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Defining the Road Map to a UK National Lung Cancer Screening Program

1. Introduction

Screening for lung cancer with low dose computed tomography (LDCT) has been shown to reduce disease-specific mortality¹⁻⁴. The largest trial, the National Lung Screening Trial (NLST), showed a reduction in all-cause mortality of 6.7% despite being underpowered for this outcome¹. An all-cause mortality reduction was not seen in the screening trials in breast and bowel cancer⁵⁻⁷. Recent meta-analyses have confirmed both the disease-specific and all-cause mortality benefit when other, also underpowered trials are included^{3,4}. These trials provide sufficient evidence to show clinical efficacy, but further work is needed to prove deliverability, in preparation for a national roll out of the first major targeted screening program. The United Kingdom (UK) has been world-leading in addressing logistical issues through clinical trials, implementation pilots and the National Health Service England (NHSE) Targeted Lung Health Check Program (TLHC)⁸.

This paper presents a consensus on the essential elements that should form part of the implementation of a pragmatic and cost-effective screening program. It has been produced by an expert group comprising clinicians, behavioural scientists, stakeholder organisations and representatives from NHSE and the UK National Screening committee (UKNSC) with representation from the 4 UK nations. The Roy Castle Lung Cancer Foundation provided funding for the round table discussions involved in the background work for the paper.

2. Identification of population, invitation, selection

Advertising and questionnaires have been the main method of invitation in many research trials to date but uptake of those eligible for screening is often low and such approaches can be highly resource intensive. Trials that have adopted a population approach to recruitment have shown very low participation rates (UKLS, NELSON) and serve to indicate that this should not be employed in the UK. The Lung Screen Uptake Trial^{9,10} was designed to maximise uptake using a targeted approach in primary care and found a 53% participation in the “MOT for your lungs”. UK pilots in Manchester and Liverpool did not directly measure participation rates but recruited very quickly, again using targeted methods^{11,12}. Drawing on these examples, the NHSE Targeted Lung Health Check Program (TLHC) uses primary care data to identify people who have any smoking record, who are then contacted for further risk stratification⁸. This is a way to minimise contact with people who are ineligible thereby reducing cost and potential distress from being contacted about cancer screening.

Risk-related eligibility criteria can be defined by age and smoking status or by using multivariable models. Risk prediction models incorporate additional risk factors such as chronic obstructive pulmonary disease (COPD) or asbestos exposure and have been shown to identify more people with lung cancer per screen. However, they may select people at greater risk of comorbidity and competing cause of death¹³⁻¹⁸. The fact that models identify more cases of lung cancer than age and smoking criteria, has been confirmed in UK data for those models used in the TLHC⁸ (Liverpool Lung Project version 2 (LLP_{v2})¹⁹ and the Prostate, Lung, Colorectal and Ovarian Cancer Screening Trial model

(modified 2012) (PLCO_{m2012})¹⁸. Several new models have been published and it is important that a strategy for testing those that may be better in UK data is developed. Cost-effectiveness estimates, model performance, eligibility thresholds and prediction of benefit from screening are all important in evaluating new models. Machine learning approaches are also in development²⁰.

A recent validation study showed that the existing models cannot currently be used directly on primary care data to select the participants, largely due to missing detailed smoking data that they require²¹. Instead, additional data may be sought from people with an ever-smoking history of ever having smoked before the models are applied. It is important that data completeness in primary care records, particularly for smoking status, is comprehensive and contemporaneous, which may require incentivisation. Novel approaches to optimising data completeness and quality are needed e.g. using the NHS Health app to encourage people to update their own smoking data and text messages to ask those without a primary care smoking record to reply with their smoking status. Ongoing research work seeks to identify those unlikely to benefit from screening and develop newer risk prediction models which can integrate into primary care software²¹.

3. Supporting Equitable Participation in Lung Cancer Screening

It is important to use evidence-based approaches to contact potential screening candidates, and to maximise informed participation in a population where socioeconomic deprivation is common and there is risk of widening existing inequalities²². UKLS and other studies have shown that individuals at highest risk are least likely to respond to a lung screening invitation²³. Common reasons are difficulty accessing services and cancer fear and fatalism in this population²⁴. The balance of harms and benefits of lung cancer screening (LCS) participation is underpinned by the wider social determinants of health, or environmental conditions that impact health outcomes and risks. For example, time and resources required to participate in the lung screening process may be a greater burden for people from lower socioeconomic backgrounds.

Currently, participation rates in the TLHC average around 35%, which is well below other established screening programs. Data from the SUMMIT Study and Yorkshire Lung Screen Trial show uptake rates of 41% and 51% respectively^{25,26}. These data also confirmed socioeconomic and smoking-related inequalities in participation, and inequalities by ethnicity and region, also seen in screening programs for other cancer types^{27,28}

Behavioural science principles tell us that behaviour change is influenced by capability, opportunity and motivation²⁹. In relation to improving participation this means improving awareness of lung cancer screening and its availability (capability), enabling easier physical access and support (opportunity) and addressing perceptions of benefit and harm (motivation).^{30,31} Each of these components may be targeted through evidence-based methods at multiple levels (individuals, community, system). Examples of this might include tailored messaging, and a targeted, stepped and low-burden invitation approach, as proposed and tested by the LSUT^{10,32,33} These methods should be co-designed and evaluated based on local knowledge, community engagement and evidence from other screening programs to optimise equitable participation among the eligible population.

This process applies to the whole lung screening pathway from awareness, invitation and eligibility assessment, through to surveillance, adherence to subsequent screening rounds and potential decisions about diagnostic work-up or treatment³⁴. Shared decision making is important, involving participants and healthcare professions, the latter supporting the often complex cognitive and

emotional demands³⁵. It is recognised that decision support tools can improve overall knowledge scores, but eligibility, false positive and negative findings, and lung cancer mortality reduction remain poorly presented and misunderstood³⁶⁻³⁸. Thus, LCS programs need to be organised in a way that supports integration of shared decision making in lung screening.

Evidence from existing TLHC pilots suggests that community outreach in the form of local communications (e.g. local radio, bus-stop and engagement events, community educators or 'champions') are effective. This should be supported by materials adapted to the needs of the local population, with regular evaluation of acceptability. Charity and third sector support can facilitate this (e.g. Roy Castle Lung Foundation supported events and media activity <https://roycastle.org/lung-health-checks/>), with patient and public involvement and behavioural scientists key to their evidence-based design and evaluation. Pathway navigators may have an important role in helping high risk individuals from under-represented communities to access lung screening, integrated smoking cessation and treatment.

4. Lung Health Check

The Lung Health Check (LHC) approach was perceived to be valuable in embodying a holistic, targeted health intervention that combines lung cancer screening with prevention and early detection of other smoking related co-morbidities such as COPD and cardiovascular disease (CVD). Components of the LHC include an assessment of screening eligibility, based on an individual's lung cancer risk score, an assessment of respiratory symptoms, immediate access to smoking cessation support and measurement of spirometry (although spirometry was paused during the Covid-19 pandemic); assessment of cardiovascular risk may also be included³⁹.

LHC models that have been developed to address 'barriers' to participation include a 'one-stop-shop' community-based service with immediate access to a mobile CT scanner located in areas of high socio-economic deprivation^{11,40,41} and a targeted, low burden, stepped invitation approach to a hospital based service¹⁰. In the Yorkshire Lung Screening Trial (YLST) and the SUMMIT study, an initial telephone triage was used to assess risk followed by a community or hospital-based LHC / LDCT scan for those identified to be at higher risk^{25,41,42}. Other variations in service delivery include LHCs located in the primary care setting, followed by LDCT scans in hospital at a separate appointment¹² or a combination of approaches⁴³. Although the optimal approach will continue to evolve following evidence and good practice, the guiding principle is that LHC services should be accessible and convenient, especially for individuals from underserved communities in whom transport and perception of healthcare models may be particularly misaligned with provision. It is recognised that local TLHC teams are best placed to determine the optimal approach for their area. For those eligible, the LHC should include a discussion about the benefits and harms of screening prior to undergoing the baseline LDCT scan with attendees and their GP should receive a prompt, electronic copy of the LHC outcome.

Smoking cessation

It is widely acknowledged that smoking cessation is an essential component of any lung cancer screening program. The UKLS demonstrated that LCS, and in particular receiving an abnormal scan result, increased smoking cessation rates and thus represents a powerful opportunity to maximise cessation⁴⁴. Cost effectiveness data show that adding any kind of stop smoking intervention is very likely to be cost-effective⁴⁵. Smoking cessation should be delivered as an 'opt out', and where possible,

as an integrated service for current and recent former smokers. Ideally there should be immediate access to a smoking cessation practitioner who is able to provide a comprehensive package of smoking cessation support including immediate access to nicotine replacement therapies including electronic cigarettes or 'vapes'^{46,47}. A model which simply suggests onward referral of screening attendees to external services will be ineffective and risks widening health inequalities⁴⁷⁻⁴⁹. Consideration must be given to how support may be provided and funded given disparities in TLHC pilots and community stop smoking service provision.

Spirometry

In contrast, there is ongoing debate about the relative merits of measuring spirometry within a LCS program, especially in asymptomatic participants, where evidence of benefit, particularly on the scale required for screening program implementation and cost effectiveness, is lacking⁵⁰. Whilst published series to date suggest approximately 10 to 15% of attendees are likely to have undiagnosed symptomatic COPD⁵¹⁻⁵³, it is unclear whether this measurably improves health for these individuals and hence there are not sufficient grounds to adopt this within a national program. Further research is however required to better define the role of spirometry within lung cancer screening programs and the NHSE TLHC is likely to be well placed to enable such investigation. Spirometry may also be useful in further defining risk of lung cancer as recent screening studies have shown this to be an independent risk factor⁵³.

5. Management of Findings and Pathways

Incidental findings are common in CT screening but there are concerns that over-investigation and over-reporting might cause anxiety, lead to harm from unnecessary tests and increase costs. Data from the UK have shown that by using clear guidelines and protocols for the management of incidental findings, those requiring referral to primary care (10%) or hospital referral are low⁵⁴⁻⁵⁶. NHSE guidelines for referral of incidental findings are largely based on American College of Radiology (ACR) white papers and included in the NHSE Quality assurance document appendix⁵⁷. Principles for referral are described in the NHSE Standard Protocol and Quality Assurance Standard appendix⁸. Implicit within these documents is the requirement for a high threshold for referral to primary/secondary care due to either clinically significant and/or urgent findings and where there is a recognised evidence-based intervention available to benefit patient outcome. A European Consensus Statement on management of incidental findings from low-dose CT screening for lung cancer is expected to be published in 2023. It is critical that the national screening program develop and promote clear and unambiguous guidelines for clinicians about the threshold for onward referrals. Practice in other screening programs suggest that variable thresholds are the norm, and this must be avoided.

Lung nodule management in most UK screening pilots follow (modified) British Thoracic Society (BTS) guidelines and volumetric analysis should be used wherever possible.^{58,59} Updated BTS nodule management guidelines are also planned, which are likely to include guidance for new nodules detected at incident screening rounds. Computer-aided detection (CAD) software can assist nodule detection, perform semi-automated or fully automated volumetric analysis and assess risk of malignancy. Research is needed to compare and validate existing and new systems and assess their impact on nodule management and LDCT reporting times.

LDCT screening also readily detects undiagnosed cardiovascular and respiratory disease, which could be an 'added benefit' of LCS^{39,51,60,61}. The evidence is clearer for coronary artery disease where the

degree of coronary artery calcification is correlated with clinical outcome⁶²⁻⁶⁴. However, limited evidence suggests that despite identification of respiratory and cardiovascular disease, changes to patient management in primary care are infrequent⁵⁴. There needs to be more effort to ensure that evidence-based preventive management is offered in primary care facilitated by communication from the screening programme.

It is crucial to ensure that radiology reporting and management of incidental findings by the clinical team are audited regularly and form part of formal screening QA for any program. In line with the TLHC recommendations and following precedent from other screening programs using imaging interventions, all radiologists should undertake a training program before becoming screening reporters. They should be subject to regular appraisal to ensure that their reporting is in line with expected standards. Examples of best practice include screening review meetings, where all incidental findings are assessed by an expert team with shared responsibility to minimise downstream impacts.

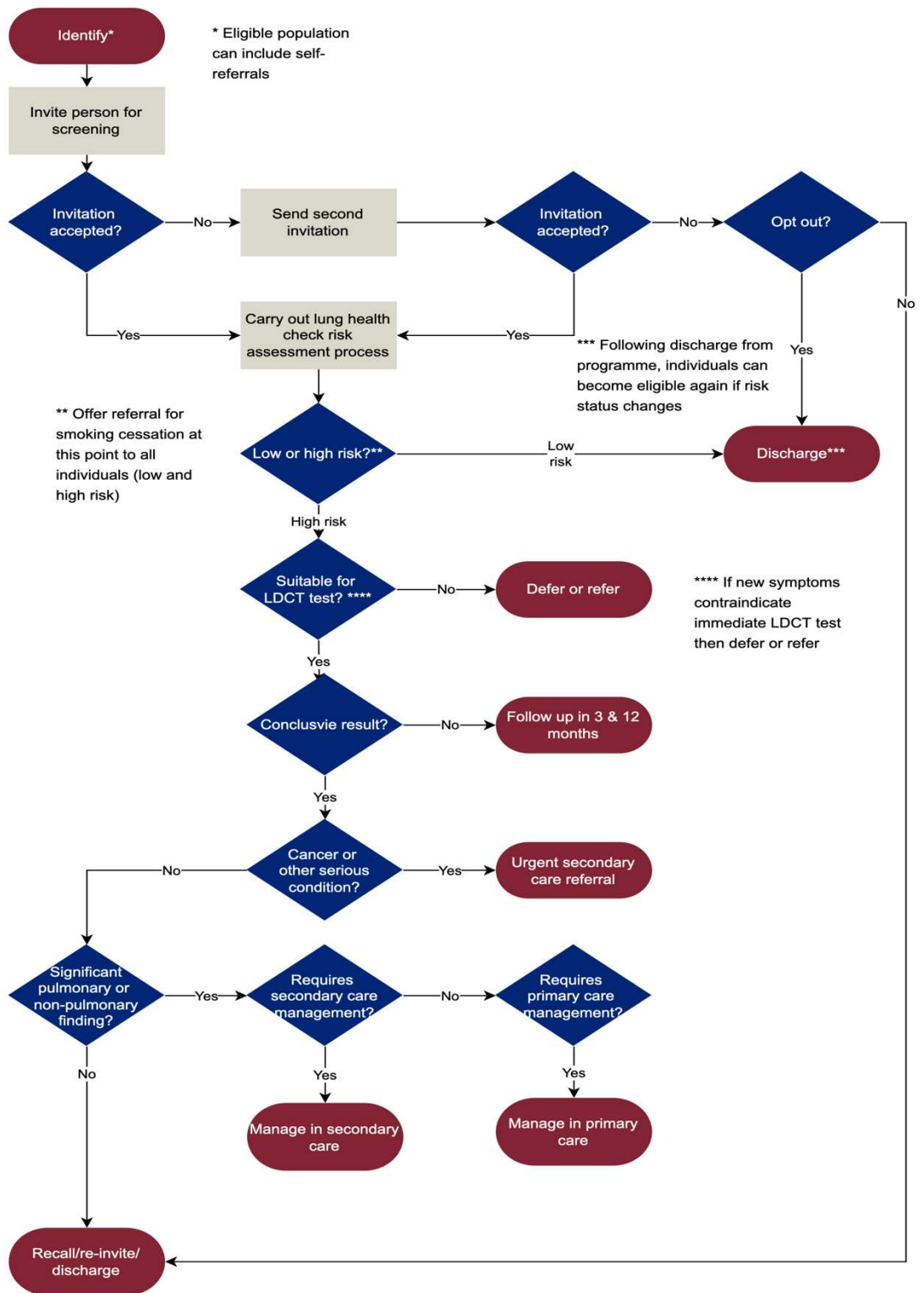


Figure 1 NSC Consultation TLHC pathway diagram – permissions?

6. Adherence

Adherence to subsequent screening rounds is important to realise the full potential of the program both for the individual and the population as a whole. Adherence in LCS trials has been high (92-94%)^{1,2}. In the Manchester UK pilot adherence was 90% at 1 year⁴⁰ and in YLST it was 80% after a 2-year interval (unpublished). In the US, adherence rates vary greatly but the model of care is also variable and not transferable to the UK. Two systematic reviews and meta-analyses of adherence to screening have shown pooled adherence rates of 37-72%^{65,66}. Factors that affect adherence were found to be very similar to those impacting baseline participation. Navigators have been identified as an important way to improve adherence. It is established that either nurse navigators or lay patient navigators improve baseline participation. In one primary network based randomised controlled trial in the US, patient navigators assessed eligibility, undertook shared decision making and addressed concerns and barriers⁶⁷. Participation amongst eligible people was 94% and of all people approached, 31% in the navigator arm and 17% in the control arm had a CT.

Target metrics for adherence are unclear but should be $\leq 10\%$ attrition per year of screening interval. This may be influenced by screen interval, currently set in the UK at 2 years for those without significant indeterminate nodules. Shorter screen intervals would require higher total funding, whereas intervals of >2 years are not recommended based on data from NELSON where the final screening round, 2.5 years from the penultimate found a higher proportion of later stage tumours⁶⁸.

7. QA and governance

Quality Assurance (QA) is an essential requirement for all screening programs. QA provides a mechanism to support very complex programs in delivering the most benefit and minimising harm. This is achieved by helping providers to meet requirements for safe and effective delivery of screening, facilitate quality improvement and mitigate harm. Screening QA spans the entire screening pathway from identification and invitation of eligible individuals to informing the attendee and relevant health services of the screening result. QA metrics need clear definitions and should focus on those processes in which system failures or errors are most likely to lead to harm. This will help to minimise the burden of data collection and reporting. The framework used by Screening Quality Assurance Service (SQAS) to QA the national cancer screening programs is set out in Program Specific Operating Models (PSOM). Screening providers and commissioners are required to have internal processes that effectively manage service quality and describe participation in QA assessments. SQAS regional teams look at data from the services, compare these with other similar services and undertake QA visits. This ensures compliance with standards, assessment of service quality and supporting quality improvement. They also support local providers with advice on quality related matters at commissioner led program board meetings and through regular contact with providers. QA will be a mandatory requirement for all sites delivering lung cancer screening. However, to be effective and proportionate it is vital that this is underpinned by a suitable IT system and QA should link in closely with screening digital transformation programs. For example, nationally defined data items should be uploaded, and results presented through a single interface using a consistent format across the country. This could include a dashboard providing site specific 'RAG' ratings for each quality standard, with results updated in a timely manner. At present, TLHC sites are asked to return questionnaires to this effect.

Screening standards are used to drive and benchmark screening performance and enable consistent data collection across sites. Quality standards have already been published for the TLHC program⁵⁷

and reviewed by the Royal College of Radiology (RCR) and British Society of Thoracic Imaging (BSTI)⁶⁹. It is recognised that current standards are likely to need further development. The screening standards should incorporate mechanisms to assess the ongoing clinical effectiveness of the program, including mechanisms to capture recall rates, and to identify and manage discrepancy (i.e. a “live” QA). In addition, periodically mandated QA of radiologists using an external system with expert-validated cases, analogous to that used for over 30 years in the breast cancer screening (BCS) program (PERFORMS) is needed⁷⁰. This is currently at the deployment stage in the TLHC (acronym PERFECTS)⁷¹. The quality of healthcare experiences should also be captured through participant-reported outcome measures (PROMs) and participant-reported experience measures (PREMS). Development modified or additional standards should take advantage of best practice and learning from other screening programs already in operation. For example, the UKNSC categorises standards for population screening into themes, which include population, coverage, uptake, test, diagnosis/intervention, referral, intervention/treatment, and outcome. In addition, a standardised approach and timeframe (e.g. every three years as in the BCS program) for reviewing and revising standards is required. Criteria of success should be defined and used to compare screening sites, drive precise remedial actions, and allow prioritisation of specific areas for QA.

8. Data and Information technology

IT Systems

UK health data are extensive and largely ahead of other countries. However, for a national cancer screening program, it is vital to aggregate existing healthcare data and LCS data that are identified as a requirement. In 2019 an independent report commissioned by NHSE on screening was very critical of the IT systems for the existing cancer screening programs, describing them as “..woefully out of date and long due for replacement.”⁷² It was noted that NHSX had then started the scoping exercise but that it was “...important to progress this work programme at pace, and under close scrutiny.” In LCS, as in other programs, a safe, end-to-end IT solution covering invitation and recall, results communications, and QA is required, including necessary live data returns. A single, national IT system is considered a priority in LCS to provide consistency and standardisation. Although single national systems run the risks that they might not meet the required specification, could be inflexible and limit innovation, this can be mitigated through careful design and evaluation, building on the functionality seen in some of the trial IT systems. These systems must be maintained and evolved.

In the TLHC, individual sites are required to collect data but the approach to IT is highly variable. Some are modelled on existing screening infrastructure or use third party solutions, but many employ simple spreadsheets for data collection and disjointed systems for managing other aspects. A major limitation is the ability of many these systems to output data and provide real-time review of performance (e.g. uptake, DNA and recall rates). Furthermore, the lack of a national system means that new sites must develop their own, which is inefficient and leads to further variation.

The initiation of a new program is an ideal time to develop a system that is fit for purpose, and which is easily adopted by new sites. Whilst separate systems adhering to the same standards may be alternative, they are a compromise. In this scenario, systems must be able to output data in a format that can be amalgamated at a national level for benchmarking, QA and research.

Technology and artificial intelligence

In recent years, the development of digital radiology tools has been rapid. In LCS, tools in use include computer-aided detection (CAD) of pulmonary nodules and (semi-)automated measurement of nodule volume. These are predominantly third-party solutions that interface with the Picture Archiving and Communications Systems (PACS). It is important that these undergo validation and revalidation on a regular basis. More advanced AI solutions are in development and may be important to improve accuracy of reporting and workflow^{73,74}.

AI solutions offer the opportunity to reduce workforce pressures; e.g. obviating the need for double radiologist reading, but it is important that workflow is improved and this will require greater technical capacity, server infrastructure and appropriate backup mechanisms.

9. Workforce

The Health Select Committee report from April 2022 set out the significant workforce challenges faced by today's NHS⁷⁵. National LCS will add to this and therefore careful planning is required to optimise resources. This will mean that that design of the program should always have in mind potential capacity limitations and should deploy technology where this maximises efficiency. Table 1 lists the workforce disciplines involved in lung cancer screening, with comments on likely increased demand and potential solutions.

Table 1: Workforce disciplines in LCS

Discipline	Level of resource increase and comment.	Potential mitigations
Radiology	Marked; estimates provided by RCR/BSTI	AI solutions to improve accuracy and workflow National or regional pooled reporting platforms
Radiography (diagnostic / reporting / therapeutic)	Marked – likely marked for diagnostic; modest for reporting in the short term; modest for therapeutic	AI solutions to improve flow and potentially allow first or definitive read by radiographer
NM radiology	Modest – mainly PET	More staff with appropriate training
Interventional radiology	Marked – lung biopsy	Latest technology to assist in lung biopsy
Administrative staff	Marked – potentially easy recruitment and training	Good administrative cover likely to improve efficiency of whole program
Nursing staff (screening process)	Modest – need to ensure duties focussed on clinical aspects	Good training in screening activity
Respiratory Medicine	Marked – used in screening review and work up of participants with positive scans (including peripheral lung biopsy)	Use of admin staff to support, automated communications where possible; Guideline driven management; Latest technology in peripheral biopsy funded for selected centres;

		Train and appoint more respiratory physicians.
Thoracic surgery	Marked – surgery rates are high	More theatre time and ITU beds now; Train and appoint more surgeons for the future
Clinical oncology	Marked – SABR rates higher; likely increase in chemoradiotherapy	Train and appoint more clinical oncologists and therapeutic radiographers; work on better and more efficient pathways (see NOLCP)
Medical oncology	Modest – late stage patients are fit and earlier stage disease requiring adjuvant treatment. With time, fewer late stage patients requiring long term treatment	Train and appoint more specialist nurses to run nurse-led clinics; train and appoint more medical oncologists
Pathology	Modest – longer reporting times for resections and possible frozen sections	Existing shortfall should be addressed; digital pathology
Pathology scientists	Modest – more patients will need full molecular tests	Provision of better equipment including local NGS panels
Smoking Cessation Practitioners	Marked – essential to maximise benefit	Fund SCP and deploy on site or on mobile unit
Primary care	Modest- will help patient engagement and some incidental findings management	Mitigate workload through clear protocols and pathways of care

There was consensus on the importance of an explicit roadmap to developing the workforce capacity for the TLHC, and the need to demonstrate that the creation of such capacity synergistically benefits the wider NHS (e.g. increased clinical and radiology capacity) as a whole.

10. Corporate / third sector / charity and Participant Engagement

It is important to engage a variety of charitable, third sector and corporate groups and ensure that they are part of the discussions around lung cancer screening. These sectors are often a key source of cancer information for the public and are well known for providing accurate, trustworthy and accessible content. Many charities and third sector organisations already have information about the TLHC program on their websites and would update this for any national program, with tailored information as required⁷⁶⁻⁷⁹. As well as 'standard' descriptive information, charities can also play an important role in addressing misunderstandings and myths around cancer screening. This can be via online content, but they can also create bespoke opportunities to air specific messages through their experts in promoting awareness and in leveraging mainstream and social media. Expertise within these organisations can also be helpful for the development/review of formal program participant-facing materials. Whether charities are in a position to get involved in more actively raising awareness and promoting engagement with cancer screening opportunities varies. Some charities have considerable experience with local community engagement. However, there is often not the funding in charitable organisations for large scale national campaigns. Instead, charities often put their efforts into influencing Government-funded campaign plans⁸⁰. There has also been industry interest in increasing engagement with lung cancer screening, acknowledging the growing evidence for its effectiveness. It is important to maximise the impacts of relationships with Industry, whilst adhering to the principles surrounding transparent joint working relationships⁸¹.

Engaging at a more strategic/political level to ensure screening implementation and ongoing optimisation is also an important role of these organisations. They play a key role in influencing national policy and holding Government and other key stakeholders to account and also in producing reports for politicians and policymakers to highlight the most important areas of focus to improve lung cancer outcomes⁸².

These organisations also undertake insight work across different audiences, including public and health professionals. While this is often led by internal priorities, there can be opportunities to feed questions into this process that may provide rapid feedback on topics relevant to cancer screening program development and implementation.

Another important role is as funders of academic research. Where this operates on a commissioned basis, there may be opportunities to influence the focus of commissioned research to fit with cancer screening program development and implementation, but the bulk of research is likely to be investigator-led and highly competitive.

11. Discussion

This article describes the consensus reached by a multiprofessional group of experts in LCS on the key requirements and priorities for effective implementation of a program (see Table 2). It draws on the considerable experience gained from UK trials, pilots and most recently the NHSE TLHC. In September 2022, the UKNSC recommended LCS be implemented in the four UK countries, initially on the same basis as the TLHC. This manuscript serves as an important tool in the ongoing expansion and evolution of an already successful program as well as providing a summary of UK expert opinion for consideration by those organising and delivering LCS in other countries. Full implementation in the UK is a major challenge but has to be achieved if the full benefits of LCS are to be realised. It is essential that the UK countries prepare to deliver high quality LCS by complying with the key elements identified here, and in particular addressing capacity limitations and ensuring a secure funding source equivalent to the other UK screening programs. There needs to be a clear message to the entire healthcare system about the nature and efficacy of an ongoing LCS program with explicit information on roles and responsibilities at all levels including Cancer Alliances and Integrated Care Systems.

It is appreciated that the 4 UK nations will implement screening programs under different branding but it is strongly recommended that each adopt a shared learning principal to achieve comparable standards.

Table 2: Priorities and requirements for implementation of LCS

Priorities	Requirements
Identification and Selection	Methodology to identify ever smokers from GP record. Consider updating the primary care record
Participation and Adherence	Clear guidance on the best methods to encourage equitable participation and adherence
Smoking cessation	Enhanced SC intervention with co-location and opt-out
Managing findings	Guidelines, education and QA of management of nodules, work-up and incidental findings
Add-on health interventions	Clarification of what is included in the screening intervention LHC and from where the funding is derived
QA and governance	Full participation in QA with clear effective and audited governance
Data and IT	An end to end IT system for LCS; use of the latest technology to minimise workload
Workforce	Identify the workforce needs and plan expansion and improved logistics
Collaboration	Continue to develop effective working relationships between responsible NHS organisations and the third sector, industry and charities
Innovation and Research	Foster innovation by encouraging local initiatives with a mechanism for evaluation. Build research into the LCS program

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