent and high-quality data from each hospital and to provide outcome measures of improvement, including an Interrupted Time Series (ITS) analysis.

This project showed a marked reduction in the time from the initial GP referral to first specialist appointment interval across all sites (median (IQR) fell from 6 (0-15) to 4 (1-10) days), and the proportion of patients being seen by a specialist within 14 days, increased from 74.3% to 84.2%. The interval between diagnosis to treatment was not substantively changed in the 6-month implementation period. The proportion of subjects with documented presentation to the MDM increased from 61% to 67%. The proportion of patients with documentation of supportive care screening remained low at 26.3% post-intervention.

Precision Medicine (2017-current)

Following the expansion of the Lung Cancer Registry population capture in 2017-2018, the Lung Cancer Registry has worked with multiple industry organisations to assess and monitor the impact of precision medicine, including novel therapies delivered in a "real world" setting. The Lung Cancer Registry, utilising risk-adjusted clinical data outcomes and patient reported outcome measures, provides an ideal platform to continue to monitor and report the impact of new therapies as they emerge. The following research projects related to precision medicine have been delivered, with some still currently underway.

1. Astra-Zeneca [2017-2019]:

Describe clinical and tumour characteristics for late stage patients with lung cancer being tested for PDL1 status, including treatment and overall survival.

2. Merck Sharp & Dohme [2017-current]:

- Describe clinical characteristics and provide survival outcomes (Kaplan Meier Curves) for patients treated with Nivolumab.
- Describe patient and tumour characteristics, treatment pathways (including lines of therapy, time on therapy, or no Systemic Anti-Cancer Treatment) delivered for patients diagnosed with Non-Small cell Lung Cancer (NSCLC) Stage IV, ECOG 0-1, high PDL1 gene expression.
- Assess the impact of PBS approved treatment for non-squamous NSCLC [Carboplatin + Atezolizumab + Bevacizumab + Paclitaxel].
- Describe changes in patterns of care for late stage NSCLC (III, IV) over a 3-year period, to understand the link between patient characteristics and treatment received (including chemotherapy, targeted therapy and immunotherapy). This project aims to assess changes in treatment regimens from 2019-2021, including changes in novel therapies (TKIs and IOs) and combined chemo-radiation.

3. Bristol Myers Squibb [2019]

Report the number of patients with NSCLC (stage III) who have a resection, platinum based chemoradiation or no treatment.

4. IQVIA (health information Technology) [2020-current]

The Lung Cancer Registry has worked with IQVIA, a large multinational health information technology and clinical research organisation that supports biopharmaceutical development, to contribute to the following research:

EXPLORE-LC: This project describes real-world outcomes (overall survival and patterns of care) for patients with NSCLC in the APAC countries, by clinical stage at diagnosis. This project used Lung Cancer Registry data to:

- describe the baseline demographic and clinical characteristics of all patients and by clinical stage at diagnosis.
- describe treatment patterns of all patients following diagnosis of NSCLC, by clinical stage at diagnosis.
- describe treatment activity for all patients by clinical stage at diagnosis.

EGFR molecular status: This project is assessing the proportion of patients with a positive EGFR mutation status and categorising the specific mutation subtypes and the type of biomarker testing received by patients in Victoria, from 2017-2020.

Fast Healthcare Interoperability Resources (FHIR) project (2019-current)

This project is funded by MRFF to pilot “a proof of concept” to use FHIR technology to automate the integration of hospital data from two major Victorian hospitals into two Victorian CQRs (Lung Cancer Registry and Prostate Cancer Outcome Registry (PCOR)) managed by the School of Public Health and Preventive Medicine at Monash University. Once established, the FHIR technology will allow

the integration of real time clinical data from hospital medical records, into multiple CQR database platforms. The pilot is due to be completed in 2022.

Building a Value-based Health Care Model for lung cancer (2019-current)

Health services aim to deliver the best healthcare for patients with lung cancer, within available resources. Delivering optimal care requires an understanding of clinical outcomes as well as patient reported measures such as patient reported outcomes (PROs), patient reported experiences (PREs) and health related quality of life (HRQoL), in order to understand the perceived value of different management and treatments for lung cancer.

The Lung Cancer Registry has been funded by the MRFF (via Monash Partners Comprehensive Cancer Consortium (MPCCC)), to conduct a pilot study that aims to develop a value-based health (VbHC) model for lung cancer care at selected cancer health services in Victoria. To develop the VbHC model, the Lung Cancer Registry is utilising clinical and administrative data already collected by the Registry, with electronically collected PROs [EORTC QLQ-C30, EORTC LC-29] PREs, HRQoL survey responses and derived costs for health services delivered to patients.

The primary aim of this project is to report compliance with registry collection patient reported measures and to report overall patient satisfaction with regard to lung cancer diagnosis and patient experience of care, with results stratified by stage. Costs to health services of optimal pathway treatments will be reported by clinical stage. Secondary outcomes of the pilot include exploratory benchmarking of patient satisfaction by health services and exploratory analysis of variation in benchmarking costs incurred by individual health services, compared to the optimal pathway costs, stratified by age and health service category (public/private).

In developing the most appropriate patient experience survey tool, the Lung Cancer Registry used the Victorian healthcare experience survey and worked with the Lung Foundation Australia's lung cancer patient advocacy group, to ask people affected by lung cancer to choose what were the five most important things for them regarding their care from a list of 20 items. A high response rate (n=49) gave valuable insights into what patients' value most and there are plans to further explore what people value most in a discrete choice experiment study.

Health economic evaluation of different treatments will use the QLU-C10D multi-attribute utility in cancer instrument derived from the EORTC QLQ30 with Australian utility weights for health services (King, M. T. *et al.* QLU-C10D: a health state classification system for a multi-attribute utility measure based on the EORTC QLQ-C30. *Qual. Life Res.* 25, 625–636 (2016). The economic evaluation will collate costs related to health services delivery of optimal treatment at each stage of disease. The pilot will be completed by the end of 2022.

Interstate collaborative project reviewing surgical indicators (2019-current)

This project is a retrospective, observational study investigating the management and outcomes of patients newly diagnosed with Non-Small Cell Lung Cancer (NSCLC) in Victoria, Queensland, New South Wales and Western Australia, who have had surgical resection. The study will focus on details of surgical management. By combining state-based data sets there is an opportunity to assemble a large dataset with capacity for describing broader surgical treatment of Australian lung cancer patients. The use of a national dataset may enable comparison and institutional, regional and State

based benchmarking of quality measures in lung cancer management that may inform stakeholders of patterns of variation in care.

Outcomes and survival in lung cancer surgery: A comparison of the Victorian Lung Cancer Registry and the Danish Lung Cancer Registry (2019-2020)

The Lung Cancer Registry worked with Dr Michael Stenger, a visiting cardio-thoracic surgeon from Denmark, to investigate the potential of clinical quality lung cancer registries in Victoria, and Denmark, to benchmark lung cancer surgery clinical outcomes. This study found the resection rate was 26.3% in Victoria and 28% in Denmark, but a higher proportion of Victorian patients underwent sub lobar resection (29.8% vs 11.9%). Stage concordance was 59.6% and 54.9% in Victoria and Denmark, respectively. The 30- and 90-day mortality was 1.3% and 2.6% in Victoria, compared to 1.4% and 2.8% in Denmark with no difference in overall survival ($p=0.10$) or risk-adjusted survival (HR: 1.07 (95% CI: 0.95-1.20); $p=0.27$).

Surveillance, Patterns of Recurrence and Survivorship in Early Stage Lung Cancer Patients- Pilot Study (2019-2020)

This study was conducted to observe the patterns of surveillance of early stage Non-small cell lung cancer (NSCLC) patients and their impact on detection of recurrence/new disease, retreatment and survival. The study included 200 patients from a large tertiary hospital in Melbourne. Results demonstrated a significantly increased survival for patients that had a documented follow up protocol and routine imaging detection of an event. Cox regression analysis reported decreased likelihood of death for those surgically treated (HR:0.518, 95%CI:0.33- 0.83), and for those who had subsequent treatment with curative intent (HR:0.15, 95%CI: 0.05-0.46). An increased likelihood of death was reported in patients with no follow up protocol (HR: 2.24, 95% CI: 1.31-3.83) and for patients with recurrent disease (HR: 3.0, 95%CI: 2.34-6.20). Conclusion: Despite the variation in routine surveillance protocols at Alfred Health, patients with a documented follow up protocol were shown to have improved survival. This may be due to the fact that routine imaging detected tumour recurrence or a new primary earlier than otherwise might have been the case. Follow-up research in additional health services is recommended. (*publication under development*).

Development of a benchmarked surgical performance checklist (2021-current).

This research project is being led by A/P Gavin Wright to use clinical and surgical data collected by the Lung Cancer Registry and by ANZTHOR (a clinician led surgical database managed by BioGRID) to analyse pre-operative, intra-operative and post-operative care. This study aims to develop a benchmarked “checklist for best practice surgical care” for health services and clinicians to monitor surgical care and outcomes delivered by their institutions.

Patterns of care of Stage III NSCLC in Victoria. The Lung Cancer Registry provided clinical data and led a data linkage project with CVDL to extract Victorian Radiotherapy Minimum Dataset (VRMDS) to support a PhD study investigating NSCLC Stage III patterns of care. The study found that a third of NSCLC stage III patients diagnosed from 2011-2019 did not receive radical treatment and strategies to facilitate radical treatment and better support decisions making between increasing multimodality options are required.

Examining impact of COVID pandemic on lung cancer diagnosis and stage presentation in Victoria (2021-current).

This project is using data collected by Lung Cancer Registry and the Victorian Cancer Registry, linked to administrative data from the DHHS to provide a comparison of diagnostic and management trends for primary lung cancer in 2020 Q2-3 (first peak of COVID cases) with 2018-2019 Q2-3. This analysis will include multiple measures including clinical stage at presentation to determine if there has been stage migration due to delays in diagnosis.

Australian-New Zealand Lung Cancer Registry Protocol (ANZLCR) (2021-current)

This project is bringing together key stakeholders from Australia and New Zealand to develop a bi-national lung cancer CQR model. The protocol paper includes objectives of the ANZLCR to measure and report benchmarked outcomes reflecting quality of care, describe unwarranted variation in care, provide a data infrastructure for data-driven improvements in lung cancer care and to develop a clinical data repository to support research. The ANZLCR protocol includes the suggestion to re-define a revised set of quality indicators using a DEPLHI process, as well as establish a truly national governance and management structure for a bi-national lung cancer CQR. *(Authors: Shantelle Smith, Margaret Brand, Dr Susan Harden, Dr Lisa Briggs, Lillian Leigh, Professor Nick Pavlakis, Professor Shalini Vinod, Dr Morgan Windsor, Professor Fraser Brims, Dr Emily Stone, Ms Mary Duffy, Dr Nicole Rankin, Henry Marshall, Dr Collin Chia, Dr Rebecca Tay, Dr Vanessa Brunelli, Dr Jennifer Phillip, Dr David Leong, Dr Paul Dawkins, Professor Sue Evans, Associate Professor Arul Earnest, Mr Mark Brooke, Professor John Zalberg and Associate Professor Rob G Stirling)*

Appendix H: Lung Cancer Registry Current Students and Publications

PhD candidates (current)

Ms Katrina Woodford “Patterns of care for locally-advanced non-small cell lung cancer in Victoria”.

Ms Sanuki Tissera “Risk adjustment models in lung cancer patients in Victoria”

Dr Evangeline Samuel “Decision support systems in lung cancer”

Publications

1. Shantelle Smith, Margaret Brand, Susan Harden, Lisa Briggs, Lillian Leigh, Fraser Brims, Mark Brooke, Vanessa N. Brunelli, Collin Chia, Paul Dawkins, Ross Lawrenson, Mary Duffy, Sue M Evans, Tracy Leong, Henry Marshall, Dainik Patel, Nick Pavlakis, Jennifer Phillip, Nicole M. Rankin, Nimit Singhal, Emily Stone, Rebecca Tay, Shalini K Vinod, Morgan Windsor, Gavin M Wright, David Leong, John Zalberg and Rob G Stirling . Development of an Australia and New Zealand Lung Cancer Clinical Quality Registry: A protocol paper. (submitted for review BMJ open, Jan 2022).
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