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Are working practices of lung cancer nurse specialists associated with variation in peoples' receipt of anticancer therapy?

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ABSTRACT

Objectives: Treatment choices for people with lung cancer may be influenced by contact and engagement with lung cancer nurse specialists (LCNSs). We investigated how service factors, LCNS workload, and LCNS working practices may influence the receipt of anticancer treatment.

Materials and methods: English National Lung Cancer Audit data and inpatient Hospital Episode Statistics for 109,079 people with lung cancer surviving 30 days from diagnosis were linked along with LCNS workforce census data and a bespoke nationwide LCNS survey. Multinomial logistic regression was used to determine adjusted relative risk ratios (RRRs) for receipt of anticancer therapies associated with LCNS assessment, LCNS workforce composition, caseload, LCNS reported working practices, treatment facilities at the patients' attending hospitals, and the size of the lung cancer service.

Results: Assessment by an LCNS was the strongest independent predictor for receipt of anticancer therapy, with early LCNS assessments being particularly associated with greater receipt of surgery (RRR 1.85, 95%CI 1.63–2.11). For people we considered clinically suitable for surgery, receipt was 55%. Large LCNS caseloads were associated with decreased receipt of surgery among suitable patients (RRR 0.71, 95%CI 0.51–0.97) for caseloads > 250 compared to ≤150. Reported LCNS working practices were associated with receipt of surgery, particularly provision of psychological support (RRR 1.60, 95%CI 1.02–2.51) and social support (RRR 1.56, 95%CI 1.07–2.28).

Conclusion: LCNS assessment, workload, and working practices are associated with the likelihood of patients receiving anticancer therapy. Enabling and supporting LCNSs to undertake key case management interventions offers an opportunity to improve treatment uptake and reduce the apparent gap in receipt of surgery for those suitable.

1. Introduction

A diagnosis of lung cancer is often associated with a poor prognosis because of its frequent identification at an advanced disease stage and the rapid decline in performance status; as such it has the highest mortality of all cancers [1,2]. Improvement in survival in the UK has been greater than in other high-income countries globally [3], although relative survival is reported to be lower than in other parts of Europe [4].

Increased uptake of treatment is crucial to drive improvements in lung cancer survival. The 2016 National Lung Cancer Audit (NLCA) reported improvements in the proportions of people with non-small-cell lung cancer (NSCLC) undergoing surgery and those with small-cell lung cancer (SCLC) receiving chemotherapy compared with those in previous years, but concluded that there was an unexplained variation in surgical resection rates; the majority of hospital providers did not meet a 60% target for the proportion of people receiving anticancer treatment (in the form of surgery, chemotherapy or radiotherapy) [5].

Previous studies have identified specific hospital-provider and patient factors associated with inequalities in access and uptake of lung cancer treatment across England [6–10], with similar characteristics shown to have an influence internationally [11]. We have previously

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shown that such factors are also associated with a patient's likelihood of assessment by a lung cancer nurse specialist (LCNS) [12]. Guidelines from the National Institute for Health and Care Excellence (NICE) recommend that patients have direct access to an LCNS for support throughout the cancer pathway [13]; NLCA annual reports show improvement over time in the proportion of patients seen by a nurse specialist, although recommended targets are not always met [14,15]. LCNSs have a crucial role in an individual's cancer journey as experienced professionals who case manage care, meet information needs, manage symptom control issues, support patients and families in decision-making and readiness for treatment, and advocate patient wishes within multidisciplinary settings [16,17]. However, whether these working practices are directly linked with treatment uptake has not been assessed.

To understand how contact with an LCNS may influence a person's decision for anticancer therapy, we assessed whether factors affecting LCNS workload are associated with receipt in an English lung cancer population and, in particular, those who could be expected to undergo surgical resection.

2. Materials and methods

NLCA data capturing cases of lung cancer diagnosed at hospital providers across the UK were linked with the 2011 National Cancer Action Team (NCAT) census of specialist cancer nurse workforces in England by hospital provider (National Health Service trust) code [18], and hospital episode statistics (HES) inpatient data according to NHS number provided the official record of admission episodes to NHS hospital trusts. We included NLCA patients from 146 English hospital providers who were first seen between January 2007 and December 2011 at a service with NCAT workforce data verified by regional cancer network (Appendix A). People diagnosed through death certificates only and those with mesothelioma or carcinoid were not included. We also excluded people who died within 30 days of their diagnosis as it is likely they were at a very advanced stage upon diagnosis and therefore did not have an opportunity to commence anticancer therapy or be assessed by an LCNS.

A combination of the NLCA and HES—where dates of surgery, chemotherapy and radiotherapy are recorded [19]—was used to assign people to one of four exclusive categories: surgery with or without chemotherapy or radiotherapy, chemotherapy with or without radiotherapy, radiotherapy alone, or no anticancer therapies. All chemotherapy and radiotherapy treatments were then combined for subgroup analysis. Whether radiotherapy was of curative or palliative intent was not distinguished because detail to definitively determine this was not available.

NLCA and HES data classified specialist anticancer treatment facilities available at each hospital provider: thoracic surgery facilities (surgical), chemotherapy available without surgery (chemotherapy), or neither treatment option onsite (no specialty). A hospital provider with a specialty in chemotherapy was defined by at least 75% of patients receiving an anticancer drug at a service where they were also first seen, as previously described by Powell et al. [8]. NLCA data were used to determine the annual number of new lung cancer patients seen by a service in each year of the study, with an average providing a measure of service size.

Using NCAT national census information on salary bands, we categorized the composition of LCNS workforces as Band 7 only, Bands 6–7 or Band 8 included. Each hospital provider's LCNS caseload was calculated as the total number of patients first seen there divided between the LCNS whole-time equivalent (WTE) workforce, assuming people followed the lung cancer pathway at that same site [12]. Evidence about whether the patient was assessed by an LCNS was obtained from NLCA data, as was the timing of assessment relative to diagnosis. Where no information was entered, patients were separately categorized as missing and were included in the analyses.

3. Statistical analysis

There were three or more possibilities for the receipt of treatment. We performed multinomial logistic regression using Stata (SE15) to calculate the relative risk ratio (RRR) of receipt of specified therapies relative to a base group of no anticancer therapy. The RRR is sometimes interpreted as a conditional odds ratio or called a multinomial odds ratio. Cluster robust standard errors were derived to calculate confidence intervals for RRRs using regional cancer networks to account for hierarchical groupings of observations. Exposure variables were individual patient-recorded LCNS assessment and its timing, salary band composition of the LCNS workforce, the average LCNS caseload at the service, treatment facilities available, and the annual service size. Univariate analyses were performed, and models were mutually adjusted for exposures as well as patient co-morbidity defined using HES IP ICD-10 codes [20], age at diagnosis, sex, socioeconomic quintile (based on income deprivation domain for the national population), performance status, and cancer stage as recorded in the NLCA.

As receipt of treatment is influenced by a number of factors that we were unable to control for, we conducted a subgroup analysis restricted to people who we deemed were suitable for surgery based on clinical guidelines and author expertise (RBH, PB) and the clinical data available to us. Suitability for surgery was defined as a recorded performance status of 0–1 (World Health Organization, WHO) and NSCLC stages I, II, IIIA (Union for International Cancer Control versions 6 and 7) [20].

For people who were suitable for surgery, receipt of therapy was also assessed according to LCNS-reported experiences of working practice by using responses from a bespoke e-survey disseminated to all LCNSs in the UK's National Lung Cancer Forum for Nurses (NLCFN) (Appendix B). A total of 230 survey responses from 105 hospital providers were collected; the response rate was estimated to be 76% of WTE LCNS positions in England [21], with a completion rate for questions presented here ranging from 83% to 100%. Responses were linked to the combined dataset based on the NHS trust code where the LCNS worked. Routine provision of key LCNS interventions was defined as offered to more than 70% of patients along the clinical pathway from pre-diagnosis up to and including the point of treatment. As the role of the LCNS can vary widely, affirmative responses were aggregated according to hospital provider to present the perspective of at least one LCNS and an indication of key interventions available to the patient population served.

4. Results

A total of 109,079 patients in our study population were diagnosed with lung cancer between 2007 and 2011 and survived 30 days; of these, 31.8% did not receive anticancer therapy, 33.9% received chemotherapy, 18.3% received radiotherapy, and 16.1% received surgery (Table 1).

4.1. LCNS workforce factors

Assessment by an LCNS was associated with increased RRR in receipt of each therapy group compared to not being assessed (surgery RRR 1.98, chemotherapy RRR 2.18, radiotherapy RRR 1.84 after adjustments). LCNS assessment before/at diagnosis also resulted in an increased RRR in each therapy group compared to assessment after diagnosis, particularly for surgery (RRR 1.85 95%CI 1.63–2.11). Where workforces included a Band-8 LCNS, there was an associated 27% reduction in RRR for receipt of chemotherapy (RRR 0.73, 95%CI 0.54–0.97), whilst average caseloads of > 250 patients per LCNS were associated with a 26% increase in the RRR for receipt of radiotherapy (RRR 1.26, 95%CI 1.00–1.59).