UK National Screening Committee

UK National Screening Committee (UK NSC)

Targeted screening for lung cancer in adults with a history of smoking

Purpose

To ask the UK NSC to

- recommend that the NHS in the four UK countries move towards the implementation of a targeted screening programme for lung cancer in adults aged 55 – 74 with a history smoking
- approve the establishment of a group, reporting to the Adult Reference Group, to consider the detail of this recommendation further.

Current recommendation

The last time the UK NSC formally considered screening for lung cancer was in 2007. At this point, the recommendation was not to offer screening.

More recently, following the publication of an HTA cost effectiveness evaluation in 2018 a decision was taken to defer a review of the 2007 recommendation until the important NELSON study reported its results on the impact of screening, and subsequent intervention, on lung cancer mortality.

Once this happened the UK NSC convened a series of expert meetings to consider the way in which the HTA cost effectiveness evaluation should be updated and developed. Membership of the expert groups are attached as appendix 1.

The UK NSC is extremely grateful to all who participated in these meetings.

In keeping with UK NSC processes an evidence summary was also commissioned to review the evidence on a number of questions.

Change of UK NSC remit

Consideration of targeted screening programmes was not formally within the remit of the UK NSC when the first version of the HTA cost effectiveness evaluation was published. This changed following an announcement by the Secretary of State for Health in October 2019 and the subsequent recommendations of the four UK Chief Medical Officers.

Evidence Summary

Solutions for Public Health were commissioned to produce an evidence summary in keeping with the UK NSC process (https://www.gov.uk/government/publications/uk-nsc-evidence-review-process/uk-nsc-evidence-review-process). This has been circulated with the meeting papers.

The evidence summary addressed two key questions:

i) What is the clinical effectiveness of screening programmes for the detection of lung cancer using LDCT in individuals at increased risk, compared with no screening? (UK NSC criteria 11 and 13)

- In relation to criterion 11, 'there should be evidence from high quality randomised controlled trials that the screening programme is effective in reducing mortality or morbidity', the summary concluded that this criterion was met. This was based on meta-analysis of seven RCTs reported in the evidence summary.
- In relation to criterion 13, 'the benefit gained by individuals from the screening programme should outweigh any harms, for example from overdiagnosis, overtreatment, false positives, false reassurance, uncertain findings and complications', the summary concluded that this criterion was uncertain. This was because differences between the RCTs, in terms of eligibility criteria, threshold for a positive screen, round length, number of rounds of screening, follow up period and definition of significant incidental findings led to some inconsistency in findings and leads uncertainty about the approach which would be the most clinically effective to reduce mortality and morbidity from lung cancer screening whilst reducing possible harms to a minimum.

ii) What is the acceptability of screening programmes for lung cancer using LDCT in individuals at increased risk? (UK NSC criterion12)

- In relation to criterion 12, 'there should be evidence that the complete screening programme (test, diagnostic procedures, treatment/ intervention) is clinically, socially and ethically acceptable to health professionals and the public', the review concluded that this criterion was met for volume, applicability and quality of evidence, unmet for consistency. This was because UK studies reported a reasonable level of acceptance of the screening test but there was limited evidence concerning the acceptability of the full screening pathway including diagnostic work up and treatment of lung cancer for those people who test positive.

The evidence summary also addressed three contextual questions:

i) what factors increase the risk of lung cancer? What is the incidence, prevalence and mortality of lung cancer by risk groups, and what are the trends in the risk factors over time? (UK NSC criterion 1)
ii) what is the accuracy of risk assessment algorithms and/or low dose computed tomography (LDCT) to predict/detect lung cancer? (UK NSC criterion 4)
iii) what is the cost effectiveness of screening programmes for the detection of lung cancer using LDCT in individuals at increased risk, compared with no screening? What is the cost effectiveness of different strategies using LDCT screening (e.g. different intervals, use of risk algorithm, etc.)? (UK NSC criterion 14)

For the cost effectiveness question, the evidence summary reported a systematic review which identified a large number of cost effectiveness evaluations with a wide range of ICER (Incremental Cost Effectiveness Ratio) estimates.

Within this body of studies, four UK evaluations were identified. The majority reported ICERs below £20,000. In relation to the UK evaluations, but not the body of evaluations as a whole, the ICER estimates produced by the 2018 UK HTA evaluation represented an outlier as the estimate for all screening strategies exceeded this figure. Importantly, some of the HTA ICERs were below £30,000.

Overall, in the studies included in the systematic review it was difficult to understand the sources of variation which resulted in favourable or unfavourable ICERs. For example, the four UK studies included in the systematic review varied in whether they included only males or all people, the target age range, the risk algorithm for identifying eligible people, whether they considered overdiagnosis, whether the model was based on RCT data, the number of sensitivity and scenario analyses and whether there was any external validation.

The evidence summary noted the significant ongoing work to update the 2018 UK HTA cost effectiveness evaluation and suggested that this should be used to identify the optimum screening strategy including, for example, the population (age and smoking history), screening intervals, lung cancer risk thresholds and CT scanning schedules.

Evidence summary conclusion

The review concluded that, assuming screening is found to be cost effective, any further research on screening should be considered as part of an implementation strategy, the prioritisation and the design of which should be discussed and planned with stakeholders.

Cost effectiveness work

i) HTA cost effectiveness evaluation

The NIHR and UK NSC Secretariat organised a stakeholder engagement process to help update and develop the 2018 HTA cost effectiveness evaluation. Two task and finish groups provided a forum of expert discussion on the pathways which might be considered, the data inputs which could be used and on the approach to modelling.

The importance of, and need for, a complex model in providing a reliable estimate of cost effectiveness and a reference point for further development of a targeted lung cancer screening programme was recognised in the discussions within the task and finish groups.

A major component of the HTA evaluation is a natural history model which required further work to ensure a reasonably accurate estimate of the lung cancer stage distribution in both the screening and current practice arms. It has not been possible to complete this work and completion of the natural history model remains an outstanding issue.

However the HTA team did implement some major updates to the cost effectiveness model, for example to costing, lung cancer mortality, disutility value and diagnostic pathway parameters. These updates resulted in significant changes to the estimated cost effectiveness of some screening strategies which brought the HTA evaluation much closer to the other UK estimates.

Notwithstanding the need to finalise the evaluation in the light of the completed natural history model, the interim report concluded that it is likely that cost effective screening strategies will be available.

These updates, and the cost effectiveness outcomes, were reported in an interim report which has been circulated with the meeting papers.

ii) Quality assurance of a supplementary cost effectiveness evaluation

The engagement with clinical stakeholders made a significant contribution to the update of the HTA cost effectiveness evaluation. The delay in the completion of that work was the source of some concern about the absence of an evaluation which accurately represented the lung cancer stage shift achieved by screening, the impact on clinical outcomes and, consequently, an accurate assessment of cost effectiveness.

To address this concern, the UK NSC Secretariat agreed to consider a completed evaluation which was developed by a commercial company (Institute for Diagnostic Accuracy (iDNA)) based in the Netherlands with input from UK clinicians. The development of the evaluation was funded by AstraZeneca.

This evaluation was considered as a supplement to the HTA interim report with the aim of reinforcing and building confidence in the direction of the interim report's ICER estimates. To ensure quality and manage potential conflicts of interest the Sheffield University School of Health and Related Research (ScHARR) was commissioned to undertake a quality assurance assessment of the iDNA model.

The iDNA technical report was considered at a meeting of ARG and UK NSC members and the HTA cost effectiveness team in June 2022. A summary note of this meeting is at appendix 2.

An update on the final ScHARR report will be provided at the meeting on 24 June 2022.

Public consultation

Two consultation documents were circulated to stakeholders and posted on the UK NSC website:

- the UK NSC evidence summary
- interim findings from the HTA cost effectiveness evaluation

These documents were circulated to the ARG and UK NSC before the consultation opened.

Twenty nine stakeholder organisations were contacted proactively. These are listed at appendix 3. The consultation opened on 11 March 2022 and closed on 8 June 2022.

Stakeholders were invited to:

- make an overall statement of their views on screening for the condition being reviewed and, on the quality and accuracy of the supporting documentation
- draw attention to disagreements with any aspects of the documents including their conclusions and / or the consultation recommendations
- highlight potential inconsistencies in the interpretation of the evidence which has been included in the documents
- comment on whether the recommendations are consistent with the evidence which has been presented
- alert the Committee to questions or evidence which may have been omitted by the documents and which may contribute to the recommendation or its revision
- suggest amendments to important errors in the wording of the documents

Consultation recommendation

In terms of the recommendation on which views were sought, it was proposed that:

- a quality assured, targeted screening programme for lung cancer in people aged 55 – 74 with a history of smoking should be recommended in the UK
- implementation of screening for lung cancer should not be seen as an alternative to the delivery of high-quality smoking cessation services across all

age groups. That smoking cessation should be an integral part of the screening programme

- the lung cancer screening strategy being piloted by the NHSE Targeted Lung Health Check (TLHC) provides a feasible, practical and effective approach to implementation. This pathway includes:

  i identifying and inviting 'ever' smokers aged 55 - 74 from GP records
  ii assessing eligibility for low dose CT (LDCT) using a multivariable risk assessment tool
  iii offering a LDCT schedule based on the baseline CT
  iv assessing CT results using the nodule management guidance by the British Thoracic Society
  v following NICE guidance in relation to diagnosis and treatment of detected cancers
  vi providing smoking cessation advice to all participants in the programme

- the UK NSC should undertake further work to consider the optimum approach to screening using the completed HTA cost effectiveness model once this becomes available. This would consider issues such as:

  i whether re-screening people with a history of smoking who are not eligible for LDCT should be part of the overall screening strategy
  ii which multivariable risk assessment tool or combination of tools should be used to maximise efficiency within the screening programme
  iii further refinement of the LDCT schedule for those with negative scans
  iv how the consequences of incidental findings from screening might be evaluated in the cost effectiveness model
  v issues of inequalities

Responses

321 responses were received. The responses are overwhelmingly from individuals who have been diagnosed with lung cancer or who have experience of the disease through family members or friends. A selection of the responses is attached. All responses have been circulated to members.

The ARG meeting in May 2022 considered the responses which were available at that point in the consultation process which was still open.

The overwhelming majority of responses are supportive of screening:

- a small number of responses explicitly state that their personal experience of lung cancer has been associated with tobacco smoking. Others, generally from individual health professionals or stakeholder organisations directly comment on issues relating to the consultation recommendation. Four examples of these are grouped in appendix 5, selection A, below and a list of responding organisations is attached at appendix 4.

Some common themes can be identified across these responses:

i. an emphasis on the programmatic and resourcing requirements for effective delivery across the screening, diagnostic, management / intervention (primary and secondary care) and reporting pathway is a frequent theme
ii. the need for high quality smoking cessation services is highlighted in many responses which draw attention to the variability in current delivery, the need for standardisation and the importance this intervention outside the screening population
iii. another frequently cited theme is concern about incidental findings, in particular that the balance of benefits and harms had not been evaluated, that this aspect of the screening programme had not been factored into the cost effectiveness analysis and that their onward management needed to be standardised
iv. related to this, the options for including lung conditions other than cancer in the screening protocol was raised as an area requiring further consideration
v. the importance of embedding research within a targeted lung cancer screening programme was raised in several responses, for example on the lung cancer risk algorithm, and a small number of responses drew specific attention to the importance of strengthening the cost effectiveness evaluation and periodic re-modelling to contribute to ongoing programme development
vi. a very small number of responses are not supportive of the UK NSC recommendation, the response from the Committee On Medical Aspects Of Radiation In The Environment is below. This response suggests that a more provisional recommendation would more appropriately reflect the current evidence base and that a more definitive recommendation should made on the basis of further implementation oriented research. The themes proposed to be addressed in such an approach align closely with those highlighted above.

- a larger number of responses are from individuals who state their experience of lung cancer is unrelated to tobacco smoking. While these responses tend to be brief and support screening, it is unclear whether this is explicit support for the consultation recommendation. In addition some common themes can be identified across these responses:
  i. emphasis on smoking as the cause of lung cancer stigmatises non smokers with the disease and this can lead to misrecognition of risk factors and symptoms
  ii. improvements to the diagnostic pathway are therefore necessary
  iii. public information and professional education campaigns are needed to draw attention to the disease in non smokers
  iv. incidental detection of early stage lung cancer in non smokers highlights the value of screening
  v. research into screening tests should be funded (blood tests and breath tests)

- within these ‘non smoking’ responses, there are some which imply an expectation that ‘screening’ will be available to groups which would not be eligible. These are grouped in selection B below
- also within the non smoking responses, there is a small minority who are concerned about limiting screening to adults with a history of tobacco smoking. Selection C below provides an example of this

Summary of responses

This set of responses is generally supportive of screening and, in many cases, explicitly supportive of the consultation recommendation.

However it is a complicated set of responses which emphasise the:

- significant number of issues requiring further consideration and resolution in any move towards a national targeted screening programme
- logistic and organisational challenges of implementing a high quality screening programme which would necessitate a substantial lead in period. Importantly not all of these challenges relate directly to the screening programme itself (for example smoking cessation services, symptomatic pathway improvement)
- communication and expectation management challenges related to a screening programme focusing on people with a history of tobacco smoking amongst a diverse group of stakeholders

These themes and the conclusions drawn from them were noted at meetings of the ARG in May and June 2022.

Proposed recommendation

It is proposed that UK NSC should recommend that:

- the NHS in the four UK countries should move towards the implementation of targeted screening programme for lung cancer in adults aged 55 – 74 with a history smoking acknowledging the challenges and need for a lead in period
- the strategy being piloted by the NHSE Targeted Lung Health Check (TLHC) provides a starting point in England and further modelling is required to consider the optimum approach for the UK as a whole
- the Adult Reference Group establishes a working group to develop a more refined recommendation incorporating this modelling work and to identify issues on which UK NSC input would be useful

Action

The UK NSC meeting is asked to consider this paper and the circulated documents and to approve the proposed recommendation.

UK National Screening Committee

Appendix 1: Membership of the expert groups

Lung Cancer Screening Pathways Task and Finish Group

Name	Role	Organisation at the time of the meetings
David Baldwin	Consultant Respiratory Physician	Nottingham University Hospitals
Anne Mackie	D.D. Screening Ops and QA	PHE / UK NSC
John Marshall	Evidence Lead	UK NSC
Anne Stevenson	National Programmes Lead	PHE
Liz Rochelle	Project Manager	PHE
Fabrice Lafronte	UK NSC Secretariat Officer	UK NSC
Sebastian Hinde	Research Fellow	University of York
Nicholas Hicks	Consultant Advisor HTA	NIHR
Matthew Callister	Consultant Respiratory Physician	Leeds Teaching Hospitals NHS Trust
Ayan Saeed	Screening Data and Info Administrator	PHE
Marta Soares	Senior Research Fellow - Health Economics	University of York
Mariejka Beauregard	Public Health and Preventative Medicine Specialist	PHE
Kirsty Dare	Strategic Development Manager - Screening	PHE
Bob Steele	Chair	UK NSC
Stephen Duffy	Professor of Cancer Screening	Queen Mary, University of London
Sam Janes	Consultant in Respiratory Medicine	University College London
Peter Sasieni	Academic Director of King's Clinical Trials Unit and Professor of Cancer Prevention	Kings College London
Robert Rintoul	Honorary Respiratory Physician	Royal Papworth Hospital
Jesme Fox	Medical Director	Roy Castle Lung Cancer Foundation
Arjun Nair	Consultant Radiologist	University College London Hospital
Richard Lee	Consultant Physician in Respiratory Medicine	Royal Marsden Hospital

John Field	Director of Research Visiting Professor Chief Investigator Clinical Chair in Molecular Oncology	Roy Castle Lung Cancer Foundation University College London UK Lung Cancer Screening Trial (UKLS) University of Liverpool
Anand Devaraj	Professor of Practice in Thoracic Radiology Consultant Thoracic Radiologist	National Heart and Lung Institute Royal Brompton Hospital
Amelia Randle	GP Clinical Director	Shepton Mallet Somerset Wiltshire Avon and Gloucestershire Cancer Alliance
Sion Barnard	Consultant Thoracic Surgeon	Newcastle Upon Tyne Hospitals
Jodie Moffat	Head of Strategic Evidence and Early Diagnosis Programme Lead	Cancer Research UK
Philip Crosbie	Senior Lecturer in the Division of Infection, Immunity and Respiratory Medicine Honorary Consultant in Respiratory Medicine	University of Manchester Wythenshawe Hospital, Manchester University NHS Foundation Trust
Anna Sharman	Consultant Thoracic Radiologist	Manchester University Hospital
Samantha Quaife	Senior Research Psychologist Senior Research Fellow	Cancer Research UK University College London
Sinan Eccles	Consultant Respiratory Physician	Royal Glamorgan Hospital Cwm Taf Morgannwg University Health Board
Richard Booton	Honorary chair in Respiratory Medicine	The University of Manchester

	Honorary Consultant Respiratory Physician Clinical Director for Lung Cancer & Thoracic Surgery	North West Lung Centre Wythenshawe Hospital
Emma O'Dowd	Consultant Respiratory Physician	Nottingham University Hospitals

Members of Modelling Task and Finish Group

Name	**Role**	**Organisation at the time of the meetings**
Mark Sculpher	Professor of Health Economics	University of York
David Baldwin	Consultant Respiratory Physician	Nottingham University Hospitals
Anne Mackie	D.D. Screening Ops and QA	PHE / UK NSC
John Marshall	Evidence Lead	UK NSC
Chris Hyde	Professor of Public Health and Clinical Epidemiology	University of Exeter
Anne Stevenson	National Programmes Lead	PHE
Liz Rochelle	Project Manager	PHE
Fabrice Lafronte	UK NSC Secretariat Officer	UK NSC
Sebastian Hinde	Research Fellow	University of York
Nicholas Hicks	Consultant Advisor HTA	NIHR
Matthew Callister	Consultant Respiratory Physician	Leeds Teaching Hospitals NHS Trust
Tristan Snowsill	Research Fellow - Health Economics	University of Exeter
Ayan Saeed	Screening Data and Info Administrator	PHE
Jim Chilcott	Professor of Healthcare Decision Modelling	University of Sheffield
Jaime Peters	Senior Research Fellow	University of Exeter
Alan Brennan	Professor of Health Economics & Decision Modelling	University of Sheffield
Marta Soares	Senior Research Fellow - Health Economics	University of York
Alastair Gray	Professor of Health Economics	University of Oxford - Nuffield Dept. of Population Health
Mariejka Beauregard	Public Health and Preventative Medicine Specialist	PHE

Kirsty Dare	Strategic Development Manager - Screening	PHE
Bob Steele	Chair	UK NSC
Stephen Duffy	Professor of Cancer Screening	Queen Mary, University of London
Ed Griffin	Research Fellow- Health Economics	University of Exeter
Sam Janes	Consultant in Respiratory Medicine	University College London
Andrew Briggs	Professor of Health Economics	London School of Hygiene and Tropical Medicine

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Appendix 2: Draft summary note of the UK National Screening Committee / Adult Reference Group post consultation meeting on Targeted Lung Cancer Screening

At the start of the meeting it was noted that:

- the function of the Adult Reference Group (ARG) was to advise the UK NSC on matters relating to screening in the adult population
- part of this involved consideration of the evidence products during their development and consideration of public consultation comments ahead the UK NSC meeting at which they will be discussed
- a public consultation had taken place using a UK NSC evidence summary and an interim report of an HTA cost effectiveness evaluation on which work was continuing
- the current meeting was being held because of the importance of the topic, targeted lung cancer screening, the ongoing work around cost effectiveness and the fact that the public consultation closed after the most the current ARG meeting

The agenda consisted of two items. The first item was:

- a report on a cost effectiveness evaluation produced by a commercial company (Institute of Diagnostic Accuracy (iDNA)) with input from UK clinicians and funding from AstraZeneca. The base case focused on 17 rounds of annual LDCT in a high risk population of smokers and sought to explore the way in which the results of the NELSON trial might be applied in a UK setting
- the UK NSC Secretariat agreed to consider this evaluation following discussion with clinical stakeholders who were concerned about the lack of a completed model which accurately reflected the stage shift and clinical outcomes achieved by screening and, consequently, the cost effectiveness of this intervention
- to address this concern, the UK NSC Secretariat agreed to consider the iDNA evaluation as a supplement to the HTA interim report. The aim of this was to reinforce and build confidence in the direction of the interim report's ICER estimates. These had reduced significantly compared to the original HTA report which was published in 2018
- to ensure quality and manage potential conflicts of interest the Sheffield University School of Health and Related Research (ScHARR) had been commissioned to undertake a quality assurance assessment of the iDNA model. This process had been reported to previous meetings of the ARG and UK NSC. The initial iDNA report was submitted to ScHARR and a list of required changes was returned to the company. In response iDNA implemented some of the changes and reported these in a technical report. The original ScHARR recommendations and the iDNA technical report had been circulated to attendees
- an analysis of the technical report was being prepared by ScHARR and the meeting provided an opportunity to share the results. It was noted that the

technical report was the result of a limited number of changes which had been recommended. These changes had resulted in an increase in the base case ICER from £3,686 to £7,191

- however, a significant number of problems remained. These included insufficient transparency in the reporting, overestimation of lung cancer survival and background mortality, inconsistent application of population assumptions throughout the model and, in practice, variation in the time horizon which applied to different screening strategies. The impact of problems such as these on the cost effectiveness estimate was unclear and ScHARR considered the current version of the technical report to be unsuitable for the intended purpose
- in discussion, it was suggested that iDNA should be afforded the opportunity to respond to the critique and this would be fed back in the final ScHARR report. There was disappointment that the model would not be satisfactorily completed by the time of the UK NSC meeting on 24th June 2022. However the group considered that, regardless of the quality of the iDNA report, it was very likely that cost effective screening strategies would be available. This has been reported in systematic reviews although it had proved difficult to generalise from a diverse set of cost effectiveness studies developed over many years in quite different settings. Cost effective screening strategies in the UK setting were more likely to be identified through completion of the HTA evaluation than completion of the iDNA evaluation
- in conclusion, ScHARR were asked to complete the final report on the iDNA evaluation and to identify the most important changes to the model which, if implemented, might help improve confidence in the ICER estimate. In the meantime the UK NSC Secretariat would need to consider the options for using the iDNA evaluation bearing in mind the limited purpose for which it had originally been considered.

The second item was the consultation responses:

- the full set of 321 responses had been circulated to the meeting with a note summarising the main themes. Because of the extended focus on cost effectiveness only a very brief discussion of these took place
- it was noted that, the ARG meeting in May had discussed the responses which had been received at that point in the consultation. There had been 179 responses at that point and, despite the increase in volume since then, the main themes remained unchanged
- the responses were generally supportive of screening and, in many cases, explicitly supportive of the consultation recommendation. However it was a complicated set of responses which emphasise the:

    i. significant number of issues requiring further consideration and resolution in any move towards a national targeted screening programme
    ii. logistic and organisational challenges of implementing a high quality screening programme which would necessitate a substantial lead in period. Importantly not all of these challenges relate directly to the

screening programme itself (for example smoking cessation services, symptomatic pathway improvement)

iii. communication and expectation management challenges related to a screening programme focusing on people with a history of tobacco smoking amongst a diverse group of stakeholders

The meeting closed and it was agreed to report the discussion to the UK NSC.

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Appendix 3: Registered stakeholder organisations contacted directly in the public consultation

- ALK Positive
- British Association of Surgical Oncology
- British Lung Foundation
- British Society of Lifestyle Medicine
- British Thoracic Oncology Group (BTOG)
- British Thoracic Society
- Cancer Research UK
- EGFR Positive UK
- Faculty of Public Health
- Institute of Physics and Engineering in Medicine
- Macmillan
- Northern Ireland Cancer Network
- Primary Care Respiratory Society UK
- Royal College of General Practitioners
- Royal College of Nursing
- Royal College of Pathologists
- Royal College of Physicians
- Royal College of Physicians and Surgeons of Glasgow
- Royal College of Physicians of Edinburgh
- Royal College of Radiologists
- Royal College of Surgeons
- Royal College of Surgeons of Edinburgh
- Scottish Radiation Protection Advisers Group (SRPA)
- Society and College of Radiographers
- The British Association for Cancer Research
- The British Society of Thoracic Imaging
- The Roy Castle Lung Cancer Foundation
- UK Lung Cancer Coalition (UKLCC)
- Yorkshire Cancer Research

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Appendix 4: Responding organisations

Organisation Name
Wales Cancer Network
NHS Manchester CCG (Manchester Health & Care Commissioning)
Newcastle & Gateshead Targeted Lung Health Check Team
Occupational Lung Disease Unit, Birmingham
Aneurin Bevan University Health Board (NHS Wales)
Scottish Primary Care Cancer Group
National Lung Cancer Audit
British Thoracic Society
NHS Lothian
Cancer Research UK
British Thoracic Oncology Group
North Scotland Cancer Alliance
University of Oxford / University of Nottingham
Royal College of Radiologists
City of Wolverhampton Council Public Health Department
Yorkshire Cancer Research
Committee On Medical Aspects Of Radiation In The Environment
Action on Smoking and Health
British Society of Thoracic Imaging
Hull Targeted Lung Health Check Team
AstraZeneca
Novartis
Cancer Research Wales
Asthma + Lung UK
Primary Care Respiratory Society and Taskforce for Lung Health
Somerset County Council Public Health Department
UK Clinical Expert Group for Lung Cancer and Mesothelioma
Merck
Scottish Radiation Advisory Group
Manchester University NHS Trust
Johnson & Johnson
Illumina
Intuitive Surgery

Appendix 5: Selection of stakeholder responses

A Examples of responses commenting directly on the proposal to recommend screening in adults with a history of tobacco smoking

1 Name: xxxx xxxx
Organisation: xxxx xxxx
Role: Respiratory Consultant and Regional TLHC Director

Lung cancer screening in high risk individuals has been shown to reduce lung cancer specific and overall mortality. It appears to be cost-effective too. I strongly feel that lung cancer screening should be made available to all eligible people, and for this to happen effectively, efficiently and consistently, it needs to be a national programme with National Screening Committee approval. Without this, I worry that services would develop in a patchwork fashion, creating inconsistency and inequity. Harms may also increase if nationally mandated outcomes, targets and KPIs are not established. Finally, without a national programme, adequate resource to deliver a robust service is unlikely to be forthcoming.

2 Name: Coral Higgins
Organisation: NHS Manchester CCG (Manchester Health & Care Commissioning)
Role: Cancer Commissioning Manager

Introduction
Manchester Health and Care Commissioning (MHCC) is a partnership between NHS Manchester Clinical Commissioning Group and Manchester City Council.
On behalf of MHCC, I have reviewed the evidence summary and the interim findings of the cost effectiveness evaluation.
MHCC supports the proposals and the further work suggested within the consultation cover note (page 2).
MHCC's consultation response is framed around the lessons learned from Manchester's experience of delivering lung health checks (LHC), risk assessment and targeted lung cancer screening (TLCS).

The response covers:

- Approach to delivery
- Co-production, community engagement and inclusive practice
- The importance of effective data
- Workforce
- Estates
- Wider benefits of the model

Approach to delivery

Manchester was proud to be one of the first areas to test out a proposal for lung health checks, risk assessment and targeted lung cancer screening as part of a Macmillan Cancer Improvement Partnership (MCIP) funded pilot from 2015 to 2017.

The report from the Macmillan supported Manchester Lung Health Check Pilot can be found here: https://mft.nhs.uk/app/uploads/sites/12/2019/02/lung-health-check-manchester-report_tcm9-309848.pdf

Based on the findings, NHS Manchester Clinical Commissioning Group commissioned one of the first local LHC services for patients in the north of Manchester.

This part of the city was targeted based on lung cancer incidence, smoking rates, and premature mortality from preventable cancers. The service began in April 2019, with a community-based model and one stop assessment and scan service. Smoking cessation and tobacco addiction treatment were also available to participants that were current smokers. Taking the service out into local communities and to patients was crucial to the success of the model and Manchester will continue to champion the community based one stop approach. The majority of LHC and baseline CT scans were completed by March 2020, and the first round of surveillance scans, for people identified as being at increased risk of lung cancer, were completed in August 2020 to March 2021. Manchester became an onboarded project with national funding from August 2020.

In the first two years of the service Manchester diagnosed approximately 160 lung cancers, 80 per cent of which were at stage 1 and 2. In addition, 270 people were identified with symptomatic undiagnosed Airway Flow Obstruction, and approximately 2,500 people with Cardiovascular Disease. All of these patients were referred appropriately for treatment and ongoing management. Annual / biannual surveillance will continue in line with the national protocol until March 2024.

Further information on the outcomes of the lung health checks can be read in the research papers published on the work delivered in Manchester: https://thorax.bmj.com/content/74/7/700

Manchester has plans to continue the service and the long-standing collaboration with its provider, Manchester University Hospitals NHS Foundation Trust (MFT), and plans to roll out the offer to patients in central and south Manchester from April 2023. MHCC looks forward to working collaboratively with the cancer alliance in Greater Manchester to support the development of a clinical model and delivery plan, to achieve full coverage of the eligible Greater Manchester population by March 2027.

MHCC’s experience in implementing a LHC service is that the time needed to plan and prepare cannot be underestimated. It requires a multi-disciplinary stakeholder approach, with partners focused on a common goal. Furthermore, a consistent approach to the TLCS strategy is necessary, especially regarding patient criteria, round length, threshold for positive scans and follow up protocols. MHCC appreciates that this is still under consideration, with the findings and experience of the national pilot projects and onboarded projects to be considered.

The screening programme will grow, develop, and improve over time as learning is taken from its implementation. Regular check-ins and review points would be appropriate, as would the ability to adapt and make changes when necessary.

Co-production, community engagement and inclusive practice

Co-production and community engagement has been crucial to the success of the LHCs in Manchester. This was achieved not just through communications alone, but through co-production by and with patients affected by lung cancer and through a proactive approach to going out to patients and the public and explaining the service. This enabled partners to listen, understand and address concerns, and to change the messages based on community need.

In addition, young people were supported to be community LHC champions, a role which involved supporting and influencing their older relatives. Furthermore, voluntary and community sector organisations were commissioned to deliver awareness messages through a range of activities and worked alongside neighbourhood health development co-ordinators.
The Manchester Lung Health Check – Engaging with Communities document can be found here: https://manchesterccg.nhs.uk/wp-content/uploads/MCIP-Engagement-with-communities_NW_V4-2.pdf

Manchester is proud of its cultural diversity and was pleased to welcome patients from over 40 different countries to the service. In this context, interpretation and translation services must be embedded and valued. In addition, “quiet sessions” were provided for patients with a learning disability, autism, and mental health issues on request. Such approaches are important to the inclusive practice that is essential for equitable access.

The importance of effective data

Effective data is an enabler of the service. For instance, the invitation process must be linked to reliable and accurate primary care data. In Manchester, all people within the relevant age range were invited, with LHC appointments booked based on an assessment of patients who made contact. When comparing the data, it was clear that if invitations had only been sent to patients based on the smoking codes in primary care records, eligible people, and lung cancer diagnoses, would have been missed. Perhaps some incentive to primary care to update records could be considered given that so many national health care policy decisions will be based on ‘big data’ held in primary care.

MHCC’s biggest issue for the service since 2019 has been data collection, which has necessitated using multiple hospital and primary care systems. The workload to be able to collect, validate and then report data back to the national team has been considerable, with very little resource for data management. Provider goodwill and expertise has been essential in reporting back to the national team in a timely way, as has the support of the Commissioning Support Unit.

Given the importance of the service and outcomes information it would be a good investment to have a national system for data collection and data management support within each provider as well as at an alliance level. This system must be able to link with primary care data to identify eligible patients for invitation as well as recording outcomes and transferring information across health care systems.

Patient demographics and equality measures are vital to ensuring that eligible individuals are not being missed or excluded. This is ever more important as the COVID-19 pandemic has disproportionally impacted communities facing racial inequalities and inequity, and it is imperative that any future lung health check programme is inclusive. Such information must be included in records from the start, rather than being treated as an 'add on'. Lessons can be learned from the national breast screening system, which is years behind in this respect.

Timeliness of reporting findings should also be considered so that alliances, via their locality teams, can respond quickly to any issues with uptake and coverage either within Primary Care Networks / neighbourhoods or population groups. Waiting six months for the latest uptake figures (as is the case for breast and bowel cancer screening) is too long.

Workforce

Having an appropriately skilled and resourced workforce is fundamental for success. Lessons must be learned from the current state of NHS diagnostics and workforce planning should take account of forward planning, talent management, succession plans as staff near retirement, training roles for specialists of the future, extended roles, and career progression.

All national cancer screening programmes should be made an attractive employment proposition to health care professionals and managers, including to those who are at an early stage of their career.

It will be important to ensure that the workforce is recruited and developed in line with the phased roll out of the future service across the alliance model. Furthermore, it is necessary to be aware of and plan for the implications of the service model for the wider workforce, for instance for primary and secondary care in relation to diagnoses (cancer or otherwise) requiring intervention or management.

Estates

Manchester believes in a community-based one stop service, where we go to our patients rather than them coming to us. This requires mobile ultra-low dose CT scanners and support units with enough capacity to manage 70+ scans per day (8am-8pm, Monday to Saturday). Suitable locations are not always easy to find that can accommodate the size of the mobile units but also the power and services supply necessary, but they are there. In Manchester, local supermarkets

were keen to support the service, and outdoor markets were excellent venues which were familiar to patients.

The TLHC and lung cancer screening programme will result in an increase in the number of patients needing to be referred to the local lung cancer teams for specialist diagnostics and treatments. There must be local / regional consideration in how best to support acute trusts to manage this expected increase. Manchester's partner trust, MFT, in collaboration with Christie Hospital NHS Foundation Trust, has developed a case for a joint diagnostic and treatment centre to provide capacity to manage patients with suspected and confirmed lung cancer. This capacity will be available to manage screen detected patients in an efficient and timely manner with expertise available to support patients.

Wider benefits of the model

As set out in section two of this response, Manchester's service has identified a rage of conditions beyond lung cancer, thus enabling timely intervention to support wider condition management. To this end, clear national guidance on incidental findings would be helpful, covering what is actionable and what should be reported. Manchester's experience has been good regarding over-diagnosis and false positive diagnosis, but it is important to set these expectations to providers and to monitor outcomes.

3

Name: Nick Jones
Organisation: Cancer Research UK
Role: Policy Advisor

UK National Screening Committee (UKNSC) consultation on a national targeted lung screening programme, June 2022

Key Points

- Cancer Research UK (CRUK) welcomes and supports the UK National Screening Committee (UKNSC) recommendation in favour of a national targeted lung screening programme, along with the focus on smoking cessation as an integral part of it.

o Lung cancer is the most common cause of cancer death in the UK, accounting for 21% of all cancer deaths. Lung cancer outcomes in the UK are consistently poor, with just around 4 in 10 people diagnosed with lung cancer in England surviving their disease for one year or more, and around 3 in 20 people surviving their cancer for 5 years or more after diagnosis.

o Early diagnosis is vital for improving lung cancer outcomes. More than 55 out of 100 people diagnosed with stage 1 lung cancer will survive their cancer for 5 years or more after diagnosis. In contrast, less than 5 out of 100 people diagnosed with stage 4 lung cancer will survive their cancer for 5 years or more after they are diagnosed.

o A national targeted lung screening programme has the potential to increase the proportion of lung cancers diagnosed at an earlier stage, when treatments are more effective and kinder, and to reduce lung cancer mortality.

- As CRUK supports the UKNSC recommendation for a national targeted lung screening programme, this consultation response focuses on key considerations for governments across the UK in delivering such a programme.
- There are several considerations for the UKNSC and governments in all four UK nations in recommending and then delivering a targeted lung screening programme.

o Long term investment and planning to tackle shortages in diagnostic capacity will be central to implementing a comprehensive programme. These are principally driven by shortages in key workforce groups in diagnostic services, but must also consider diagnostic equipment. Without an uplift in diagnostic capacity, there is a risk that lung screening programmes may draw capacity from other areas of already strained diagnostic services.

o Maximising the benefits of targeted lung screening will also require an uplift in treatment capacity. Outcomes will only improve if cancer treatment services have sufficient capacity to deliver timely, optimal treatment for more early-stage patients.
o It is essential that invitation to the lung screening programme is based on high quality smoking status data across all UK nations. Smoking cessation should also be an integral part of the targeted lung screening, with opportunities for participants to engage at multiple points in the pathway, and continued cessation support following participation. UK health departments must ensure stop smoking services have enough capacity, resource, and are funded sustainably to cope with additional demand for stop smoking support.

o Upon implementation, consistent and tailored public engagement will be necessary to ensure that those invited consider attending. Targeting this towards those from more deprived populations, where lung cancer is more common, and those who are currently smoking will be particularly important. Moreover, this programme would be the first cancer screening programme to invite participants based on characteristics other than age and gender, meaning engagement to ensure public confidence and mitigate against unintended consequences, such as reinforcing stigma, will also be vital.

o Given the scale of a national lung screening and the potential to do harm as well as good, it is crucial that national lung screening programmes are delivered by expert teams, and that independent quality assurance is in place.

- Additional strategies must also be implemented to effectively tackle lung cancer more broadly, for example by supporting patient

presentation and the recognition and referral of symptomatic disease. High quality lung cancer screening has the potential to improve lung cancer outcomes in the UK – however, it will not be a silver bullet. While based on the current evidence it is appropriate that lung screening is targeted, nearly 6,000 people who have never smoked die of lung cancer every year, not all former or current smokers will necessarily be deemed of sufficient risk to undergo a CT scan, and not all deemed of sufficient risk will ultimately undergo their scan.

Key considerations

Smoking

Availability, quality and transfer of smoking status data

If the UKNSC recommended lung screening pathway involves inviting those who have ever smoked for a risk assessment based on primary care record data, it is essential that there is high quality smoking status data to base selection on. If not, people who are eligible may be missed, and people who are ineligible may be incorrectly invited. GP systems also include several codes to categorise smoking status, so depending on which codes are used as a basis for selection in targeted lung screening, some people who smoke may be unintentionally excluded. To support accurate smoking status records and invitation to targeted lung screening, it will be vital that each national health department maintains commitments for primary care professionals to be trained in and routinely deliver Very Brief Advice (VBA) on smoking in consultations with patients who smoke. These national commitments should also be strengthened: see our Making Conversations Count for All report for further detail.

Health departments must also consider other methods, including quality improvement and development of standards, to optimise both completeness and quality of GP record data. This may include contacting those with absent smoking records to ascertain smoking status. Dr. Sinan Eccles and colleagues at Cardiff University have explored an automated text message system to update data for people with no smoking status recorded, including a follow up prompt to national smoking cessation support through Help Me Quit. It would be useful to collate and learn from this and other relevant work.

Alternative invitation methods could also be considered to mitigate against the quality of patient data in GP records. For example, the Manchester lung health check pilot sent letters to everyone who was registered with a GP in the target age range, inviting people who have ever-smoked to participate in the risk assessment. While this could create concern from a public understanding perspective given people who never smoked will also receive a letter, it could ensure all people who have ever smoked are invited for risk assessment. It would therefore be useful to consider undertaking cost-effectiveness analyses of different invitation/pathway approaches.

Smoking cessation

The UKNSC's focus on smoking cessation as an integral part of the screening programme is welcomed, alongside their recommendation to provide smoking cessation advice to all participants in the programme.

There are clear opportunities to influence people who smoke through lung screening given the population of people who currently smoke that will invited. There also appears to be an appetite for smoking cessation advice among attendees – in the independent evaluation of NHS England's Targeted Lung Health Check (TLHC) programme, it is reported that 31% of those who smoked cigarettes in the week of completing the survey said they attended the LHC because they thought it would help them to reduce or stop smoking [confidential statistic and reference].

It is therefore vital that, as a minimum, all clinical and non-clinical staff in contact with lung screening invitees and participants receive training on VBA to ensure all staff are educated in smoking cessation. The Hull TLHC programme demonstrates that participants are receptive to smoking cessation interventions when triage staff are trained effectively. Pre-COVID, there were poor levels of engagement with smoking cessation support following nurse triage, but this rose to 70% following a VBA refresh training to triage nurses emphasising the shortness and effectiveness of the intervention, the introduction of specific scripts for triage nurses to support improved referral into the service, and the first promoted follow-up contact being done via telephone. Hull TLHC is now the second highest source of referral to the Hull stop smoking service since April 2021.

In the Yorkshire Lung Screening Trial, an initial consultation with a trained smoking cessation practitioner following the risk assessment is happening on site on an opt-out basis. Follow-up smoking cessation support is available either face-to-face or by telephone., Where direct follow-up is not possible, or if preferred by the individual, contact details are shared to refer into local stop smoking services. Initial data from this trial indicates positive results from this approach, with 11.9% of eligible people who smoke validated to have successfully quit (7-day point prevalent) at four weeks. When including self-reported quits (some could not be validated due to COVID-19), this figure increased to 15%. A recent qualitive study also suggests immediate on-site approach is also preferred by attendees. Both of these studies suggest that a non-judgemental, positively framed approach taken by staff is key in promoting uptake in smoking cessation support.

Targeted lung screening programmes should also be embedded into national smoking cessation programmes such as Help Me Quit in Wales and Quit Your Way in Scotland. Given public health functions and health and social care provisions, including NHS-delivered services, are linked across devolved – this should be easier to implement.
Continued cessation support is crucial for people who want to stop smoking following participation in targeted lung screening. If UK health departments adopt

a positive recommendation by the UKNSC, national programmes will need to ensure that stop smoking services across the UK have enough capacity and are adequately resourced to cope with additional demand for stop smoking support. Collaboration with stop smoking services leads, as well as other stakeholders, early in the planning process for targeted lung screening rollout will be paramount to this.

A barrier that will need to be resolved, particularly in England, is the lack of universal stop smoking services open to everyone to be referred onto. This is causing issues in the North Central London TLHC: there are different smoking cessation offers across boroughs with different referral criteria from programmes such as TLHCs. Similar issues are occurring in Stoke-on-Trent where the stop smoking service has had to restrict it's referral criteria to support 'Smoking in Pregnancy' or people with moderate to severe mental health problems.

Local stop smoking services, which provide a combination of behavioural support and pharmacotherapy, offer people who smoke the best chance of stopping successfully. However, local authorities in England have experienced a sustained programme of cuts in recent years, which severely compromises their ability to provide vital functions and services that prevent ill health: such as stop smoking services. These funding cuts have also been greatest in more deprived local authorities – which risks exacerbating existing health inequalities. Whilst all areas used to have one, now only 67% of local authorities in England commissioned a specialist service open to all local people who smoke in 2021. Smoking cessation interventions are an extremely cost-effective method of preserving life and reducing ill health. Therefore, effective integration of stop smoking support into the lung screening programme is very likely to also improve its cost effectiveness.

Smoking is also highly profitable to tobacco manufacturers. That's why the UK Government should introduce a fixed annual charge on the tobacco industry, making them pay for the damage their products cause, but without letting them influence how the funds are spent. Funds generated from this charge should be used to help deliver the necessary evidence-based tobacco control measures at a national, regional and local level across the UK, such as stop smoking services.

It is vital that UK-wide tobacco control measures are prioritised across the UK, which is why we also welcome the UKNSC's acknowledgement that implementation of screening for lung cancer should not be seen as an alternative to the delivery of high-quality smoking cessation services across all age groups.

Presentation and public understanding

Maximising presentation among those invited

Recent news reports celebrate the potential of the current TLHC programme in diagnosing lung cancer at an earlier stage, with 600 participants being diagnosed at an early stage so far. However, only around 35% of those invited by the NHS in

England attend their lung health check, compared to the anticipated uptake rate of 50%.

Health departments and systems must deliver consistent and tailored engagement with the public to ensure that those invited consider taking part in the initial risk assessment, and in the CT scan should they meet the risk threshold. This includes building opportunities for reminders, text messages and other approaches to raise awareness of, and build engagement with, the screening programme, into the screening pathways, and delivering evidence- and insight-informed public-facing campaigns.

As with other screening programmes, risks, as well as benefits, of taking up screening need to be communicated in a clear, accessible way to all invitees, to allow them to make an informed decision.

Lung cancer is more common in more deprived populations, with smoking a leading driver of health inequalities, accounting for approximately half of the difference in life expectancy between the lowest and highest income groups in England alone. In England, there are over 14,000 excess cases of lung cancer attributable to socio-economic deprivation each year. Deprivation affects uptake across existing screening programmes and in the UKLS trial, participants in more deprived quintiles were more likely to not take up lung screening than those in the least deprived quintile. An initial evaluation of the TLHC programme indicates that uptake may be lower in more deprived groups compared with less deprived. In the 10 original projects launched, there was an uptake of 45% in the most deprived quintile of the invited compared to 66% in the least deprived quintile [confidential statistics and reference]. As people from lower socio-economic groups are more likely to smoke and may be less likely to attend lung screening, there is the strong potential to widen health inequalities in lung cancer outcomes if inequalities in uptake and completion of the screening pathway are not addressed.

Government engagement programmes should be targeted to remove barriers that may prevent people from lower socioeconomic groups from taking part in lung cancer screening and achieve informed uptake, including to the initial risk assessment, CT scan for those who meet the risk threshold, and treatment for those who are found to have lung cancer.

Tackling potential barriers to uptake

CRUK and YouGov polling indicates that people who smoke may face psychological and information barriers to taking up lung screening, such as fatalism. Whilst people who currently smoke are more likely to worry about getting lung cancer compared with people who formerly smoked or never have, they are less likely to agree that lung screening can help to detect cancer early. This

notion of fatalism is echoed by research into attitudes towards a potential lung screening programme among people who smoke or used to smoke in socioeconomically deprived communities. Participants were supportive of screening in theory, however many perceived lung cancer as an uncontrollable disease and were doubtful about the ability of screening to improve survival for heavy smokers. In addition, blame and stigma around lung cancer as a self-inflicted disease were also highlighted by participants as social deterrents to attending screening. It is important that the benefits of stopping smoking at any age are highlighted, so participants understand that it is never too late to stop. The language used should not perpetuate the stigma faced by people who smoke. For example, referring to smoking in a person centric manner – "people who smoke", rather than labelling people as "smokers" which may be considered stigmatising.

Governments must target people who smoke to attend screening in a sensitive manner that does not perpetuate the stigma already faced by many and that counters fatalistic beliefs.

Ensuring public confidence

This programme would be the first UKNSC recommended cancer screening programme to invite participants based on characteristics other than age and gender. This presents unique challenges in building public understanding and confidence and has the potential to be controversial if the public believe they are missing out on a potentially lifesaving health intervention. There may be interest in lung screening among those who are not eligible, with polling from CRUK and YouGov finding 26% of never smokers disagreeing with the statement that they wouldn't mind not being offered lung screening.
Governments across the UK should effectively engage with the public prior to introducing the programme to increase the public's understanding of who is eligible and why, and ensure public confidence in the programme.

Capacity

Diagnostic capacity
Targeted lung cancer screening will require significant diagnostic capacity. Shortages in diagnostic capacity, including imaging, endoscopy and pathology, have led to delays in cancer diagnosis across the UK, for example in England the target to treat 85% of cancer patients within two months of an urgent suspected cancer referral has not been met since 2015.
The UK ranks close to the bottom on average number of CT scanners per million out of 36 OECD countries. We are also overly reliant on ageing, less sophisticated scanners prone to breakdown. In England, the 2021 Spending Review allocated £2.3bn over 3 years to fund the expansion of Community Diagnostic Centres (CDCs) in England, committing to roll out at least 100 CDCs. This was welcome and will increase the availability of the CT scanners needed to deliver this programme. However, it is unclear whether this will be sufficient to meet existing rising demand for cancer services and deliver this programme.

UK Governments should ensure there is sufficient CT scanner capacity to deliver this programme alongside existing planned activity, including reassessing existing plans to expand CT capacity with this programme in mind.

Shortages in the diagnostic workforce would also be a significant concern in the implementation of this programme. The RCR 2020 clinical radiology census found that the radiology workforce across the UK is now short-staffed by 33%, needing almost 2,000 more consultants. Without more training, investment in new models of care and better retention and recruitment they estimate that by 2025 this shortfall will hit 44%. Similarly, there are significant shortages in the diagnostic radiography workforce, with the 2020 diagnostic radiography workforce census published by the College of Radiographers showing an average current UK vacancy rate of 10.5% in diagnostic radiographers. Similarly, evidence of shortages in the pathology workforce are compounded by the fact that around a third of pathologists are 55 or over.

Chronic shortages in the NHS in specialties key to diagnosing lung cancer have hampered progress for several years, with, as of February 2022, 19% of people waiting for a radiology test in England waiting 6 or more weeks. It is vital that there is sufficient diagnostic capacity to roll out the targeted lung screening programme nationally, without drawing capacity and further exacerbating pressures on other areas of diagnostic services.

UK Governments must set out long-term funding plans to deliver a sustained expansion of the cancer workforce to meet future demand for cancer services – including in the radiography, clinical radiology, reporting radiography and pathology workforce – to deliver a comprehensive and national targeted lung screening programme without drawing capacity out of other services.

To ensure enough staff are trained to meet future demand, robust workforce planning supported by regular, independently verified projections of the future supply and demand of the health workforce is key. Such workforce planning should include the impact that a new national targeted lung screening programme will have on diagnostic demand.

The use of reporting radiographers to report on images is well established across the UK. The proportion of trusts and health boards using radiographer reporting rose from 72% to 82% in the five years to 2020. However, it still varies significantly across trusts and Sir Mike Richards' review of diagnostic services in England recommended that there should be an increase in advanced practitioner radiographer roles. Difficulties accessing training courses and difficulty carving out time for continuous professional development (CPD) act as significant barriers to increasing the use of reporting radiographers. Governments across the UK must ensure that the cancer workforce has both access to and the opportunity to undertake CPD, for example by providing sufficient funding for staff wishing to upskill. However, the most significant barrier to the use of reporting radiographers to support the radiology workforce is radiographer shortages.

Governments should tackle the barriers to the expansion of reporting radiologists, including financial and geographical barriers to training, shortages in radiographers and a lack of time for training, to free up radiologist capacity to support the programme.

Treatment capacity

To be successful, this programme will also require increased treatment capacity, especially in cancer surgery and radiotherapy services which are two of the main treatment modalities for earlier stage lung cancer. As specified in the consultation document, lung screening can identify people at an earlier stage, compared to people who have no screening and are diagnosed with lung cancer. This stage-shift has the potential to improve cancer patients' outcomes as lung cancers detected at earlier stages are more likely to be successfully treated. But outcomes will only improve if cancer treatment services organise and plan for this shift in order to have sufficient capacity to deliver timely, optimal treatment for more early-stage patients.
Performance against the 62-day wait target has been declining over the last decade across the UK. Taking England as an example, the pandemic has impacted performance further. In 2020/21, we saw the 10 worst moths on record for cancer service performance in lung cancer. In February 2022, only 54% of lung cancer patients started treatment within 62 days of urgent suspected referral. During the same time period, performance against the 31-day wait target has been more stable and, even though the pandemic has impacted performance, the 96% target has generally been met in England. While this is positive and may indicate that service capacity to start timely lung cancer treatment following diagnosis is adequate, significant challenges remain.

The UK is lagging behind comparable countries in terms of survival. While this can be ascribed to a range of possible factors, including healthcare system structures, patient choice, and prevalence of comorbid conditions, it may also suggest suboptimal treatment and less willingness or capacity to treat using radical approaches. In 2020, the National Lung Cancer Audit (NLCA) ran its second spotlight audit to understand why patients diagnosed with stage I-II disease were not receiving surgery despite having a good performance status (PS). It found that 35% of patients received no specific anticancer treatment.

In line with the recommendations of the spotlight audit, MDTs should review the case records of patients with early-stage disease and good PS who do not receive treatment with curative intent to help identify and address the underpinning factors driving worse in-stage survival in the UK.

Cancer surgery has been significantly affected by the pandemic. Staff redeployment and restrictions on surgical capacity and intensive care beds meant the number of cancer surgeries fell by an estimated 24% in England between April and November 2020 compared to 2019. The proportion of patients in England with early-stage non-small cell lung cancer (NSCLC) and PS 0-2 that

received surgery fell from 58% in 2019 to 48% in 2020, further demonstrating the impact of the pandemic on lung cancer treatment.

In the coming years, as the NHS seeks to address a significant elective backlog – for cancer as well as a range of other conditions – surgical capacity will continue to be placed under pressure. A national lung screening programme would compound pressures on surgical services and the workforce. Surgical training is a long process which can take up to eight years after graduation. This makes it challenging to address increased demand and reinforces the importance of organising and planning for future changes to demand.

Therefore, health services must implement ongoing reviews of demand, capacity, and workforce requirements to plan and optimise service provision and expand capacity to meet demand where needed.

As with diagnostics, cancer treatment services also suffer from workforce shortages that hamper treatment capacity and may become a barrier to reaping the benefits of diagnosing more lung cancers early as a result of lung screening. According to the RCR's 2020 clinical oncology census, the clinical oncologist consultant workforce has a shortfall of 17% which is set to rise to 28% by 2025. 90% of Heads of Service are reported to be concerned about the continued availability of specialty site-specific expertise and 88% are concerned about treatment delays. 66% reportedly believe that workforce shortages are affecting the quality of patient care, a rise from 51% in 2020.

To manage the changes to demand on treatment services stemming from a national targeted lung screening programme, Governments must set out long-term funding plans to deliver a sustained expansion of the treatment workforce, particularly in the services that treat earlier stage lung cancer.

Operations and rollout

Organisational structure

A national targeted lung screening programme is a public health intervention, aiming to identify cancer amongst people at increased risk of the disease but without symptoms. As such, it interacts with many more people that do not have cancer than do. With all screening programmes, maintaining a favourable balance of benefits and harms is vital. To ensure that the theoretical balance is achieved in practice, it is essential that the programme falls within the remits of the teams currently responsible for delivering and quality assuring the existing national cancer screening programmes. Not only does this help to ensure that the necessary expertise is brought to this critical public health intervention, it also helps to ensure that targeted lung screening is captured within national transformation agendas, such as IT infrastructure developments, and seizes opportunities to learn, share and improve across screening programmes, including developments and interventions which support the addressing of inequalities.

Frequency of scans, risk stratification and significant results

The recommendation for introducing lung cancer screening doesn't detail the exact approach for implementation to be taken. Trials supporting the recommendation employ different methods of risk stratification, number of screens, screening intervals and definitions of significant results. Employing different methods will result in different outcomes for benefits (reduced lung cancer mortality) and harms (overdiagnosis, false positives, false negatives and radiation exposure) of lung screening. In addition, in two of the largest trials assessing the benefits and harms of targeted lung screening (NELSON and NLST), participants were followed up for several years after their screening ceased, which makes it difficult to interpret the burden of overdiagnosis from these studies and extrapolate these results to a programme with different screening intervals. Further clarity on the chosen protocol and publicly available modelling on its clinical effectiveness is necessary to gauge the exact balance of benefits and harms. Once implemented, this balance should be closely monitored. This will be necessary for positioning public communications and resources to ensure that the public can make an informed choice on attending. Clarity on the protocol to avoid differences in regional outcomes, aiming for consistent, optimal service design across the UK, will be important to mitigate the risk of widening regional inequalities.

Data transparency

Timely and transparent data that reveal how targeted lung screening is performing is crucial. A flag in the relevant datasets will be needed to ensure that patients who have been through targeted lung screening can be clearly identified, regardless of outcome. We anticipate it will take time to incorporate a lung screening flag into records, therefore we recommend that this be considered early in the process.
A breakdown of the key performance indicators, including screening uptake and coverage (for any lung health check/risk assessment element and the CT scan for eligible individuals) should be provided for participants in targeted lung screening, on a quarterly basis. This must include breakdowns by key demographic groups (ethnicity, age, gender, deprivation, employment status), region and, if programmes continue to be delivered virtually as well as in person, by type of appointment delivered.

We also are aware of reports of data sharing challenges between smoking cessation providers. It will be vital that UK health departments ensure that robust data transfer systems are in place across GP, screening and smoking cessation sites. Any data sharing should be done in a trustworthy and secure way, with proper transparency and communication with the public and patients.

Digital transformation

Information systems for screening are essential for identifying cohorts of people who should be invited for screening at a specific point in time, managing screening programmes for example issuing invitations, and recording outcomes.

However, as was highlighted by the Professor Sir Mike Richards review of Adult Screening Programmes in England, poor digital infrastructure has held other cancer screening programmes back from meeting their potential to improve cancer outcomes – most notably in breast and cervical.

Governments across the UK must ensure that there is sustainable and ongoing capital investment to continually improve digital capabilities across the targeted lung screening programme, horizon scanning for actual or likely innovation requirements into IT development at the earliest reasonable opportunity.

Governments must also ensure that IT systems can identify who has attended the targeted lung screening programme, including a comprehensive demographic breakdown, to ensure that the programme works to tackle health inequalities in lung cancer outcomes. IT systems should also be able to track patients back to their GP and their smoking outcomes.

Ensuring action for everyone with lung cancer – not just those who are eligible for targeted lung screening or are on a screening pathway

It must be recognised that screening is just one measure necessary to improve lung cancer outcomes in the UK – and is not a silver bullet.

Given that 79% of lung cancers are preventable, all possible action should be taken by the UK Government to reduce the number of cases attributed to preventable risk factors.

Furthermore, there remains a large contingent of people who have never smoked who will develop lung cancer without being eligible for any national lung screening programme targeted on the basis of a current or previous smoking history. Nearly 6,000 people who have never smoked die of lung cancer every year. While lung screening is not suitable for people who haven’t smoked, additional strategies must also be implemented to effectively tackle lung cancer more broadly. Efforts to optimise the diagnosis of lung cancer through patient presentation and recognition and referral of symptomatic disease will continue to be key to any comprehensive strategy to improve lung cancer outcomes in the UK.

4 Name: Committee on Medical Aspects of Radiation in the Environment (COMARE)
Organisation: Committee on Medical Aspects of Radiation in the Environment (COMARE)
Role:

The Committee on Medical Aspects of Radiation in the Environment (COMARE) is pleased to respond to the UK NSC's consultation on screening for lung cancer in individuals at increased risk. COMARE's remit is to assess and advise government and the devolved administrations on the health effects of natural and man-made radiation and to assess the adequacy of the available data and the need for further research. The following paragraphs summarise COMARE's views of the key issues raised in the consultation.

The consultation is concerned with a proposal to introduce a targeted population screening programme for lung cancer in persons aged 55 to 74 who have a history of smoking. The programme will include Low Dose CT scanning (LDCT). The pathway currently being piloted by the NHS England Targeted Lung Health Check (TLHC) is suggested as a basis for the implementation. The protocol for TLHC requires the effective (radiation) dose from each LDCT scan to be kept well below 2 mSv. The participants deemed eligible for LDCT will undergo between 2 and 4 scans in a two-year period.

The evidence document is a rapid review of literature entitled 'Screening for lung cancer in individuals at increased risk: External review against programme appraisal criteria for the UK National Screening Committee'. It poses three contextual questions and two review questions.

The first contextual question relates to the epidemiology of lung cancer.

The second is concerned with a) the accuracy of risk prediction algorithms vs eligibility criteria in identifying participants eligible for LDCT and b) the accuracy of LDCT in detecting cancer. There is consistency but imprecise agreement between the use of modes and the use of criteria. There is no gold standard prospective randomised trial considering the accuracy of LDCT (although one US trial has scanned over 2600 participants), but amongst the nine investigated here, two had reasonable statistical power and had sensitivities of 59% and 93% and specificities of 96% and 76%. Positive predictive values (PPV) were 3.3% and 43.5% and negative predictive values were 98% and 99.9%. The summary downplays the PPV result.

The third contextual question is concerned with cost effectiveness and is supported by a comprehensive document, with significant detailed work having been conducted. The outcome is not particularly conclusive and shows a wide range in the incremental cost effectiveness ratio, with some studies showing that a programme would meet the UK threshold for screening studies and others that it would not. The results from an updated computer model suggest that that LDCT screening for lung cancer is likely to be cost-effective for the NHS, but the model has yet to be finalised. A number of limitations are also noted, including that 'The natural history model used is completely unchanged from that in the original model, which received warranted criticism on a number of counts. Therefore, the interpretation of cost-effectiveness results reported here need to be interpreted in the knowledge that there are many limitations still with the reported results.'

The review questions employed systematic searches and were concerned with a) the efficacy of lung cancer screening at reducing lung cancer mortality and identifying associated adverse effects and b) the acceptability of lung cancer screening.

The nine clinical trials (RCTs) already referenced were used to provide the evidence regarding the first review question. The RCTS showed that screening identified people at an earlier stage of lung cancer when treatment has a greater chance of being effective, compared to people who had no screening and were subsequently diagnosed with lung cancer. The evidence is clear that a number of people will receive a false positive result leading to unnecessary tests and invasive procedures with associated adverse effects / morbidities. False positive rates of between 2% and 27% are reported in the document. The study with the highest number of participants reported over-diagnosis rates of up to 68%. The document points out that the use of LDCT as the screening tool means it is inevitable that other clinically significant findings such as cancers of the thyroid, kidney and liver and not so significant findings such as minor coronary artery calcification and small lymph nodes are likely to be detected during screening. However, rates reported vary substantially. One study referenced identified that the use of LDCT for lung cancer screening, may increase the detection of incidental thyroid cancer. Overall, the evidence document points out that the balance of adverse effects compared to benefits is uncertain due to the heterogeneity of screening strategies employed by RCTs.

The evidence regarding the second review question concluded that on balance, participants and professionals are likely to consider lung cancer screening to be beneficial. However, there is not sufficient evidence to make any conclusion on the acceptability of the full screening pathway.

The twelfth COMARE report, ‘The impact of personally initiated X-ray computed tomography scanning for the health assessment of asymptomatic individuals’ was published in 2007. The report did not consider the relevance of CT scanning in a population screening programme and concentrated on the practice of scanning individual asymptomatic patients. In this context, the report recommended that the evidence available at the time indicated that there was no benefit to be derived from CT scanning of the lung in asymptomatic individuals. However, the report did make the overall comment that the pitfalls in CT scanning of the lung are comparable to those in screening programmes already in place in medicine. These include the identification of unimportant disease, the failure to identify important disease successfully, the consequence of investigating and treating disease identified, and the expenditure of money that may be better utilised elsewhere.

Conclusions:
The basic premise of the proposal is sound. People are more likely to be cured of lung cancer the earlier it is found and ultimately reducing the number of people who die as a result of lung cancer. This is especially the case as currently most patients present with late-stage cancer and as a result, prognosis is poor. It also makes sense to start with people most at risk.

However, the report appears to be premature, as there is a lot of uncertainty associated with the results presented, which leaves many questions unanswered. The evidence presented is not sufficient to support the recommendation that a quality assured, targeted screening programme for lung cancer in people aged 55 – 74 with a history of smoking should be recommended in the UK. A recommendation in principle would be a different thing that would be supported by the evidence.

The report suggests that the use of LDCT for lung cancer screening is likely to be cost-effective compared to no screening; however, it recognises that there are some very important limitations. An important consideration is the potential detrimental effects of cancer screening, with the review indicating that there is sufficient evidence of clear harms of overdiagnosis, high false positive rates and short-term anxiety and stress. In addition to the health economics, it would be helpful to have a careful assessment of possible negative and positive indirect effects a screening programme for this age group. While the costs of additional diagnostic effects are included, the model does not consider the costs or health impacts of incidental findings from LDCT or costs associated with any adverse effects arising from these tests (particularly non-cancer cases).

It is clear from the review that there are still questions that need answering. Work still needs to be done on identifying how best to set up and optimise the screening programme in order to save most lives and do least harm. These plans need to be carefully studied in an implementation test to address these and other remaining questions. Any roll out will need to be carefully monitored and reviewed. Also, the availability of adequate resources and expertise for the roll out will need to be ensured. Getting the new natural history component is crucial to firm up the conclusions and it would be helpful to know the timeframe for this and methodologies being used to construct it.

In summary, COMARE holds the opinion that there is not sufficient evidence in the report to make any definitive conclusion on the acceptability of the full screening pathway.

Additional comments:
The Plain English Summary is not required for a document such as this. The Executive Summary should be sufficient and should be written clearly enough that a non-expert reader can understand what the study's objectives were, its findings, its limitations, and proposed next steps or questions for consideration. If retained, the Plain English Summary should be reviewed for clarity.

It would be helpful to include an estimate of the Lost Life Years from Lung Cancer in the UK since 2006 when it was decided there was insufficient evidence to undertake targeted screening. It would also be useful to have more information about the radiation exposure associated with the screening protocols, dose to lung and associated risks.

It may also be useful to explore links between potential benefits of screening genetically susceptible individuals in addition to smokers.

It is notable that membership of the expert groups, especially the Lung Cancer Screening Pathways Task and Finish Group, had no Lay or Patient representative member.

B Examples of responses which may assume the recommended screening programme would apply to ineligible groups defined by family history, non smokers, genetics, younger age

1 Name: xxxx xxxx
Condition: Lung cancer

Affected Comment:

With a long family history of lung cancer I feel this screening will make diagnosing lung cancer a lot quicker process. Instead of waiting till symptoms are bad and with the long doctor/hospital waiting list this screening will speed up the process hopefully resulting in less deaths by diagnosing earlier

Alternatives comment:

Right now I don't feel enough research is being put into lung conditions to help find treatment. I would like to know what alternatives there is that will be as effective & quick as screening

2 Name: xxxx xxxx

Affected Comment:

My father passed away aged 58, 6 weeks after his diagnosis of Lung Cancer. His mum (my Grandma) also died of the disease in her 70s. My dad was a non-smoker. He he had been diagnosed earlier, as it was already in the family, maybe we would've had him longer. I am worried that I will also get it. Once symptoms exist, its normally too late to save the person.

Recommendation comment:

Absolutely should be recommended! My father (non-smoker) died 6 weeks after diagnosis aged 58, once you get symptoms, it's too late! We are screened for breast, cervical, prostrate...why not lungs?! You could save hundreds of lives.

3 Name: xxxx xxxx

Affected Comment:

I lost my dad at 59 years old to lung cancer in 2020. My dad had ALK+ lung cancer and received targeted therapy for 2 years before he passed. This has devastated our family as had there been a screening programme available it might have been caught before it got to stage 4 and he could have still been here now. My friends mum was also diagnosed with stage 4 lung cancer in December 2021 following a local screening programme, she had no symptoms and so she was very lucky to have had the opportunity of this local screening programme.

Recommendation comment:

I 100 percent believe screening should be recommended. There are many genetic mutations of lung cancer affecting people who've no idea about these specific types. Sadly because the majority are non smokers it's brushed off as asthma, viral etc and is often caught at stage 4 which is too late. If screening was in place this could at least give people a little longer with their families and if caught early enough even cure them fully. 96 people die each day from lung cancer and this could be prevented if screening was introduced.

Alternatives comment:

Lots more information regarding lung cancer and the genetic mutations that can affect non smokers. Lung cancer is always seen as an old peoples smokers diseased and this simply isn't the case anymore. People need to know the symptoms and GPs need to also be educated and consider referring people earlier and not fobbing them off for 18mths which then means cancer has spread and unable to be treated

4 Name: xxxx xxxx

Affected Comment:

Yes, my sister died of lung cancer 3 years ago aged just 47 years old. If there was a national screening program in place, maybe the cancer would have been caught earlier for her? She was told it was terminal & she was taken from us only 5 short months later.
These poor people who are one day living healthy, happy lives thinking they have years ahead of them, are then given the shock that they have only months to live. It's crazy, if we have the technology to catch lung cancer before it's too late, why don't we use it. So many families are torn apart by these tragic stories. I know of 2 other families who have lost family members to lung cancer. Surely, if its the 2nd most common cancer, there should be more schemes in place to prevent or catch it before its too late.

Recommendation comment:

It should be recommended! To help catch lung cancer before it's too late.

5 Name: xxxx xxxx

Affected Comment:

My mum and dad has had Lung cancer my dad 18years ago and he survived an op and had chemotherapy he had symptoms, but sadly for my mum it was very different she didnt have symptoms until.the very end it had reached stage 4 and no option for treatment she died only 3 weeks after been told she had cancer this was only 1

month ago as u can imagine my life has been shattered my mum also was a non smoker i think Lung cancer screening could of saved her life

Recommendation comment:

Defo recommended as with lumg cancer symptoms can happen too late

C Example of response concerned about limiting a screening programme to adults with a history of smoking

Name: xxxx xxxx

Affected Comment:

Yes, my Mum died of Lung Cancer last year. She was a non-smoker, a spritely, fit and healthy 69 year old. Her GP did not recognise her early symptoms and took 3 months to refer her. By the time she exhibited full symptoms and was diagnosed her lung cancer was Stage IV metastatic. She suffered greatly through chemotherapy treatment and died 9 months after her diagnosis.
Evidence Comment:
The screening trial program that was carried out in Nottingham (incidentally which is where I am from and where my Mum lived), demonstrated success in identifying people for referral and follow up, which allowed for successful early interventions. Screening should be for everyone, not just smokers. Had my Mum been screened her risk factors likely would have been spotted and her cancer could have been caught earlier.

Discussion comment:

Lung cancer is increasing among non-smokers and women, but for too long has been dismissed as a smokers' disease and this has been used to justify doing nothing to look for other causes and preventative solutions. Lung cancer often does not display symptoms until an advanced stage when it is untreatable. Therefore screening is imperative to catch it early when it is treatable.
Recommendation comment:
Yes, screening is the best option to catch lung cancer early when it is treatable. It should be available to everyone, in the same way as breast cancer and bowel cancer screening. Lung Cancer is the biggest cancer killer, and more should definitely be done to save lives. Screening could encompass not just CT scans, but there are blood tests and breath tests in development too… with funding and resources allocated, successful screening is achievable.

Alternatives comment:

In addition to developing and rolling out a proper screening test to everyone, GPs should be better educated to assess patients and spot symptoms early, and refer at risk candidates. My Mum suffered from bronchitis and chest infections for years, she

also developed finger clubbing, diagnosed as rheumatoid arthritis. These are early risk factors for lung cancer – we didn't know because of lack of awareness.

Other comments:

Run National campaigns educating people about symptoms and urging them to get checked and screened, without only focusing on smoking. No one deserves lung cancer, not non -smokers and not smokers. Campaigns that only lecture people on giving up smoking to reduce their risk don't actually help anyone, and they especially don't help non-smokers who might be at risk of lung cancer for other reasons but wouldn't realise it or think to get checked.