Psychological responses to a ‘real world’ demonstration lung cancer screening pilot when compared with an unscreened community sample

S. Kummer, J. Waller, M. Ruparel, S. Janes, S. Quaife

CRUK Early Diagnosis Conference, Tuesday 12th February 2019
Screening cascade

1. Screening test
   - Test results
     - Positive (true or false)
     - Incidental findings (other conditions)
     - Negative (true or false)

2. Separate cascade
   - Routine screening
     - (Surveillance)

3. Workup
   - Workup results
     - Positive (benefit from treatment)
     - Positive (no benefit from treatment)
     - Positive (overdiagnosis)
     - Indeterminate
     - Negative (true or false)

4. Treatment
   - Overtreatment

Harris et al., 2014; JAMA
Psychological impact of LDCT screening

• Essential to understanding risk-benefit ratio

• Decision-making about screening implementation

• Psychological impact in the trial setting
  – Increased distress but short-lived (≤ 6 months)
  – Biases in participation: smoking, SES and psychosocial factors
  – Unscreened control group may be an inadequate comparator
Objective

• To compare **real world** psychological outcomes of LDCT lung cancer ‘screenees’ with individuals who have never been offered screening, both overall and by LDCT result.
Methods

Screening sample (n=787)

Lung Screen Uptake Trial
(Real world demonstration screening pilot)

Aged 60-75
Current and former smokers quit <7 years

Lung Cancer Worry
(Cancer Worry Scale)

Depression and Anxiety
(HADS)

Type of LDCT result

At appointment

Next day

3 months F/U

Comparison sample (n=383)

Smoking Toolkit Study
(Population-representative, Ipsos MORI, Omnibus Survey)

Aged 60-75
Current and former smokers quit <5 years

Lung Cancer Worry
(Cancer Worry Scale)

Depression and Anxiety
(HADS)

Screening aware?

Single time point only
<table>
<thead>
<tr>
<th></th>
<th>Comparison sample (n=383)</th>
<th>Screening sample (n=787)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender, % (n)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>46.0 (176)</td>
<td>46.0 (362)</td>
</tr>
<tr>
<td>Male</td>
<td>54.0 (207)</td>
<td>54.0 (425)</td>
</tr>
<tr>
<td><strong>Age, mean (SD)</strong></td>
<td>66.24 (4.18)</td>
<td>65.75 (4.01)</td>
</tr>
<tr>
<td><strong>Ethnicity, % (n)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>96.3 (367)</td>
<td>84.1 (660)</td>
</tr>
<tr>
<td>Not White</td>
<td>3.7 (14)</td>
<td>15.9 (125)</td>
</tr>
<tr>
<td><strong>Education, % (n)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finished school ≤ age 15</td>
<td>31.1 (119)</td>
<td>49.2 (387)</td>
</tr>
<tr>
<td>CSEs/O levels</td>
<td>28.2 (108)</td>
<td>10.5 (83)</td>
</tr>
<tr>
<td>A levels/Other</td>
<td>24.8 (95)</td>
<td>17.5 (138)</td>
</tr>
<tr>
<td>Degree</td>
<td>15.9 (61)</td>
<td>22.7 (179)</td>
</tr>
<tr>
<td><strong>Marital status, n (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/cohabiting</td>
<td>53.1 (203)</td>
<td>45.2 (355)</td>
</tr>
<tr>
<td>Not married/cohabiting</td>
<td>46.9 (179)</td>
<td>54.8 (431)</td>
</tr>
<tr>
<td><strong>Smoking status, n (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current smoker</td>
<td>80.8 (308)</td>
<td>68.6 (538)</td>
</tr>
<tr>
<td>Former smoker</td>
<td>19.2 (72)</td>
<td>31.4 (246)</td>
</tr>
<tr>
<td></td>
<td>Comparison sample (n=383)</td>
<td>Screening sample (n=787)</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td><strong>Gender, % (n)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>46.0 (176)</td>
<td>46.0 (362)</td>
</tr>
<tr>
<td>Male</td>
<td>54.0 (207)</td>
<td>54.0 (425)</td>
</tr>
<tr>
<td><strong>Age, mean (SD)</strong></td>
<td>66.24 (4.18)</td>
<td>65.75 (4.01)</td>
</tr>
<tr>
<td><strong>Ethnicity, % (n)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>96.3 (367)</td>
<td>84.1 (660)</td>
</tr>
<tr>
<td>Not White</td>
<td>3.7 (14)</td>
<td>15.9 (125)</td>
</tr>
<tr>
<td><strong>Education, % (n)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finished school ≤ age 15</td>
<td><strong>31.1 (119)</strong></td>
<td><strong>49.2 (387)</strong></td>
</tr>
<tr>
<td>CSEs/O levels</td>
<td>28.2 (108)</td>
<td>10.5 (83)</td>
</tr>
<tr>
<td>A levels/Other</td>
<td>24.8 (95)</td>
<td>17.5 (138)</td>
</tr>
<tr>
<td>Degree</td>
<td>15.9 (61)</td>
<td>22.7 (179)</td>
</tr>
<tr>
<td><strong>Marital status, n (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/cohabiting</td>
<td><strong>53.1 (203)</strong></td>
<td><strong>45.2 (355)</strong></td>
</tr>
<tr>
<td>Not married/cohabiting</td>
<td>46.9 (179)</td>
<td>54.8 (431)</td>
</tr>
<tr>
<td><strong>Smoking status, n (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current smoker</td>
<td><strong>80.8 (308)</strong></td>
<td><strong>68.6 (538)</strong></td>
</tr>
<tr>
<td>Former smoker</td>
<td>19.2 (72)</td>
<td>31.4 (246)</td>
</tr>
</tbody>
</table>
Mean lung cancer worry scores over time
Mean lung cancer worry scores over time
Mean lung cancer worry scores by LDCT result

Comparison sample (REF) (n=383)
Normal LDCT (n=196)
Indeterminate nodule (n=104)
Suspicious thoracic lesion (n=27)
Incidental GP F/U (n=268)
Incidental hospital F/U (n=36)
Mean lung cancer worry scores by LDCT result

- Comparison sample (REF) (n=383)
- Normal LDCT (n=196)
- Indeterminate nodule (n=104)
- Suspicious thoracic lesion (n=27)
- Incidental GP F/U (n=268)
- Incidental hospital F/U (n=36)
Mean anxiety scores over time

- Comparison sample (REF)
- Screening sample (At appt)
- Screening sample (3 months)
Mean anxiety scores over time

Comparison sample (REF)  Screening sample (At appt)  Screening sample (3 months)

Normal  Mild  Moderate  Severe
Mean anxiety scores by LDCT result

At appointment
3 months F/U

Comparison sample (REF) (n=383)
Normal LDCT (n=187)
Indeterminate nodule (n=107)
Suspicious thoracic lesion (n=23)
Incidental GP F/U (n=251)
Incidental hospital F/U (n=34)
Mean anxiety scores by LDCT result

- **Comparison sample (REF) (n=383)**
- **Normal LDCT (n=187)**
- **Indeterminate nodule (n=107)**
- **Suspicious thoracic lesion (n=23)**
- **Incidental GP F/U (n=251)**
- **Incidental hospital F/U (n=34)**

Anxiety levels:
- **Normal**
- **Mild**
- **Moderate**
- **Severe**
Mean depression scores over time

- **Normal**
- **Mild**
- **Moderate**
- **Severe**

Comparison sample (REF)
Screening sample (At appt)
Screening sample (3 months)
Mean depression scores over time

Comparison sample (REF)  Screening sample (At appt)  Screening sample (3 months)

- Normal
- Mild
- Moderate
- Severe
Mean depression scores by LDCT result

- Comparison sample (REF) (n=383)
- Normal LDCT (n=189)
- Indeterminate nodule (n=105)
- Suspicious thoracic lesion (n=27)
- Incidental GP F/U (n=250)
- Incidental hospital F/U (n=34)
Mean depression scores by LDCT result

- Comparison sample (REF) (n=383)
- Normal LDCT (n=189)
- Indeterminate nodule (n=105)
- Suspicious thoracic lesion (n=27)
- Incidental GP F/U (n=250)
- Incidental hospital F/U (n=34)
Summary and conclusions

- Statistically higher scores on negative psychological outcomes
  - Overall
  - For abnormal LDCT results
  - On anxiety and cancer worry

- But no evidence for clinically significant adverse impact

- Important to monitor in any future screening services
  - Single screen design, response bias, small LDCT result subgroups

- Evidence-based communication strategies important for minimising any potential for distress
Acknowledgements

**Funding**
PEOPLE: Roy Castle Lung Cancer Foundation
LSUT: NAEDI/Cancer Research UK
Smoking Toolkit Study: Cancer Research UK

**Behavioural Science**
Prof Jane Wardle (1950-2015)
Prof Jo Waller
Dr Sonja Kummer
Dr Andy McEwen
Dr Jamie Brown

**Respiratory Medicine**
Prof Sam Janes
Dr Mamta Ruparel
Dr Jennifer Dickson
Dr Angshu Bhowmik
Prof David Baldwin
Dr Neal Navani

**Epidemiology/Statistics**
Prof Stephen Duffy

**Primary Care**
Dr Karen Sennett

**LSUT Radiology**
Dr Penny Shaw, Dr Stephen Burke,
Dr Magali Taylor, Dr Asia Ahmed,
Dr Nicholas Woznitza

**LSUT Research Nurses/Trial Practitioners**
Claire Whipp, Krishna Patel, Amy Smith,
Gemma Hector, Adelaide Austin,
Juancho Salgado, Nilabhra Dutta,
Derya Ovayolu

**Patient Representative**
Judy Cass