ISRCTN42704678 https://doi.org/10.1186/ISRCTN42704678

# The Yorkshire Lung Screening Trial

**Submission date**
26/03/2018

**Recruitment status**
No longer recruiting

**Registration date**
03/04/2018

**Overall study status**
Completed

**Last Edited**
18/11/2025

**Condition category**
Cancer

[X] Prospectively registered
[X] Protocol
[_] Statistical analysis plan
[_] Results
[_] Individual participant data
[X] Record updated in last year

## Plain English summary of protocol

See: https://www.cancerresearchuk.org/about-cancer/find-a-clinical-trial/a-study-looking-at-lung-health-checks-to-help-diagnose-lung-diseases-earlier

Background and study aims
Screening for lung cancer with Low Dose Computed Tomography (LDCT) scans reduced deaths in a large US study and is now routine care in North America. The UK National Screening Committee has yet to approve a screening programme for lung cancer. Lung cancer is much more common in deprived communities, and yet these populations are less likely to participate in both established screening programmes and research studies. Unanswered questions about lung cancer screening include: how to design services that are convenient and accessible to people from deprived populations who are most at risk; how much extra benefit might be seen with targeted screening of high-risk current or ex-smokers in the UK compared to the US; is overdiagnosis a problem (where screening detects indolent cancers that would not have caused patients harm during their lifetime); and what effect screening has on smoking rates. This study aims to test targeted LDCT screening in community settings concentrating on deprived areas of Leeds.

Who can participate?
People in Leeds aged between 55 and 80 who smoke or used to smoke

What does the study involve?
Participants are randomly allocated to the intervention group or the usual care group. The intervention group are invited to an assessment for a Lung Health Check (including LDCT screening for high-risk people). The Lung Health Check is like an MOT for the lungs to see if they are in good working order. A nurse asks the participants questions about any problems they might have noticed with their lungs. They also ask about any other health problems they might have. Participants are asked to blow into a machine that measures how well their lungs are working. Oxygen levels and other chemicals in their breath are also measured to provide important information about their lung health. Depending on this information, the nurse may offer a lung CT scan with a second scan in two years. The CT scan takes about 10 minutes. Participants are asked to lie on a couch which moves slowly backwards and forwards while scanning their chest. The scan is pain-free and does not need an injection. Trained staff are present and they talk participants through what is happening. The whole lung health check including the scan takes less than one hour. Outcomes are compared between the intervention

group and the usual care group, who aren't invited to take part or know that they are in a research study.

What are the possible benefits and risks of participating?
The results will show the true benefits (of reducing number of late stage cancers, and therefore lives saved) and possible harms (of overdiagnosis) of introducing screening in the UK. When lung cancer is found through screening it is usually very small and only in the lungs. This means treatment can cure most patients. When lung cancer is found by screening and is successfully treated, people live an average of ten years longer than people who have cancer found in other ways. CT scanners use a small amount of radiation to produce pictures of the lungs. Exposure to radiation can itself cause problems (very rarely actually causing cancer). By using very modern CT scanners the amount of radiation needed is reduced. The scanner uses levels of radiation that are about the same as those found in the environment over the past year. The chance of the scan saving a life by finding an early cancer is much greater than the risk of the scan causing any harm.

Where is the study run from?
Leeds Teaching Hospitals NHS Trust (UK)

When is the study starting and how long is it expected to run for?
July 2017 to November 2025

Who is funding the study?
Yorkshire Cancer Research (UK)

Who is the main contact?
Dr Matthew Callister

# Contact information

### Type(s)
Scientific

### Contact name
Dr Matthew Callister

### ORCID ID
https://orcid.org/0000-0001-8157-0803

### Contact details
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Leeds
United Kingdom
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# Additional identifiers

### Clinical Trials Information System (CTIS)
Nil known

### Integrated Research Application System (IRAS)
235803

### ClinicalTrials.gov (NCT)
Nil known

### Protocol serial number
36258, IRAS 235803

# Study information

### Scientific Title
A randomised controlled trial to evaluate invitation to community-based low dose computed tomography (LDCT) screening for lung cancer versus usual care in a targeted population at risk

### Acronym
YLST

### Study objectives
Current study hypothesis as of 20/02/2024:

Screening for Lung Cancer with Low Dose Computed Tomography (LDCT) scans reduced deaths in a large US trial and is now routine care in North America. The UK National Screening Committee recently approved a screening programme for lung cancer in the UK. Lung cancer is much more common in deprived communities, and yet these populations are less likely to participate in both established screening programmes and research studies. Unanswered questions about lung cancer screening include: how to design services that are convenient and accessible to people from deprived populations who are most at risk; how much extra benefit might be seen with targeted screening of high-risk current or ex-smokers in the UK compared to the US; is overdiagnosis a problem (where screening detects indolent cancers that would not have caused patients harm during their lifetime); and what effect screening has on smoking rates.
In 2021 the study was extended for a third screening round. Existing participants will receive an invitation to a third round of biennial screening.

Participants who were previously ineligible due to falling below the risk stratification criteria for receiving a scan will have their risk score recalculated and be invited for screening if now likely to be eligible based on updated age and smoking history parameters.

Non-responders to previous screening invitation material will be randomised to a pathway navigator approach. Those allocated to the intervention arm will receive a letter informing them of a telephone appointment to discuss lung screening. At this telephone appointment staff trained in pathway navigator techniques will address any barriers to capability, opportunity and motivation for attending screening using problem-solving, behaviour change techniques and practical arrangements.

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Previous study hypothesis:

Screening for Lung Cancer with Low Dose Computed Tomography (LDCT) scans reduced deaths in a large US trial and is now routine care in North America. The UK National Screening Committee has yet to approve a screening programme for lung cancer. Lung cancer is much more common in deprived communities, and yet these populations are less likely to participate in both established screening programmes and research studies. Unanswered questions about lung cancer screening include: how to design services that are convenient and accessible to people from deprived populations who are most at risk; how much extra benefit might be seen with targeted screening of high-risk current or ex-smokers in the UK compared to the US; is overdiagnosis a problem (where screening detects indolent cancers that would not have caused patients harm during their lifetime); and what effect screening has on smoking rates.

The Yorkshire Lung Screening Trial aims to test targeted LDCT screening in community settings concentrating on deprived areas of Leeds.

## Ethics approval required
Ethics approval required

## Ethics approval(s)
approved 22/01/2018, North West - Greater Manchester West Research Ethics Committee (2 Redman Place, Stratford, London, E20 1JQ, United Kingdom; +44 2071048051; gmwest.rec@hra.nhs.uk), ref: 18/NW/0012

## Study design
Randomized; Interventional; Design type: Screening, Imaging, Complex Intervention

## Primary study design
Interventional

## Study type(s)
Treatment

## Health condition(s) or problem(s) studied
Lung cancer

## Interventions
Current interventions as of 20/02/2024:

The trialists wish to use a Zelen’s design, where they randomise 55-80 year old smokers or ex-smokers to intervention or usual care groups before they approach them. The intervention group will be invited to assessment for a Lung Health Check (including LDCT screening for high-risk people) framed as a pilot health service. Other studies using this approach have shown greater participation from deprived populations. The trialists will compare outcomes between the invited group and a usual care group, who won’t be invited to take part or know that they are in a research study. By comparing outcomes with a control population, they will be able to assess the true benefits (of reducing number of late stage cancers, and therefore lives saved) and possible harms (of overdiagnosis) of introducing screening in the UK.

YLST plans 2 rounds of invitation to LDCT screening at an interval of 2 years. For participants being screened, there will be 4 years to 6 years of follow up from date of baseline LDCT screen. For all randomised participants, the trialists plan up to 6 years follow up from point of randomisation to ascertain and compare lung cancer outcomes including diagnoses and rates of

advanced cancers based on staging. Longer term follow up on lung cancer outcomes including incidence of lung cancer, incidence of advanced cancer and mortality may be undertaken subject to funding and permissions from the Confidentiality Advisory Group and Research Ethics Committee.

At screening round three, non-responders to previous screening invitation material will be randomised to a pathway navigator approach. Those allocated to the intervention arm will receive a letter informing them of a telephone appointment to discuss lung screening. At this telephone appointment staff trained in pathway navigator techniques will address any barriers to capability, opportunity and motivation for attending screening using problem-solving, behaviour change techniques and practical arrangements.

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Previous interventions:

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## Intervention Type
Other

## Primary outcome(s)
Current primary outcome measure as of 20/02/2024:

YLST Primary Outcome Measures
1. The proportion of the study population allocated to intervention who undergo telephone assessment and are screened according to the USPSTF, PLCO and LLP criteria
2. Lung cancers identified in participants selected for LDCT screening according to the USPSTF, PLCO and LLP criteria over two rounds of biennial screening
3. The incidence of advanced lung cancer in the intervention and control arms over the course of the study

Pathway Navigator Primary Outcomes
1. The number undergoing initial telephone assessment of lung cancer risk.
2. The number undergoing a LDCT screening scan.

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Previous primary outcome measures as of 02/04/2020:

1. The proportion of the study population allocated to intervention who undergo telephone assessment and are screened according to the USPSTF, PLCO and LLP criteria
2. Lung cancers identified in participants selected for LDCT screening according to the USPSTF, PLCO and LLP criteria over two rounds of biennial screening
3. The incidence of advanced lung cancer in the intervention and control arms over the course of the study

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Previous primary outcome measures:

1. The proportion of the study population allocated to intervention who undergo telephone assessment and are screened according to the USPSTF, PLCO and LLP criteria, measured at initial telephone triage at study baseline
2. Lung cancers identified in patients selected for LDCT screening according to the USPSTF, PLCO and LLP criteria over two rounds of biennial screening, measured at study end (5-6 years following initial recruitment)
3. The incidence of advanced lung cancer in the intervention and control arms over the course of the study, measured using local medical records and national database (National Cancer Registration and Analysis Service) at study end (5-6 years following initial recruitment)

## Key secondary outcome(s))

Current secondary outcome measures as of 20/02/2024:

YLST Secondary Outcome Measures
1. Incremental cost-effectiveness ratio for community-based lung cancer screening overall and according to the three criteria for identifying candidates for screening
2. Screening performance including the following parameters:
2.1. Cancer detection rate and number needed to screen to detect one lung cancer according to risk criteria over two screening rounds
2.2. False-positive and false-negative rate
2.3. Rate of investigation of benign disease and benign surgical resection rate
2.4. Attendance by LDCT screening round and according to participant characteristics (age, sex, smoking status, ethnicity and SES)
2.5. Treatment of screen-detected lung cancer including surgical resection rate
2.6. Investigations, treatments and adverse events generated from screening including incidental findings
2.7. Interval cancers and recall rates in those undergoing screening
3. Smoking prevalence at the start and end of the study in the intervention arm and usual care arm
4. Participation rates in telephone assessment by age, sex, smoking status, ethnicity and SES
5. Route to diagnosis, histological subtype, stage and treatment of lung cancers in the intervention (LDCT screened group, eligible respondents, non-respondents and ineligible low risk responders) and usual care arms
6. Lung cancer and all-cause mortality by trial arm
7. Numbers of nodules detected, proportion with eventual diagnosis of cancer by: size (volume), Pancan malignancy risk prediction score and volumetry-derived Volume Doubling Time (VDT)

8. Prevalence of undiagnosed airflow obstruction and coronary artery calcification in the screened population
9. Quality of life measured using EQ-5D and SF-12 scores

Pathway Navigator Secondary Outcomes
Secondary outcomes include: demographic, clinical and risk parameters of people undergoing telephone risk-assessment; number of people eligible for screening following telephone risk-assessment; number of screen-detected cancers diagnosed; costs; a mixed-methods process evaluation.

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Previous secondary outcome measures as of 02/04/2020:

1. Incremental cost-effectiveness ratio for community-based lung cancer screening overall and according to the three criteria for identifying candidates for screening
2. Screening performance including the following parameters:
2.1. Cancer detection rate and number needed to screen to detect one lung cancer according to risk criteria over two screening rounds
2.2. False-positive and false-negative rate
2.3. Rate of investigation of benign disease and benign surgical resection rate
2.4. Attendance by LDCT screening round and according to participant characteristics (age, sex, smoking status, ethnicity and SES)
2.5. Treatment of screen-detected lung cancer including surgical resection rate
2.6. Investigations, treatments and adverse events generated from screening including incidental findings
2.7. Interval cancers and recall rates in those undergoing screening
3. Smoking prevalence at the start and end of the study in the intervention arm and usual care arm
4. Participation rates in telephone assessment by age, sex, smoking status, ethnicity and SES
5. Route to diagnosis, histological subtype, stage and treatment of lung cancers in the intervention (LDCT screened group, eligible respondents, non-respondents and ineligible low risk responders) and usual care arms
6. Lung cancer and all-cause mortality by trial arm
7. Numbers of nodules detected, proportion with eventual diagnosis of cancer by: size (volume), Pancan malignancy risk prediction score and volumetry-derived Volume Doubling Time (VDT)
8. Prevalence of undiagnosed airflow obstruction and coronary artery calcification in the screened population
9. Quality of life measured using EQ-5D and SF-12 scores

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Previous secondary outcome measures:

1. Participation rates in telephone assessment by age, sex, smoking status, ethnicity and SES, measured using information collected from primary care databases at initial telephone triage at study baseline
2. Attendance by LDCT screening rounds, measured at baseline screen (T0) and T2 screen
3. Numbers attending LDCT screening and by patient characteristics (age, sex, smoking status, ethnicity and SES) by screening round, measured at baseline screen (T0) and T2 screen
4. Adverse events in attenders of the LHC/LDCT scanning on the mobile van, recorded on electronic case report form at baseline screen (T0) and T2 screen

5. Number needed to screen to detect one lung cancer for each of the three risk criteria over the two rounds of screening, measured at study end (5-6 years following initial recruitment)
6. Cancer detection rate for each of the three risk criteria over two rounds of LDCT screening, measured at study end (5-6 years following initial recruitment)
7. Lung cancer stage in the intervention arm (LDCT screened group, eligible respondents, non-respondents and ineligible low risk responders) and usual care arms over the course of the study, measured using local medical records and national database (National Cancer Registration and Analysis Service) at study end (5-6 years following initial recruitment)
8. Route to diagnosis, histological subtype and treatment of lung cancers intervention arm (LDCT screened group, eligible respondents, non-respondents and ineligible low risk responders) and usual care arms over the course of the study, measured using local medical records at study end (5-6 years following initial recruitment)
9. Lung cancer and all-cause mortality by trial arm, measured using UK Office for National Statistics at study end (5-6 years following initial recruitment)
10. Sensitivity, specificity, PPV and NPV for each of the three risk criteria after at least 6 years of follow up (funding dependent), measured at study end (5-6 years following initial recruitment)
11. False positive rates, false negative rates, rates of investigation of benign disease, benign resection rate in participants, interval cancers, recall rates in those undergoing LDCT screening, measured at study end (5-6 years following initial recruitment)
12. Resection rates, investigations, treatments and adverse events generated from screening including incidental findings, measured using local medical records at study end (5-6 years following initial recruitment)
13. Numbers of nodules detected, proportion with eventual diagnosis of cancer by volume, Pancan malignancy risk prediction score and volumetry-derived Volume Doubling Time, measured using local medical records at study end (5-6 years following initial recruitment)
14. Incremental cost-effectiveness ratio for community-based lung cancer screening overall and according to the three criteria for identifying candidates for screening, measured using local medical records at study end (5-6 years following initial recruitment)
15. Smoking prevalence at start and end of study in intervention arm and usual care arm, smoking and smoking cessation rates in those invited to LDCT screening, measured using primary care databases at time of initial data extraction and at study end
16. Prevalence of undiagnosed airflow obstruction in the screened population, measured using spirometry data recorded as part of Lung Health Check at baseline screen (T0)
17. Prevalence of coronary artery calcification, recorded on radiology report from scan at baseline screen (T0)
18. Quality of life (SF-12, EQ-5D) and anxiety/worry measures (Cancer Worry Scale adapted to lung cancer), measured at baseline screen (T0) and T2 screen

### Completion date
30/11/2025

# Eligibility

### Key inclusion criteria
The inclusion criteria for entry into the randomisation cohort are:
1. Registered with a participating General Practice within the Leeds CCG area
2. Registered as current or ex-smoker in primary care databases
3. Age between 55 and 80 years (inclusive) at the time of randomisation

The inclusion criteria for being invited to attend a mobile lung health check following contacting the telephone triage service are any of:

1. 30 pack year history of smoking and current smoker, and quit within the last 15 years, (USPSTF criteria)
2. Lung cancer risk of ≥1.51% over 6 years as calculated by the PLCOM2012 score
3. Lung cancer risk of ≥5% over 5 years as calculated by the LLPv2. score

### Participant type(s)
Patient

### Healthy volunteers allowed
No

### Age group
Adult

### Sex
All

### Total final enrolment
8847

### Key exclusion criteria
1. Unable to provide written informed consent
2. Diagnosed with lung cancer within past 5 years
3. Diagnosed with incurable cancer
4. CT thorax within past 12 months
5. Registered on any of the following primary care databases:
5.1. Palliative care register
5.2. Dementia register
5.3. Frailty index > (to be decided)
6. Recorded type 2 objection to participation in the General Practice Extraction Service

### Date of first enrolment
01/09/2018

### Date of final enrolment
31/10/2024

## Locations

### Countries of recruitment
United Kingdom

England

### Study participating centre
**Leeds Teaching Hospitals NHS Trust**
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Leeds
England
LS9 7TF

## Sponsor information

### Organisation
University of Leeds

### ROR
https://ror.org/024mrxd33

## Funder(s)

### Funder type
Charity

### Funder Name
Yorkshire Cancer Research; Grant Codes: L403

### Alternative Name(s)
YCR

### Funding Body Type
Government organisation

### Funding Body Subtype
Trusts, charities, foundations (both public and private)

### Location
United Kingdom

## Results and Publications

### Individual participant data (IPD) sharing plan
The datasets generated during and/or analysed during the current study are/will be available upon request from Professor Matthew Callister, matthew.callister@nhs.net. In order to meet our ethical obligation to responsibly share data generated by clinical trials, YLST operates a transparent data-sharing request process. Anonymous data will be available for request once the study has published the final proposed analyses. Researchers wishing to use the data will need to complete a request for data-sharing form describing a methodologically sound proposal. The form will need to include the objectives, what data are requested, timelines for use,

intellectual property and publication rights, data release definition in the contract and participant informed consent, etc. A data-sharing agreement from the sponsor may be required.

## IPD sharing plan summary

Available on request

## Study outputs

| Output type | Details | Date created | Date added | Peer reviewed? | Patient-facing? |
|---|---|---|---|---|---|
| Protocol article | | 10/09/2020 | 15/09/2020 | Yes | No |
| Protocol article | Protocol for a nested randomised controlled trial | 09/07/2024 | 11/07/2024 | Yes | No |
| HRA research summary | | | 28/06/2023 | No | No |
| Interim results article | | 23/08/2023 | 25/08/2023 | Yes | No |
| Participant information sheet | Participant information sheet | 11/11/2025 | 11/11/2025 | No | Yes |
| Study website | Study website | 11/11/2025 | 11/11/2025 | No | Yes |