Impact of low dose CT screening on smoking cessation in the UK Lung Cancer Screening trial

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Lung cancer is an unmet need

Leading cause of cancer mortality in the US\(^1\) and UK\(^2\)

UK five year survival rate < 10\(^{\%}\)\(^3\)

Higher incidence in socioeconomically deprived areas\(^4\)

No routine lung cancer screening programme in the UK

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Low dose computed tomography (CT) screening

20% reduction in mortality in a US CT screening trial

“License to smoke” or “teachable moment”?

US\textsuperscript{1}, Danish\textsuperscript{2} and Dutch-Belgian\textsuperscript{3} trials report favourable quit rates

UK Lung Screening trial\textsuperscript{4} – behavioural effects

\textsuperscript{1}Tammemägi MC, Berg CD, Riley TL et al. Impact of lung cancer screening results on smoking cessation. \textit{J Natl Cancer Inst} 2014;106[6].
\textsuperscript{3}van der Aalst CM et al. Lung cancer screening and smoking abstinence: 2 year follow-up data from the Dutch-Belgian randomised controlled lung cancer screening trial. \textit{Thorax} 2010;65:600-605.
\textsuperscript{4}Brain K et al. Long-term psychosocial outcomes of low dose computed tomography screening: results of the UK Lung Cancer Screening (UKLS) trial. \textit{Thorax} 2016 doi:10.1136/thoraxjnl-2016-208283.
UK Lung Screening trial

- Population-based trial of low dose CT screening in high risk individuals
- Random sample of ≈250,000 (50-75 years) approached via 6 primary care trusts in Liverpool and Cambridge
- Risk screening questionnaire: >5% risk over 5 years*

* Liverpool Lung Project\textsuperscript{v2} risk criteria including smoking, family/medical history, age, gender, occupational exposure
High-risk individuals randomised
4055

CT screening arm
2028 (50%)

Smokers 759 (49%)

Short term follow up

Quit smoking at T1 (two weeks)
Completed and eligible 527 (70%)
“Have you quit smoking since joining UKLS?”

Long term follow up

Quit smoking at T2 (two years)
Completed and eligible 488 (65%)
“Have you quit smoking since joining UKLS?”

No screening control
2027 (50%)

Smokers 787 (51%)

Quit smoking at T1 (two weeks)
Completed and eligible 479 (61%)
“Have you quit smoking since joining UKLS?”

Quit smoking at T2 (two years)
Completed and eligible 377 (49%)
“Have you quit smoking since joining UKLS?”
### UKLS smoking cessation rate at T1

<table>
<thead>
<tr>
<th>Two weeks follow-up</th>
<th>Intervention</th>
<th>Control</th>
<th>Net trial quit rate</th>
<th>UK population cessation rate*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quit smoking</td>
<td>Yes</td>
<td>Yes</td>
<td>11%</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td>75 (14%)</td>
<td>36 (8%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>452 (86%)</td>
<td>443 (92%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Predictors of smoking cessation at T1

<table>
<thead>
<tr>
<th>Odds of T1 quitting</th>
<th>OR (95% CI)</th>
<th>Adj OR^ (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial allocation</td>
<td>2.04 (1.34 to 3.10)***</td>
<td>2.09 (1.36 to 3.23)***</td>
</tr>
<tr>
<td>Recruitment site</td>
<td>1.26 (0.85 to 1.87)</td>
<td>1.32 (0.76 to 2.32)</td>
</tr>
<tr>
<td>Age (up to 65, over 70 yrs)</td>
<td>1.08 (0.59 to 1.96)</td>
<td>1.09 (0.59 to 2.01)</td>
</tr>
<tr>
<td>Gender</td>
<td>1.03 (0.67 to 1.59)</td>
<td>0.99 (0.63 to 1.55)</td>
</tr>
<tr>
<td>Marital group</td>
<td>0.83 (0.54 to 1.27)</td>
<td>0.86 (0.54 to 1.35)</td>
</tr>
<tr>
<td>Deprivation (most/least)</td>
<td>1.13 (0.65 to 1.95)</td>
<td>0.95 (0.44 to 2.05)</td>
</tr>
<tr>
<td>Lung cancer experience</td>
<td>0.97 (0.65 to 1.46)</td>
<td>1.02 (0.67 to 1.58)</td>
</tr>
<tr>
<td>Baseline cancer distress</td>
<td>2.15 (1.05 to 4.40)</td>
<td>2.42 (1.14 to 5.12)</td>
</tr>
</tbody>
</table>

*** p<0.001

^ Adjusted for baseline cancer distress, recruitment site, gender, age, marital group, deprivation, experience of lung cancer

Complete case analysis
# UKLS smoking cessation rate at T2

<table>
<thead>
<tr>
<th>Two years follow-up</th>
<th>Control</th>
<th>Net trial quit rate</th>
<th>UK population cessation rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quit smoking</td>
<td>Quit smoking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>115 (24%)</td>
<td>79 (21%)</td>
<td>22%</td>
</tr>
<tr>
<td>No</td>
<td>373 (76%)</td>
<td>298 (79%)</td>
<td></td>
</tr>
</tbody>
</table>
## Predictors of smoking cessation at T2

<table>
<thead>
<tr>
<th>Odds of T2 quitting</th>
<th>OR (95% CI)</th>
<th>Adj OR(^\wedge) (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial allocation</td>
<td>1.60 (1.18 to 2.17)**</td>
<td>1.59 (1.17 to 2.17)**</td>
</tr>
<tr>
<td>Recruitment site</td>
<td>1.03 (0.74 to 1.43)</td>
<td>0.90 (0.59 to 1.37)</td>
</tr>
<tr>
<td>Age (up to 65, over 70 yrs)</td>
<td>1.49 (0.94 to 2.37)</td>
<td>1.54 (0.97 to 2.46)</td>
</tr>
<tr>
<td>Gender</td>
<td>0.76 (0.53 to 1.10)</td>
<td>0.73 (0.50 to 1.07)</td>
</tr>
<tr>
<td>Marital group</td>
<td>0.86 (0.60 to 1.24)</td>
<td>0.94 (0.64 to 1.38)</td>
</tr>
<tr>
<td>Deprivation (most/least)</td>
<td>1.08 (0.68 to 1.71)</td>
<td>1.12 (0.62 to 2.05)</td>
</tr>
<tr>
<td>Lung cancer experience</td>
<td>0.91 (0.65 to 1.28)</td>
<td>0.93 (0.65 to 1.33)</td>
</tr>
<tr>
<td>Baseline cancer distress</td>
<td>1.69 (0.95 to 3.02)</td>
<td>1.99 (1.08 to 3.67)</td>
</tr>
</tbody>
</table>

\(^\wedge\) Adjusted for baseline cancer distress, recruitment site, gender, age, marital group, deprivation, experience of lung cancer

Complete case analysis
Impact of screening result on cessation at two weeks

*** $p<0.001$

- Control group
  - Reference

- Negative result
  - Adj OR = 1.61 (0.93 to 2.77)

- Further investigation
  - Adj OR = 2.46 (1.53 to 3.96)***
Impact of screening result on cessation at two years

** p<0.01

Adj OR = 1.66 (1.15 to 2.39)**

Adj OR = 0.65 (0.41 to 1.04)
• CT lung screening is a “teachable moment” for smoking cessation in high risk groups
  – positive CT results prompted smoking cessation
  – no evidence that negative results were falsely reassuring

• Methodological limitations
  – trial self-selection based on motivation to quit?

• Integrate CT lung screening with evidence-based SCIs
  – strategies for engaging harder to reach smokers
  – optimal type and timing of SCIs in the lung screening pathway
Thanks to UKLS researchers and collaborators

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John Field (University of Liverpool)

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