Original Article

"We need to work towards it, whatever it takes."—participation factors in the acceptability and feasibility of lung cancer screening in Australia: the perspectives of key stakeholders

Rachael Helen Dodd[1,2], Ashleigh Rebecca Sharman[2], Mei Ling Yap[2,3,4,5], Emily Stone[6,7], Henry Marshall[8], Joel Rhee[9,10], Sue McCullough[11], Nicole Marion Rankin[12]

[1]The Daffodil Centre, A Joint Venture between The University of Sydney and Cancer Council New South Wales, Faculty of Medicine and Health, The University of Sydney, New South Wales, Australia; [2]Faculty of Medicine and Health, School of Public Health, The University of Sydney, New South Wales, Australia; [3]Collaboration for Cancer Outcomes, Research and Evaluation, Ingham Institute, University of New South Wales Sydney, Liverpool, New South Wales, Australia; [4]Liverpool and Macarthur Cancer Therapy Centres, Western Sydney University, Campbelltown, New South Wales, Australia; [5]The George Institute, University of New South Wales Sydney, New South Wales, Australia; [6]Department of Thoracic Medicine and Lung Transplantation, St Vincent's Hospital Sydney, New South Wales, Australia; [7]School of Clinical Medicine University of New South Wales Sydney, New South Wales, Australia; [8]University of Queensland Thoracic Research Centre and Department of Thoracic Medicine, The Prince Charles Hospital, Chermside, Queensland, Australia; [9]School of Population Health, Faculty of Medicine and Health, University of New South Wales Sydney, New South Wales, Australia; [10]Graduate School of Medicine, Faculty of Science, Medicine and Health, University of Wollongong, Wollongong, New South Wales, Australia; [11]Thoracic Oncology Group Australasia Consumer Advisory Panel, Melbourne, Victoria, Australia; [12]Centre for Health Policy, Melbourne School of Population and Global Health, The University of Melbourne, Victoria, Australia

Contributions: (I) Conception and design: All authors; (II) Administrative support: All authors; (III) Provision of study materials or patients: RH Dodd, AR Sharman, NM Rankin; (IV) Collection and assembly of data: RH Dodd, AR Sharman, NM Rankin; (V) Data analysis and interpretation: RH Dodd, AR Sharman, NM Rankin; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Dr. Rachael Helen Dodd, BSc, MSc, PhD. The Daffodil Centre, A Joint Venture between The University of Sydney and Cancer Council New South Wales, Australia; Faculty of Medicine and Health, The University of Sydney, New South Wales, Australia; Faculty of Medicine and Health, School of Public Health, Room 127A Edward Ford Building, Fisher Road, The University of Sydney, New South Wales 2006, Australia. Email: rachael.dodd@sydney.edu.au.

Background: Low dose computed tomography (LDCT) screening, targeted at those at high-risk, has been shown to significantly reduce lung cancer mortality and detect cancers at an early stage. Practical, attitudinal and demographic factors can inhibit screening participation in high-risk populations. This study aimed to explore stakeholders' views about barriers and enablers (determinants) to participation in lung cancer screening (LCS) in Australia.

Methods: Twenty-four focus groups (range 2–5 participants) were conducted in 2021 using the Zoom platform. Participants were 84 health professionals, researchers, policy makers and program managers of current screening programs. Focus groups consisted of a structured presentation with facilitated discussion lasting about 1 hour. The content was analysed thematically and mapped to the Consolidated Framework for Implementation Research (CFIR).

Results: Screening determinants were identified across each stage of the proposed screening and assessment pathway. Challenges included participant factors such as encouraging participation for individuals at high-risk, whilst ensuring that access and equity issues were carefully considered in program design. The development of awareness campaigns that engaged LCS participants and health professionals, as well as streamlined referral processes for initial entry and follow-up, were strongly advocated for. Considering practical factors included the use of mobile vans in convenient locations.

Conclusions: Participants reported that LCS in Australia was acceptable and feasible. Participants identified a complex set of determinants across the proposed screening and assessment pathway. Strategies that enable the best chance for program success must be identified prior to implementation of a national LCS program.

Keywords: Lung cancer screening (LCS); implementation; barriers and facilitators; qualitative research

Submitted Oct 18, 2023. Accepted for publication Jan 10, 2024. Published online Feb 21, 2024.
doi: 10.21037/tlcr-23-623
View this article at: https://dx.doi.org/10.21037/tlcr-23-623

Introduction

Lung cancer is the number one cause of cancer death worldwide (1) and has the highest cancer burden in Australia (18% of the total burden) (2). While tobacco control strategies are most effective for disease prevention in the Australian population, early detection via lung cancer screening (LCS) in high-risk populations presents the best option for people who are currently smoking (13%) or have formerly (24%) smoked (3).

Outcomes from the National Lung Screening Trial (NLST) in reducing lung cancer mortality and improving early detection prompted the United States Preventive Services Task Force to recommend implementation of low dose computed tomography (LDCT) screening programs in December 2013 (4). However, policymakers in Australia, Canada, United Kingdom (UK) and Europe have taken a more cautious approach, carefully evaluating evidence before recommending population-based screening (5-7). Recent announcements in Australia (May 2023) (8), England (June 2023) (9) and in British Columbia and Ontario, Canada [2022] (10) confirmed the implementation of LCS programs. The United States Preventive Services Task Force has since updated their recommendations for LCS in 2021 (11) but this has not influenced the implementation plans for Australia (12). Following publication of the NELSON trial in Europe, demonstrating clinical effectiveness of LDCT in 2020, implementation was acknowledged as the next significant challenge to ensure programs reach priority populations (7,13,14). In Australia, any proposed screening program must satisfy all criteria of the 'Population Based Screening Framework' (15) before policymakers will recommend implementation. The criteria include that screening must be acceptable to the population, promote equity and access across the priority population and be "clinically, socially, and ethically acceptable to both health professionals and consumers" (15) (page 11).

In defining the priority population for LCS, the term 'high-risk' is applied to individuals, usually within the context of screening eligibility criteria that includes age (e.g., 50–70 years), smoking pack-year history (e.g., 30 years) and smoking status (e.g., current or former, having quit in <10 years) (16). The term 'hard-to-reach' or 'underserved' describes communities who are typically under-represented in health planning processes, due to limited capacity for involvement or barriers to accessing healthcare programs (17). The acceptability of LCS has been measured in communities where screening has been introduced through surveys with participants (18) and with health professionals (19) but few studies have used focus groups methods to measure acceptability (20).

Barriers to LCS exist at a patient, provider and system level (21). At a patient level, this can include barriers such as cost, lack of awareness, stigma, and mistrust of the healthcare system (21). Individual factors shown to be associated with participation in LCS include age, gender, smoking status and socioeconomic group, but the direction of these associations has been found to vary. In a UK trial setting, being older, female, currently smoking and being in an underserved population, were associated with low participation (22). A cohort study in the US, however, found those who were older, female and were currently smoking, were more likely to be screened for lung cancer (23). Practical (travel, comorbidities, convenience) and emotional (fear, avoidance of

Highlight box

Key findings
- Stakeholders reported that lung cancer screening (LCS) in Australia was acceptable and feasible
- Access and equity issues need to be carefully considered in program design

What is known and what is new?
- There are significant barriers to the provision of LCS identified in US and UK programs.
- This study explores barriers in the setting of Australia, where LCS is yet to be introduced.

What is the implication, and what should change now?
- Our study identifies facilitators to be considered by policymakers, with emphasis placed on developing strategies in consultation with consumers and healthcare providers
- Consultation with healthcare professionals and consumers are essential in the development of implementation plans

lung cancer information) barriers to participation in LCS are also evident in those at high risk (21,22).

There is enormous variation in LDCT screening uptake in other countries. For example, a recent report from the US shows screening rates as low as 1% in some states (average screening rate of those eligible 5.8%) (24), with screening rates as high as 58% in the Veterans Health Administration demonstration projects performed across 8 sites (25). In contrast, a UK pilot screening program that used community-based mobile vans to conduct 'Lung Health Checks' across 10 pilot sites, including in underserved populations of Manchester, has had considerable success reaching high-risk populations (26). Service demand was extremely high in communities in the lowest-deprivation quintile (75%); and lung cancers were significantly more likely to be diagnosed at an early stage in comparison with a community-based control group. Previous research has shown reduced uptake of cancer screening consistently in underserved populations (26-28) and so demonstrates the need for newly implemented cancer screening programs to address the barriers to uptake in these populations from the early stages of planning a program. A recent Australian study examined participation factors in the International Lung Screening Trial using the COM-B model of behaviour change, citing capability, opportunity and motivation as factors to change behaviour (29). This study found that motivation alone may not be sufficient to change behaviour related to screening participation, unless capability (e.g., enhance people's knowledge) and opportunity (e.g., convenient locations) are considered.

In the US, a decade has passed since implementation first began. Although practical and financial barriers to screening continue to be significant, most LCS participants have reported screening as acceptable, non-invasive and relatively easy to engage in (30). However, we know very little about what healthcare providers consider to be the barriers and enablers that will impact on LCS participation in Australia.

Therefore, the aim of this study was to gain an understanding of the potential barriers or facilitators to the uptake of a national LCS program for screening participants from the perspectives of healthcare providers, using qualitative methods and the Consolidated Framework for Implementation Research (CFIR) (31).

Methods

Participants

Recruited participants purposefully represented the spectrum of health professionals responsible for the implementation of a national LCS program. This included general practitioners (GPs), primary care nurses, respiratory physicians, radiologists, oncologists, and other healthcare professionals, as well as current cancer screening program managers and policy makers. Participants were also purposively recruited to include those practising in regional, remote and urban settings where lung cancer incidence is high. Recruitment methods included Primary Health Networks across New South Wales and contacts of the research team, with a passive snowballing approach adopted in email and focus group communication with participants.

Design

The research team developed a structured presentation to provide an introduction about LCS. Key components included findings from international LCS randomised controlled trials, an overview of findings from the National Lung Cancer Screening Enquiry (October 2020), the proposed risk assessment tool (PLCOm2012), and international LCS trials. A semi-structured moderator guide was developed to explore the potential of LCS in Australia, including the constructs of the CFIR in the design of the guide. The presentation and guide were used in all focus groups. On multiple occasions participants were asked to express their attitudes freely, across all aspects of implementation and to express any concerns. The presentation consisted of 14 PowerPoint slides in total, 8 of which posed questions to facilitate discussion. This manuscript focuses on the participation factors when implementing a LCS program, with two manuscripts focused on (I) health system factors (32) and (II) smoking cessation.

Data collection

Focus groups were conducted between February and July 2021 and included a mix of professional disciplines from a range of clinical sites within each group. Participants completed a brief online questionnaire to collect demographic data. All focus groups with the exception of one, were carried out via Zoom due to coronovirus-19 restrictions and participants locations across Australian states, and lasted no longer than 1 hour. For those who could not attend a focus group, individual interviews were conducted. Each group was moderated by a researcher with expertise in behavioural science. Participants were given a

$A100 gift card for reimbursement for their time.

Data analysis

The focus groups were audio recorded, transcribed using AI powered software *Trint* and anonymised, and initially checked by one author. Three authors independently familiarised themselves with three transcripts and developed codes which reflected the main themes from the groups. An initial coding framework was developed and a further six transcripts were discussed, with disagreements resolved before finalising the coding framework.

All remaining transcripts were then coded in NVivo using thematic analysis, by two authors. Themes and subthemes were first mapped to the proposed screening and assessment pathway and subsequently mapped to the CFIR (31). Frequent comparisons were made across authorship team to reach consensus, and all disagreements were resolved by discussion.

Ethics approval

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the University of Sydney Human Research Ethics Committee (2020/743). All participants gave informed consent before taking part.

Results

We conducted 24 focus groups (range 2–5 participants) and three individual interviews to include 84 participants. A description of the sample is shown in *Table 1*. A graphic representation of the high-level topics in the coding framework is shown in *Figure 1*. The full coding framework can be found elsewhere (32). Following the proposed screening and assessment pathway, the data was coded into five themes and CFIR domains are reflected throughout: (I) promotion to and recruitment of the eligible population, (II) risk assessment, (III) screening, (IV) referral and management, and (V) return for screening. Barriers and facilitators at each stage of the pathway are summarised in *Table 2*.

Promotion to and recruitment of the eligible population

Participants had many views about how to promote and recruit the eligible population, and the associated barriers and facilitators. These views are organised into the subthemes of: avenues for promotion, the priority population, naming the program, and engagement, awareness and outreach.

Avenues for promotion

Promotion ideas for the general community included mass media—television advertisements, advertising on cinema screens, at grocery store entry points, and quick response (QR) codes. Participants thought that primary care was a key avenue for recruitment as GPs can stratify and target patients, and awareness can be increased through advertisements in waiting rooms.

"I think that's my personal feeling, is that that is what will work best and melded into, obviously know, a very targeted campaign through patients seeing the general practitioner. And if it's a matter of having a flyer on the wall in the waiting room and patients see that when they come in and they're either asked about it and if not, it's brought up during the conversation, so, I mean, I think you just have to get the message out there. I think they're the best ways." (FG2)

Strategies for recruitment included suggestions such as mailouts, using existing age-based health check-ups (e.g., for diabetes) to approach LCS, giving LCS brochures at GP practices upon check in with the receptionist, and the promotion of a lung health week/month; all such strategies were acknowledged as needing engagement from multiple communities and translation into numerous community languages. Digital methods were suggested, such as YouTube videos for education, and social media. Key messages to convey included the benefits of early detection of lung cancer via screening and informed choice.

There were mixed views about using an app to facilitate self-referral. Some participants saw the benefits of potentially saving time, having a degree of anonymity, not requiring medical staff input and providing an engagement route with LCS other than through the GP. Others thought it was not the best investment of resources as it would reach a minority of people and exclude those who are older or not confident with technology. These participants also thought that risk assessment should be conducted by a GP.

"A brochure would be very helpful just so we can give it to them to read and maybe we can have an app as well [where]… they can track their progress and follow up." (FG1)

Suggestions for incentives to encourage participation were discussed, such as a voucher for LCS when purchasing cigarettes (see quote below), however, some viewed this as bribery and poor practice.

Table 1 Sample characteristics

Participant characteristics	Frequency (percent) (n=82)*
Age	
18–40 years	36 (43.9)
41–60 years	37 (45.1)
61+ years	9 (11.0)
Gender	
Female	48 (58.5)
Male	34 (41.5)
Country of birth	
Australia	54 (65.9)
Other	28 (34.1)
Aboriginal or Torres Strait Islander	
Yes	5 (6.1)
Country of university education completion	
Australia	75 (91.5)
Professional role	
General practitioner	13 (15.9)
Nurse	11 (13.4)
Radiation oncologist	10 (12.2)
Radiologist	9 (11.0)
Respiratory physician	9 (11.0)
Policy/program manager	6 (7.3)
Medical oncologist	4 (4.9)
Allied health professional	3 (3.7)
Researcher	2 (2.4)
Trainee, general practitioner registrar	1 (1.2)
Other	14 (17.1)
Years worked professionally	
0–10 years	31 (37.8)
11–20 years	17 (20.7)
21–30 years	21 (25.6)
30+ years	12 (14.6)
Not applicable	1 (1.2)
State or territory of work	
New South Wales (NSW)	36 (43.9)
Victoria (VIC)	14 (17.1)
Queensland (QLD)	11 (13.4)
Western Australia (WA)	8 (9.8)
Tasmania (TAS)	5 (6.1)
South Australia (SA)	3 (3.7)
Australian Capital Territory (ACT)	3 (3.7)
Northern Territory (NT)	2 (2.4)
Workplace setting	
Public hospital	33 (40.2)
Other setting	16 (19.5)
Medical centre/community-based clinic	11 (13.4)
Private practice/sole practitioner	8 (9.8)
Combination of settings	8 (9.8)
Academic, university-based clinic	4 (4.9)
Private hospital	2 (2.4)
Practice location	
Urban/inner-city	43 (52.4)
Suburban	19 (23.2)
Rural	8 (9.8)
Not applicable	12 (14.6)
Nature of practice	
Public	44 (53.7)
Private	14 (17.1)
Not applicable	12 (14.6)
Non-practising	2 (2.4)
Other	10 (12.2)

*, data missing for 2 participants.

“Cigarettes are expensive, I guess, if we just offer everyone a ten-dollar voucher when they buy their smokes to go and get lung cancer screening you might find some would turn up.” (FG3)

Incentives for primary care were also suggested, in terms of GP practice incentive payments and Medicare (funding) rebates, which would encourage more GPs to become educated about LCS and approach their eligible patients about screening.

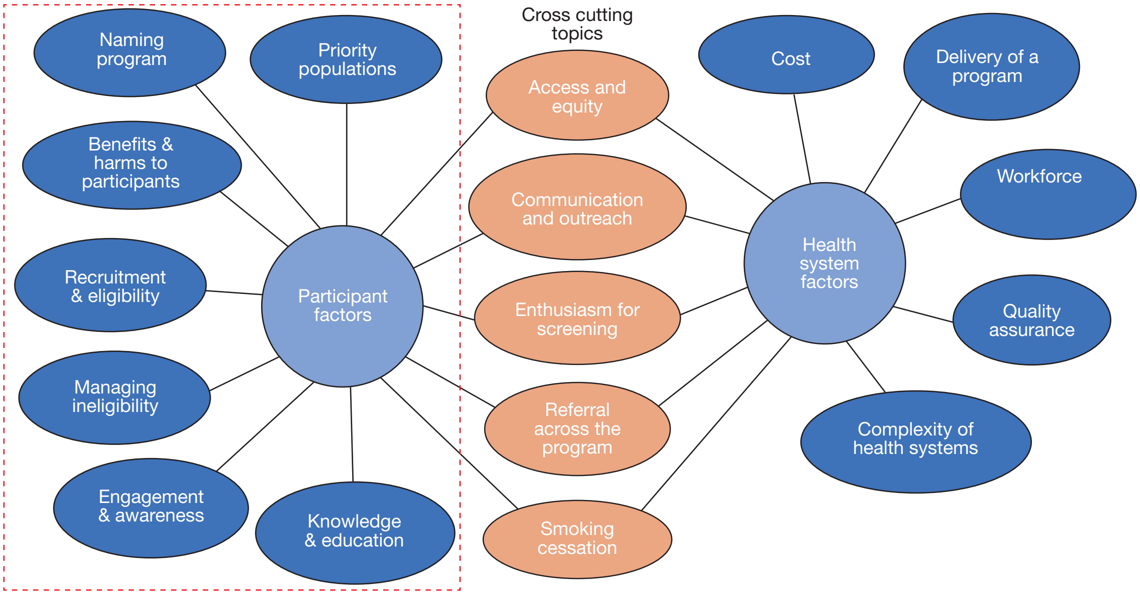

Figure 1 Participant and health system factors identified (in blue ovals) during analysis including cross-cutting topics (in orange ovals), with the dotted line indicating those topics included within this manuscript.

Characteristics of individuals—knowledge and beliefs about the intervention: priority populations

Participants considered priority populations as including those people who don't tend to engage with GPs, those with low health literacy, Aboriginal and Torres Strait Islander people and culturally and linguistically diverse communities. These were viewed as challenging populations to reach, with language and cultural barriers, with some expressing concern that communities would be even more isolated than already if these priority populations weren't reached. The participants also perceived the priority population to be faced with barriers of access, affordability, cultural safety, consent and empowerment. These priority populations need to feel safe and supported. There is also the need for health professionals to be educated that smoking history can have indirect correlation with other forms of psychosocial vulnerability and coping, with people who smoke feeling guilty when cancer is found and that most are aware of the health risks but have difficulty quitting.

Stigma was discussed in most groups, with participants suggesting facilitators to reduce stigma of lung cancer being: showing empathy to individuals who come for screening, ensuring the risk assessment tool is not judgemental and conducting screening removed from a hospital setting. Barriers to reducing stigma included: having a targeted screening group based on smoking rather than age, the stigma of lung cancer being worse in Australia than other countries, older clinicians, and the 'you deserve it' attitude held towards people, particularly in rural and regional areas where mobile screening vans would be used.

"I think you have to be realistic and truthful to the patient that's going to be have to be tailored to each patient, how they feel in terms of that stigma and why they feel that stigma, as well, because I'm sure each patient may feel it because '[they] all told me to quit and I feel bad about not doing it'." (FG2)

In Indigenous communities, participants viewed barriers in this population to include access in remote areas, a desire to continue smoking, low uptake of other screening programs, a fear of cancer and cultural considerations about dying 'off country' (taking place away from Aboriginal land or community).

"I concur about that entry pathway into the screening program and having to do the risk assessment tool, that that it will likely be a barrier for targeting some of those hard-to-reach communities like Aboriginal communities." (FG17)

For those populations who do not engage with GPs, this was considered as due to people not being unwell, and also raised the barrier that recruitment through GPs alone means that all eligible people will not be captured. Participants expressed the view of not wanting a system where people miss out. Where long-term relationships exist between GPs and their patients, this was perceived as a facilitator to discussing LCS. Participants perceived a need to support practices to identify eligible patients. It was

Table 2 Barriers and facilitators at each stage of the screening and assessment pathway

Stage	Barrier	Example quote	Facilitator	Example quote
Promotion to and recruitment of lung cancer screening	• Not engaging with GPs • Stigma • Low health literacy • Language and cultural • Access, affordability, cultural safety, consent, empowerment • Fear of cancer • Recruitment through GPs alone • Funding	*The thing with lung cancer screening that I'm worried about is I don't want this to create fear or stigma or those sorts of things. I know, for example, lung cancer is feared as a death sentence by many people, and they may well prefer not to know about it. (FG16)*	• Access to GPs • Skill nurses/community health workers to recruit participants • Specific funding item for GPs • Combine screening and smoking cessation • Empathy for those who attend LCS • Outreach in rural & remote communities • Target resources for low health literacy and community language translations • Education for all • Comprehensive consumer engagement • Establish knowledge and trust in healthcare professionals	*If they have early engagement and if they get a sense that they're building the program with the health care providers, then that might enable success rather than say, well, this is the model we're going to do type thing. (FG3)*
Risk assessment	• Risk assessment can be subjective • Dependent on reliable data • Occupation exposure not included • Literacy level of tool	*I agree with you on the smoking pack-years, is probably harder to calculate in general practice, especially when people are trying to quit and then they try and lower the smoke down to five secret for two years and go down 20. And then on an average, it's really, really hard. (FG9)*	• Risk assessment tool non-judgemental • Easily accessible tool • NLST criteria simpler • Integrate into GP systems • App for self-referral • Incentives	*It'd be nice if you could have this tool that it could automatically like if a patient is coming to see them. If you could just run the tool based on the information that comes up, to seamlessly integrate it into GP services so they'll use it. (FG3)*
Shared decision making	• Stigma • Compliance • Cancer fear	*That taboo still exists about smoking know and… we have to be mindful that we're not adding to that (FG24)* *So, we know that you might be willing to undergo the first part of the screening… but there's no way that they're going to [travel] to have a lung biopsy done or pulmonectomy… so it is never going to be a willingness to actually progress down to actually have the intervention. (FG21)*	• Informed choice • Non-invasive • Opportunity to talk about smoking cessation	*Yeah, I think it's just like just like any other cancer screening programs as well. And even ones that are technically not really on the range of like prostate, for example, you can explain these to the patient and let them weigh up that risk themselves as well, giving them that information that gears them towards that decision. (FG2)*

Table 2 (*continued*)

Table 2 (*continued*)

Stage	Barrier	Example quote	Facilitator	Example quote
Screening and assessment	• Access and equity • Number of scanners available	*I'm working in the Northern Territory. I don't see any way in which this program would work in the indigenous population, especially people from remote communities, these places don't even have CT scanner… and the way that we communicate [is] by via mail or phone. Even in metropolitan areas, it's difficult for patients to get into hospitals, to have a CT, with parking and often they've got some chronic breathlessness. (FG1)*	• Conduct screening outside a hospital setting • Less invasive program • Patients already asking about LCS • Outcomes more advanced than other screening programs • Mobile screening vans	*Yeah, my sense is that it's less invasive than some of the other screening tests, and so that's a big step up, so you don't have to take poo samples and you don't have to squash your breasts. So, I think that will increase the acceptability for those that can see value in screening. (FG6)*
Referral and management for suspicious lesion on LDCT scan	• Referrals without GP	*If you've got people who referred themselves or people from remote communities, it's trying to then plug them into the hospital system without a GP is going to be a major problem for a lot of patients. How you could smooth that process out? Could you refer someone to a rapid access clinic without a referring doctor? I think that will be an issue for the remote disadvantaged people. Non-English speaking. That will be a stumbling block for a lot of those patients. (FG4)*	• Centralised system • Need appropriate guidelines for follow up management • Clear pathways for referral	*I think BreastScreen is quite well set up in the way that it's fairly centralised. So, once you've had the imaging, you've got you get a call back and you've got a team of people looking after you. So, whereas I'm not sure how this would work, but you feel like if it is a positive, if you feel a call-back as such, you'd need to have a follow up. Maybe not just the GP, but like, MDTs… some kind of centralised process. (FG19)*
Repeat screening	• Patient's willingness to attend future appointments • Delays in results • Distance and travel	*So, if there would be any out-of-pocket costs and how to how quickly to access it and the waiting times and turnover times as well as the follow up. So, what will be the process (for) a positive result?... that is a really big thing that patients really fear. And if they have to wait for weeks before they get some sort of answer, that sort of thing, that can be a really big discouraging factor for them. (FG10)*	• Well-structured and supportive follow up pathway • Nurse led program • Mobile app for patients to track progress • Funding package of care	*That's very much what our team of nurses do here for the bowel screening program. We have a nurse-led model that supports participants from the point of their positive screening result to a diagnostic assessment and a definitive diagnosis. So that's something that really needs to be incorporated so that the individual is supportive throughout and they're not left to the system… where they can slip through so many cracks and they do. (FG7)*

GP, general practitioner; LCS, lung cancer screening; LDCT, low dose computed tomography.

recognised that GPs' relationships with their patients have changed with it often being difficult to get an appointment and long-standing relationships with GPs are less common than in the past.

Intervention characteristics—design quality and packaging: naming the LCS program

Participants discussed the use of 'cancer' in the program name. Some believed this made it clear what is being screened for. Participants perceived that if cancer is not included in the name of the program, those worried about cancer won't be motivated to attend as they will not recognise it as cancer screening. It was therefore felt that the name needs to be as obvious as possible, to attract those appropriately concerned for their health and act as a trigger for more people to attend.

Others thought you shouldn't use the word 'cancer' in the program's name, so that it doesn't sound as scary, it makes screening seem more acceptable and reduces taboo. Using the term 'lung cancer screening' might draw in symptomatic patients as well, and they may find it distressing to walk into something labelled cancer. Alternatively, not using the word 'cancer', it was perceived to sound like a lung function test. Lung screening was suggested as a good approach as there might be other findings from screening and it could reduce stigma attached to cancer.

"I guess if you call it cancer screening, you may induce in some people are concerned that, like, I don't want to find that there's a life-threatening problem and again, that 'head in the sand' type thing, sometimes people don't want to know. So maybe having it more generic like, lung health check or a lung check might be better and not scare away people who are worried that they're going to have a cancer found." (FG14)

Alternative names suggested included following the UK model of 'Lung Health Check' but there were doubts into the feasibility of being able to screen for other lung conditions and the using of spirometry. Barriers to this approach would include feasibility, the need to give more advice about lung health and the clouding of messages. Facilitators include "Lung Health" being a neutral term, all encompassing, more acceptable and it could be linked to smoking cessation.

"The way the Brits have done it and calling it a healthy lung check I think is going to help with some of the stigma, rather than calling it lung cancer screening in terms of radiology." (FG4)

When considering the name in comparison to other cancer screening programs, LungScreen was suggested to keep it simple for the general population already familiar with 'BreastScreen' (the Australian program name for breast cancer screening). It was noted that breast and cervical screening programs do not include the word 'cancer', whereas bowel cancer screening does, with people knowing the reason for going along for screening, as one participant said:

"So, BreastScreen doesn't have 'cancer' in [the name]. The cervical screening test for the cervical screening program, doesn't have the word 'cancer' in it, but then the bowel cancer screening does have 'cancer' in it. So, 'cancer' might be a bit off putting for people." (FG11)

Chest screen (breast and lung combined) was suggested, to ensure consistency with the other programs. Essentially, participants stated the need for consumer perspectives as they decide whether or not to take part in screening and may prefer the name of the program to reflect what it is and not be too scientific.

Engagement, awareness and outreach

Mapping to intervention characteristics, characteristics of individual and process domains of the CFIR, this theme reflected strategies to build awareness about the LCS program, and increase engagement by screening participants, including those most at risk. Education for everyone including health professionals and the general population was identified as a key facilitator to promotion and recruitment into LCS. This included educating GPs and Aboriginal health workers so they are proactive in consultations and can provide key information about the high rate of early detection and evidence from the trials. Specific education resource suggestions included a website to house information about LCS and responses to frequently asked questions, brochures, and decision aids. Marketing of LCS was viewed as key, with messaging important about rationale for program, benefit/gain to those at high risk and broader population health; one participant commented:

"QR codes are on everything… they could get a link to a website that tells them about the program. People are very familiar with that. The website… could have all the information you need." (FG12)

In terms of increasing awareness of LCS in both the general population and the priority population, multifaceted ways to reach the population were seen as necessary. It was viewed as important to reach not only those at high risk, but connecting with family members and workplaces, which could influence intergenerational care and concern. This included different communications and different forms of messaging and advertising campaigns through mail, social media and television, that feature role models who had been for screening. Targeted advertising suggestions to raise awareness in those at high risk, included venues such as Returned and Services League of Australia (war veterans association) clubs and on cigarette packaging, as smoking is an important eligibility criterion. Over time, participants perceived that these strategies could help normalise LCS and gain 'critical mass' through word of mouth; as one participant said:

"And I'm sure when BreastScreen started, I'm sure it was a subgroup of women who thought, this is fabulous. The word got out there, GPs got behind it, women's magazines got behind it. More people heard about it, talked to their friends about it. So, my expectation is that this, too, would start with an enthusiastic group of medical practitioners and committed patients who are concerned." (FG22)

Traditional routes such as advertising in newspapers and posters in medical practices with simple eligibility criteria displayed were also suggested, including advertisements in different languages to reach culturally and linguistically diverse communities. Co-design of materials and resources was also discussed as important, as was early engagement with all stakeholders who would be involved in LCS as to how these materials and resources could be incorporated. Facilitators to understanding the population also included being creative, identifying what has worked in other screening programs that might translate, working with Aboriginal liaison officers, and comprehensive consumer engagement.

"I guess what I'm saying is building the screening program with them as a shared thing rather than saying we're going to do this. So if they want, one community says 'we need the mobile vans' versus something else. If they have early engagement and if they get a sense that they're building the program with the health care providers, then that might enable success." (FG3)

One of the barriers for engagement and awareness was seen to be funding, with lung cancer perceived to be 'not a sexy cancer' and attracts less 'healthcare dollars' and media attention than other cancers. Due to the cost savings LCS could bring to healthcare, one participant said that engagement and awareness is an investment and those cost savings could be diverted to this.

"Lung cancer… doesn't get anywhere near the health resource dollars or the media attention that a lot of other cancers. So, we are as a group, I think, well and truly behind the eight ball on that front." (FG14)

Out of pocket costs for patients were a great concern to participants. Many thought that even if the screening test was free, a large proportion of potential screening participants would need to pay costs toward travel to have a LDCT scan, potentially accommodation costs and at follow up, which would impact acceptability and uptake.

Intervention characteristics—adaptability: risk assessment

The tool

For recruitment, understanding eligibility was perceived to be straightforward due to it being based on having a risk score from the risk assessment tool to determine patient eligibility, but that any risk tool needs to be easily accessible and understandable. The NLST criteria were viewed as much simpler for patients to understand and assess their own eligibility. The use of the PLCOm2012 risk assessment tool for determining eligibility was discussed with participants. Participants thought this would be feasible to administer, as most of this information should be available to GPs. Barriers to its use included its subjectivity, its dependency on the reliability of the data gathered, pack year calculations can get complicated, race/ethnicity is hardly ever logged in GP systems, no occupational exposure is included in the model and that it relies on the patient.

"So, we'll be using pack-years but sometimes calculations actually get quite complicated. I think if the patient did the calculation before seeing me, I'd prefer that." (FG8)

To facilitate the use of the risk assessment tool, participants suggested its integration into GP systems such as the electronic medical record and the need for the tool to be made locally appropriate.

"It'd be nice if you could have this tool that it could automatically [identify] a patient that is coming to see them. If you could just run the tool based on the information that comes up, like trying to seamlessly integrate it into GP services so they'll use it." (FG3)

Managing ineligibility

Mapping to the outer setting domain of the CFIR, to maintain the success of the program, managing those patients who are deemed ineligible from the risk assessment was viewed as paramount. This included not sending patients who are symptomatic to screening and inviting the 'right group' to avoid diluting the credibility of the service and minimise potential error. Adhering to the eligibility criteria needs to be rigid and ethical, and LCS should only take those who meet the requirements.

"The other thing is differentiating lung cancer screening from

responding to suspected lung cancer, which is always a point of, I guess, confusion sometimes for people, in the front line, like c.” (FG5)

Participants perceived that there will be many enthusiastic patients who will want to screen but will be deemed ineligible. This may include younger people, people who have never smoked, and the worried well who already engage with the health system. Participants expressed concern that such people may be disappointed when they don’t meet the criteria. For those who screen, their eligibility may change over time and a GP will need to explain why they are no longer eligible. Some participants were concerned about the reputational risk of the program if those people deemed ineligible are diagnosed with lung cancer later. Participants perceived that some patients may seek private screening and that despite their best efforts, people not eligible will end up getting screened.

“They go and seek private screening, same what happens with breast screening program.” (FG10)

Participants also discussed the other risk factors that patients may have, such as family history, asbestos exposure, and environmental factors such as mining and passive smoking. Participants recognised that screening has to be for those who can benefit (e.g., good life expectancy), and not for those who wouldn’t be able to undergo treatment for lung cancer.

Benefits and harms for participants

The relative advantage (intervention characteristics) of LCS was discussed evenly across the groups. The benefits identified by participants included: the improvement of outcomes of cancer using a risk-based approach, less false positives and negatives, detection of earlier stage, more treatable disease (including incidental findings), that it is not labour-intensive, the opportunity to talk about smoking cessation, the reduction in stigma about lung cancer by normalising it, and it being more cost-effective due to the new chemotherapy and targeted treatment agents for lung cancer being expensive.

Harms of LCS were identified as radiation exposure, psychosocial factors, potential for overtreatment from false positives and the burden on the health system, incidental findings, overdiagnosis, potential to further disenfranchise rural populations and those needing more support to access the program. Participants also identified the potential societal harm, the need for medical indemnity due to interval cancers or cancers missed, the creation of fear or stigma and the risks associated with biopsy.

Screening

Inner setting—implementation climate: enthusiasm for screening

Participants perceived that those eligible for screening would find LCS very acceptable and that patients will be happy to have further investigations. This may not all come in the first year but build over time. Although participants acknowledged that they couldn’t answer from the patient perspective, they believed lung cancer survivors and people who used to smoke would support LCS. Facilitators to uptake were viewed as LCS being less invasive and patients already asking about LCS.

These participants viewed LCS as evidence-based, in the best interest of their patients, feasible, simple, accessible, and more cost effective than breast screening. Most of these participants were strong believers in LCS and given there are lots of lung nodules currently picked up incidentally, they viewed it as a very seamless tie in with clinical practice. Some participants reported that they had already started discussions internally about how they would set up LCS.

“We also had a look at it, setting it up unofficially in-house for a while. But it just was all too difficult. The politics of it got involved and it was all too hard.” (FG25)

Outer setting—patient needs and resources: access and equity

This theme encompassed access to screening and follow up appointments with a need to ensure access is equitable across all eligible people, with an emphasis on those most at risk of lung cancer. Importantly, ensuring those most at risk of lung cancer can get access to screening through uniform approaches was viewed as fundamental. Participants recognised that lung cancer is a disease of the poorer in regional areas, but since not all people who smoke are from low socio-economic status (SES) backgrounds, screening is likely to first reach the highly educated. Equity of access was viewed as the gold standard, targeting those with the most to gain from an early diagnosis. Barriers to equitable access were also recognised as: screening causing potential harm by further disenfranchising rural areas, as well as those who need extra support to access the program, and it costing more to access those underserved by the health system.

Mobile screening vans were discussed across all groups as essential in being able to bring LCS to the people, but there were barriers identified. This included access in the islands in far-north Australia and to remote areas during the wet season, and access to treatment for people who are geographically isolated. Participants thought some barriers for low SES populations could be overcome through initiatives such as increasing access to the priority population through physical reminders in visible places (e.g., sporting stadiums, local clubs, shopping centres) and for LCS to not require a GP consultation.

"Well, it [LCS] could overcome some of those barriers, you know, as we were saying, the lower socio economic might not go to primary care, but if you went to the areas and I don't know, parked at a shopping centre or in the rural remote and because, in fact, there is already, I think, a cardiology type bus that goes in rural remote Australia. So I think there's merit in this for the hard to reach. And I guess Aboriginal communities who are also living out more rural." (FG3)

Access in terms of the number of scanners was seen as a barrier to implementation of LCS. Participants discussed issues of availability and whether that rural would have sufficient computerized tomography (CT) scanners to meet the program needs, the geographic spread of the population, access to radiologists, and difficulty for follow up scans being offered. To facilitate access, scanners need to be available at a local level, appointments need to be available quickly in private practice could be considered.

Referral and management

Process—planning: referral across the program

Participants' views on this part of the screening and assessment pathway reflected the logistics of ensuring those screened are referred to the right services and what this might look like. The need for appropriate guidelines for follow-up management was viewed as paramount. Participants discussed inclusion of guidance on where to refer patients, who is responsible for the follow up and resources significant for positive findings, using a pathway with clear steps. Participants viewed the need for screening to be a seamless experience for the patient, with timely referral for investigations. This included incidental findings, and the large volume of work that will be generated.

A centralised referral and management system was suggested by some participants, as it was viewed that there should be capacity to follow up patients within the program, and this would facilitate communication between primary and hospital care. This would also ensure all participants followed the same process. A centralised database of CT images would allow streamlined access to previous imaging, essential for comparisons for nodule growth over time.

"One thing that has been talked about in the past and would be particularly useful, especially for the first round of screenings, would be access to any previous imaging that patients had. And now the government has talked in the past about sort of a centralised database for radiology." (FG4)

Return to screening

Process—planning: support for follow up

In the final part of the screening and assessment pathway, participants discussed the need for a well-structured follow up pathway, to facilitate patients attending future appointments and avoid losing patients when it is time for repeat screening.

"I think it needs to have a far more supportive structure, and particularly because low compliance through to actually diagnostics, if all you do is screen people all you end up with is a whole bunch of people that you know are at high risk and you never change their outcome. You've got to get them to the investigation. You've got to them to the intervention. It actually gives you a chance to diagnose the disease early because otherwise you'd just be wasting a lot of money on a very expensive program." (FG21)

Participants recognised that bowel screening is a nurse-led program (in some jurisdictions) that supports people from screening to diagnosis and treatment and it was suggested LCS could adopt a similar model. The need to communicate the follow up process and timeline to participants and support their access to other healthcare interventions including smoking cessation was emphasised across the focus groups.

Discussion

This qualitative study takes a patient-centred approach to barriers and facilitators to implementation of a national LCS program in Australia, with data mapped across the proposed screening and assessment pathway. Access and equity, engaging with the priority population, as well as raising awareness of LCS, were seen as key themes across the screening and assessment pathway, mapping to the CFIR domains of intervention characteristics and outer setting.

Access and equity was a key theme that emerged from this data from focus groups conducted with health professionals across Australia, with it strongly advocated that strategies are needed to ensure immediate equitable access, as the success of the program would be dependent on it. Access as a barrier, particularly travel, has been commonly reported in previous research in initial screening of multiple cohorts (30,33,34). Suggestions by the health professionals in this study to facilitate access and equity included mobile screening vans to reach rural and remote communities such as those used in the UK pilot screening trials. These mobile screening vans have been demonstrated to be very successful in the UK and the US for reaching underserved populations (26,35). Although there was a great deal of enthusiasm for the use of these vans in Australia, it was also recognised that there are challenges in the Australian setting including unsealed roads, monsoonal weather preventing access, and no power supply or internet connection. It is also essential to address these challenges with regards to supporting screening participants in follow up, as screening is more than just the initial LDCT scan.

These data have demonstrated that health professionals recognise the need for specific approaches for reaching the priority populations for LCS—it is not possible to rely solely on GPs. These barriers include those such as low health literacy, language and cultural barriers, as well as access. A recent review highlighted important themes for reaching the priority population for LCS, recognising that there are challenges compared to the other cancer screening programs (36), such as defining and locating the priority population, general recruitment barriers and additional barriers for people who currently or formerly have smoked. This review offers potential solutions which were replicated by data in this study, such as using electronic records to identify the priority group, and providing tailored information materials. It is especially important in Australia with its geographical challenges that there is awareness raising and outreach in rural and remote communities and that there are targeted resources accessible in different languages and also to those with low health literacy.

Shared decision making (SDM) was identified as a solution for recruitment and reaching the priority population in a recent review (36), but SDM itself was not a feature beyond discussing the benefits and harms of LCS. Recent feasibility projects undertaken in Australia (12) indicate that this is an emerging issue for consideration. It is unlikely to be mandated in the Australian setting but there is a keen interest in adapting existing tools and resources for the Australian program. Providing designated counselling and SDM has been shown in previous research to significantly improve patients' understanding of LCS with LDCT (37), but SDM has been evaluated to be low quality in LCS with minimal to no discussion of potential harms and use of decision aids (38,39). Implementation strategies to increase provider self-efficacy towards SDM with a decision aid to support SDM, could facilitate ordering of LDCT (40). These decision aids are universally recommended and are required in the US for LCS by the Centers for Medicare and Medicaid Services, but need to be short, patient-friendly and easily available for clinicians (41). Further efforts should be made in Australia to facilitate the use of SDM prior to the implementation of LCS to ensure providers and patients alike are supported in their decision making.

Another key finding was the advocacy for a supportive structure to the screening and assessment pathway for patients. Patient navigation was a suggested facilitator for this from the health professionals in this study. A randomised controlled trial has supported the use of patient navigation, demonstrating 24% of patients who underwent a patient navigation program for LCS in the US completed screening compared to 8.6% of the control group with usual care (42). 'End to end' support from patient navigators have also been used in an organised LCS pilot in Canada, finding they contributed significantly to the high acceptance of screening among those referred as well as the high retention rates in the pilot (43). This is an important facilitator to be considered alongside implementation of a potential LCS to support screening participants to attend past the first LDCT scan if they need further investigation.

This study highlights key barriers to LCS from both the patient and provider perspective that were also found in a review by Wang and colleagues (44). Key barriers included lack of patient awareness, cost concerns and insurance coverage, patient perceptions, and challenges to accessing screening. Strategies suggested by the health professionals in our study concurred with the review findings, including the need for patient-directed interventions to raise awareness, increasing health literacy, various strategies for inviting eligible participants, educational outreach, resources to address barriers such as stigma and fear of cancer, as well as targeting access by offering travel vouchers, shuttle services and out-of-hours appointments. These strategies, along with the geographical spread and the diverse communities that are features of the Australian population, are essential considerations in the proposed implementation of a LCS program.

A strength of this study is the wide inclusion of professional groups and the breadth of LCS participation factors and associated barriers and facilitators identified about national LCS program in Australia. The need for Australian specific data about LCS barriers and facilitators was emphasised by the participating health professionals.

This study is the most comprehensive analysis of factors conducted to date. Limitations include that we may not have reached a sufficient sample of healthcare professionals with doubts about LCS feasibility. We acknowledge that the perception of health professionals does not represent the perspectives of consumers likely to be eligible in LCS. Our team is addressing this acknowledged need with a study currently underway to gain community perspectives on LCS.

Conclusions

For the implementation of a national LCS program to be successful, the facilitators suggested by the study participants need to be considered by policymakers, and emphasis placed on developing strategies in consultation with consumers and healthcare providers as specified by the Australian Population Based Screening Framework. LCS must be acceptable to the population, with the proposed program promoting equity and access across the priority population, thus consultation with healthcare professionals and consumers are essential in the development of implementation plans.

Acknowledgments

Funding: This study was funded by an Australian National Health and Medical Research Council (NHMRC) Ideas Grant (2019/GA65812) (NMR). HM is supported by a Metro North Hospital and Health Service (Queensland, Australia) Clinical Academic Fellowship and an NHMRC Investigator Grant. MLY is funded by an NHMRC Investigator Grant (APP 2018108).

Footnote

Data Sharing Statement: Available at https://tlcr.amegroups.com/article/view/10.21037/tlcr-23-623/dss

Peer Review File: Available at https://tlcr.amegroups.com/article/view/10.21037/tlcr-23-623/prf

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://tlcr.amegroups.com/article/view/10.21037/tlcr-23-623/coif). M.L.Y. reports the funding from an NHMRC Investigator Grant (APP 2018108). E.S. has received honoraria for lectures from AstraZeneca, Merck Sharp & Dohme, and The Limbic, support to attend meetings from AstraZeneca LOBES 2022 and has received ad hoc advisory board payment from Bristol Myers Squibb. She holds leadership roles as Deputy Board Chair for the Thoracic Oncology Group of Australasia and Editor in Chief of JTO Clinical and Research Reports. She is the past Co-Convenor of the Tobacco and Related Substances Special Interest Group, Thoracic Society of Australasia. H.M. is supported by a Metro North Hospital and Health Service (Queensland, Australia) Clinical Academic Fellowship and an NHMRC Investigator Grant, and has received honoraria for lectures from AstraZeneca, funding for travel from International Association for the Study of Lung Cancer (IASLC), and holds leadership roles for the Thoracic Society of Australia and New Zealand (Convenor of Tobacco and Related Substances Special Interest Group) and IASLC (committee member). NMR reports the funding from an Australian National Health and Medical Research Council (NHMRC) Ideas Grant (2019/GA65812). The other authors have no conflicts of interest to disclose.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the University of Sydney Human Research Ethics Committee (2020/743). All participants gave informed consent before taking part.

References

1. Sung H, Ferlay J, Siegel RL, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA Cancer J Clin 2021;71:209-49.
2. Australian Institute of Health and Welfare. (2023). Cancer data in Australia. Available online: https://www.aihw.

gov.au/reports/cancer/cancer-data-in-australia/contents/overview-of-cancer-in-australia-2023

3. Greenhalgh EM, Bayly M, Jenkins S, et al. 1.3 Prevalence of smoking—adults. In: Greenhalgh EM, Scollo MM, Winstanley MH. editors. Tobacco in Australia: Facts and Issues. Melbourne: Cancer Council Victoria; 2023. Available online: https://www.tobaccoinaustralia.org.au/chapter-1-prevalence/1-3-prevalence-of-smoking-adults
4. Moyer VA; U.S. Preventive Services Task Force. Screening for lung cancer: U.S. Preventive Services Task Force recommendation statement. Ann Intern Med 2014;160:330-8.
5. Cancer Australia (2015). Position Statement: Lung Cancer Screening using Low-Dose Computed Tomography. Sydney, Australia.
6. Tammemagi MC, Lam S. Screening for lung cancer using low dose computed tomography. BMJ 2014;348:g2253.
7. Oudkerk M, Devaraj A, Vliegenthart R, et al. European position statement on lung cancer screening. Lancet Oncol 2017;18:e754-66.
8. Australian Government Department of Health. (2023). National Lung Cancer Screening Program. Retrieved August 24, 2023. Available online: https://www.health.gov.au/our-work/national-lung-cancer-screening-program
9. Mahase E. Lung cancer screening for over 55s will be rolled out in England. BMJ 2023;381:1469.
10. Lung Cancer Canada (2023). Screening. Retrieved August 24, 2023. Available online: https://www.lungcancercanada.ca/en-CA/Lung-Cancer/Screening.aspx
11. US Preventive Services Task Force; Krist AH, Davidson KW, et al. Screening for Lung Cancer: US Preventive Services Task Force Recommendation Statement. JAMA 2021;325:962-70.
12. Cancer Australia. Exploring the feasibility of a potential Lung Cancer Screening Program - Summary Report. Surry Hills, NSW, 2023.
13. Duffy SW, Field JK. Mortality Reduction with Low-Dose CT Screening for Lung Cancer. N Engl J Med 2020;382:572-3.
14. Balata H, Evison M, Sharman A, et al. CT screening for lung cancer: Are we ready to implement in Europe? Lung Cancer 2019;134:25-33.
15. Australian Government Department of Health. Population Based Screening Framework. Canberra, Australia, 2018.
16. ; Aberle DR, Adams AM, et al. Reduced lung-cancer mortality with low-dose computed tomographic screening. N Engl J Med 2011;365:395-409.
17. Bonevski B, Randell M, Paul C, et al. Reaching the hard-to-reach: a systematic review of strategies for improving health and medical research with socially disadvantaged groups. BMC Med Res Methodol 2014;14:42.
18. Balata H, Tonge J, Barber PV, et al. Attendees of Manchester's Lung Health Check pilot express a preference for community-based lung cancer screening. Thorax 2019;74:1176-8.
19. Eberth JM, McDonnell KK, Sercy E, et al. A national survey of primary care physicians: Perceptions and practices of low-dose CT lung cancer screening. Prev Med Rep 2018;11:93-9.
20. Cavers D, Nelson M, Rostron J, et al. Optimizing the implementation of lung cancer screening in Scotland: Focus group participant perspectives in the LUNGSCOT study. Health Expect 2022;25:3246-58.
21. Carter-Harris L, Gould MK. Multilevel Barriers to the Successful Implementation of Lung Cancer Screening: Why Does It Have to Be So Hard? Ann Am Thorac Soc 2017;14:1261-5.
22. Ali N, Lifford KJ, Carter B, et al. Barriers to uptake among high-risk individuals declining participation in lung cancer screening: a mixed methods analysis of the UK Lung Cancer Screening (UKLS) trial. BMJ Open 2015;5:e008254.
23. Silvestri GA, Goldman L, Burleson J, et al. Characteristics of Persons Screened for Lung Cancer in the United States : A Cohort Study. Ann Intern Med 2022;175:1501-5.
24. American Lung Association (2022). New Report: Critically Low Lung Cancer Screening Rates Reveal Opportunity to Save More Lives. Retrieved December 5, 2023. Available online: https://www.lung.org/media/press-releases/state-of-lung-cancer-2022
25. Kinsinger LS, Anderson C, Kim J, et al. Implementation of Lung Cancer Screening in the Veterans Health Administration. JAMA Intern Med 2017;177:399-406.
26. Crosbie PA, Balata H, Evison M, et al. Implementing lung cancer screening: baseline results from a community-based 'Lung Health Check' pilot in deprived areas of Manchester. Thorax 2019;74:405-9.
27. Rustagi AS, Byers AL, Keyhani S. Likelihood of Lung Cancer Screening by Poor Health Status and Race and Ethnicity in US Adults, 2017 to 2020. JAMA Netw Open 2022;5:e225318.
28. Tailor TD, Tong BC, Gao J, et al. Utilization of Lung Cancer Screening in the Medicare Fee-for-Service Population. Chest 2020;158:2200-10.
29. Dunlop KLA, Marshall HM, Stone E, et al. Motivation is not enough: A qualitative study of lung cancer screening

uptake in Australia to inform future implementation. PLoS One 2022;17:e0275361.

30. Holman A, Kross E, Crothers K, et al. Patient Perspectives on Longitudinal Adherence to Lung Cancer Screening. Chest 2022;162:230-41.
31. Damschroder LJ, Aron DC, Keith RE, et al. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implement Sci 2009;4:50.
32. Dodd RH, Sharman AR, Marshall HM, et al. "What do I think about implementing lung cancer screening? It all depends on how." Acceptability and feasibility of lung cancer screening in Australia: The view of key stakeholders about health system factors. PLoS One 2023;18:e0283939.
33. Lillie SE, Fu SS, Fabbrini AE, et al. What factors do patients consider most important in making lung cancer screening decisions? Findings from a demonstration project conducted in the Veterans Health Administration. Lung Cancer 2017;104:38-44.
34. Roth JA, Carter-Harris L, Brandzel S, et al. A qualitative study exploring patient motivations for screening for lung cancer. PLoS One 2018;13:e0196758.
35. Raghavan D, Wheeler M, Doege D, et al. Initial Results from Mobile Low-Dose Computerized Tomographic Lung Cancer Screening Unit: Improved Outcomes for Underserved Populations. Oncologist 2020;25:e777-81.
36. Van Hal G, Diab Garcia P. Lung cancer screening: targeting the hard to reach-a review. Transl Lung Cancer Res 2021;10:2309-22.
37. Mazzone PJ, Tenenbaum A, Seeley M, et al. Impact of a Lung Cancer Screening Counseling and Shared Decision-Making Visit. Chest 2017;151:572-8.
38. Brenner AT, Malo TL, Margolis M, et al. Evaluating Shared Decision Making for Lung Cancer Screening. JAMA Intern Med 2018;178:1311-6.
39. Wiener RS, Koppelman E, Bolton R, et al. Patient and Clinician Perspectives on Shared Decision-making in Early Adopting Lung Cancer Screening Programs: a Qualitative Study. J Gen Intern Med 2018;33:1035-42.
40. Reese TJ, Schlechter CR, Kramer H, et al. Implementing lung cancer screening in primary care: needs assessment and implementation strategy design. Transl Behav Med 2022;12:187-97.
41. Jensen, T., Chin, J., Baldwin, J., et al. (2022). Screening for Lung Cancer with Low Dose Computed Tomography (LDCT). Centers for Medicare & Medicaid Services. Retrieved August 12, 2022. Available online: https://www.cms.gov/medicare-coverage-database/view/ncacal-decision-memo.aspx?proposed=N&ncaid=304
42. Percac-Lima S, Ashburner JM, Rigotti NA, et al. Patient navigation for lung cancer screening among current smokers in community health centers a randomized controlled trial. Cancer Med 2018;7:894-902.
43. Darling GE, Tammemägi MC, Schmidt H, et al. Organized Lung Cancer Screening Pilot: Informing a Province-Wide Program in Ontario, Canada. Ann Thorac Surg 2021;111:1805-11.
44. Wang GX, Baggett TP, Pandharipande PV, et al. Barriers to Lung Cancer Screening Engagement from the Patient and Provider Perspective. Radiology 2019;290:278-87.

Cite this article as: Dodd RH, Sharman AR, Yap ML, Stone E, Marshall H, Rhee J, McCullough S, Rankin NM. "We need to work towards it, whatever it takes."—participation factors in the acceptability and feasibility of lung cancer screening in Australia: the perspectives of key stakeholders. Transl Lung Cancer Res 2024;13(2):240-255. doi: 10.21037/tlcr-23-623