The National Optimal Lung Cancer Pathway

Sadia Anwar
Overview

- State of lung cancer
- NOLCP - pathways
- Rationale/ evidence
- Implementation NUH
- Primary care
Incidence of common cancers UK, 2014

- Breast
- Prostate
- Lung
- Bowel
- Melanoma Skin Cancer
- Non-Hodgkin Lymphoma
- Kidney
- Head and Neck
- Brain, other CNS and Intracranial
- Bladder
- Pancreas
- Leukaemia
- Uterus
- Oesophagus
- Ovary
- Stomach
- Liver
- Myeloma
- Thyroid
- Cervix
- Other Sites

Number of Cases

CRUK
Mortality from common cancers UK, 2014

The diagram shows the number of deaths from various cancers in the UK in 2014, differentiated by gender.

- **Lung**: The highest number of deaths in both males and females.
- **Bowel** and **Breast**: Follow lung as the second and third highest in males. In females, breast cancer has the second highest number of deaths.
- **Prostate** and **Pancreas**: High numbers of deaths in males, with prostate having more than pancreas.
- **Oesophagus**, **Bladder**, **Brain, other CNS and Intracranial**, **Liver**, **Non-Hodgkin Lymphoma**, **Leukaemia**, **Stomach**, **Kidney**, **Ovary**, **Head and Neck**, **Myeloma**, **Mesothelioma**, **Melanoma Skin Cancer**, and **Uterus**: Various numbers of deaths, with some cancers having higher numbers in males, while others have higher numbers in females.
- **Cervix** and **Other Sites**: The lowest numbers of deaths in both males and females.
1 year Survival E&W 2010-2011

- Testis: 99%
- Malignant Melaonoma: 97%
- Breast: 96%
- Prostate: 94%
- Hodgkin Lymphoma: 91%
- Uterus: 90%
- Larynx: 86%
- Cervix: 83%
- NHL: 80%
- Myeloma: 77%
- Bowel: 76%
- Bladder: 72%
- Kidney: 72%
- Ovary: 72%
- Leukaemia: 69%
- Oesophagus: 42%
- Stomach: 42%
- Brain: 40%
- Lung: 32%
- Pancreas: 21%

CRUK
ICBP: International comparison of relative survival

Coleman et al Lancet 2011; 377: 127–38
ICBP: Comparison of stage distribution

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<th>Stage 2 %</th>
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Walters et al 2013
Performance status at presentation
Unwarranted variation

— wide variation in access to diagnostics and treatment

— variation in pathways, treatment rates, outcomes not explained by case mix
Surgery and Outcome in the UK

* For age, sex, stage, PS, deprivation, comorbidity

Surgery for Non-small cell

Chemotherapy for small cell

NHS Trust first contact: adjusted OR

Rich AL et al Thorax. 66(12), 1078-84

Emergency presentation

- ICT aim: reduce emergency admission diagnoses
- 35% lung cancers diagnosed as EA
- short survival

- EM audit: most had primary care contact in preceding weeks; 50% of EA diagnosed referred in by primary care
- CADIAS study
Routes to diagnosis: 1 year survival (%)
Problems

- late diagnosis
- poor PS/ co morbidities
- unwarranted variations in care
- treatment
National Optimal Lung Cancer Pathway

- CEG for lung cancer, NHSE
- Whole of pathway commissioning guidance
- National pathway requested by NHSE clinical panel
- Wide consultation
- Jan 2016 v1
- Aug 2017 v2
Objectives

- Accelerate, standardise and optimise care
- Improve patient outcomes
- Reduce unwarranted variation
- Reduce emergency admission presentation
- Achieve national performance targets
Pathways developed

- Optimal pathway
- Straight to CT
- Triage
- Curative intent
- Direct to biopsy
Throughout pathway consider:
Supportive and palliative care
Smoking cessation
Research trials
Optimise PS
Early Pathway

Maximum times

High clinical suspicion?

Yes

No

Direct referral criteria (NICE)

Urgent or routine CXR

CXR suspicious of lung cancer?

Yes

CT same day / within 72 hours

CT abnormal?

Yes

No

TRIAGE* (1,2)

(by radiology or respiratory medicine according to local protocol) Lung cancer suspected?

Day -3-0

Day 0-3
Mid Pathway

Day 0-3

(by radiology or respiratory medicine according to local protocol) Lung cancer suspected?

Direct biopsy option

Yes

No

Day 1-5

Fast track lung cancer clinic. Meet LCNS
- Diagnostic process plan / diagnostic planning meeting prior to clinic
- Treatment of co-morbidity and palliation / treatment of symptoms

Suitable for potentially curative treatment?

Yes

No

Curative Intent Management pathway
- Test bundle requested at first OPA including at least: PET-CT and as required: detailed lung function and cardiac assessment / ECHO.
- Meet with LCNS and receive information.

Further investigation(s) indicated?

Yes

No

Will pathological diagnosis influence treatment and is potential treatment appropriate to patient's wishes?

Yes

No

Investigations to yield maximum diagnostic AND staging information with least harm. Results available within 3 days for subtype and 10 days for molecular markers.

Clinical diagnosis or patient preference means biopsy not required.

Day 21

Full MDT discussion of treatment options
**Triage**

**Triage**
By radiologist or chest physician  CT + clinical info
Lung cancer likely?

Yes | No
--- | ---

- **Fast track lung cancer clinic.**
  Meet LCNS.
  Diagnostic process plan / diagnostic planning meeting prior to clinic.
  Treatment of co-morbidity and palliation / treatment of symptoms.

- **Non lung cancer pathway**

  Condition requiring urgent appointment including other cancer?

  Yes | No
  --- | ---

  - **Lung cancer pathway**
  - Refer for urgent clinic, admission or other fast track cancer referral

  - **Non urgent condition?**

    Yes | No
    --- | ---

    - Manage in primary care or non urgent referral. Management of pulmonary nodules is included here.
    - **GP manages patient**
Fast track lung cancer clinic ± diagnostic planning meeting / Diagnostic MDT
Meet lung cancer nurse specialist

Stage: Potentially T1-3 N0-2 M0 (N2 non-bulky; i.e. <3cm)
Or locally advanced; potential for radical RT?
May include selected patients with oligometastatic disease

Yes

Potentially fit enough for treatment with curative intent and willing to consider this?
(Ensure low threshold for proceeding with work up for curative treatment)

No

Patients with borderline fitness add:
• Preoperative rehabilitation
• Shuttle walk test / CPEX / ECHO
• Perfusion scan if required
• Early cardiology assessment for cardiac co-morbidity

Simultaneous fast track:

No

All patients:
• Medical optimisation (incl. smoking cessation)
  • PET-CT (within 5 days)
  • Diagnostic and staging tests
  • Spirometry ± TLCO
• Complete all tests within 14 days
• Alert surgeons / clinical oncology

Yes

Usual diagnosis and staging pathway

Full MDT Discussion of treatment options or further investigation
Mid pathway

Suitable for potentially curative treatment?

Yes

*Curative Intent Management pathway*

Test bundle requested at first OPA including **at least**: PET-CT and **as required**: detailed lung function and cardiac assessment / ECHO.

Meet with LCNS and receive information.

Further investigation(s) indicated?

Yes

Investigations to yield maximum diagnostic AND staging information with least harm. Results available within 3 days for subtype and 10 days for molecular markers.

No

Will pathological diagnosis influence treatment and is potential treatment appropriate to patient’s wishes?

Yes

No

Further management of CT findings by primary care or secondary care (see separate detailed algorithm)

Clinical diagnosis or patient preference means biopsy not required.

Full MDT discussion of treatment options
First treatment pathway

Day 21

Day 28

Day 33

Day 42

Day 49

Full MDT discussion of treatment options

Further investigation(s)?

No

Yes

Further discussion needed?

No

Follow-up Lung Cancer Clinic
Cancer confirmed and treatment options discussed. Research trial considered. LCNS present

No

Yes

OPA with treating specialist (within 3 working days)

Further investigation(s)?

No

First Treatment

- Specialist supportive/palliative care
- Other palliative treatments
- Chemotherapy
- Radiotherapy
- Surgery

Maximum times

*Refer to separate numbered pathway detail

# Low threshold for curative intent pathway; may discuss with wider MDT if unsure

Some or all diagnosis and staging tests may be in a tertiary centre

+ all patients with stage IV cancer should be routinely offered an assessment

£ Reflects the aim for reduced time to treatment; the national target remains 62 days
Requirements

- Straight to CT
- Test bundles
- Rapid turnaround times
- Protocols
- Flexibility of scheduling
- Capacity
Rationale: speed

- Comply with current and future CWT
  - 62d nationally 75% v 85%
  - NHS Cancer plan 2000
  - Independent Cancer Taskforce:
    - diagnosis 50% by 2 weeks, 95% by 4 weeks

- Patient anxiety and experience (nb speed v quality)

- Evidence that faster pathways result in better outcomes
  - RCT and non RCT
EBUS as first test v conventional: overall survival

The novel use of fast track CT to select patients for lung cancer clinics: effect on clinic efficiency, waiting times, and patient satisfaction.

Lal A¹, Phillips S, Russell C, Woolhouse L.
Rationale: PS

- Shorter time to diagnosis lengthens survival
  - lead time may improve treatment options if PS more favourable
- 26% patients report health decline awaiting OPA
- PS very strongly correlated with
  - Prognosis
  - Access to treatment (all modalities)
  - Response to treatment
### PS and mortality from surgery

<table>
<thead>
<tr>
<th>PS</th>
<th>Alive at 90 d</th>
<th>Dead at 90 d</th>
<th>Adj. OR*</th>
<th>95% CI</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>3422 (31.1)</td>
<td>132 (3.9)</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2815 (25.6)</td>
<td>177 (6.3)</td>
<td>1.38</td>
<td>1.09 to 1.75</td>
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<tr>
<td>2</td>
<td>465 (4.2)</td>
<td>51 (11.0)</td>
<td>2.40</td>
<td>1.68 to 3.41</td>
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<tr>
<td>3–4</td>
<td>108 (1.0)</td>
<td>20 (18.5)</td>
<td>4.08</td>
<td>2.37 to 7.02</td>
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<tr>
<td>Missing</td>
<td>4181 (38.0)</td>
<td>267 (6.4)</td>
<td>1.35</td>
<td>1.06 to 1.73</td>
</tr>
</tbody>
</table>

* Adjusted for age, sex, ethnicity, deprivation, comorbidity, FEV1, stage, laterality, histology and procedure type.

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**PS and age strongly influence mortality**

**Appropriate patient selection is key**

Powell HA et al Thorax 2013;68:826-834
Chest x-rays prior to a diagnosis of lung cancer in general practice
Rationale

✗ Cost effectiveness
  - reporting radiographers;
  - reduced interspecialty handover
  - reduced repeat scans and bx

✗ Stratified management
  ✗ avoid delays in complex pathways
  ✗ divert those without cancer appropriately
Local implementation: NUH progress

- Formal project structure
  - 5 workstreams (admin, tertiary, referral, diagnostic, treatment)
- Bids for Alliance Transformation funding
- Cross discipline and boundary engagement
- Themes from RCAs for breaches (multiple)

- Organisational
- Demand/ capacity
Local implementation: NUH progress

- Triage - 1/3 off pathway
- CXR to CT pathway - CCGs, GPs, rad, resp
- Same day US neck bx
- Ambulatory lung bx
- ACE programme: direct to CT for normal CXR
- Chest physician recruitment
- OP clinic management - in house

- Endoscopy
- Pathology - transport, test sequences, lab staff, business case
- Oncology: ACPs
- LCNS recruitment
- Surgery: clinic scheduling, admin
Challenges

- Advocacy:
  - Evidence based, guideline driven
  - Supported by CRUK, NHSE, Alliances, QA, RCF
- Cross specialty and cross boundary
- Data quality
- Resources
  - Cancer Alliances support ICT strategy
  - £160 million cancer transformation funds from NHSE to support taskforce recommendations
Shared learning

- Liverpool Heart and Chest: streamlined pathway
- Homerton reporting radiographers
- Leicester diagnostic MDT arrangements
- Kettering ambulatory care service
- Royal Free London ambulatory lung biopsy
- South Tyneside one stop clinic
- S Manchester - RAPID programme
Systematic and radical change
Multi faceted problem needs a multi faceted approach
Early diagnosis: the GP role

- Recognition
- Risk assessment
- Tests: CXR
- Referral
- ?screening
1.1.1 Refer people using a suspected cancer pathway referral (for an appointment within 2 weeks) for lung cancer if they:

- have chest X-ray findings that suggest lung cancer or
- are aged 40 and over with unexplained haemoptysis. [new 2015]
1.1.2 Offer an urgent chest X-ray in people aged ≥40 if they:

- have 2 or more of the following unexplained symptoms
- have ever smoked and have 1 or more of the following unexplained symptoms:

- cough
- fatigue
- shortness of breath
- chest pain
- weight loss
- appetite loss. [new 2015]

nb CXR - new COPD or heart failure
Estimated 700 additional cancers diagnosed, compared to the same period in the previous year.

Approximately 400 more people diagnosed at an earlier stage (23.4% to 26.1%)

Around 300 additional patients had surgery (13.6% to 16%)
1.1.3 Consider an urgent chest X-ray to assess for lung cancer in people aged ≥40 with any of the following:

- persistent or recurrent chest infection
- finger clubbing
- supraclavicular lymphadenopathy or persistent cervical lymphadenopathy
- chest signs consistent with lung cancer
- thrombocytosis. [new 2015]

nb CXR v low risk radiation
1.15.1 ...... Be aware of the possibility of false-negative results for chest X-rays .... [new 2015]

1.15.2 Consider a review for people with any symptom that is associated with an increased risk of cancer, but who do not meet the criteria for referral or other investigative action.

nb

Can be appropriate to refer with normal CXR
**Risk assessment**

- biggest risk factors: 
  - age 
  - smoking status 

- Decision support tools: 
  - Q cancer 
  - RAT 
  - Others 

- All have limitations 
- All adjuncts to GP assessment 
- Should not stop you referring

- symptoms - major? unexplained? refractory? 

- CXR 

- Refer or direct to CT if CXR normal and still high risk
Thank you
GP Direct to CT?

Patient presents to GP

Consider NICE referral criteria (including risk factors)

Persistent (>3 weeks) Dyspnoea or cough
Resolved minor haemoptysis
High risk of lung cancer
Unexplained change in symptoms in patients with chronic respiratory disease

Conventional route

CT Request by GP

CT report to GP; If cancer direct to 2WW

CXR

Normal

Other diagnosis

Suggestive of Lung cancer

GP 2WW referral
The future

- Low dose CT screening in high risk groups
- Awaiting Health Technology Assessment Review and
- The UK National Screening make the recommendation
- ?age 55-80, 3% risk, annual screen
CADIAS Study & SEA Audit
Standardised CXR rates by Practice

Median 3.8/100 population (IQR 2.7-5.3)

**Practice CXR requests and outcomes**

<table>
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<th>CXR quartile</th>
<th>Died within 90 days</th>
<th>95% CI</th>
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<tbody>
<tr>
<td>1-2.73/100 patients</td>
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<tr>
<td>2.74-3.84/100 patients</td>
<td>1.03</td>
<td>0.94-1.14</td>
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<td>3.85-5.33/100 patients</td>
<td>1.28</td>
<td>1.16-1.41</td>
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<tr>
<td>≥5.34/100 patients</td>
<td>1.41</td>
<td>1.29-1.55</td>
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• Possible ascertainment bias in the higher quartiles

Lung Cancer symptoms at referral

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<tr>
<th>Symptom</th>
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<th>Percent</th>
<th>No benign</th>
<th>Percent</th>
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<tr>
<td>No patients</td>
<td>650</td>
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<td>392</td>
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<tr>
<td>Cough</td>
<td>266</td>
<td>41</td>
<td>255</td>
<td>65</td>
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<tr>
<td>Dyspnoea</td>
<td>355</td>
<td>55</td>
<td>153</td>
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<td>Weight loss</td>
<td>308</td>
<td>47</td>
<td>100</td>
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<td>Haemoptysis</td>
<td>140</td>
<td>22</td>
<td>119</td>
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<td>Chest pain</td>
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<th>Cough</th>
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<th>Loss of weight</th>
<th>Loss of appetite</th>
<th>Thrombocytosis</th>
<th>Abnormal spirometry</th>
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<td>0.43</td>
<td>0.66</td>
<td>0.82</td>
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<td>PPVs as a single symptom</td>
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<td>0.95</td>
<td>1.8</td>
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<td>2.3</td>
<td>4.9</td>
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<td>1.2</td>
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<td>1.7</td>
<td>&gt;10</td>
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W Hamilton et al. Thorax 2005;60:1059-1065
Table 3. Adjusted hazard ratios (95% CI) for the final model for lung cancer for males and females in the derivation cohort

<table>
<thead>
<tr>
<th>Symptoms presented to GP</th>
<th>Adjusted hazard ratios for females (95% CI)</th>
<th>Adjusted hazard ratios for males (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current haemoptysis(^a)</td>
<td>23.9 [20.6 to 27.6]</td>
<td>21.5 [19.3 to 23.9]</td>
</tr>
<tr>
<td>Current appetite loss(^a)</td>
<td>4.14 [3.15 to 5.45]</td>
<td>4.71 [3.69 to 6.00]</td>
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<tr>
<td>Current weight loss(^a)</td>
<td>4.52 [3.80 to 5.38]</td>
<td>6.09 [5.33 to 6.95]</td>
</tr>
<tr>
<td>New onset cough in last 12 months(^a)</td>
<td>1.90 [1.56 to 2.32]</td>
<td>1.47 [1.23 to 1.75]</td>
</tr>
<tr>
<td>Recorded haemoglobin&lt;11 g/dl in last 12 months(^a)</td>
<td>1.75 [1.38 to 2.22]</td>
<td>1.89 [1.54 to 2.32]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Smoking status</th>
<th>Adjusted hazard ratios for females (95% CI)</th>
<th>Adjusted hazard ratios for males (95% CI)</th>
</tr>
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<tbody>
<tr>
<td>Non smoker</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Ex-smoker</td>
<td>3.37 [2.83 to 4.01]</td>
<td>2.13 [1.87 to 2.43]</td>
</tr>
<tr>
<td>Light smoker (&lt;10/day)</td>
<td>6.57 [5.37 to 8.03]</td>
<td>3.70 [3.20 to 4.27]</td>
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<tr>
<td>Moderate smoker (10–19/day)</td>
<td>8.32 [7.05 to 9.82]</td>
<td>4.95 [4.26 to 5.76]</td>
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<tr>
<td>Heavy smoker (≥20/day)</td>
<td>10.6 [8.49 to 13.2]</td>
<td>6.35 [5.43 to 7.43]</td>
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<tr>
<td>Prior diagnosis other cancer except lung cancer(^a)</td>
<td>1.33 [1.09 to 1.63]</td>
<td>NS</td>
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<tr>
<td>Chronic obstructive airways disease(^a)</td>
<td>1.82 [1.57 to 2.11]</td>
<td>1.51 [1.34 to 1.69]</td>
</tr>
<tr>
<td>Townsend deprivation score (5 unit increase)</td>
<td>1.17 [1.08 to 1.27]</td>
<td>1.17 [1.10 to 1.24]</td>
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</tbody>
</table>

Hippisley-Cox J and Coupland C. Br J Gen Pract 2011; DOI: 10.3399/bjgp11X606627
<table>
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<th>First author</th>
<th>Database</th>
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<td>Iyen-Omofoman 2013</td>
<td>THIN</td>
<td>12074</td>
<td>2000-2009</td>
<td>National</td>
</tr>
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Proposal – comparison of methods within ACE projects

Patient presents to GP

- NICE referral criteria
- Macmillan tool
- Qcancer risk (3%)
- Iyen-O risk (3%)
- New criteria

Manage on basis of the score tool with the highest risk / referral criteria met

- CT

Evaluate:
- Number of cancers
- Number referrals without cancer
- Number of cancers missed by each score
- Stage
- Number of emergency admissions

Other diagnosis

Suggestive of Lung cancer

GP Fast track referral