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Original Research

High lung cancer surgical procedure volume is associated with shorter length of stay and lower risks of re-admission and death: National cohort analysis in England

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Abstract It is debated whether treating cancer patients in high-volume surgical centres can lead to improvement in outcomes, such as shorter length of hospital stay, decreased frequency and severity of post-operative complications, decreased re-admission, and decreased mortality.

The dataset for this analysis was based on cancer registration and hospital discharge data and comprised information on 15,738 non-small-cell lung cancer patients resident and diagnosed in England in 2006–2010 and treated by surgical resection. The number of lung cancer resections was computed for each hospital in each calendar year, and patients were assigned to a hospital volume quintile on the basis of the volume of their hospital.

Hospitals with large lung cancer surgical resection volumes were less restrictive in their selection of patients for surgical management and provided a higher resection rate to their geographical population. Higher volume hospitals had shorter length of stay and the odds of re-admission were 15% lower in the highest hospital volume quintile compared with the lowest quintile. Mortality risks were 1% after 30 d and 3% after 90 d. Patients from hospitals in the highest volume quintile had about half the odds of death within 30 d than patients from the lowest quintile.

Variations in outcomes were generally small, but in the same direction, with consistently better outcomes in the larger hospitals. This gives support to the ongoing trend towards centralisation of clinical services, but service re-organisation needs to take account of not only the size of hospitals but also referral routes and patient access.

1. Introduction

Lung cancer is one of the most frequent types of cancer and the leading cause of cancer death globally [1,2]. There has been notable progress in lung cancer prevention, as evidenced by declining incidence rates in males [3], and treatment for lung cancer has become more active and more effective [4–6]. Surgical resection remains the preferred treatment option for medically fit patients with early-stage disease [7–10].

Lung cancer surgery is highly specialised and increasingly centralised [5]. There is evidence that patient survival is better when surgical care is provided by a multidisciplinary team in hospitals with high-volume practices, and analysis of surgical data from England in patients diagnosed in 2004–2008 showed lower death rates in patients operated in large-volume hospitals [11]. It remains to be addressed whether treating patients in high-volume surgical centres can lead to improvement in other relevant outcomes, such as shorter length of hospital stay, decreased frequency and severity of post-operative complications, decreased re-admission to hospital, and improved patient experience and satisfaction. The present study extends earlier work on patients undergoing lung cancer surgery in England to examine other outcomes, specifically length of stay in hospital after lung cancer resection, and risks of re-admission and death within 30 and 90 d of surgery.

2. Methods

2.1. Study population and main predictor variables

The principles of data extraction and linkages were as described previously [9,11]. The dataset for the analysis comprised information on 15,738 non-small-cell lung cancer patients who were resident and diagnosed in England in 2006–2010 and treated by potentially curative surgical resection as part of their initial care. The majority of resections were lobectomy (85%), 10% were pneumonectomy and 5% were other procedures. This is a complete and population-based ascertainment of surgically treated lung cancer in the country. The number of lung cancer resections was computed for each hospital in each calendar year, and patients were assigned to a hospital volume quintile on the basis of the volume of their hospital in the year of diagnosis.

The geographical resection rate was computed as the resected proportion of all non-small-cell lung cancer patients in each of 152 geographical primary care trust areas in the period 2006–2010 [9].

2.2. Covariates

Sex and age were analysed as categorical variables (age categorised in 5-year groups). Socio-economic status was characterised by the quintile of the income domain