Early detection of lung cancer

Dr Mat Callister
Consultant Respiratory Physician
Leeds Teaching Hospitals
Lung cancer survival vs GDP per capita

GDP per capita (USD 2009, OECD)

Lung cancer 5YS (EUROCARE 5)
Lung cancer survival vs healthcare expenditure

Healthcare expenditure per capita (USD 2009, OECD)
Stage I/II

Stage III/IV

25%

75%
Stage I/II

Stage III/IV

25 deaths

25% of Stage I/II cases lead to 75% of deaths.
Stage I/II

Stage III/IV

10% stage shift

35%

65%
8% reduction in deaths

10% stage shift

23 deaths

35%

65%
Leeds Early Lung Cancer Campaign

Mat Callister
Consultant Respiratory Physician
Leeds Early Lung Cancer Campaign

- Public-facing social marketing campaign
- Primary Care Education Programme
- Community Health Educators
- Self-request Chest X-ray service
Leeds, January 2011

Got a cough? Get a check.

If you have a cough for over three weeks, you need a chest x-ray.

Ask your GP or, if you're over 50, visit us at Seacroft Hospital on York Road. Open Monday to Friday, 9.30am to 4.30pm - no appointment needed.

NHS Leeds

Leeds, January 2011
Social marketing materials evolution
When Kenneth Dorling picked up a copy of the Yorkshire Evening Post, he never expected it would change his life.
Spectrum of lung cancer symptoms

- No symptoms suggestive of lung cancer
- Symptoms mildly suggestive of lung cancer
- Symptoms strongly suggestive of lung cancer

CXR threshold

- CXR not done
- CXR done
Mrs JB
55 yr old woman
Never smoker
A-level teacher
3/52 persistent dry cough
No other concerning symptoms
Consulted GP 09.10.08

Dr MC
37yr old man
Healthcare professional
Never smoker
6/52 non-productive cough
No other concerning symptoms

Mr CW
79 year old man
Smoker (105 pack years)
Returned from cruise 05.01.09
Since then daily haemoptysis
1 stone weight loss over 1/12
3/52 increasing breathlessness
GP consultation 14.01.09

Mr DA
68 yr old man
Smoker (45 pack years)
No respiratory symptoms
Borderline hypertension
Attends surgery for BP check
CXR done
CXR threshold
CXR not done

Chest X-ray referral rates from GP practices in Leeds 2008-2009
Community ordered CXRs in Leeds 2008-2019

- 88% increase in CXR rates
- 126,519 extra CXRs 2011-18
Proportion early stage lung cancer
Leeds vs England 2008-2017

9% stage shift to stage I/II
Lung cancer mortality
Leeds vs England 2001-2018

- 8% reduction lung cancer deaths 2014-2017 vs 2000-2010
- 42 fewer deaths per year
- Timing - 3 years from campaign✓
- Effect size – same as stage shift✓
- Not seen elsewhere nationally (initially)✓
Acknowledgements

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Martyn Kennedy
Leanne Cheyne
Mike Darby
Paul Plant
Richard Milton
Jon Robson
Alison Gill
Puneet Malhotra
Victoria Turner
Kirsty Rodger
Kumar Paramasivam
Annette Johnstone
Bobby Bhartia
Shishir Karthik
Victoria Coupland
Margreet Lüchtenborg
Ruth Jack
Henrik Møller
Mick Peake
Sara Hiom
Amanda Boughey
Presenting symptoms of cancer and stage at diagnosis: evidence from a cross-sectional, population-based study

Minjoung Monica Koo, Ruth Swann, Sean McPhail, Gary A Abel, Lucy Elliss-Brookes, Greg P Rubin, Georgios Lyratzopoulos

• Analysed English National Cancer Diagnosis Audit 2014
• Patients 7,997 patients with solid tumours to link with stage at diagnosis

Koo et al. Lancet Oncology, epub ahead of print, 5th November 2019
Figure 2: Presenting symptoms and proportions of patients with stage I-III and stage IV cancer.

The first bar of each pair for each symptom represents symptoms recorded alone (single symptoms), whereas the second bar of each pair represents symptoms recorded with other symptoms (multiple symptoms).
Chest X-rays fail to spot lung cancer in up to 23% of patients - despite being the recommended method of spotting the killer disease

- Machines miss up to 23 per cent of cancers in patients, shocking review found
- Researchers X-rays out of date, which may explain UK's lagging survival rates
- They called for CT scans to replace them as first-line test for spotting the disease

By CONNOR BOYD HEALTH REPORTER FOR MAILONLINE
PUBLISHED: 09:55, 22 October 2019 | UPDATED: 15:07, 22 October 2019

22nd October 2019
Sensitivity of chest X-ray for detecting lung cancer in people presenting with symptoms: a systematic review

Bradley et al. BJGP, epub ahead of print, 22nd October 2019
CXR sensitivity for Lung Cancer

• Systematic review
• Only 3 studies identified with low risk of bias
• 2 primary care studies with sensitivities of 77% and 79%; 1 secondary care study with sensitivity of 80%
• Assumes that lung cancer present for year before diagnosis

Bradley et al. BJGP Dec 2019, epub ahead of print
These findings support calls to increase open-access CT for GPs, but, given resource restrictions and the potential to cause harm through overdiagnosis, further research is required to help identify which patients who have had a non-diagnostic chest X-ray should be referred for additional investigation.

Bradley et al. BJGP Dec 2019, epub ahead of print
Investigating symptomatic disease - Summary

• Leeds Early Lung Cancer Campaign
  – 88% increase in community-ordered CXRs
  – 9% Lung Cancer stage shift
  – 8% reduction in Lung Cancer Deaths seen alongside the campaign (168 fewer deaths in 2014-2017)

• CXR may miss 1 in 5 symptomatic lung cancers
  – Further investigation/referral maybe appropriate
  – Risk increases with age and intensity of smoking history
  – All patients with haemoptysis should be referred anyway
  – Weight loss also has high yield for diagnosis
When Kenneth Dorling picked up a copy of the Yorkshire Evening Post, he never expected it would change his life.
Reduced Lung-Cancer Mortality with Low-Dose Computed Tomographic Screening

The National Lung Screening Trial Research Team*
National Lung Screening Trial. NEJM 2011;365:395-409
Effects of volume CT lung cancer screening

Mortality results of the NELSON randomised-controlled population-based screening trial

Harry J. de Koning, MD PhD

PI NELSON
Professor & Deputy Head
Department of Public Health
Erasmus MC, University Medical Center Rotterdam, the Netherlands
Cumulative lung cancer deaths (Men only)

Control arm: 214 lung cancer deaths
Screen arm: 157 lung cancer deaths
National Targeted Lung Health Check Programme

- 14 sites chosen (highest mortality for lung cancer)
- Lung Health Checks (risk assessment for lung cancer, spirometry)
- Estimate 50% response rate and ≈ 50% eligibility
- Variable size, but largest project (Newcastle and Gateshead) anticipating over 9,000 scans in 1 year
# National Targeted Lung Health Check Programme

## First phase (2019 to 2023)

<table>
<thead>
<tr>
<th>Service</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participants</td>
<td>600,000</td>
<td></td>
</tr>
<tr>
<td>Ever smoked</td>
<td>54%</td>
<td></td>
</tr>
<tr>
<td>Lung Health Checks</td>
<td>150,000 (50%)</td>
<td></td>
</tr>
<tr>
<td>Initial CT scans</td>
<td>81,000 (56%)</td>
<td></td>
</tr>
<tr>
<td>Clinical Investigations</td>
<td>5,000 (5.9%)</td>
<td></td>
</tr>
<tr>
<td>Indeterminate results</td>
<td>11,500 (14.2%)</td>
<td></td>
</tr>
<tr>
<td>24 month follow up CT scan</td>
<td>67,000 (82.5%)</td>
<td></td>
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Dr Mat Callister
Consultant Respiratory Physician
Leeds Teaching Hospitals
On behalf of the YLST team
9 lessons learned from setting up a local screening service

1. GP-endorsed invitation is effective
2. If people are going to respond, they usually do so within a short interval of receiving an invitation
3. Reminder invitations are extremely effective
4. Telephone triage is a very efficient way of determining eligibility for screening
5. Providing mobile services brings with it logistical challenges
6. Current smokers are receptive to on-site smoking cessation provision
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MOT FOR YOUR LUNGS

People aged 55 to 80 in Leeds are being offered a new FREE LUNG HEALTH CHECK

The checks take place in mobile vans in convenient community locations like supermarket car parks, so you won’t have to travel to hospital.

They are run by specially trained nurses, who can find out how well your lungs are working. If needed, you’ll get care and treatment to help breathe new life into your lungs.

The checks are for people aged 55 to 80, who are current or former smokers. You are invited whether you feel fine or not, and whether or not you have any lung problems.

Having a check even if you don’t have symptoms is really important. It might pick up things you didn’t even know were there. Catching disease earlier means it’s much easier to treat.

Margaret, Halton

We started smoking young, back then everyone was smoking around you. It was the norm. It’s good to know people won’t get a hard time at the Lung Health Checks.

Jenny, Woodlesford

You can bring a friend, family member or partner along to support you on the day

Dr Bill Jones

Reminder Letter v2.1 3rd Jan 2019 READ No. 235453

BENEFITS OF THE LUNG HEALTH CHECK

- Totally FREE
- LOCAL and easy to get to, your check takes place in a community setting close to your home.
- TALK through your questions over tea or coffee.
- Find out about having a lung scan.
- No judgements on smoking.

LOOKING AFTER YOUR LUNGS

HOW THE NHS CAN HELP

Your lungs work hard every minute of your life. As you get older it’s worth checking them out.

The lung health check can spot problems early, often before you notice anything, when treatment could be simpler and more successful.

YOUR LUNGS COULD BE EASIER TO FIX THAN YOU THINK

You have two lungs, made up of five sections called lobes. Each lobe is made up of thousands of tiny grape-like sacs, called alveoli.

If there is a problem in one bit of the lung, early treatment can focus just on the bit that is affected.
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Number of telephone triage events per weekday Jan - Jun 2019

Invite
9 lessons learned from setting up a local screening service

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Dear David Test

NHS Number: 123456789

Free NHS Leeds Lung Health Check

We recently contacted you about a new Lung Health Check. You are invited to attend whether or not you have any current lung problems, even if you feel fine.

We didn’t hear from you. This letter is a reminder that you can call the Lung Health Check number 0113 39 26688 to find out more. We will ask you some short questions about you and your lung health. These questions will help us to decide if you need to attend our mobile van for a lung screen.

Please be aware this GP surgery won’t be able to answer any questions about this service. The checks are organised by the Lung Health Check team at Leeds Teaching Hospital Trust. If you would like further information call 0113 39 26688.

If you have already called, please ignore this reminder. Thank you for considering this service.

Yours sincerely

Dr Bill Jones
Number of telephone triage events per weekday Jan - Jun 2019

- Invite
- 1st reminder
- 2nd reminder
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Duration of YLST Telephone Triage Calls (n=7,970)
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Your heart

This is a picture of your heart taken from your CT scan.

The white areas show parts of the arteries going to your heart that have become hard or narrow.

Smoking is associated with the hardening and narrowing of the heart arteries. This can lead to problems including heart attacks.

This drawing shows what your heart looks like inside.

The yellow parts show roughly where the arteries going to your heart have become hard or narrow.

By stopping smoking, you can reduce the chance of the arteries to your heart becoming hardened or narrowed and lower your risks of problems like heart attacks.

These are drawings of what healthy and narrowed arteries look like.
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<table>
<thead>
<tr>
<th>FEV₁/FVC</th>
<th>Symptoms</th>
<th>FEV₁ % predicted</th>
<th>YLST Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;70%</td>
<td>No</td>
<td>Any</td>
<td>None</td>
</tr>
<tr>
<td>&lt;70%</td>
<td>Yes</td>
<td>&gt;80%</td>
<td>GP informed No action taken</td>
</tr>
<tr>
<td>&lt;70%</td>
<td>Yes</td>
<td>&lt;80%</td>
<td>Refer Comm. Resp. Team</td>
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The proportion of lung cancer patients attending UK lung cancer clinics who would have been eligible for low-dose CT screening

Only 1 in 5 lung cancers (at best) likely to be diagnosed by LDCT screening

Gracie et al.
ERJ 2019;54: 1802221
Lung Health Check/Screening - Summary

• GPs have a key role to play in recruitment/participation
• A significant proportion of participants have undiagnosed COPD
• Other incidental findings mostly need review in Secondary Care
• Local pathways need developing to deal with this work
YORKSHIRE LUNG SCREENING TRIAL

www.leedslunghealthcheck.nhs.uk

@LungHealthCheck

@YESSstudy

www.isrctn.com/ISRCTN63825779

www.isrctn.com/ISRCTN42704678

yorkshire cancer research

THE LEEDS TEACHING HOSPITALS
NHS TRUST