

# Victorian Lung Cancer Service Redesign Program

Final report

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of Health

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The information and summary statistics presented in Tables 6 and 7 were sourced directly from the *Victorian Lung Cancer Registry: Victorian Lung Cancer Service Redesign Program – All site final report*, noted in the references section of this report.

Note that the Department of Health was established in early 2021 following machinery-of-government changes that saw the Department of Health and Human Services divided into two new departments. References to DHHS in this report refer to the former Department of Health and Human Services.

# Summary

## Background

Lung cancer is the fifth most commonly diagnosed new cancer and leading cause of cancer death in Victoria.<sup>1</sup> In most cases, by the time lung cancer is diagnosed it is too late for curative treatment.<sup>2</sup> The five-year relative survival for those diagnosed with lung cancer is 20 per cent for females and 16 per cent for males it is 68 per cent and 67 per cent respectively for all cancers combined.<sup>1</sup> The diagnosis and staging process is complex, often needing complex multidisciplinary evaluation and testing before treatment begins.<sup>3</sup> Critically, a retrospective study ( $n = 1,417$ ) of Victorian Lung Cancer Registry (VLCR) data sourced from six public and two private health services reported a delay of 30 median days (interquartile range (IQR) 6–84) from diagnosis to first treatment and 53 median days (IQR 25–106) from referral to first treatment.<sup>4</sup> Also, patients managed in the public sector had a longer median delay from referral to first treatment (61 days, IQR 35–118) than those in the private sector (30 days, IQR 13–76).<sup>4</sup> Another study revealed only 33 per cent ( $n = 206$ ) of lung cases were discussed at a lung multidisciplinary meeting (MDM). This was despite evidence showing that patients whose cases are discussed by a lung multidisciplinary team are more likely to receive treatment and survive longer.<sup>5</sup>

The Department of Health and Human Services (DHHS) set up the Victorian Lung Cancer Service Redesign Program (VLCSR) in July 2016 to help develop local redesign projects to decrease delays in diagnosing and treating lung cancer. Five such projects were piloted in health services across Victoria to promote quality improvement initiatives, targeting steps 2–4 of the lung optimal care pathway,<sup>6</sup> from the point of referral to the start of treatment. Each project was co-funded by DHHS and the respective local Integrated Cancer Service or health service. Redesign methodologies were used to identify baseline performance and improve processes across the referral to treatment pathway. The VLCR was engaged to support a standard approach to data collection and evaluation. Both quantitative and qualitative data were collected, including information on clinician and consumer experience. Four Community of Practice forums were held to support collaborative learning.

## Objectives

- To decrease delays from receipt of referral to the first lung cancer specialist appointment.
- To decrease time from the first specialist appointment to the first staging test.
- To decrease time from receipt of referral to a diagnosis of lung cancer.
- To ensure all patients with a new diagnosis of lung cancer are discussed at an MDM.
- To ensure sustainability of the redesigned services post project by building multidisciplinary lung team capacity to continue to monitor and improve performance.
- To increase the capability of Victorian lung cancer teams to employ redesign methodology to support locally led service improvement and application of best practice principles.

## Guiding principles

- Projects consisted of five clearly defined phases: set up phase, diagnostic phase, solution phase, implementation and evaluation phase, and sustainability phase.

- Redesign methodologies were used to understand baseline performance and systematically improve processes across the referral to treatment pathway.
- Multidisciplinary teams were actively engaged across the selected lung project setting.
- Solution redesign supported application of the principles for best practice management of lung cancer in Australia.<sup>7</sup>
- Solutions were tested in a series of plan–do–study–act cycles and signed off by the project executive officer and lead applicant before implementation.
- All projects demonstrated sustainability and identified potential applicability to other health services.

## Methodology

Service redesign methodologies were used to understand baseline performance and improve processes. Patient information was collected prospectively over a six-month period from 1 September 2016 to 28 February 2017.<sup>8</sup> The local service redesign intervention was then progressively rolled out. Its impacts were measured against a number of performance indicators during a post-intervention phase from 1 March 2017 to 31 August 2017.<sup>8</sup> A total of 205 new cases of primary lung cancer were recruited in the pre-implementation phase and 224 in the post-implementation phase.<sup>8</sup> Specific surveys were developed to measure local organisational capability for improvement (lung redesign) and to assess the five RE-AIM (Reach, Effectiveness, Adoption, Implementation and Maintenance) dimensions of program quality.<sup>9</sup> Clinician and consumer interview/survey questionnaires were designed locally and analysed by theme.

## Key interventions across sites

- Creating a lung cancer assessment service and rolling out an electronic referral system with the ability to prompt clinicians at each step to ensure timelines are met.
- Setting up a weekly rapid access clinic / MDM with a clearly identified decentralised referral pathway and weekly MDM teleconference with metropolitan tertiary specialists and surgeons.
- Setting up a rapid access clinic using existing oncology medical specialists enabling Medicare Benefits Schedule billing with reporting measures set up within the local patient management system. This allowed data to be tracked via a monthly executive reporting system.
- Developing an auditing/dashboard system within the CANMAP system to ensure availability of accurate and real-time data. Business case for a multidisciplinary rapid access lung lesion clinic completed. Funding sourced for a lung cancer care coordinator role.
- Setting up a multidisciplinary thoracic clinic with a respiratory physician in March 2018 and a dietitian in April 2018.

## Quantitative results

The VLCCR collated and analysed quantitative data on selected performance indicators. The following significant statistical improvements from baseline were seen in the post-intervention period:<sup>8</sup>

- 9.9 per cent increase in those getting a first specialist appointment within 14 days of referral
- 6 per cent increase in the proportion of patients presented to an MDM
- 5.0 per cent increase in those receiving chemotherapy within 14 days of diagnosis

- 4.3 per cent increase in the proportion of patients with a documented supportive care screening tool (although overall proportion of documentation remains low)
- decrease of two median days in the time from referral to the first specialist appointment
- decrease of 3.5 median days in the time from diagnosis to the first chemotherapy treatment
- decrease of two median days in the time from diagnosis to the first radiotherapy treatment.

## Qualitative results

Analysis of the pre- and post-intervention capability improvement surveys showed improvement in organisational capability (lung redesign) at two health services. For the other three sites, anecdotal evidence suggests that the staff who completed the before and after surveys varied widely in their knowledge of organisational capability. The impact of this was that results were either unclear or not as good as at baseline. The reasons for this are likely to include a turnover of staff in these sites during the project.

Assessment of the RE-AIM dimensions of quality revealed the following **key** findings.

### Reach

- 88 per cent agreed that a wide variety of stakeholders had actively and meaningfully been involved in the program.

### Effectiveness

- 92 per cent agreed that the program met its intended aims and short-term outcomes.
- 82 per cent agreed there was greater capacity to extract and analyse data.
- 80 per cent agreed that the capacity to monitor and respond to delays in the timeliness of care had improved.

### Adoption

- 50 per cent of respondents adopted five or more interventions. The remaining 50 per cent adopted between two and four interventions.

### Implementation

- 75 per cent were satisfied with the overall process of program implementation.

### Maintenance

- 83 per cent confirmed there was a clear and consistent understanding within the project team of what is being sustained.
- 86 per cent verified that this had been communicated to all staff involved in the change.

## Key lessons

The following lessons may benefit future programs of work.

- Future participation in local projects should be considered in light of flagged organisational changes.
- Participating health services should know with certainty at the beginning of the project each of the individual ethical, governance, confidentiality and insurance requirements for each service provider or privately practising clinician they are working with.
- Greater planning around baseline data collection is required. This includes more lead time for ethics approval and introducing new data capture systems such as clinical registries.
- Central ethics submission and standardised questionnaires for program interviews/surveys may reduce delays and produce a more robust dataset for comparison.
- Future grant recipients would most likely benefit from a memorandum of understanding with defined exit clauses.
- Earlier engagement of stakeholders who provide contracted services (for example, radiotherapy) where the ability to influence change is reduced, is warranted.
- The availability, capability and resources available to redesign teams is site-specific and may not be equivalent.
- Solutions often require a business and capital case to progress. This may fall outside of project timelines and across budget cycles, potentially delaying delivery of the complete solution.
- Relevant governing bodies should consider conducting a detailed cost analysis of future programs of work against outcomes and investment.
- Key performance indicators for category 1 surgery patients may have a negative impact on the initial referral to initial treatment timelines outlined in the lung optimal care pathway.
- There is no recommendation within the current guidelines to support a timeliness target for diagnosis and staging tests in lung cancer investigation.

## Conclusions

A wide variety of stakeholders were actively and meaningfully involved in the program. Local capacity to respond positively to treatment and care delays improved as reflected in the key quantitative results. The capability of lung cancer teams to employ redesign methodology in Victoria also improved.

The VLCSRP redesign approaches contributed to a meaningful reduction in the time from referral to first specialist appointment. There was also less variation between health services.<sup>8</sup> Similarly, there was a clear increase in the proportion of patients presented to an MDM, although significant variation between sites persists.<sup>8</sup> In addition, the median time from diagnosis to first chemotherapy and the median time from diagnosis to first radiotherapy treatment reduced. There was also a marked increase in the proportion of patients receiving chemotherapy within 14 days of diagnosis during the post-intervention period. While some improvements in the proportion of patients with a documented supportive care screening tool were noted, it is still a poorly documented activity that needs further study.

## Authorship

The VLCSRP was an initiative conceived by Southern Melbourne Integrated Cancer Services (SMICS), financially supported by the former DHHS and relevant Integrated Cancer Services / health services. SMICS was commissioned to provide statewide leadership and project management.

This report was compiled by Ms Geraldine Largey (SMICS) with support from the VLCSRP and DHHS. This report was endorsed by the VLCSRP Program Governance Committee.

## Program team

Project Manager: Geraldine Largey, Program Manager Research and Special Projects, SMICS

Program Manager: Marita Reed, Program Manager Quality and Cancer Outcomes Cancer Strategy and Development Cancer, Specialty Programs, Medical Research and International Health and Wellbeing, DHHS

## Data collection and evaluation

- Associate Professor Rob Stirling, Monash University, Department of Epidemiology and Preventive Medicine
- Margaret Brand, data collection supervisor, Monash University, Department of Epidemiology and Preventive Medicine

## Program Governance Committee

- Marita Reed, DHHS
- Peter Briggs, replaced by Eva Segelov, Clinician Director SMICS
- Heather Davis, replaced by Seleena Sherwell, Manager SMICS
- Paul Mitchell, Clinical Director, North Eastern Melbourne Integrated Cancer Service
- Jenny Byrne replaced by Kathy Quade, Manager, Western & Central Melbourne Integrated Cancer Service
- Joanne Gell, Manager, Grampians Integrated Cancer Service
- Sue Riches, Program Manager, Barwon South Western Regional Integrated Cancer Service
- Chan Cheah, Consumer

## Local Project Management Group

### Project executive sponsors

Tim Sinclair

Robyn Gillis

Leanne Anderson

Matt Sharp

Donna Sherringham

**Project leads**

Kethly Fallon

Craig Underhill

Robert Blum

Phillip Parente

Zee Wan Wong / Javier Torres

**Project officers**

Kellie Harvey

Cara Ross

Carol Parker

Brooke Trevorah

Carole Mott / Cheryl Lancaster

## Background

Lung cancer is the fifth most commonly diagnosed new cancer and leading cause of cancer death in Victoria.<sup>1</sup> In most cases, by the time lung cancer is diagnosed it is too late for curative treatment.<sup>2</sup> The five-year relative survival for those diagnosed with lung cancer is 20 per cent for females and 16 per cent for males. This compares with 68 per cent and 67 per cent respectively for all cancers combined.<sup>1</sup>

The inaugural Victorian Lung Cancer Summit was held in Melbourne in November 2014. One of the key recommendations arising from this summit was to improve timelines to diagnosis and treatment of lung cancer.

The lung optimal care pathway (OCP) provides a safe, consistent guide to high-quality evidence-based care for people with lung cancer.<sup>6</sup> It recommends the following timeframes for delivering care from the point of initial referral to the start of treatment:

- The specialist appointment should take place within two weeks of initial GP referral.
- Ideally, all newly diagnosed patients should be discussed in a multidisciplinary meeting (MDM) before beginning treatment.
- The time from initial referral to initial treatment should be no more than six weeks.

Delays in lung cancer diagnosis may result in disease progression and a change in prognosis from potentially curable to incurable, particularly in faster growing tumours.<sup>10</sup> Such delays may occur at one or more points along the lung pathway including referral, specialist review, staging investigation, diagnosis and/or treatment.<sup>11</sup>

In 2010 the Victorian Lung Cancer Registry (VLCR) was set up to collect prospective data on the care patterns of all newly diagnosed lung cancer patients at certain health services.<sup>12</sup> Critically, a retrospective study ( $n = 1,417$ ) of VLCR data sourced from six public and two private health services reported an interval delay of 30 median days (interquartile range (IQR) 6–84) from diagnosis to first treatment and 53 median days (IQR 25–106) from referral to first treatment.<sup>4</sup> Moreover, patients managed in the public sector had a longer median delay from referral to first treatment (61 days, IQR 35–118) than those in the private sector (30 days, IQR 13–76).<sup>4</sup> Notably, a retrospective study ( $n = 655$ ) of non-small cell lung cancer patients in Victoria showed that only 30 per cent ( $n = 198$ ) were treated with curative intent, and 21 per cent ( $n = 138$ ) received no treatment at all.<sup>5</sup> Similarly, only 33 per cent ( $n = 206$ ) of cases were discussed at a lung MDM. This was despite evidence showing that patients whose cases are discussed at a lung MDM are more likely to receive treatment and to survive longer.<sup>5</sup>

The Department of Health and Human Services (DHHS) set up the Victorian Lung Cancer Service Redesign Program (VLCSR) in 2016. Service redesign projects were set up at five Victorian health services for locally responsive health service review and improvement initiatives in line with steps 2–4 of the OCP for people with lung cancer.<sup>6</sup> Each project had five phases: set-up, diagnostic, solution, implementation/evaluation and sustainability.

This report describes the outcomes from the VLCSR evaluation and:

- confirms the overall positive impact of the program
- offers funding bodies an evidence base to assess the program they sponsored
- informs development of future initiatives to further progress the timeliness of lung cancer care in Victoria.

# Program overview

## Program logic overview

### Goal

To improve the timeliness of care for Victorian lung cancer patients.

### Objectives

- To decrease delays from receipt of referral to first lung cancer specialist appointment.
- To decrease time from first specialist appointment to first staging test.
- To decrease time from receipt of referral to a diagnosis of lung cancer.
- To ensure all patients with a new diagnosis of lung cancer are discussed at an MDM.
- To ensure sustainability of the redesigned services post project by building multidisciplinary lung team capacity to continue to monitor and improve performance.
- To increase the capability of Victorian lung cancer teams to employ redesign methodology to support locally led service improvement and application of best practice principles.

### Scope inclusions

Health services with  $\geq 150$  patients with one or more admissions for primary lung cancer per year. (Health services with  $< 150$  patients with one or more admissions for lung cancer per year needed to submit a joint application with another site.)

### Guiding principles

- Projects consist of five clearly defined phases: the set-up phase, diagnostic phase, solution phase, implementation and evaluation phase, and sustainability phase.
- Redesign methodologies consistent with the DHHS Redesigning Hospital Care Program<sup>14</sup> be used to understand baseline performance and improve processes across the referral to treatment pathway.
- Strong engagement of multidisciplinary, cross-functional teams across the selected lung project setting.
- Solution redesign supports application of the principles for best practice management of lung cancer in Australia.<sup>1</sup>
- Pilot design solutions are signed off by the project executive officer and project lead at health services before implementation. Solutions are tested in a series of plan–do–study–act (PDSA) cycles.
- Projects are sustainable and have potential to apply to other health services.

### Governance

- DHHS Cancer Strategy and Development
- Program Governance Committee
- Local Project Management Team

## Reporting requirements

- Diagnostic report at three months
- Solution report at six months
- Implementation and evaluation report at 12 months
- Sustainability report at 18 months

## Inputs

- Grant funding
- Local Integrated Cancer Service (ICS) or health service funding
- DHHS
- VLCR
- Project manager
- Project officers
- ICS team members
- Local project teams

## Activities

- Conduct workshops
- Data analytics
- Process mapping
- Design intervention
- Test intervention using PDSA cycles
- Implement and evaluate

## Outputs

- Diagnostic report
- Local project plan
- Local interventions
- Communication plan
- Risk plan
- Solution report
- Implementation/evaluation report

## Expected outcomes

- Patient-centred care
- Timely access to evidence-based pathways of care
- Multidisciplinary care
- Coordination, communication and continuity of care
- Data-driven improvements in lung cancer care
- Increased capability to employ redesign methodology
- Sustainability of the redesigned services

# Methodology

## Service redesign

Service redesign methodologies were used to understand baseline performance and improve processes across steps 2–4 of the lung cancer OCP.<sup>6</sup> Successful health services were encouraged to develop local redesign projects that:

- aligned with the aims of the program
- applied the principles for best practice management of lung cancer in Australia.<sup>7</sup>

Each participating health service held a multidisciplinary diagnostic and solution workshop. The diagnostic workshop mapped the cancer pathway from the point of initial referral to the start of treatment. Service gaps, areas of variation and barriers to timeliness of care were identified. The solution workshop focused on generating evidence-based solutions to the problems identified and process redesign. Improvements were gained by:

- minimising variation
- reducing defects
- eliminating waste
- improving flow
- applying the five best practice principles for lung cancer management.<sup>7</sup>

Pilot design solutions were tested using PDSA cycles to better understand contributions to performance improvement. Four Community of Practice (CoP) forums were held over the life of the project to:

- support collaborative learning
- facilitate joint problem solving
- spread/sustain best practice improvements in delivering lung cancer care.

Southern Melbourne Integrated Cancer Service (SMICS) also held regular teleconferences with project officers from the health services so they could support and learn from each other. SMICS recorded relevant current and emerging risks over the life of the program in the VLCSRP Risk Registry, along with strategies for addressing those risks.

## Data collection

The evaluation collected both quantitative and qualitative data. This included information on clinical and consumer experience. Interview/survey questionnaires were designed locally and results thematically analysed. The VLCSRP submitted a National Mutual Acceptance ethics application to Alfred Health's Human Research Ethics Committee. Health services also submitted a site-specific assessment to comply with relevant jurisdictional standard operating procedures.

The VLCSRP set up a secure web-based portal to collect, clean and store data. Patients were captured over a six-month period from 1 September 2016 to 28 February 2017.<sup>8</sup> The local service redesign intervention was then progressively rolled out. Impacts were measured against project performance indicators during the post-implementation phase from 1 March 2017 to 31 August 2017.<sup>8</sup>

A total of 205 new cases of primary lung cancer were captured from the Victorian Admitted Episodes Dataset in the pre-implementation phase and 224 in the post-implementation phase.<sup>8</sup>

The VLCSRP collected, analysed and benchmarked data against seven key performance indicators (refer to Table 7 in the 'Evaluation' section), with validated interval measures.<sup>13</sup> No validated measure could be found in the guidelines to support the intervals from the first specialist appointment to the first clinical staging test and the first specialist appointment to the first positron emission tomography (PET) scan. Targets for these intervals were therefore determined by local expert consensus.

Performance indicators included:

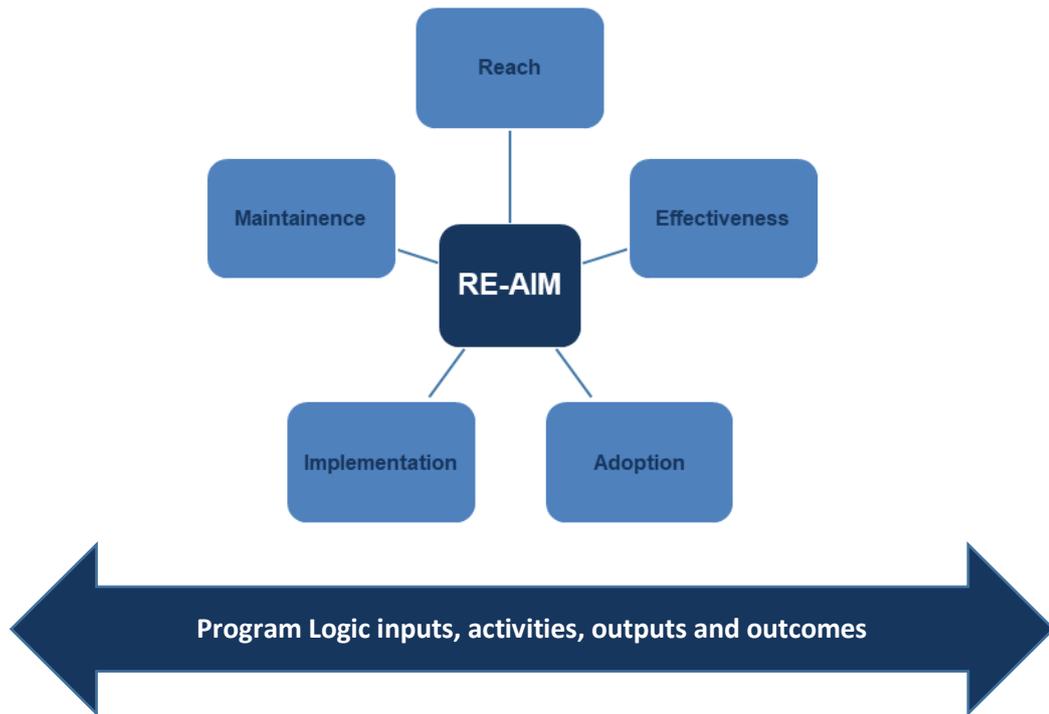
- 1.0 Referral to first specialist appointment
- 2.0 First specialist appointment to first clinical staging test
- 3.0 First specialist appointment to PET scan
- 4.0 Referral to diagnosis
- 5.0 Diagnosis to first treatment (any intent)
  - 5.1 Diagnosis to first surgical treatment
  - 5.2 Diagnosis to first chemotherapy treatment
  - 5.3 Diagnosis to first radiotherapy treatment
- 6.0 MDM documented in medical records
- 7.0 Supportive care screening tool documented in medical records

## Evaluation

A program logic (refer to 'Program overview' section) clarified the program and ensured a shared understanding of the VLCSRP's intended outcomes among stakeholders. The systematic RE-AIM (Reach, Effectiveness, Adoption, Implementation and Maintenance) evaluation framework<sup>14</sup> was selected because of the robust evidence supporting its use in evaluating health programs.<sup>9,15,16</sup>

An evaluation plan was developed to assess the overall impact of the VLCSRP and to generate meaningful insights. It did this by comparing pre- and post-intervention key performance indicators and qualitative input from thematic analysis of local consumer and clinician interviews/surveys. A capability improvement survey based on selected criteria from the Redesigning Hospital Care Program's Health Improvement Capability Quotient Tool (DHHS)<sup>14</sup> was developed to assess the level of organisational capability for improvement (lung redesign) at the health services. This survey was conducted at baseline and repeated at the end of the implementation and evaluation phase of the project. A mixed methods survey containing a succession of Likert scale, multiple choice and free-text questions was developed to examine stakeholder views on the five RE-AIM model dimensions of quality (Figure 1).<sup>9</sup> Some demographic information was also collected.

**Figure 1: RE-AIM framework dimensions**



# Program implementation

## Project framework

The project framework and key deliverables for the four key phases of the program are outlined in Table 1. The program set-up phase also included VLCSRP activities such as:

- circulating an advance notice document
- electronically publishing and submitting the application
- setting up an applicant review panel
- selecting and notifying successful applicants
- setting up the VLCSRP Program Governance Committee
- creating the VLCSRP Program Governance Committee’s terms of reference
- developing a VLCSRP project plan, communication strategy and risk registry
- organising CoP 1
- local recruitment of VLCSRP project officers.

**Table 1: Project framework and deliverables**

Phase	Start	EFD	AFD	Milestone deliverables
Diagnostic	Jul 2016	Sep 2016	Nov 2016	<ul style="list-style-type: none"> <li>• Statewide stakeholder engagement</li> <li>• Diagnostic workshop conducted</li> <li>• ‘As is’ process map completed</li> <li>• Retrospective data snapshot completed</li> <li>• Variations in timeliness of care identified</li> <li>• Diagnostic reports submitted</li> <li>• Prospective data collection commenced</li> </ul>
Solution	Dec 2016	Feb 2017	Feb–Mar 2017	<ul style="list-style-type: none"> <li>• Solution workshop conducted</li> <li>• Future process map completed</li> <li>• Agreed, evidence-based solutions generated</li> <li>• Integration of principles for best practice</li> <li>• Solution sign-off</li> <li>• Solution design reports submitted</li> <li>• CoP 2 completed</li> </ul>
Implementation and evaluation (I&E)	Mar–Apr 2017	Sep 2017	Sep–Oct 2017	<ul style="list-style-type: none"> <li>• Outstanding previous phase reports submitted</li> <li>• Interventions tested using PDSA cycles</li> <li>• Intervention implemented in practice</li> <li>• Prospective implementation data collection started</li> <li>• Interim 1 and Interim 2 data report released</li> <li>• I&amp;E reports submitted</li> <li>• CoP 3 completed</li> </ul>

Phase	Start	EFD	AFD	Milestone deliverables
Sustainability	Oct–Nov 2017	Mar 2018	Mar–Apr 2018	<ul style="list-style-type: none"> <li>Outstanding I&amp;E phase reports submitted</li> <li>Overarching evaluation survey completed</li> <li>Local sustainability audit completed</li> <li>Sustainability report submitted</li> <li>CoP 4 completed</li> </ul>

AFD = actual finish date; EFD = expected finish date

## Stakeholders

The VLCSRP engaged a wide and varied group of Victorian healthcare executives, senior managers and multidisciplinary workers (Table 2) who deliver lung cancer care.

**Table 2: Key stakeholders**

Key stakeholders	Contact
DHHS	Marita Reed
SMICS	Geraldine Largey Peter Briggs Heather Davis, replaced by Seleena Sherwell
Monash University (VLCR)	John Zalcborg Rob Stirling Margaret Brand Breanna Pellegrini Arul Earnest
VLCSRP Program Governance Committee	Marita Reed Peter Briggs / Eva Segelov Heather Davis / Seleena Sherwell Paul Mitchell Jenny Byrne, replaced by Kathy Quade Joanne Gell Sue Riches Chan Cheah
Local ICS managers	Heather Davis / Seleena Sherwell Chris Packer, replaced by Sophie Scott Ilana Solo Katherine Simons
Local executive sponsors	Tim Sinclair Robyn Gillis Leanne Anderson Matt Sharp Donna Sherringham

Key stakeholders	Contact
Local project leads	Kethly Fallon Craig Underhill Robert Blum Phillip Parente Zee Wan Wong / Javier Torres
Local project officers	Kellie Harvey Cara Ross Carol Parker and Christal Guthrie Brooke Trevorah Carole Mott and Cheryl Lancaster

## Focus areas

The diagnostic phase of the VLCSRP identified several barriers to the timeliness of care. Using common redesign methods, each site undertook a root cause analysis of these barriers. Table 3 lists the areas of focus prioritised for improvement.

**Table 3: Focus area and root causes**

Focus area	Root causes
Time delay > 14 days from referral to first specialist appointment	<ol style="list-style-type: none"> <li>1. Variance in GP awareness of current evidence-based practice in managing lung cancer</li> <li>2. Multiple referral entry pathways</li> <li>3. Lack of web-based referral information</li> <li>4. Poor quality of initial referrals</li> <li>5. Multiple referral processing steps</li> <li>6. Varying processes of triage for referrals</li> <li>7. Delay in obtaining a specialist appointment</li> <li>8. Limited availability and access to lung specialists</li> </ol>
Time delay > 28 days from referral to diagnosis	<ol style="list-style-type: none"> <li>1. Lack of local endobronchial ultrasound service</li> <li>2. Varying wait times to schedule investigations</li> <li>3. Ineffective communication</li> <li>4. Ineffective coordination of care</li> </ol>
Time delay of > 42 days from referral to start of first treatment	<ol style="list-style-type: none"> <li>1. Waiting on case to be discussed at lung MDM</li> <li>2. Infrequent lung MDMs</li> <li>3. Limited thoracic surgeon availability</li> <li>4. Care provided by multiple providers across regions</li> <li>5. Limited supportive care patient screening</li> </ol>

## Key interventions

- Creating a lung cancer assessment service and rolling out an electronic referral system with the ability to prompt clinicians at each step to ensure timelines are met.
- Setting up a weekly rapid access clinic / MDM with a clearly identified decentralised referral pathway with weekly MDM teleconference participation from metropolitan tertiary specialists and surgeons.
- Setting up a rapid access clinic using existing oncology medical specialists. This enabled MBS billing, with reporting measures set up within the local patient management system for data to be tracked via a monthly executive reporting system.
- Developing an auditing/dashboard system within the CANMAP system to ensure availability of accurate and real-time data. Business case for a multidisciplinary rapid access lung lesion clinic completed. Funding sourced for a lung cancer care coordinator role.
- Setting up a multidisciplinary thoracic clinic, with the addition of a respiratory physician in March 2018 and a dietitian in April 2018.
- Models of care for the lung cancer assessment service and rapid access clinic varied by sites, but overarching principles included more rapid access to care and improved coordination of care.

## Challenges

A number of unexpected events (refer to Table 4) occurred over the life of the project. These had a negative impact on the scheduled timeframe for submitting reports. The program ended up taking 22–23 months compared with the scheduled 18 months to complete.

**Table 4: Challenges and causal factors**

Challenge	Causal factors
Scope variance	<ul style="list-style-type: none"> <li>• Initial participant concerns about scope variance were in part due to the need for more robust contractual obligations between stakeholders</li> </ul>
Delay in integration with the VLCR	<ul style="list-style-type: none"> <li>• Lead time required to achieve governance approval to access health service data</li> <li>• Relocation of cancer service at two sites</li> <li>• Implementation of electronic medical record at singular site</li> </ul>
Local recruitment delays	<ul style="list-style-type: none"> <li>• Competing priorities and administrative delays affected recruitment to local project officer positions</li> </ul>
Ethics delays	<ul style="list-style-type: none"> <li>• Need for separate ethics submissions for consumer and clinical interviews</li> <li>• Wide variance in ethics approval timeframes</li> </ul>
Access	<ul style="list-style-type: none"> <li>• Significant delays in gaining access to representative data governance, confidentiality and insurance approvals at singular service with multiple public and private providers</li> </ul>
Unforeseen staffing issues	<ul style="list-style-type: none"> <li>• Unexpected local reduction in surgical capacity had an impact on multidisciplinary team (MDT) decision making and clinic and surgery availability at one participating health service</li> </ul>
Low and variable volume numbers	<ul style="list-style-type: none"> <li>• Low-volume sites considered VLCR criteria for patient recruitment restrictive</li> </ul>

## Resources developed

A variety of resources were developed over the duration the VLCSRPs including:

- a capability improvement survey
- VLCSRPs Grants Scheme 2016 application guidelines
- VLCSRPs prioritisation scoring guide
- VLCSRPs application prioritisation scoring guide
- VLCSRPs applicant assessment summary
- CIS summary assessment record
- VLCSRPs program governance terms of reference
- VLCSRPs Risk Registry
- Summation report templates for SMICS-VLCSRPs pilot sites teleconference meetings
- Solution report template
- implementation and evaluation report template.

## Communication strategy

The stakeholders listed in Table 5 were engaged in the communication strategy (refer also to Appendix B).

**Table 5: Stakeholders engaged**

Stakeholder group	Stakeholder	Scheduled meetings	Phone/ Webex	Progress reports/ briefings	Updates
Sponsor	DHHS	Yes	Yes	Yes	Yes
Sponsor	ICS directors and managers			Yes	
Lead agency body	Participating ICS directors and managers	Yes	Yes		Yes
Lead agency body	SMICS Leadership Group	Yes	Yes	Yes	Yes
Lead agency body	SMICS Executive Committee	Yes		Yes	
Lead agency body	VLCSRP	Yes	Yes		Yes
VLCSRPs governance body	VLCSRPs Program Governance Committee	Yes	Yes	Yes	Yes
VLCSRPs project officers	Project officers	Yes	Yes		Yes

Updates included: verbal, email, publications SMICS newsletter, website and conference.

# Evaluation

Evaluation of the VLCSR program included the following key activities:

- quantitative analysis by the VLCSR
- local qualitative analysis of consumer and clinician interviews/surveys
- quantitative and qualitative analysis of responses to a capability improvement survey and RE-AIM survey.

## Quantitative analysis

The VLCSR (Monash University) analysed the data. Summary statistics and time series analysis was performed to analyse indicator performance for the six-month **pre-implementation period** (patients diagnosed 1 September 2016 to 28 February 2017) and the six-month **implementation period** (patients diagnosed 1 March 2017 to 31 August 2017).<sup>8</sup> Only sites with enough data for both time periods were included in the time series analysis.<sup>8</sup> Benchmarked funnel plots are provided for indicator performance during the six-month implementation period only. Funnel plots were risk-adjusted for patient age (years), gender, birthplace (Australia vs other) and clinical staging where deemed appropriate by a clinical panel.<sup>8</sup>

## Total cohort results

**Table 6: Summary statistics for the patient cohort (key outcomes) – all sites**

Measure	Pre-implementation	Implementation	p-value
Number of patients	205	224	
Mean age, years (SD)	73.2 (10.4)	70.2 (10.2)	0.003*
Sex: female	82 (40.0%)	89 (39.7%)	0.950
Sex: male	123 (60.0%)	135 (60.3%)	
Birthplace: Australia	129 (62.9%)	163 (72.8%)	0.029
Smoking status: current smoker	57 (27.8%)	82 (36.6%)	0.130
Clinical stage: I	16 (7.8%)	21 (9.4%)	0.650
Clinical stage: IV	74 (36.1%)	68 (30.4%)	
Patient underwent any treatment	141 (68.8%)	164 (73.2%)	0.310
Patient underwent surgical treatment	35 (17.1%)	49 (21.9%)	0.210
Patient underwent chemotherapy treatment	74 (36.1%)	84 (37.5%)	0.045*
Patient underwent radiotherapy treatment	79 (38.5%)	89 (39.7%)	0.610

Source: VLCSR, VLCSR all-site final report.

Notes:

IQR = Interquartile range, observations at the 25th and 75th percentiles are provided in parentheses; SD = standard deviation.

A two-sample t-test  $p$ -value is provided for comparison of patient age between the pre-implementation and implementation period samples. A Pearson's chi-squared  $p$ -value is provided for all other patient characteristics to compare pre-implementation and implementation period samples.

\* denotes a statistically significant  $p$ -value for either the two-sample t-test or Pearson's chi-squared test ( $p$ -value < 0.05).<sup>8</sup>

## Key findings

The mean age of those ( $n = 224$ ) who took part in the implementation period was 70.2 years. Of these patients, most were male (60.3 per cent) and born in Australia (72.8 per cent). Notably, 36.6 per cent ( $n = 82$ ) were current smokers and 30.4 per cent ( $n = 68$ ) had stage IV cancer. Almost three-quarters (73.2 per cent;  $n = 164$ ) of patients received at least one active anti-cancer treatment modality.

## Performance measures

Table 7 summarises the key performance indicators for all sites.

**Table 7: Summary statistics for key performance indicators – all sites**

### Indicator: 1.0: Referral to first specialist appointment

Measure	Pre-implementation	Implementation
Number of patients	175	209
Median number of days (IQR)	6.0 (0.0, 15.0)	4.0 (1.0, 10.0)
Mean number of days (SD)	10.9 (18.1)	7.5 (10.9)
Within 14 days, number (%)	130 (74.3%)	176 (84.2%)

### Indicator: 2.0: First specialist appointment to first clinical staging test

Measure	Pre-implementation	Implementation
Number of patients	137	183
Median number of days (IQR)	3.0 (1.0, 7.0)	4.0 (1.0, 10.0)
Mean number of days (SD)	9.1 (21.2)	11.1 (26.2)
Within 14 days, number (%)	121 (88.3%)	150 (82.0%)
Within 21 days, number (%)	127 (92.7%)	160 (87.4%)

### Indicator: 3.0: First specialist appointment to PET scan

Measure	Pre-implementation	Implementation
Number of patients	72	102
Median number of days (IQR)	8.0 (4.0, 17.5)	9.5 (4.0, 25.0)
Mean number of days (SD)	16.0 (23.0)	20.1 (34.1)
Within 14 days, number (%)	49 (68.1%)	66 (64.7%)
Within 21 days, number (%)	60 (83.3%)	74 (72.5%)

**Indicator: 4.0: Referral to diagnosis**

Measure	Pre-implementation	Implementation
Number of patients	181	210
Median number of days (IQR)	8.0 (3.0, 22.0)	11.0 (5.0, 28.0)
Mean number of days (SD)	20.8 (35.8)	22.3 (32.3)
Within 28 days, number (%)	148 (81.8%)	159 (75.7%)

**Indicator: 5.0: Diagnosis to first treatment (any intent)**

Measure	Pre-implementation	Implementation
Number of patients	141	160
Median number of days (IQR)	22.0 (8.0, 37.0)	21.5 (6.5, 37.5)
Mean number of days (SD)	28.8 (31.2)	28.5 (36.3)
Within 14 days, number (%)	53 (37.6%)	59 (36.9%)

**Indicator: 5.1: Diagnosis to first surgical treatment**

Measure	Pre-implementation	Implementation
Number of patients	35	46
Median number of days (IQR)	0.0 (0.0, 28.0)	2.5 (0.0, 38.0)
Mean number of days (SD)	14.3 (20.5)	37.7 (73.3)
Within 14 days, number (%)	22 (63%)	25 (54%)

**Indicator: 5.2: Diagnosis to first chemotherapy treatment**

Measure	Pre-implementation	Implementation
Number of patients	74	83
Median number of days (IQR)	32.5 (16.0, 55.0)	29.0 (13.0, 49.0)
Mean number of days (SD)	38.6 (28.8)	36.7 (30.8)
Within 14 days, number (%)	17 (23%)	22 (27%)

**Indicator: 5.3: Diagnosis to first radiotherapy treatment**

Measure	Pre-implementation	Implementation
Number of patients	79	89
Median number of days (IQR)	35.0 (19.0, 67.0)	33.0 (21.0, 47.0)
Mean number of days (SD)	47.5 (47.9)	40.6 (32.2)
Within 14 days, number (%)	15 (19%)	11 (12%)

**Indicator: 6.0: MDM documented in medical records**

Measure	Pre-implementation	Implementation
Number of patients	205	224

Measure	Pre-implementation	Implementation
Yes, number (%)	125 (61.0%)	150 (67.0%)

### Indicator: 7.0: Supportive care screening tool documented in medical records

Measure	Pre-implementation	Implementation
Number of patients	205	224
Yes, number (%)	45 (22.0%)	59 (26.3%)

Source: VLCR, VLCSR all-site final report.

IQR = interquartile range, observations at the 25th and 75th percentiles are provided in parentheses; SD = standard deviation.

## Key findings

Redesign improvement initiatives saw significant improvements from baseline in several performance indicators in the post-intervention period.

In summary:

- There was a reduction in time from referral to first specialist appointment (Indicator 1) across all sites in the post-intervention period, with the interval falling from a median of 6.0 (0.0–15.0) to 4.0 (1.0–10.0) days.
- There was an increase in the proportion seen by a specialist within 14 days (OCP guidelines) from 74.3 per cent to 84.2 per cent across all sites. Interestingly, these improvements did not translate to reductions in the post-intervention interval times from first specialist appointment to first staging test, first specialist appointment to first PET scan or in the time from referral to diagnosis.
- 73.2 per cent ( $n = 164$ ) of patients received at least one active anti-cancer treatment.
- The median time from diagnosis to first chemotherapy treatment decreased from 32.5 (16.0, 55.0) days to 29.0 (13.0, 49.0) days in the post-intervention period.
- The proportion of patients who started chemotherapy within 14 days of diagnosis increased from 23 per cent ( $n = 17$ ) in the pre-intervention period to 27 per cent ( $n = 22$ ) in the post-intervention period.
- The median time from diagnosis to first radiotherapy treatment decreased from 35.0 (19.0, 67.0) days to 33.0 (21.0, 37.0) days in the post-intervention period.
- The proportion of patients with documented presentation to an MDM increased from 61 per cent in the pre-intervention period to 67 per cent (at three of five sites) in the post-intervention period.
- There was a 4.3 per cent increase in the proportion of patients with a documented supportive care screening tool from 22 per cent in the pre-intervention period to 26.3 per cent in the post-intervention period (though the overall proportion of documentation is low).

## Qualitative analysis

### Clinician interviews/surveys

Table 8 provides a snapshot of the key themes that emerged from thematic analysis of local clinician interviews/surveys.

**Table 8: Thematic analysis of clinician interviews/surveys**

Theme	Pre-intervention quote	Post-intervention quote
Referral in	'Multiple methods of referral ... no standardised pathway to follow.'	'Timely [rapid access clinic] ... has been one of the changes that has helped most.'
Nomination and presentation at MDM	'... hard because we only have the meeting once per month.'	'I'm sure increasing the frequency of meetings has assisted with more timely diagnosis and initiation of treatment.'
Delay in outpatient clinic appointment	'Public clinics are busy. Pressure on staff to squeeze in patients.'	'I think it has improved with streamlining from the project.'
Endobronchial ultrasound (EBUS)	'No EBUS ... lengthy delays when investigations need to completely externally.'	'EBUS since we have changed our referral pathway ... has come down to 0–2 weeks – it has almost halved.'
Triaging of referrals	'I don't think the triage system is designed to pick up all urgent referrals.'	'I think just identifying the appropriate referrals and fast tracking them has made a big difference.'
Referral timelines	'Referrals lost / not triaged appropriately.'	'I think it's great that we now have somewhere that the GPs can send patients as soon as they are diagnosed, and are confident they will receive gold standard care and support in the short term and that everyone at the clinic is working towards achieving the best outcome for every patient they see.'  'Based on the results to date there has been a great improvement in referral to [the first specialist appointment] timeframes.'
Investigations – lung function tests (LFT)	'Lung function tests currently have a wait list of approximately one month.'	'LFTs are performed sooner as easier access and raised awareness.'
Benefit of an MDT clinic	'The challenge is that would need to be run efficiently as these clinics can be inherently inefficient.'	'Informal communications are accessible and have improved.'  'Patient management is more appropriate and their work-up more efficient.'

## Consumer interviews/surveys

Table 9 provides a snapshot of the key themes that emerged from local analysis of consumer interviews/surveys.

**Table 9: Thematic analysis of consumer interviews/surveys**

Theme	Pre-intervention quote	Post-intervention quote
Information	'... 6 months later and I still haven't got enough information about my cancer.'	'The lung nurse is fantastic. She goes the extra mile. Lots of handouts, forms and things you can get reimbursed for.'
Support between appointments	'It's frustrating to have to wait for the appointment to get your results.'	'I thought the support I received was brilliant and between the first two appointments I had a lady ring me to see if I was okay and if there were any questions. I thought that was wonderful; it was brilliant.'
Timeliness of referral to diagnosis	'Referred for a stress test; however, this was ceased because lesions on lungs were noted – however, referral to metro hospital never eventuated and 6 months later I contacted physician to see what was going on. He referred me straight to oncology who organised all the tests – I now have stage IV lung cancer.'	'My GP heard of the lung clinician at the hospital and he referred me straight through after the CT showed a spot in my lungs. I saw the doctor the following week and everything happened really quickly after that.'
Transport and travel	'Causes unnecessary stress at a time when there is already so much going on.'	'The care coordinator at [the health service] assisted with organising accommodation for us while my husband had radiotherapy.'

## Mixed methods analysis

### Capability improvement survey

Two collaborating health services submitted a shared capability improvement survey. Analysis of the before and after intervention capability improvement surveys revealed improvement in organisational capability (lung redesign) at only two participating health services. The maximum allotted was 12.5 points (Table 10).

**Table 10: Capability improvement survey results**

Health service	Pre-intervention survey points	Post-intervention survey points
Health service 1	11.5	11.75
Health service 2	10.5	8.75
Health service 3	8.25	7.5
Health service 4	10.5	12.25

## RE-AIM survey

A total of 32 responses (out of 94 surveys) were received, equating to a 34 per cent response rate. Of these, seven surveys were incomplete, leaving 25 complete surveys for analysis. More responses were received from regional compared with metropolitan services. Local project clinical leads / clinicians were the top role responders (Appendix A). Because non-applicable responses provided no meaningful value to final analysis, they were removed from the overall number of survey responses to each question. An analysis of stakeholder responses revealed the following.

### Reach

The dimension of 'reach' aimed to:

- assess the level of engagement in the project
- identify the local drivers and barriers to group participation
- identify the strategies employed to overcome those barriers.

A detailed analysis of the results is provided in Appendices B, C and D.

- In summary, 88 per cent of all respondents ( $d = 24$ ) agreed that a wide variety of stakeholders had actively and meaningfully been engaged in the program (Appendix B).
- A total of 133 clinicians took part in the pre-intervention diagnostic and solution workshops.
- Moreover, 106 health professionals and 64 consumers took part in the pre-intervention and post-intervention program interviews/surveys.

**Key point: 88 per cent of all respondents agreed a wide variety of stakeholders had actively and meaningfully been engaged in the program (Appendix B).**

### Drivers and barriers

The complete list of the drivers to barriers to target group participation in the program are listed in order of frequency of response in Appendix C.

The top-rated drivers to participation in the program were:

1. broad multidisciplinary solution design
2. variation and ineffective care coordination
3. alignment with organisational priorities
4. patient journey focus
5. delays in timeliness of patient care.

### Primary barrier to participation in the program

The primary reported barrier to target group participation was 'competing priorities'. Reported strategies to overcome this and other barriers are grouped into six themes in Appendix D.

## Effectiveness

The RE-AIM dimension of ‘effectiveness’ aimed to assess the impact of the VLCSRP and to identify the difference, if any, that it made. A detailed analysis of the results is provided in Appendices E, F, G, H, I and J. In summary, most respondents said the program had been effective (Appendix E).

- 92 per cent agreed the VLCSRP had met its aims and short-term outcomes.
- 82 per cent agreed there is more capability in the organisation to extract, analyse and interpret lung cancer performance data than there used to be.
- 80 per cent were satisfied with the redesign solution generated by the program/service.
- 80 per cent agreed the capacity to monitor and respond to delays in the timeliness of lung cancer care had improved because of this program.

## Perceived benefits from program involvement

The perceived benefits from consumer/clinician or other involvement in the program were collated in order response numbers (Appendix F). The top perceived benefits are summarised below.

### Benefits from consumer involvement

- Improved referral management
- Timely diagnostic test scheduling
- Improved experience of care
- Timely diagnosis and treatment
- Enhanced integration/coordination of care
- Improved access to lung cancer care

### Benefits from clinician/others involvement

- Sharing of ideas and networking
- Greater inter-department collaboration
- Opportunity to enhance quality of patient care
- MDT-led solution design
- Engagement in shared purpose

## Perceived impact on patient experience

Respondent feedback on the perceived impact of the program intervention on patient experience was analysed by theme. This is recorded in Appendix G. A summary of the key findings is presented in Table 11.

**Table 11: Impact on patient experience**

Theme	Responder comments
Coordination and integration of care	<p>Patient’s coordination of care improved greatly</p> <p>Timeliness of care improved greatly</p> <p>Reduced unnecessary travel to and from metropolitan centres</p> <p>Patient’s problem is assessed and managed in a timely and coordinated manner, resulting in a more satisfactory outcome with less uncertainty about the process</p>

Theme	Responder comments
Level of impact of intervention	Major impact High level of impact
Timeliness of care	Significant impact in reducing the delays in testing and confirmation of diagnosis Improved timeliness to accessing first specialist appointment Improved treatment options
Multidisciplinary meeting	Improved and timelier access to an MDM Multidisciplinary clinic means reduced multiple visits / reduced delays for tests

### Skills gained/improved

The top-rated skills selected by respondents as gained or improved because of taking part in the program (Appendix H) included:

- service redesign
- stakeholder management
- effective communication
- project management
- improvement knowledge.

Notably, 52 per cent of respondents ( $n = 23$ ) said they had learnt new skills through being part of the redesign program (Appendix I). Also, most survey participants indicated their intent to continue to use the knowledge and skills gained in the program (Appendix J).

### Adoption

The RE-AIM dimension of 'adoption' examined:

- uptake of the intervention
- number and nature of supporting systems adopted
- new partnerships formed.

A detailed analysis of the results is provided in Appendices K, L, M and N.

**Key point: 50 per cent of respondents ( $d = 16$ ) adopted five or more interventions, while the remaining respondents adopted between two and four interventions (Appendix K).**

The top-rated lung pathway interval points for intervention adoption (Appendix K) were:

- referral to first specialist appointment
- receipt of referral to definitive diagnosis
- diagnosis to start of first treatment
- receipt of referral to first treatment
- first specialist appointment to first staging test.

## Partnerships formed

A number of new partnerships were formed through the program (Appendix L). In brief, new external partnerships were developed with local ICS, metropolitan health services, local GPs and Primary Health Networks over the course of the program.

Notably, only 45 per cent of respondents ( $n = 22$ ) said they were likely to maintain future relationships with the stakeholders involved in the program. A further 41 per cent considered it neither likely nor unlikely, while the remaining 14 per cent considered it unlikely (Appendix M).

## Supporting/enabling systems adopted

Respondent ( $n = 10$ ) feedback on the supporting/enabling systems adopted in the uptake of the program was collated into four themes (Appendix N). A summary of the systems adopted is presented by theme in Table 12.

**Table 12: Summary of systems adopted**

Theme	Supporting/enabling systems adopted
Governance	Better use of governance structures
Data	Addition of lung cancer metrics to health service's data reporting system
Stakeholders	Use of lung MDM to achieve project outcomes
IT systems	Separate clinic episodes and changes to IT systems

## Implementation

The dimension of 'implementation' aimed to examine participant views about the extent to which the program had been implemented. A detailed analysis of the results is provided in Appendices O, P, Q and R.

**Key point: 75 per cent of all respondents said they were satisfied with the overall process of program implementation (Appendix O).**

Similarly, most respondents were satisfied with the method selected for program use (Appendix O).

## Internal/external *enablers* of implementation

A detailed analysis of the enablers that helped with program rollout, collated by theme, are in Appendix P.

A summary of the findings by designated theme is in Table 13.

**Table 13: Summary of *enablers* of implementation**

Theme	Internal enablers
Administration	<ul style="list-style-type: none"> <li>• Internal administration assistance</li> <li>• Moving into a new hospital</li> </ul>
Clinical/other personnel	<ul style="list-style-type: none"> <li>• Strong support for the project from the clinical director and health service management/executive and ICS</li> <li>• Strong commitment and support from lung MDT members</li> </ul>

Theme	External enablers
External stakeholders	<ul style="list-style-type: none"> <li>• Support from DHHS, SMICS and VLCR</li> <li>• SMICS approaching the project with passion and commitment</li> <li>• Site visit by SMICS was pivotal</li> <li>• Additional funding from ICS to enable more resources for the project</li> <li>• Local Primary Health Network input</li> </ul>

## Internal/external *barriers* to implementation

A detailed analysis of the barriers to program rollout, collated by theme, is in Appendix Q. A snapshot of the findings by designated theme is in Tables 14 and 15.

**Table 14: Summary of *internal barriers* to implementation**

Theme	Internal barriers
Access	Access to local data Navigating public/private systems
Funding	Lack of funding for any initiative that went beyond refining current processes using existing personnel
Local capacity	The addition of a fast-stream lung cancer assessment path into the already overcrowded outpatient clinics, without any increase in staffing
Unplanned changes	Unforeseen thoracic surgery staffing issues impacting on MDM decision making

**Table 15: Summary of *external barriers* to implementation**

Theme	External barriers
Data	Data centralised in Melbourne
Funding	Limited funding for resources required for large scale of work involved, especially with requirements of data validation
Service agreement	Difficult to influence timelines for patients having radiotherapy as their initial treatment, due to external provider agreement
Program planning	Massive scope creep through the VLCR

## Maintenance/sustainability

This element of the RE-AIM framework aimed to establish the likely sustainability of the outcomes of the program. A detailed analysis of the results is provided in Appendices R, S, T and U.

Seventy-one percent ( $n = 24$ ) of respondents reported that it was extremely to very likely the outcomes from the program would be sustained. A further 29 per cent considered it somewhat likely (Appendix R). In addition, 83 per cent ( $n = 23$ ) of participants reported there was a clear, consistent understanding within the project team of what is being sustained. And 86 per cent ( $n = 21$ ) of participants reported this had been communicated clearly to all staff involved in the changes (Appendix S).

## Funding

Forty-seven percent of respondents ( $n = 19$ ) reported funding or other inputs had not been sought or secured from other sources to enable that program to continue. A further 11 per cent reported funding ( $n = 1$ ) had either been sought but not secured or 'probably not secured'. The remaining 42 per cent of respondents reported funding or other inputs had been sought or secured to enable that program to continue (Appendix T).

## Methods for disseminating findings and future steps

In summary, respondents said ( $n = 12$ ) they would distribute the program findings through a diverse number of channels including email, newsletters, conferences, grand rounds, the ICS annual forum and quality award applications (Appendix U). The reported local team's future steps are recorded verbatim in Appendix V.

## Conclusion

A wide variety of stakeholders were actively and meaningfully involved in the program. Local capacity to respond to delays in the timeliness of lung cancer care improved significantly through the program. The capability of lung cancer teams to employ redesign methodology also improved. A number of new external partnerships were developed with local ICS, metropolitan health services, local GPs and Primary Health Networks via the program. The CoP forums were highly effective in:

- supporting collaborative learning
- facilitating joint problem solving
- spreading/sustaining best practice improvements in delivering lung cancer care.

The VLCSRP redesign interventions led to a meaningful reduction in the time from referral to first specialist appointment, with a reduction in variation between participating health services.<sup>8</sup> Similarly, there was a clear increase in the proportion of patients presented to the MDM, although significant variation between sites persists.<sup>8</sup> Also, the median time from diagnosis to first chemotherapy and the median time from diagnosis to first radiotherapy treatment were reduced. Moreover, there was a significant increase in the proportion of patients receiving chemotherapy within 14 days of diagnosis in the post-intervention period. While some improvements in the proportion of patients with a documented supportive care screening tool were noted, it is still a poorly documented activity that needs further investigation.

In conclusion, it is difficult to determine the full benefit of the redesign strategies within the reported six-month timeframe. Further outcome assessment at delayed time points should be considered.

# RE-AIM list of appendices

**Demographics:** Appendix A

## RE-AIM dimensions

**Reach:** Appendices B, C, and D

**Effectiveness:** Appendices E, F, G, H, I and J

**Adoption:** Appendices K, L, M and N

**Implementation and evaluation:** Appendices O, P, Q and R

**Sustainability:** Appendices S, T, U and V

## Appendix A: Response by ICS and role in project

The following identifies the response by ICS and the role of respondents in the project.

Residential ICS	% (n)	Role in program/project – % (n)
Hume Regional ICS	44% (11)	Clinician – 46% (5) Project officer – 18% (2) Co-applicant – 9% (1) Executive sponsor – 9% (1) OCP manager – 9% (1) Service improvement – 9% (1)
Loddon Mallee ICS	20% (5)	Collaborator – 40% (2) Co-applicant – 20% (1) Clinician – 20% (1) Project officer – 20% (1)
North Eastern Melbourne ICS	20% (5)	Collaborator – 40% (2) Clinical lead – 20% (1) Co-applicant – 20% (1) Project officer – 20% (1)
Southern Melbourne ICS	16% (4)	Clinician – 75% (3) Project officer – 24% (1)

## Appendix B: Stakeholder participation in the program

The following reveals the level of respondent agreement (Likert scale of 1 strongly agree to 5 strongly disagree) with the statement outlined below.

Question ( <i>d</i> = 24)	Strongly/ somewhat agree % (n)	Neither agree nor disagree % (n)	Somewhat/ strongly disagree % (n)
A wide variety of stakeholders were actively and meaningfully involved in the program/service/activity?	88% (21)	8% (2)	4% (1)

## Appendix C: Drivers and barriers to group participation

The following reported drivers and barriers to target group participation in the program are sequenced in order of frequency of response (FoR).

Driver ( <i>d</i> = 23)	FoR	%
Broad multidisciplinary solution design	14	61%
Variation and ineffective care coordination	14	61%
Alignment with organisational priorities	13	57%
Patient journey focus	12	52%
Delays in timeliness of patient care	12	52%
A culture supportive of change	11	48%
Committed and respected leadership	10	43%
Data to measure / communicate impact	10	43%
Credibility of evidence-based initiative	8	35%
Resources and support for change	8	35%
Inequitable access to services	8	35%
Focus on capability building	6	26%
Systems perspective	4	17%
Effective management practices	3	13%
Other (set up MD clinic)	1	4%
Not applicable	2	8%

Barrier ( <i>d</i> = 20)	FoR	%
Competing priorities	17	85%
Characteristics of the initiative	3	15%
Employee resistance to change	3	15%
Ineffective communication	3	15%
Lack of interest from target groups	2	10%
Poor system/ facility integration	2	10%
Lack of cultural readiness – change	1	5%
Lack of incentive to change	1	5%
No one in authority to push change	1	5%
Other <ul style="list-style-type: none"> <li>• Employee resistance to change</li> <li>• The change process was OK but the ongoing multidisciplinary meeting time inhibits my</li> </ul>	6	30%

Barrier ( <i>d</i> = 20)	FoR	%
participation (another 0730 meeting – now weekly!) <ul style="list-style-type: none"> <li>• Visiting medical officer model means that part-time clinicians work on different days</li> <li>• Level of involvement required by clinicians in time and in completion of evaluation measures</li> <li>• Patients did not suit criteria for interview</li> <li>• Not involved enough in the project to be aware of the barriers</li> </ul>		
Not applicable	5	25%

## Appendix D: Strategies to overcome identified barriers

A number of respondents ( $n = 16$ ) recorded more than one response to this free-text question. Reported strategies were grouped into six themes.

Key theme	Reported strategies
Communication	<ul style="list-style-type: none"> <li>• Communication with stakeholders</li> <li>• Altered communication methods to engage employees resistant to change; approached managers for assistance</li> </ul>
Evidence	<ul style="list-style-type: none"> <li>• Evidence and data provided regarding pre-implementation timelines</li> <li>• Feedback from consumers regarding their lung cancer journey</li> </ul>
Leadership	<ul style="list-style-type: none"> <li>• Executive and management support</li> <li>• Supportive clinical and administrative leadership</li> <li>• Formation of a project steering group</li> <li>• Recognition of a stream leader; hospital initiatives to streamline review processes</li> <li>• Flexibility of project officer to approach and accommodate those who had limited availability</li> </ul>
Patient engagement	<ul style="list-style-type: none"> <li>• Various avenues were used to search for appropriate patients to interview; however, it was out of our control as many of these patients are sick and are for palliative care</li> </ul>
Solution	<ul style="list-style-type: none"> <li>• Slight adaptation of solutions</li> <li>• Re-visiting solutions at a later date</li> </ul>
Stakeholder engagement	<ul style="list-style-type: none"> <li>• Broad involvement of stakeholders</li> <li>• Highlighting the positives and need to change for greater good; enhanced participation</li> <li>• Variety of opportunities to participate and contribute</li> <li>• GP meeting groups with oncology</li> <li>• Advertising of lung redesign clinic</li> <li>• Meetings days and times changed to enable various craft groups to attend</li> <li>• Catch-ups between meetings, focused and action-based meetings</li> <li>• Telephone meetings after hours</li> <li>• Excellent project officer</li> <li>• Aimed to hold meetings at times suitable to clinicians and at a reasonable frequency</li> <li>• Encouraged engagement in completion of evaluation measures</li> </ul>

## Appendix E: Level of stakeholder agreement

Appendix E reveals the level of respondent agreement (Likert scale of 1 strongly agree to 5 strongly disagree) with the statements outlined below.

Statement	Strongly/ somewhat agree % (n)	Neither agreed nor disagree % (n)	Somewhat/ strongly disagree % (n)
The program met its intended objectives and short-term outcomes ( <i>d</i> = 25).	92% (23)	4% (1)	4% (1)
I was satisfied with the redesign solution generated by the program/service ( <i>d</i> = 25).	80% (20)	12% (3)	8% (2)
The capacity of the lung cancer team to employ redesign methodology improved as a consequence of this program ( <i>d</i> = 25).	68% (17)	20% (5)	12% (3)
There is more capability in the organisation to extract, analyse and interpret lung cancer performance data than there used to be? ( <i>d</i> = 23) (2 N/A responses)	82% (19)	9% (2)	9% (2)
The capacity to monitor and respond to identified delays in the timeliness of lung cancer care has improved as a consequence of this program ( <i>d</i> = 25).	80% (20)	12% (3)	8% (2)
The lung cancer service is better at sharing ideas and information about new ways of working than before ( <i>d</i> = 24).	71% (17)	25% (6)	4% (1)

## Appendix F: Perceived benefits from local consumer, clinician/other involvement in the program

The perceived responder benefits from local consumer, clinician and other members of the lung cancer team involvement in the program are sequenced in order of frequency of response (FoR) below.

<b>Benefits from local consumer involvement (d = 22)</b>	<b>FoR</b>	<b>%</b>
Improved referral management	16	73%
Timely diagnostic test scheduling	16	73%
Improved experience of care	16	73%
Timely diagnosis and treatment	15	68%
Enhanced integration/coordination of care	14	63%
Improved access to lung cancer care	13	59%
More efficient hospital processes of care	10	45%
Less long-distance travel	5	23%
Reduction in number of hospital visits	3	14%
Not applicable	2	9%
Other (don't recall consumer involvement)	1	4%

<b>Benefits from clinician/other involvement (d = 24)</b>	<b>FoR</b>	<b>%</b>
Sharing of ideas and networking	19	79%
Greater inter-department collaboration	16	67%
Opportunity to enhance quality of patient care	16	67%
MDT-led solution design	15	62%
Engagement in shared purpose	14	58%
Effective organisation/utility of data	8	33%
Change management expertise	2	8%
Improvement of own work environment	1	4%
Non-applicable	1	4%
Other (please specify)	0	0%

## Appendix G: Perceived impact of program intervention

Respondents' ( $d = 19$ ) perceived impact of the program intervention on patient experience were recorded and collated into four key themes. Some content has been paraphrased for report purposes.

Key theme	Perceived impact	% (n)
Coordination and integration of care	<ul style="list-style-type: none"> <li>To the patient, possibly faster initial review</li> <li>Patients' coordination of care improved greatly</li> <li>Timeliness of care improved greatly</li> <li>Reduced unnecessary travel to and from metropolitan centres</li> <li>Patient's problem is assessed and managed in a timely and coordinated manner, resulting in a more satisfactory outcome with less uncertainty about the process</li> <li>Better coordination and communication of care pathways to the patient and their carers</li> <li>Easy patient journey, focused by steps of care</li> <li>Improved patients' experience</li> <li>Availability of PET scan, therefore less travel, improved timeliness to first treatment</li> </ul>	42% ( $n = 8$ )
Level of impact of intervention	<ul style="list-style-type: none"> <li>Major impact</li> <li>High level of impact</li> <li>High</li> <li>No discernible impact</li> <li>Little to none</li> </ul>	26% ( $n = 5$ )
Timeliness of care	<ul style="list-style-type: none"> <li>Significant impact in reducing the delays in testing and confirmation of diagnosis</li> <li>Improved timeliness of care</li> <li>Improved timeliness to accessing first specialist appointment</li> <li>Improved treatment options</li> <li>There has been a more integrated approach to having diagnostic testing done, which reduces wait</li> </ul>	21% ( $n = 4$ )
Multidisciplinary meeting	<ul style="list-style-type: none"> <li>Improved and timely access to MDM</li> <li>Multidisciplinary clinic reduces multiple visits, reduces delays for tests</li> </ul>	11% ( $n = 2$ )

## Appendix H: Skills gained or improved

Respondents reported the following skills, as gained or improved, as a consequence of their participation in the program. Responses ( $d = 19$ ) are sequenced in order of frequency of response (FoR).

Skills gained/improved ( $d = 19$ )	FoR
Service redesign	16
Stakeholder management	10
Effective communication	10
Project management	10
Improvement knowledge	10
Leadership	9
Capability building	7
Team management	6
Not applicable	5
Other ('nothing new for me'...)	1

## Appendix I: New skills acquired

The following details the level of respondent agreement (Likert scale of 1 strongly agree to 5 strongly disagree) with the statement outlined below. A total of 52% of respondents ( $d = 23$ ) agreed they had learnt new skills through being part of the redesign program.

Question ( $d = 23$ )	Strongly/ somewhat agree % (n)	Neither agree nor disagree % (n)	Somewhat/ strongly disagree % (n)
I have personally learnt new and valuable skills through being part of the redesign program.	52% (12)	35% (8)	13% (3)

## Appendix J: Transfer and use of knowledge/skills gained

Importantly, the majority of survey participants ( $d = 18$ ) indicated they intent to continue to use the knowledge and skills they have gained in the program. Responses are sequenced in order of frequency of response (FoR).

Knowledge and skills learnt ( $d = 18$ )	FoR
I will transfer these skills to others in my workplace.	13
I will often use the skills and knowledge that I have gained in my practice.	11
I intend to lead another healthcare improvement project.	8
Not applicable	7

## Appendix K: Number/pathway point of adoption of interventions

This appendix details the number of program interventions adopted locally and the lung pathway interval point of adoption. Pathway intervals points of adoption are sequenced in order of frequency of response (FoR).

Number adopted ( <i>d</i> = 16)	% ( <i>n</i> )	Pathway point of adoption ( <i>d</i> = 23)	FoR
More than five interventions	25% ( <i>n</i> = 4)	Referral to first specialist appointment	21
Five interventions	25% ( <i>n</i> = 4)	First specialist to first staging test	14
Four interventions	12% ( <i>n</i> = 2)	Receipt of referral to definitive diagnosis	17
Three interventions	6% ( <i>n</i> = 1)	Diagnosis to start of first treatment	15
Two interventions	32% ( <i>n</i> = 5)	Receipt of referral to start of first treatment	15

## Appendix L: Partnerships formed in the uptake of the program

A number of new partnerships formed in the uptake of the program. The content of the responses received ( $d = 13$ ) has been paraphrased in part for report purposes.

<b>New partnerships formed</b>
<ul style="list-style-type: none"> <li>• Primary Health Network (PHN)</li> <li>• Strong and enhanced partnership with PHN, outpatient and emergency departments, local GPs and medical oncology unit</li> <li>• With local PHN in development of health pathway</li> <li>• Between clinicians, administration, information technology (IT), outpatient clerical staff, project manager, specialty registrars, radiology and theatre management</li> <li>• Access to multidisciplinary meeting</li> <li>• Hoping to form strong partnership with 'other' ICS</li> <li>• Improved working relationship with redesign team</li> <li>• Information technology system and clinical performance unit</li> <li>• ICS and multiple local health service departments</li> <li>• Working with staff across health service in new ways</li> <li>• Inter-departmental and formalised metro/regional multidisciplinary team links</li> <li>• Lung cancer care coordinator and multidisciplinary clinic</li> <li>• Partnerships reinforced amongst local lung multidisciplinary meeting/clinic members and with relevant clinicians at two metropolitan sites</li> </ul>

## Appendix M: Likelihood of maintaining relationships

The following details the likelihood (Likert scale of 1 very likely to 5 very unlikely) that respondents will maintain future relationships with the stakeholders involved in the program. Only 45% of respondents ( $d = 22$ ) indicated they were likely to maintain future relationships with the stakeholders involved in the program intervention.

Question ( $d = 22$ )	Very/ somewhat likely % (n)	Neither likely nor unlikely % (n)	Very/ somewhat unlikely % (n)
How likely are you to maintain future relationships with the stakeholders involved in the program/service intervention?	45% (10)	41% (9)	14% (3)

## Appendix N: Supporting/enabling systems adopted

Responses (d = 10), collated into four themes, are outlined below. Paraphrased in part for report purposes.

Theme	Systems adopted in uptake of the program
Governance	<ul style="list-style-type: none"> <li>Better use of governance structures</li> </ul>
Data	<ul style="list-style-type: none"> <li>Additional fields relating to lung cancer metrics included now in health service's data reporting system</li> <li>Utilisation of organisation data systems to establish clinics and data collection of activity</li> <li>Different hospital databases</li> <li>'R&amp;D' partnership</li> </ul>
Stakeholder relationships	<ul style="list-style-type: none"> <li>Liaison with outpatient booking systems</li> <li>Existing relationships with PHN via GP liaison medical officer. Existing relationship with metropolitan cancer centre. Lung multidisciplinary meeting a major enabler to achieving project outcomes.</li> <li>Post-acute care</li> <li>Utilisation of mung multidisciplinary meeting. Support of local redesign team. Support of the local director of Cancer Services. ICS directorate in VLCDR data collector resources</li> <li>Strong commitment from stakeholders and collaborative working arrangements supported uptake of the program</li> </ul>
IT systems	<ul style="list-style-type: none"> <li>Separate clinic episodes, changes in the IT system and educating the administration staff</li> </ul>

## Appendix O: Satisfaction with program implementation

The following details the level of respondent satisfaction (Likert scale of 1 very satisfied to 5 very dissatisfied) with differing elements of program implementation. Significantly, the majority of respondents were satisfied with the overall process of program implementation and the methodology selected for use.

Question	Very satisfied to satisfied % (n)	Neither satisfied nor unsatisfied % (n)	Very dissatisfied to dissatisfied % (n)
How satisfied were you with the overall process of program implementation? ( <i>d</i> = 24)	75% (18)	21% (5)	4% ( <i>n</i> = 1)
How satisfied were you with the process of the project of program implementation in each phase of the project?			
• Set-up phase ( <i>d</i> = 22)	50% (11)	27% (6)	23% (5)
• Diagnostic phase ( <i>d</i> = 23)	48% (11)	26% (6)	26% (6)
• Solution phase ( <i>d</i> = 23)	52% (12)	35% (8)	13% (3)
• Implementation and evaluation phase ( <i>d</i> = 23)	48% (11)	35% (8)	17% (4)
• Sustainability phase ( <i>d</i> = 22)	50% (11)	36% (8)	14% (3)
How satisfied were you with the program methodology in the following:			
• Engaging local stakeholders ( <i>d</i> = 25)	72% (18)	24% (6)	4% (1)
• Identifying problems ( <i>d</i> = 25)	76% (19)	16% (4)	8% (2)
• Understanding variation ( <i>d</i> = 24)	60% (15)	28% (7)	8% (2)
• Promoting multidisciplinary teamwork ( <i>d</i> = 25)	76% (19)	20% (5)	4% (1)
• Generating evidence-based solutions ( <i>d</i> = 24)	74% (18)	21% (5)	5% (1)
• Promoting iterative learning ( <i>d</i> = 20)	65% (13)	30% (6)	5% (1)
How satisfied were you with the process of engagement employed by Victorian Lung Cancer Registry? ( <i>d</i> = 21)	43% (9)	48% (10)	9% (2)
How satisfied were you with the level of resources provided for program activities? ( <i>d</i> = 22)	41% (9)	41% (9)	18% (4)
How satisfied were you with the level of support provided by SMICS the programs lead agency? ( <i>d</i> = 23)	48% (11)	43% (10)	9% (2)

## Appendix P: Internal/external enablers of implementation

Multiple responses were received from some respondents ( $d = 14$ ). Responses were and paraphrased in part for report purposes and grouped into three themes under the headings of internal and external enablers.

Theme	Internal enablers
Administration	<ul style="list-style-type: none"> <li>• Hospital administration, lead specialist physicians/surgeons, information technology (IT) manager</li> <li>• Internal administration assistance</li> <li>• Moving into a new hospital</li> <li>• Project officer</li> </ul>
Clinical	<ul style="list-style-type: none"> <li>• Support of the director of Cancer Services</li> <li>• Strong support for the project from the clinical director and health service management/executive and ICS</li> <li>• Weekly multidisciplinary meeting forum to engage key stakeholders</li> <li>• Clinicians could see benefit in improving the process and were eager to see changes made</li> <li>• Strong support from clinical director and local executive, oncology team and ICS</li> <li>• Strong commitment and support from lung multidisciplinary meeting/clinic members</li> <li>• Supportive clinicians and management</li> <li>• The program worked because of clinician goodwill will and buy-in</li> </ul>

Theme	External enablers
External stakeholders	<ul style="list-style-type: none"> <li>• Elements of redesign methodology were useful and the templates were pretty robust</li> <li>• SMICS certainly approached project with passion and commitment, which helped with its success</li> <li>• Site visit by SMICS was pivotal</li> <li>• Project manager</li> <li>• Support from DHHS, SMICS and VLCR</li> <li>• Additional funding from ICS to enable more resource for project</li> <li>• ICS's support in providing VLCR data collector resources was absolutely necessary in meeting data collection timeframes</li> <li>• Local PHN and GP medical liaison officer provided great input into the local project steering committee and development of lung cancer health pathway and referral processes</li> </ul>

## Appendix Q: Internal/external barriers to implementation

Multiple responses were received from some respondents ( $d = 12$ ). Responses were paraphrased in part for report purposes and grouped into eight themes under the headings of internal and external barriers.

Theme	Internal barriers
Access	<ul style="list-style-type: none"> <li>• Access to local data</li> <li>• Ethics</li> <li>• Navigating public/private systems</li> </ul>
Funding/resources	<ul style="list-style-type: none"> <li>• Limited funding and available health service resources</li> <li>• Lack of funding for any initiative that went beyond refining current processes using existing personnel</li> </ul>
Local capacity	<ul style="list-style-type: none"> <li>• Lack of ability to increase bookings and speed of diagnostic procedures e.g., no ability to adjust EBUS bronchoscopy procedures, PET scans</li> <li>• Addition of a fast-stream lung cancer assessment path into the already overcrowded outpatient clinics without any increase in staffing</li> <li>• Lack of flexibility/availability of outpatient consulting space to facilitate multidisciplinary clinic</li> <li>• Not enough time in the week to meet clinician leave and inability to replace at capacity</li> <li>• Moving into a new hospital</li> </ul>
Unplanned changes	<ul style="list-style-type: none"> <li>• Unexpected changes to thoracic surgery staffing impacted on multidisciplinary meeting decision making and clinic and surgery availability</li> <li>• Delays were noted for patients with surgery as their initial treatment intent over May and June 2017</li> </ul>

Theme	External barriers
Data	<ul style="list-style-type: none"> <li>• Data centralised in Melbourne</li> </ul>
Funding	<ul style="list-style-type: none"> <li>• Project funds were inadequate in meeting VLCR data collection resource requirements of the project – resources had to be sourced from outside</li> <li>• Limited funding for resources required for large scale of work involved, especially with requirements of data validation and entry to VLCR</li> </ul>
Service agreement	<ul style="list-style-type: none"> <li>• Local radiotherapy services are provided by an external provider and therefore difficult to influence timelines for patients having radiotherapy as their initial treatment</li> <li>• Within the current service structure for radiotherapy services it is not feasible for treatment to commence within two weeks of diagnosis for most patients</li> </ul>
Program planning	<ul style="list-style-type: none"> <li>• Solution generation over the Christmas/January period was difficult – this delayed finalisation of the solutions</li> <li>• VLCR's lack of ability to meet reporting needs of specific projects, causing data to need to be doubled up</li> <li>• Massive scope creep through VLCR</li> <li>• Health service will be very reluctant to apply for grants like this in the future</li> </ul>

## Appendix R: Participant suggestions for program improvement

Responses ( $d = 15$ ) were grouped into seven key themes. Paraphrased in part for report purposes.

Theme	Suggestions for program improvement
Data	<ul style="list-style-type: none"> <li>• Data collection</li> <li>• Provision of adequate resources to enable appropriate data collection</li> <li>• Identifying data collection process prior to grant submission and allowing for appropriate funding and resources based on the work required for the project</li> <li>• VLCR data collection occurring prior to the commencement of the project to minimise delays relating to data collection/publication</li> <li>• There is a large time commitment in uploading to the VLCR; to sustain this, funded positions would need to be provided</li> <li>• Notification in application that extra resources would be required for VLCR – huge component of this project not budgeted</li> </ul>
Ethics	<ul style="list-style-type: none"> <li>• Central ethics submission for project surveys/questionnaires to reduce delays – same as point prevalence supportive care study</li> <li>• Appropriate timeframes to allow for ethics applications</li> <li>• Need to accept and allow for variations to practices for regional organisations due to access to diagnostic services which result in lower numbers than actual activity (VLCR)</li> <li>• Questionnaires need to be standardised prior to commencement of project – too much time wasted deciding on a format and not all organisations measuring the same for consumers and clinicians</li> </ul>
Emphasis	<ul style="list-style-type: none"> <li>• More emphasis on service improvement and less on data collection</li> <li>• Whole system review so that, for example, number of perform EBUS bronchoscopies able to be performed is increased</li> <li>• No point in just altering the initial review process if other limitations are present</li> </ul>
Governance	<ul style="list-style-type: none"> <li>• Program very well designed</li> <li>• Establish relationship between existing cancer registries at the time of grant application</li> <li>• Clearly establishing use of project tool use early in the project including reporting timeframes</li> <li>• The reporting templates and expectations were very time consuming and repetitive in nature; the wording on the words also made it difficult to understand what was being asked</li> </ul>
Stakeholder engagement	<ul style="list-style-type: none"> <li>• Closer working relationship among all the stakeholders</li> <li>• Earlier engagement with tumour-based registries</li> <li>• Earlier engagement with stakeholders who provide contracted services (radiotherapy), where our ability to influence change is reduced</li> <li>• Grant recipients should have MOUs with defined exit clauses</li> <li>• Significant changes to project scope should be explicitly managed</li> <li>• The project governance should have considered the VLCSR change at the outset and changed the project in a structured way</li> <li>• Need a better project and contract management methodology within the ICS realm</li> </ul>

Theme	Suggestions for program improvement
	<ul style="list-style-type: none"> <li>• Welcomed SMICS site visits; suggest closer understanding of the sub-projects from host ICS from outset</li> </ul>
Sponsors	<ul style="list-style-type: none"> <li>• Commitment by the sponsoring organisation to fund at least on a trial basis, initiatives suggested as a result of the project (for example, lung cancer care coordinator)</li> </ul>
Timeframe	<ul style="list-style-type: none"> <li>• More time</li> <li>• Monitor timing of interventions</li> <li>• Try to avoid 'MDM tennis' – we run the risk of falling into the traps metro multidisciplinary meetings exhibit (long delays in decision making if no one takes responsibility of individual patients)</li> <li>• Longer implementation phase to allow for exploration and potential implementation of larger pieces of work (multidisciplinary clinic)</li> </ul>

## Appendix S: Likelihood of outcome sustainability

Respondents ( $d = 24$ ) were invited to identify on a Likert scale of 1 (extremely likely) to 5 (extremely unlikely) their level of agreement with the question below.

Question	Extremely/very likely % (n)	Somewhat likely % (n)
How likely are the outcomes from this program to be sustained?	71% (17)	29% (7)

## Appendix T: Funding and consistent understanding

Respondents were invited to respond with a yes, no, other or non-applicable response to the questions below.

Question	Yes % (n)	No % (n)	Other % (n)
Have funding or other inputs been sought or secured from other sources to enable the program to continue? ( <i>d</i> = 19)	42% (8)	47% (9)	11% (2)
Is there a clear, consistent understanding within the project team of what is being sustained (for example, targets, news ways of working, cultural change)? ( <i>d</i> = 23)	83% (19)	17% (4)	0% (0)
Has this been communicated clearly to all staff involved in the changes? ( <i>d</i> = 21)	86% (18)	14% (3)	0% (0)

## Appendix U: Methods for disseminating findings

Responses paraphrased in part for report purposes.

Reported methods for disseminating VLCSRP findings
<ul style="list-style-type: none"> <li>• Through governance structures</li> </ul>
<ul style="list-style-type: none"> <li>• Health service newsletter, ICS and Primary Health Network newsletters</li> <li>• Presentations to governance committees including executive and poster presentations at future conferences</li> </ul>
<ul style="list-style-type: none"> <li>• Quarterly newsletter</li> <li>• Presentation in multidisciplinary meetings</li> </ul>
<ul style="list-style-type: none"> <li>• Through the multidisciplinary lung cancer team (has been ongoing throughout the project)</li> </ul>
<ul style="list-style-type: none"> <li>• GP meetings and grand rounds</li> </ul>
<ul style="list-style-type: none"> <li>• Newsletter</li> <li>• Email summarising program findings from local site director of Cancer Services</li> <li>• Presentation at residential ICS annual forum (August 2017)</li> <li>• Local site internal reporting mechanisms such as Great Care Everywhere committee, Oncology and Haematology Quality and Strategy</li> <li>• Meeting and Specialty Medicine and Ambulatory Care Project Governance group</li> </ul>
<ul style="list-style-type: none"> <li>• Reports to working/steering group and executive</li> </ul>
<ul style="list-style-type: none"> <li>• The results should speak for themselves</li> </ul>
<ul style="list-style-type: none"> <li>• Via residential ICS annual forum, annual report, Clinical Oncology Society of Australia papers, website, quality award application</li> </ul>
<ul style="list-style-type: none"> <li>• Final project reports to local executive and residential ICS governance committees</li> <li>• Going forward through organisational monthly performance reporting</li> <li>• Local Primary Health Network newsletter</li> </ul>
<ul style="list-style-type: none"> <li>• Redesign A3 and PowerPoint presentation at the lung cancer multidisciplinary meetings</li> </ul>
<ul style="list-style-type: none"> <li>• Communicated through reporting to SMICS, Community of Practice, local cancer centre, lung multidisciplinary meeting/clinic members and project groups at the steering committee, the clinical reference group and local ethics through reports</li> </ul>

## Appendix V: Teams' future steps

Responses (*d* = 12) paraphrased in part for report purposes.

Teams' future steps
<ul style="list-style-type: none"> <li>• Continue to ensure lung cancer data is entered and reported at the health service level</li> <li>• Continue to promote lung cancer service among GPs, clinicians and health service staff</li> <li>• Linkages with metropolitan multidisciplinary meetings to continue</li> </ul>
<ul style="list-style-type: none"> <li>• Quarterly steering committee meetings</li> <li>• Ongoing data collection and reporting to multidisciplinary meeting</li> <li>• Ongoing exploration of multidisciplinary clinic and lung cancer nurse coordinator</li> </ul>
<ul style="list-style-type: none"> <li>• Ongoing audit and reporting of timelines</li> <li>• Work to secure funding for unfunded recommendations</li> <li>• Continued effort to either combine or streamline specialty clinics of the various disciplines</li> </ul>
<ul style="list-style-type: none"> <li>• Funding business case</li> </ul>
<ul style="list-style-type: none"> <li>• Currently exploring opportunities for:</li> <li>• developing a multidisciplinary 'Rapid Access Lung Lesion Clinic'</li> <li>• recruiting a lung cancer clinical nurse coordinator</li> </ul>
<ul style="list-style-type: none"> <li>• Regular review and recording of data from patient diagnosis to commencement of treatment to ensure satisfactory timelines are met</li> </ul>
<ul style="list-style-type: none"> <li>• Monitor to ensure we have not caused harm</li> </ul>
<ul style="list-style-type: none"> <li>• Seek to get EFT for a respiratory physician</li> </ul>
<ul style="list-style-type: none"> <li>• Continue to review processes, performance and patient/carer satisfaction as part of general unit quality improvement activities and promotion of clinic through local Primary Health Network or residential ICS</li> </ul>
<ul style="list-style-type: none"> <li>• Appointment of a lung cancer care coordinator</li> <li>• Setting up a lung assessment multidisciplinary clinic after the weekly multidisciplinary meeting</li> </ul>
<ul style="list-style-type: none"> <li>• We are still finalising our data collection and reporting – that is a key focus at this point, then sustaining the changes observed</li> </ul>
<ul style="list-style-type: none"> <li>• All implementations initiated by the project will be sustained and improvements will continue over time</li> </ul>

# Abbreviations

CoP – Community of Practice

DHHS – Department of Health and Human Services (now the Department of Health)

ICS – Integrated Cancer Service

IQR – interquartile range

MDM – multidisciplinary meeting

MDT – multidisciplinary team

OCP – optimal care pathway

PDSA – plan–do–study–act (cycle)

PET – positron emission tomography

SMICS – Southern Melbourne Integrated Cancer Services

VLCR – Victorian Lung Cancer Registry

VLCSRP – Victorian Lung Cancer Service Redesign Program

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