



AUDIT, RESEARCH AND GUIDELINE UPDATE

# Variation in lung cancer resources and workload: results from the first national lung cancer organisational audit

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## ABSTRACT

We report the findings of the first national lung cancer organisational audit. The results demonstrate marked variation in service provision and workload of some lung cancer specialists. For example, over half of the clinical nurse specialists report case volumes over recommended numbers. Some trusts have no access to key treatments such as video assisted thoracoscopy (VAT) lobectomy and stereotactic radiotherapy. Multivariate regression analysis demonstrated an association between higher surgical resection rates and the on-site availability of advanced staging and therapeutic modalities, for example, PET scan and VAT lobectomy. We conclude by making a number of recommendations to address the variation in lung cancer care.

treatment centres only, and were excluded from the service provision, diagnostic and staging analysis.

## Service provision

The median (range) average number of patients discussed per multidisciplinary team (MDT) meeting was 26 (5–88) with a median (range) number of new lung cancer diagnoses per trust per year of 189 (41–496). This equates to a median (range) annualised rate of 6 (2–18) cases discussed at MDT meeting for each new lung cancer diagnosis. Twenty-nine per cent of trusts have a separate diagnostic/planning MDT meeting. [Table 1](#) shows the number and workload of lung cancer specialists available to each trust.

## Diagnostic and staging services

All trusts have CT lung biopsy on site, and all, bar one, had bronchoscopy on site. Local anaesthetic thoracoscopy is available on site in 39% of trusts, and of the remainder, 20% have no access to this diagnostic modality. Molecular testing for epidermal growth factor receptor (EGFR) and anaplastic lymphoma kinase (ALK) are available on site in 27% of trusts and off site in all the remainder, bar one for ALK. Endobronchial ultrasound, mediastinoscopy and PET scanning are available on site in 44%, 18% and 27% of trusts, respectively, and the remainder all have access off site.

## Lung cancer treatments

Chemotherapy (including biological), conventional radiotherapy and thoracic surgery are available on site in 89%, 33% and 18% of trusts, respectively. The remainder all have access off site. Video-assisted thoracoscopic lobectomy, stereotactic radiotherapy and radiofrequency ablation are not available either on site or off site to 6%, 5% and 10% of trusts, respectively. Palliative care is available on site at all trusts.

A total of 16 centres (16%) completed the thoracic surgery section of the questionnaire. Median (range) reported number of thoracic surgeons, theatre sessions and high dependency unit beds were 2.25 (0.5–6.0), 5.5 (1–18) and 9 (0–24), respectively. Pulmonary rehabilitation was available on site in 75% of thoracic surgical centres.

A total of 79 trusts (78%) completed the chemotherapy section and 31 (31%) trusts completed the radiotherapy section. The median (range) number of chemotherapy nurses was 4 (0–17) and radiotherapy nurses 2 (0–6). Acute oncology services

## BACKGROUND

National Lung Cancer Audit (NLCA) reports consistently demonstrate variation in diagnostic pathways, treatment rates and outcomes that are not wholly explained by case-mix. One possible explanation is different access to lung cancer diagnostics, treatment options and specialists. This hypothesis is supported by previous reports, which have demonstrated that patients with lung cancer are 50% more likely to undergo surgical treatment if they are first seen in a thoracic surgical centre,<sup>1</sup> and twice as likely to receive active anticancer treatment if they are seen by a lung cancer clinical nurse specialist (CNS).<sup>2</sup> Little is known about provision of lung cancer services across the UK. To address this, we performed the first ever national lung cancer organisational audit in 2014.

## METHODS

An electronic survey was sent to all lung cancer lead clinicians in England and Wales in January 2014. The survey included seven questions on service provision, diagnostic and treatment services. There were a further three questions for treatment centres. To assess the feasibility of linking service provision to outcomes, the organisational audit results were linked to the trust-level NLCA results from 2011, and a multivariate logistic regression analysis was performed.

## RESULTS

A total of 128 records were submitted from 176 trusts. After removal of duplicate and empty records, 101 were analysed. Four trusts were



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**Table 1** The number and workload of lung cancer specialists available to each trust

	Number of whole time equivalents (WTE)	Workload—expressed as annual lung cancer diagnoses per WTE specialist
Clinical nurse specialists	2 (0.5–10)	90 (10–413)
Thoracic radiologists	2 (0–10)	90 (14–826)
Thoracic pathologists	1 (0–10)	131 (14–716)
Thoracic oncologists	2 (0.3–5)	93 (18–826)
Thoracic surgeons	1 (0–5)	135 (19–1820)

Data are presented as median (range).

were available at 92% of chemotherapy trusts and 96% of radiotherapy trusts.

### NLCA-linked data

Using a multivariate logistic regression analysis, the odds of having surgery were adjusted for age, performance status, FEV<sub>1</sub> (% predicted) and source of referral. The odds of having surgery within a trust is increased by the presence of on-site PET scan (OR 1.2, 95% CI 1.01 to 1.41), on-site stereotactic radiotherapy (OR 1.55, 95% CI 1.26 to 1.92) and on-site video assisted thoracoscopy (VAT) lobectomy (OR 1.28, 95% CI 1.06 to 1.56). There were no apparent associations between the availability of on-site pulmonary rehabilitation or cardiopulmonary exercise testing on likelihood of surgery—respective OR 1.17 (95% CI 0.93 to 1.46) and 1.05 (95% CI 0.89 to 1.25).

### DISCUSSION

Despite significant improvements in treatment rates and outcomes for lung cancer in the UK, the NLCA continues to show unexplained variation in care. This, the first national organisational audit, demonstrates similar variation in the availability and workload of lung cancer specialists, diagnostic and treatment services.

Although there remain areas of service provision for which there are no clearly defined standards or recommendations, the wide variation between trusts for some services is concerning. Key treatment decisions for patients with lung cancer are made at the MDT meeting, yet, nearly a quarter of trusts discuss 35 or more cases per meeting, which equates to only 7 min (or less) per patient, assuming a 4 h meeting. Maintaining focus for this length of time is challenging, and of major concern is that patients discussed towards the end of the meeting will not receive the same quality of discussion as those discussed towards the beginning. This can be addressed by having a separate diagnostic and treatment MDT, yet, only one-third of trusts do this.

The workload of key lung cancer MDT members varies greatly. The national lung cancer forum for nurses recommends that the caseload for a lung cancer CNS should be approximately 80 per annum;<sup>3</sup> however, our data show that over half of CNSs have a caseload of patients higher than this, with some up to five times greater. It has been recognised that the ratio of new lung cancer diagnoses in England to lung cancer CNSs is far greater than in most other cancers.<sup>4</sup> Given the crucial role the CNS plays in supporting patients at all points of the cancer pathway, but in particular when it comes to treatment decisions, this inequity needs to be urgently addressed.

The presence of basic investigations on site at all trusts is reassuring; however, there are unacceptable gaps in the availability (either on or off site) of key diagnostics such as local

anaesthetic thoracoscopy, plus wide variation in workload of diagnostic specialists, including radiologists and pathologists. With the advent of targeted lung cancer therapy necessitating optimal tissue sampling and expert interpretation, all lung cancer MDTs should have access to the full range of diagnostic tests and prompt thoracic pathologist input. With short diagnostic pathways being closely linked to increased treatment rates, unavailability of diagnostic modalities and high specialist workloads may negatively impact on diagnostic time and subsequent treatment rates.

The majority of trusts have on-site chemotherapy services, and the availability of radiotherapy and surgery in this audit sample is representative of the national provision of these services. It is concerning that a proportion of trusts do not have any access to new treatment modalities such as VAT lobectomy and stereotactic radiotherapy. Given that 25% of patients with lung cancer are now over the age of 80,<sup>2</sup> it is crucial that less invasive treatment modalities are available to all patients. Similarly, there should be equitable access to oncologists and thoracic surgeons, yet, our data suggest the provision of these specialists varies widely, and does not correlate with the number of new lung cancer cases.

We have demonstrated that it is feasible to link this organisational audit data to trust-level outcomes from the NLCA, although the moderate response rate for the current study somewhat limits the interpretation of these results. The association of higher surgical resection rates with on-site access to the most up-to-date staging and treatment modalities is of interest, and supports previous findings that patients seen in tertiary surgical centres are more likely to receive surgery. Further work is required on a more complete dataset to confirm these findings and to assess associations between other aspects of service provision and outcomes.

In summary, these data provide a moderately representative snapshot of the provision of lung cancer services in England and Wales and begin to explore how variation in service provision impacts on patient outcomes. While it is reassuring that the majority of lung cancer MDTs have access to all the basic diagnostic, staging and treatment modalities, the extreme variation in workload of key members of the MDT, together with gaps in the availability of key treatment modalities is concerning. We make a number of recommendations to address this (see below), and encourage the commissioners and providers of lung cancer services to adopt these recommendations. We plan to repeat the organisational audit in 2 years with more detailed links to process, outcomes and patient experience.

### RECOMMENDATIONS

1. Maximum of 30 patients discussed per MDT meeting.
2. Diagnostic and non-cancer cases discussed at a separate MDT meeting.
3. Lung CNS's workload should not exceed 80 new cases per whole time equivalent per year.
4. All lung cancer MDTs should have access to all diagnostic tests and prompt thoracic radiology and pathology input.
5. All treatment modalities, including VAT lobectomy and stereotactic radiotherapy, should be available to all patients.
6. All trusts should participate in the next round of the national lung cancer organisational audit.

**Contributors** IW, PB, MDP and RH designed the audit. EOD, IW and KC analysed the results and prepared the manuscript. All authors contributed to the interpretation of the results for the final manuscript.

**Competing interests** None declared.

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THORAX

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