



Lung Cancer Consultant Outcomes Publication

Introduction

This report describes the outcomes of individual consultant thoracic and cardiothoracic surgeons who carry out surgery for lung cancer. It has been prepared from data collected by the *National Lung Cancer Audit (NLCA)* and the *Society for Cardiothoracic Surgery for Great Britain and Ireland (SCTS)*. It is in response to an initiative of *NHS England (Everyone Counts: Planning for Patients)* to create greater transparency and more choice for patients and commissioners.

This is the first time individual outcomes for consultants have been reported for lung cancer treatment. Although previous NLCA reports have focused on surgical resection rates for acute NHS Trusts and for Strategic Clinical Networks it has never reported individual activity of surgeons or their specific contribution to lung cancer care.

The primary outcome measure for surgeons in this publication is resection rate for lung cancer. This figure is the proportion of patients undergoing surgery expressed as a percentage of the total number of patients who were diagnosed with lung cancer in 2012.

Surgeons are core members of lung cancer *Multidisciplinary Teams (MDTs)* that are the focus of care for patients who have suspected or proven lung cancer. Along with the other members of the team they have a direct influence on whether or not surgery should be offered to patients who develop lung cancer. Previous NLCA and SCTS reports have emphasized the importance of the resection rate in improving cure rates for lung cancer, as well as highlighting significant variations throughout the country.

In addition to resection rates this report also describes the activity of individual surgeons and the hospitals in which they carry out lung cancer surgery along with the 30-day and 90-day mortality. These mortality figures have been produced for the hospitals although not for individual surgeons. The reason for this is because of the significant concern that the lung cancer resection rate for the United Kingdom is low compared to other countries in Europe and that increasing the resection rate for the country would mean surgeons having to operate on patients at higher risk of death following surgery. We were concerned that focusing on mortality as an outcome for surgeons (as has been the primary outcome for consultants in all other surgical specialties) would lead to a reduction in the resection rate and a reduction in the numbers of cures for patients suffering from lung cancer. Although this concern could be mitigated by a robust risk stratification model for lung cancer surgery, such a model has not as yet been developed, nor is the relevant data available in either the NLCA or SCTS audits for individual patients. This is why resection rate rather than operative mortality has been the focus for this year's publication of consultant outcomes for lung cancer surgery.

The national average 30-day mortality after lung cancer surgery is 2.2% in 2012. This means that about 1 out of every 45 patients undergoing surgery for lung cancer did not survive beyond 30 days after their operation. Within the 28 hospitals providing thoracic surgery this figure varied from 0% to 6.5%. The corresponding figures for the 90-day mortality is 4.5% for the national average with a range of between 1.6% and 11.3%

Organisation of Lung Cancer Services

As with all forms of cancer treated in the United Kingdom, patients developing lung cancer are managed by MDTs. Because of the frequency of lung cancer (in the order of 31,000 new diagnoses per year in England)



every acute hospital is required to have a lung cancer service. Respiratory physicians lead these services, with the assistance of the rest of the MDT which includes thoracic surgeons as core members.

Because of the complexity of the surgery and after-care required for patients, thoracic surgery is only carried out in specialist thoracic and cardiothoracic Surgical Units. In 2012 there were 28 such hospitals in England. The surgeons employed by these Units are required to attend all the lung cancer MDTs throughout the country either in person by traveling to the hospitals or via a video-link.

Cancer care has also been organized previously within Cancer Networks of which there were 28 in England, although they have now been replaced by Strategic Clinical Networks. The Networks usually have only one surgical service within their boundaries which provides care for the Network lung cancer MDTs, such that most MDTs access only a single surgical service for their patients. This is the case for most areas of the country which are geographically defined from one another such as Merseyside and Manchester. The service is more complex in the Greater London area where there are several surgical services that in many cases provide a dual input to lung cancer MDTs. This variability in the organisation of services is important when understanding variations in resection rates between MDTs.

Lung Cancer Treatment

It is a sad fact that more than half of patients who develop lung cancer have their disease in several sites throughout their body and are frequently very ill when their diagnosis is made. These patients can only be rarely be helped by surgery which is why the lung cancer resection rate is as low as it is. Nevertheless there is a large group of patients for whom surgery may or may not be beneficial or safe in terms of either the stage of their tumour or their fitness for surgery. They are therefore treated in other ways such as with chemotherapy or radiotherapy although in only a small proportion of cases are such treatments curative. It is therefore imperative that as many patients as possible who develop lung cancer have access to surgery for their disease.

In support of this initiative recent evidence has shown that those parts of the country which have the highest resection rates for lung cancer have the highest cure rates for the disease. This is despite the fact that operative mortality outcomes for hospitals and individual surgeons will necessarily be slightly higher when resection rates are higher for lung cancer, because of the need to offer surgery to patients who are older and sicker and therefore at higher risk of complications after surgery. This rather alarming concern is mitigated by the simple fact that with higher resection rates more patients with lung cancer are cured of their disease.

Maintaining access to surgery is not just the thoracic surgeon's responsibility. It is the responsibility of all the members of the lung cancer MDT (especially respiratory physicians, oncologists, lung cancer nurses and palliative care specialists) and the Surgical Units where the surgery is carried out.

Lung Cancer Surgery and Resection Rates

This report frequently refers to lung cancer resection rates, which is calculated as follows:-

$$\text{Resection rate} = \frac{\text{Number of patients undergoing surgery}}{\text{Total number of patients with lung cancer}} \times 100$$



The rate always describes a specific time period, and for this report includes all patients who underwent surgery in the 12-month period between 1st January and 31st December 2012.

When calculating a resection rate the number of patients undergoing lung cancer surgery (the numerator in the equation above) encompasses all operations where a section or the whole of a lung is removed to treat a cancer originating in the lung with the intention of providing a cure. It excludes surgery carried out only to make a diagnosis, and those patients in whom a primary lung cancer is not the reason for the operation (e.g. secondary lung tumours or non-malignant lung conditions). The number of such operations carried out by surgeons and the hospitals in which they work is a figure that is relatively easy to obtain.

In contrast the figure for the denominator in the equation to calculate resection rates, i.e. the total number of patients presenting with lung cancer in the time period to be specified is much more difficult to obtain accurately. In comparison to other cancers (such as breast cancer where the diagnosis can be made by inserting a needle in to a breast lump, usually carried out in the first clinic the patient attends) lung cancer is a more difficult disease to diagnose with certainty. Patients usually go through a series of increasingly complex tests to gain an accurate diagnosis of lung cancer. In some situations despite the tests giving strong circumstantial evidence of a cancer being present it is only after a part of the lung that is suspected as harboring a cancer has been removed with an operation that a cancer is shown with certainty.

For those patients thought to be suffering from lung cancer who don't have an operation the diagnosis may be made on the basis of the appearances of CT and PET scans. In these situations a biopsy that would give a definite histological diagnosis of cancer has not been obtained. These patients are referred to as having a "clinical" diagnosis of lung cancer. The reasons for a biopsy not being obtained when managing lung cancer patients are multifactorial and are beyond the scope of this report but clearly illustrates the difficulty in the accurate calculation of lung cancer resection rates. This is in contrast to the usual method of diagnosing the vast majority of other cancers such as those originating in the breast or colon/rectum where a biopsy of the tumour for pathological analysis is much easier to obtain.

Thus there are two groups of patients with lung cancer that are important for discussions of lung cancer resection rates – those in whom a biopsy has shown a cancer and those in whom the diagnosis has been made without a biopsy. These groups are referred to respectively as "**histological cancers**" and "**clinical cancers**". Many of the latter group are very ill and may even have died by the time the patient's scans are discussed at the lung cancer MDT. Nevertheless they are still included in descriptions of the total number of patients presenting with lung cancers for hospitals and for the calculation of resection rates.

There is a third smaller group of patients which are important to an understanding of lung cancer resection rates, namely those who have developed a "small-cell" lung cancer. This disease is a more aggressive form of lung cancer and is only very rarely suitable for surgical treatment. These patients have therefore not been included in the data presented in this report, which refers to the much larger group of patients who have all the other forms of lung cancer. These cancers are grouped together as "Non-Small Cell Lung Cancers" or NSCLC.

The national average resection rate for patients diagnosed with lung cancer in 2012 is 18.4% for all NSCLC's cancers and 24.6% for patients with a histological diagnosis of NSCLC. Within the 28 hospitals providing thoracic surgery this figure ranges from 14.2% to 34.4% for histologically-confirmed lung cancer and 11.2% to 26.8% for all NSCLC's cancers. The range of resection rates for the 152 individual lung cancer MDT's is much higher and varies from 10.1% to 41.4% and 7.8% to 24.6% for the same cohorts.



Variations in Lung Cancer Resection Rates

It can be seen within the data that there are wide variations in resection rates both throughout the country, and within catchment areas served by the surgical Units. There are many reasons for these variations, examples of which are as follows:-

1. The efficiency of the organisation of diagnostic tests within the lung cancer pathway to enable an appropriate decision to be made regarding treatment with surgery. A patient approaching lung cancer surgery will always have had CT and PET scans and tests of pulmonary reserve. In many cases additional tests such as further scans, invasive tests such as endobronchial ultrasound, and more detailed tests of fitness will be necessary. These tests usually require several visits to hospital for the patient and several discussions of the results at the lung cancer MDTs. The best lung cancer services are those that organize this complex pathway as efficiently as possible. These services have a head start in making sure as many patients as possible are considered for surgical treatment.
2. Ease of access to thoracic surgery, in terms of seeing a thoracic surgeon for a consultation in the out-patient setting or the availability of theatre/recovery space in the specialist hospitals for patients thought to be suitable for surgery. As a result of the efforts of the SCTS and colleagues working within the NLCA there has been a significant expansion in the number of surgeons providing thoracic surgery and lung cancer surgical services within Surgical Units. Between 2005 and the present day the numbers of lung cancer operations carried out in the United Kingdom has doubled.
3. There is a variation in the understanding and belief as to the advantages of lung cancer surgery within the wider lung cancer team, especially thoracic surgeons, respiratory physicians and oncologists. As a result there are variations in the willingness to push for patients with borderline fitness and/or more advanced tumours to be considered for surgery.
4. Random variations in the stage of the cancers and fitness of the patients for surgery within short time-periods in relatively small groups of patients presenting to MDTs. This phenomenon applies especially to the smaller MDTs where a relatively small change in the profile of the patients will produce an apparently significant change in the numbers going forward for surgery, regardless of the quality of the service as a whole.

Thus it is not merely the individual thoracic surgeon who is responsible for the resection rate of a hospital and lung cancer MDTs, just as operative mortality outcomes are not entirely due to the skill or otherwise of surgeons. This has been discussed in the previous outcome publications of all other surgical specialty reports for individual surgeons. The same multidisciplinary approach applies to selecting patients for lung cancer surgery and their in-patient care, when discussing variations in operative mortality and resection rates as outcome measures for lung cancer teams.

The National Lung Cancer Audit (NLCA)

Often known as LUCADA (which more accurately refers to the LUng Cancer DATabase of the audit) data collection for the NLCA was initiated in 2004 under the auspices of the Royal College of Physicians of England. The aim was to look at all aspects of the disease initially in England, although it now provides information for lung cancer diagnosis and treatment throughout all parts of the United Kingdom. It is the most comprehensive audit of lung cancer anywhere in the world and it is estimated that over 98% of patients with lung cancer in England are captured by the audit process for analysis.

Although over recent years the NLCA has focused on the surgical management of lung cancer, and in



particular variations in the resection rate the audit was not designed to look at management of patients by individual surgeons, or indeed any individual clinicians. This information which has now become required for the current report has been made available by a joint initiative between colleagues working within the NLCA and the SCTS. The two organisations will continue to work closely together to describe outcomes for individual surgeons in more detail in future reports.

The Data

As will be seen in the reports of each unit the data is divided into two areas of activity and outcomes for patients presenting with lung cancer in the 12-month period between January and December 2012:-

1. Surgical Unit data
 - a. Total number of operations for lung cancer
 - b. The names of the surgeons working in each surgical Unit and the numbers of operations per surgeon
 - c. 30-day and 90-day mortality for the Unit's patients

2. MDT data for the individual hospitals for which the Surgical Units provide a lung cancer surgical service
 - a. Lists of lung cancer MDTs served by each Surgical Trust
 - b. Number of patients with a diagnosis of non-small cell lung cancer
 - c. Number of lung cancer operations for each MDT
 - d. Lung cancer resection rates for each MDT
 - e. Names of the surgeons who are core members of each lung cancer MDT
 - f. Overall resection rate for the Surgical Unit

Where there were two surgical services for a lung cancer MDT the calculations for the resection rate is based on the total numbers of patients from the MDT being operated in both Surgical Units. For example, if a lung cancer MDT had 200 new patients in 2012, and there were 15 operations in Surgical Unit A and 35 operations in Surgical Unit B there would be 50 operations in total between the two surgical services for the MDT. This leads to a resection rate of $50 / 200 \times 100 = 25\%$. This overall resection rate would be shared by both Surgical Trusts, the lung cancer MDT, and the individual surgeons who were core members of the MDT. From the data available it is not possible to analyse in more detail if there was a difference in the resection rate for the two Surgical Units providing the surgical service for the MDT.

Lung Cancer Surgeons

The vast majority of thoracic and cardiothoracic surgeons provide a lung cancer resection service for their Units and their names will be identifiable within the data presented. There is a large variation in the numbers of operations carried out per surgeon; the average number per surgeon in 2012 was 31, ranging from a single operation to 132 operations per year. Some of the reasons for this variation are as follows:-

1. Many surgeons provide a major contribution to cardiac surgical services and have much less time within their job plans to treat lung cancer patients
2. Some whole-time thoracic surgeons have a sub-speciality expertise in a branch of surgery other than for lung cancer, such as transplantation, oesophageal and chest wall surgery. Again this impacts on the time they have in their job plans to treat lung cancer patients, and may explain a



relatively low number of operations per surgeon

3. The incidence of lung cancer varies significantly throughout England; in general the disease is commoner in urban areas and less common in rural populations. Thus in those areas of the country where the incidence is highest, more patients will be identified so more operations will be necessary. The highest numbers of operations were carried out in Surgical Units in the North West of England where the incidence of lung cancer is the highest of all.

Although the above factors can explain the differences in total numbers of the operations per surgeon, it should not lead to the large variations in lung cancer resection rates have been identified in current report and previous NLCA publications. Other factors as explained in the previous section will be much more influential in this area.



Information for Patients

Information on the results (outcomes) of individual surgeons working in cardiothoracic surgery and carrying out operations for lung cancer has been collected and released for the first time. The data relates to patients diagnosed with lung cancer who underwent surgery during the period between 1st January and 31st December 2012.

Below are some questions which you may like to ask about this process.

What data is being published?

The following outcomes are being reported for surgeons and their hospitals

- 1. The number of operations carried out by all the specialist hospitals that provide surgery for lung cancer, the names of the consultant surgeons and how many operations each surgeon did*
- 2. How many of the patients died within 30 days and 90 days after their operations*
- 3. The names of the hospitals associated with the Surgical hospitals where the patients had their cancer diagnosed*
- 4. The names of the consultant surgeons who are members of the lung cancer teams of these hospitals*
- 5. The proportion of patients who had surgery for their cancers*

Why is the data being published?

This information is part of the Government initiative to help patients make a choice about their care (NHS Patient Choice website). Lung cancer teams support the transparent and open reporting of these results, and believe that this data should be made clear to patients.

Research also shows that just publishing the data, even if not used in any other way helps surgeons to examine their work leading to further improvements in outcome.

Who is involved in collecting the data?

NHS hospitals have been collecting data about the results of lung cancer treatment for some years via the National Lung Cancer Audit, the NLCA. Although the audit is not really suited to provide information on individual surgeons the NLCA has been working closely with the Society for Cardiothoracic Surgery to match the names of surgeons with the operations that have been carried out.

Why is information on only lung cancer surgery being provided?

Surgery to remove part of the lung for cancer has been chosen as the operation to be studied because it is carried out regularly by virtually all thoracic and cardiothoracic surgeons.

Why are the 30 and 90-day periods taken as the time to record deaths after surgery?

These times are chosen because it is recognised that most patients who die due to the complications of lung cancer surgery do so within 90 days of their operation. This is line with the figures available for other types of major surgery.



Why haven't the death rates for individual surgeons been reported?

We have chosen not to do this, as we are concerned that it would make surgeons avoid operating on older and sicker patients, who have a higher chance of dying following lung cancer surgery, despite the fact that surgery may be the best treatment for their cancers.

We plan to report individual death rates for surgeons in the future, but only when more information is available to be able to more accurately predict the risks for patients. This will allow the data to be fairer for surgeons in terms of avoiding giving a misleading impression of the death rates for their patients as being too high. For example, if a surgeon happens to treat much older and sicker patients then it may well be that more patients will die as a result of their surgery despite the operations being carried out to a high standard. In contrast another surgeon may have patients who are younger and less unwell and will therefore have a much lower risk from surgery. The second surgeon's results may look better although the standard of care is likely to be just as good from both surgeons.

Why can't I find a particular surgeon in this information?

Some cardiothoracic surgeons have chosen to specialise in surgery of the heart alone and therefore do not carry out any lung cancer surgery. Others will have carried out no lung cancer resections at all in 2012. Also the report only looks at those surgeons working in hospitals in England.

What has been the result of the data collection?

The data shows the differences in the number of lung cancer operations throughout the country. It shows that all hospitals provide a safe outcome for patients in terms of the vast majority of patients surviving their surgery. The data hasn't identified any poorly performing hospitals.

There are large variations in the proportion of patients being treated with surgery for their cancers, with some hospitals treating a much higher percentage of patients with surgery than others. It is a sad fact that surgery to remove a lung cancer isn't possible for the majority of patients either because the cancer has spread too far, or the patient isn't well enough to withstand the surgery. Nevertheless as surgery is the main way of trying to cure the cancer it is obviously important that as many patients as possible have the chance of seeing a surgeon for an opinion about surgery. We want the data to highlight the differences in care and lead to as many patients as possible getting surgery if this is felt by the lung cancer team to be the right way to treat them.

Why is there such variation in the outcome data between surgeons?

Many surgeons have other diseases to look after other than lung cancer (for example they have to do heart surgery as well) so they have less time in their working week to be able to treat patients with lung cancer. Also lung cancer is commoner in some parts of the country than others, so not as many patients will need surgery. These facts explain why some surgeons do a lot of lung cancer surgery whereas others do very little.

As this report deals with only a 12-month period there will be natural variations in how the patients present with their cancers, which leads to changes over the years as to how many patients can be treated with surgery. The only worry about the variations in the data are that some surgeons and the lung cancer teams they are part of may be less committed than others in making sure that as many patients as possible have the chance to have their lung cancers removed with surgery.