Royal College of Physicians

Society for Cardiothoracic Surgery in Great Britain and Ireland

Lung cancer clinical outcomes publication 2017

(for surgical operations performed in 2015)

November 2017

In association with:

British Thoracic Oncology Group

National Lung Cancer Forum for Nurses NLCFN

Roy Castle Lung Cancer Foundation

Public Health England

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Healthcare Quality Improvement Partnership

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Citation for this document

Royal College of Physicians. *Lung cancer clinical outcomes publication 2017 (for surgical operations performed in 2015).* London: RCP, 2017.

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ISBN 978-1-86016-686-0
eISBN 978-1-86016-687-7

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Document purpose	To disseminate results on the outcomes of lung cancer surgery for patients who had operations between 1 January and 31 December 2015
Title	*Lung cancer clinical outcomes publication 2017 (for surgical operations performed in 2015)*
Authors	Royal College of Physicians, Care Quality Improvement Department; Society for Cardiothoracic Surgery in Great Britain and Ireland
Publication date	November 2017
Target audience	NHS staff in lung cancer multidisciplinary teams; hospital managers and chief executives; commissioners; lung cancer researchers; lung cancer patients, their families and their carers
Description	This is the fourth lung cancer clinical outcomes publication on individual activity of surgeons or their specific contribution to lung care. The data relate to patients diagnosed with lung cancer who underwent surgery during the period between 1 January and 31 December 2015.
Related publications	National Lung Cancer Audit annual reports: **www.rcplondon.ac.uk/NLCA**
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Commissioned by:

HQIP
Healthcare Quality Improvement Partnership

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Thank you to all the lung cancer surgical teams that have contributed data to the audit; without your considerable efforts, this report would not be possible.

Contents

Foreword

This is the fourth lung cancer clinical outcomes publication (LCCOP). It reports the outcomes of operations to remove lung cancer for patients in English NHS hospitals during the 2015 calendar year. Twenty-eight NHS trusts provided lung cancer surgery in 2015, and the 27 units still active have validated their activity for this period. This engagement is excellent and adds greatly to the quality of the LCCOP project.

We continue to see increasing numbers of lung resections performed for lung cancer, although the 4.9% increase in activity seen this year is less than in recent years. Despite this increase in activity, survival rates at both 30 and 90 days have registered subtle but consistent improvements over the 4 years of the LCCOP project.

The number of operations performed by individual surgeons continues to rise, with a median of 49 cases per surgeon this year. This may reflect a decrease in the number of 'cardiothoracic' surgeons, who perform both heart and lung surgery in their routine work, and an increase in surgeons who concentrate on lung surgery alone.

This year we report adjusted 1-year survival after surgery at unit level. The decision to undergo an operation involves balancing short-term risks against the hope of longer term gain, so the reporting of longer term outcomes seems a natural progression for a cancer surgery audit. It is important to emphasise that many factors outside the control of surgical teams are very likely to affect 1-year survival. Access to and the quality of follow-up care or oncology treatments will almost certainly affect survival at 1 year, and are a shared responsibility of the whole cancer team. Also important is the proportion of people with lung cancer who are treated with surgery (the resection rate), and we know that this varies considerably across the country.

Therefore, although longer term survival after surgery is important and of interest to patients, we advise caution in using this metric as a direct measure of the quality of surgical care. This metric should not be used in isolation, but could help to direct future local audit or quality improvement activity by the wider lung cancer team.

Another addition this year is data on the use of minimal access approaches. Thoracoscopic surgery uses a camera and specially designed instruments to allow surgery with smaller incisions and no rib spreading, and is used increasingly for lung cancer surgery. Robotic assistance, where a surgeon directs the movements of a robotic device to perform surgery through small incisions, is now being pioneered in some lung cancer surgery units. For the first time this year, we publish detail on the use of thoracoscopic and robotic surgery, and unadjusted survival data for lobectomy, the commonest lung cancer operation.

In future years the Society for Cardiothoracic Surgery (SCTS) hopes to see further expansion of the LCCOP project, ideally guided by feedback from lung cancer patients, their families and the public.

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Introduction

The lung cancer clinical outcomes publication (LCCOP) is an NHS England initiative, commissioned by the Healthcare Quality Improvement Partnership (HQIP), to publish quality measures at unit level and at the level of individual consultant doctors, using national clinical audit and administrative data. The aims of publishing these results are to:

- reassure patients that the quality of clinical care is high
- assist patients in having an informed conversation with their consultant, GP or healthcare professional about the procedure or operation that they may have
- provide information to individuals, teams and organisations to allow them to monitor and improve the quality of the clinical care that they provide locally and nationally
- inform the commissioning of NHS lung cancer services.

This is the fourth report on the individual activity of surgeons and their contribution to lung cancer care. The data relate to patients diagnosed with lung cancer (including non-small-cell lung cancer, carcinoid and small-cell lung cancers) who underwent surgery during the period between 1 January and 31 December 2015. Data for this report are based on patient-level information collected by the NHS, as part of the care and support of cancer patients. The data are collated, maintained and quality assured by the National Cancer Registration and Analysis Service, which is part of Public Health England (PHE). Validation of local data, and collection of data on surgical approach, has been performed in collaboration with the Society for Cardiothoracic Surgery (SCTS) and their network of local audit leads.

Outcome measures

The following outcomes are reported:

- 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 completed
- the proportion of patients who survive at 30 days, 90 days and 1 year after their operation for each unit
- the median length of stay in hospital following an operation.

Reports containing the resection rates for units that normally submit to a surgical unit are available to download from **www.scts.org**.

The results have been adjusted to take into account the patient casemix, which may affect the outcome of the operation. For example, the age and fitness of a patient before surgery affects the risk that they will face from undergoing surgery.

The full data are available on **www.scts.org** and will be available on NHS Choices and My NHS (**www.nhs.uk**) from 5 December 2017.

Background

Data collection

NHS hospitals submit the details for all lung cancer patients, including patients undergoing lung cancer surgery, to the National Lung Cancer Audit (NLCA) via the National Cancer Registration and Analysis Service (NCRAS). The data are linked to other datasets, including Hospital Episode Statistics (HES). A list of all lung cancer patients undergoing surgery is generated from these data and linked to individual surgeons from each surgical unit. The surgical unit has the opportunity to validate the dataset prior to publication. This work is facilitated by collaborative working between the NLCA, NCRAS and SCTS.

This report does not include data for private patients, but it does include 139 patients from Wales, the Isle of Man and the Channel Islands who were operated on in NHS hospitals in England.

Organisation of lung cancer services

Treatment plans for lung cancer patients are discussed and agreed by lung cancer MDTs, which are present at every acute hospital in England. Owing to the complexity of the surgery and aftercare required, lung cancer surgery is performed in specialist thoracic and cardiothoracic surgical units. In 2015, there were 28 such hospitals in England (see Appendix 1). One of these 28 hospitals, the Royal Devon and Exeter, has stopped performing lung cancer surgery since 2015.

Lung cancer treatment

Treatment plans for lung cancer patients are based on four key factors.

1. **The type of lung cancer found on biopsy:** Surgery is generally recommended for patients with one of a group of lung cancers called non-small-cell lung cancers.
2. **The extent of disease (stage) at presentation:** Approximately two-thirds of lung cancer patients present with lung cancer that has already spread outside the lung, which means that it is not possible to remove all of the cancer by an operation. Surgery is the first choice of treatment for patients who present with early-stage lung cancer, as it offers the best chance of a cure.
3. **The presence of other serious diseases, in addition to lung cancer:** Lung cancer patients often have diseases such as emphysema and heart disease, which means that they may not be fit enough to cope with major lung surgery.
4. **Patient preference:** Some patients decide that they do not wish to have a certain form of lung cancer treatment, including surgery. Lung cancer MDTs will always support patients in the decision-making process and respect the final decision that a patient makes regarding their treatment.

Understanding the data

The results are divided into the following areas of activity and outcomes for patients undergoing lung cancer surgery in the 12-month period between January and December 2015.

Number of operations

- Total number of operations for lung cancer and type of operation.
- The names of the surgeons working in each surgical unit and the numbers of operations per surgeon (this is available online at **www.scts.org**).

Demographics

This report provides a national breakdown of demographics for the surgical population:

- by age
- by sex.

Performance status

The performance status (PS) of a patient is systematically assessed based on their ability to undertake the tasks of normal daily life compared with that of a healthy person.

Type of operation

The report includes analysis of operations by subtype. Operations have been reported in the following groups:

- bilobectomy (removal of two of the three lobes of the right lung), lobectomy (removal of one lobe of the lung) and sleeve lobectomy (removal of a lobe or whole lung together with a 'sleeve' of the main airway)
- sublobar resection, including wedge and multiple wedge resection or segmental resection
- pneumonectomy (removal of a whole lung)
- complex resection, for example resection of lung with chest wall
- other resections.

It also includes a national breakdown of the surgical approach used for lung cancer resection:

- open surgery
- thoracoscopic surgery (VATS – video-assisted thoracic surgery)
- robotic assisted surgery
- procedures started by thoracoscopic or robotic approaches but converted to open surgery during the operation.

Survival rates

Survival rates at 30 days, 90 days and 1 year (365 days) after surgery have been produced for surgical units. Surgeons increasingly work as part of integrated teams, perhaps with some members specialising in more advanced tumours or higher-risk surgery. Fortunately survival rates after surgery are high. For these reasons, we believe that the best assessment of the quality of care is to look at the results of whole teams combined.

This year we report a new outcome, the survival rate at 1 year following surgery. We have included this because we believe that patients contemplating cancer treatment want to know their chance of long-term survival.

However, caution is needed in using this outcome as a marker of the quality of surgery in a unit for two reasons. Firstly, factors unrelated to surgery and the surgical team, such as access to follow-up care and adjuvant chemotherapy, are very likely to influence 1-year survival. Secondly, we do not have all the data that might affect this outcome available for risk adjustment. We therefore suggest that the 1-year data are regarded as exploratory at this stage. We encourage units to reflect on this data, but to interpret it in the wider context of other available information on their local lung cancer service. We welcome comments on the reporting of this data.

Risk adjustment

This report includes data that have been risk adjusted. This means that the results have taken into account the different casemix of patients that individual units operate on. The variables used were age, sex, performance status (PS), cancer stage, socioeconomic status (using the Townsend index), comorbidity (using the Charlson index), a measure of lung function known as the FEV1 (forced expiratory volume in the first second) and laterality (left/right side of the chest) of the lung cancer.

We present the adjusted data as odds ratios (ORs), which refer to the chance of an outcome happening after risk adjustment. The OR of 30-day, 90-day and 1-year survival is calculated by unit and relative to the whole LCCOP population. For example, if a unit has a 30-day survival rate with an OR of more than one, their survival rate is higher than the national average once adjusted for the casemix of their patients.

The datasets available for casemix adjustment do not contain some variables that may correlate with outcome. For example, the widely used Thoracoscore risk calculator includes data such as the American Society of Anaesthesiologists (ASA) grade, which is not available for casemix adjustment in LCCOP. It is possible that some of the variation seen between units is due to these factors. However, the approach we use does provide for a fairer comparison between units.

Further information on the risk adjustment methods used is available in our methodology report, which can be downloaded from **www.scts.org**.

Length of stay in hospital

The median length of stay in hospital for each surgical unit is presented. The number of days that a patient spends in hospital before, during and after an operation can be related to the outcome of the operation, patient fitness before surgery, and the organisation of the hospital or unit. A number of quality improvement initiatives, such as enhanced recovery after surgery (ERAS) protocols and day of surgery admission (DOSA), can reduce the length of stay for patients, as well as reduce unnecessary costs.

Length of stay is also important information for patients and their families to inform them about what is to be expected after the procedure.

We are looking at whether readmission rates can be accurately produced for use in future publications.

Surgical resection rates

Surgical units usually provide services for several trusts. For each of these trusts (sometimes referred to as the ‘trust first seen’), the NLCA calculates a resection rate. The resection rate is the number of operations performed, expressed as a proportion of all the lung cancer patients (including small-cell, non-small-cell and pulmonary carcinoid tumours) diagnosed at that trust.

This is an important marker of the quality of care, as higher resection rates are linked to better overall survival rates. It is the role of the whole lung cancer MDT to ensure that as many patients who could benefit are referred for surgery.

Data on hospital resection rates are produced by the NLCA and published in our main annual report (see **www.rcplondon.ac.uk/NLCA**).

We have asked surgical units to confirm which trusts they serve and have reproduced the resection rate data from the main NLCA report in Appendix 3. The surgical trust appears in column one and the names of their referring trust cancer teams and their data appear in the other columns. The resection rates are adjusted to account for the effect of certain demographic factors.

Resection rates are calculated according to the 'trust first seen' on their clinical pathway and not by individual hospitals or clinicians. A small number of trusts contain more than one hospital with a lung cancer MDT, and some MDTs send patients to more than one surgical unit. Some trusts are defined as 'tertiary trusts' (trusts specialising in diagnosis and treatment of specific conditions), and it is unlikely that patients will be first seen in these organisations. As a result, the resection rates for tertiary trusts can appear to be very high or very low and should be interpreted cautiously. More information on the calculation of resection rates is available in the NLCA methodology reports available at **www.rcplondon.ac.uk/NLCA**.

Results

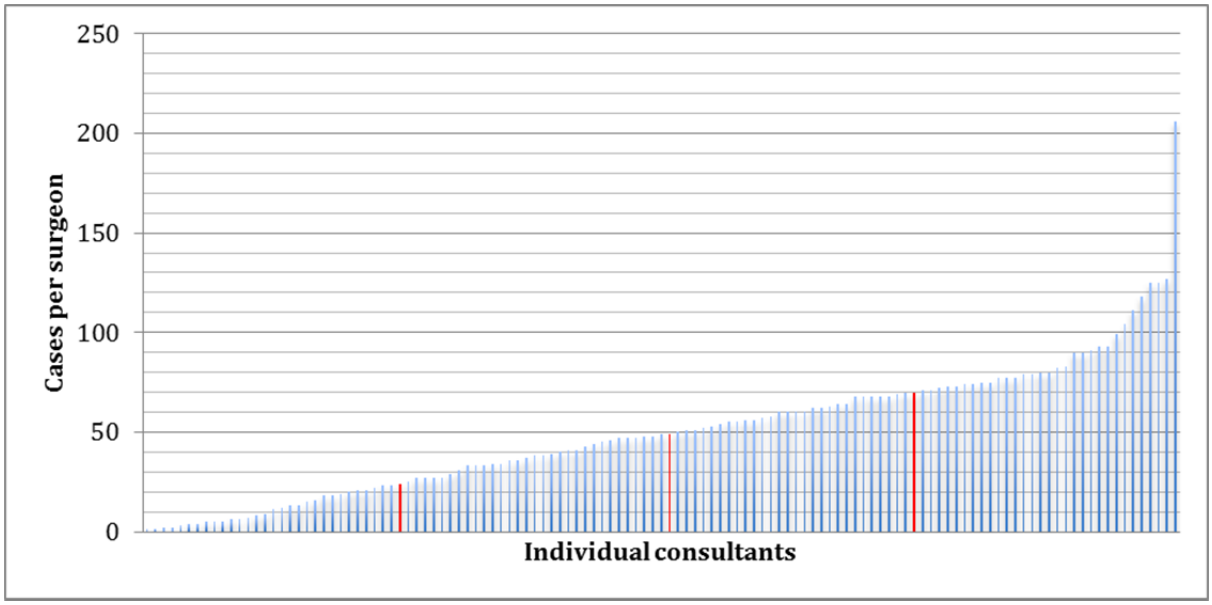
Total number of operations for lung cancer

The NLCA cancer registry identified 5,936 lung cancer resections that took place within the NHS in England in 2015. These data were returned to surgical units for validation. The surgical units reviewed the data against their own records and returned 6,021 patient records. After exclusions (see below), 5,843 patients who had 5,936 resections were included in the final dataset for publication. This is a 4.9% year-on-year increase on the 5,657 resections in 5,542 patients reported in 2014.

Twenty-eight units performed lung cancer surgery in 2015. This is unchanged from our 2014 report, but we are aware that the Royal Devon and Exeter NHS Foundation Trust has subsequently stopped providing this surgery. We were not able to locally validate data for this trust, but every other surgical unit validated their data. The median number of resections per unit was 185 (interquartile range (IQR) 141–264), and ranged from 49 to 507 resections.

A total of 123 consultant surgeons were identified as performing lung cancer resections in 2015. The median number of cases performed by each surgeon was 49 (IQR 24.5–70.5), ranging from 1 to 206 as shown in Fig 1. The number of cases performed per surgeon is rising; in 2012 the median number of cases per surgeon was 30.

Fig 1 Number of lung cancer resections performed in 2015 by individual consultant surgeons



Quartiles marked in red, n=123

There are many possible reasons for high and low numbers of cases. Surgeons starting in practice, moving hospital or retiring during the year may record low numbers. Surgeons may have other commitments, for example research, university or management responsibilities. They may do clinical work in another subspecialty, commonly cardiac surgery. Others will work part time, or will have a special interest in another area of thoracic surgery (for example, sarcoma or oesophageal surgery), which reduces the time that they spend carrying out operations for primary lung cancer.

Reasons for cases not being included in the analyses

The data returned from surgical units were examined to ensure data quality and coverage. The reasons for exclusion included: invalid or inconsistent identifier, surgery that did not take place in 2015, no valid surgery recorded, no MDT or first hospital information, and duplicate records. Where patients had multiple

operations recorded (either on the same or different days), these were all included, identified by the same patient identifier.

Breakdown of cases by pathological classification

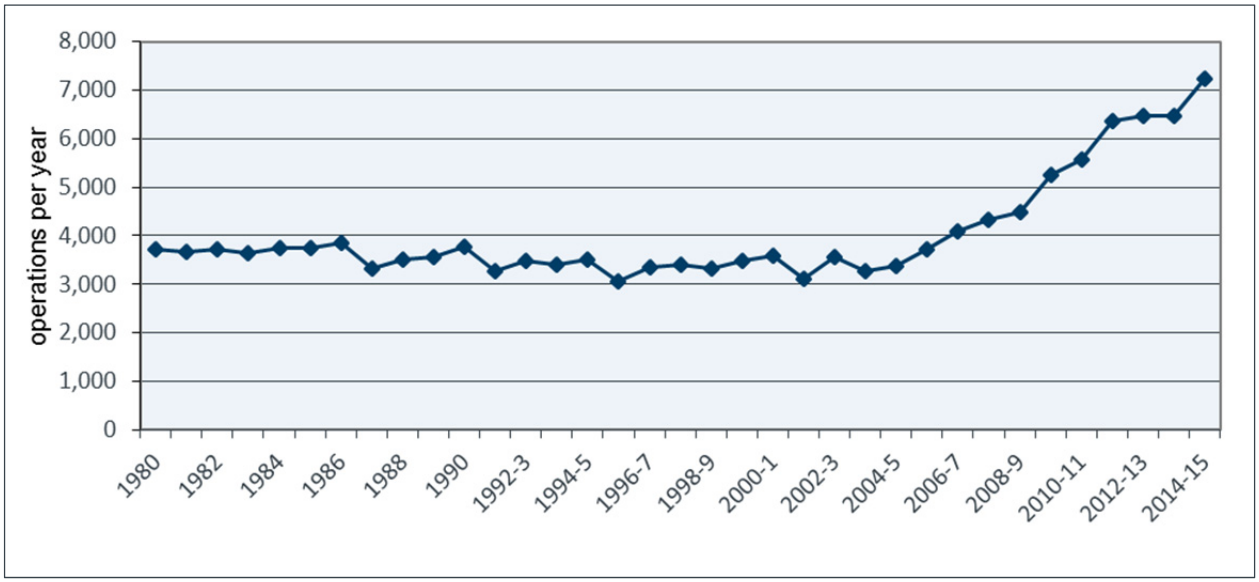
Table 1 Breakdown of patients by cancer type

Lung cancer type	Number of resections	Proportion of patients (%)
Non-small-cell lung cancer	5,499	92.6%
Carcinoid	343	5.8%
Small-cell lung cancer	94	1.6%

Table 1 shows the number of resections carried out by lung cancer type. We registered a slight increase in carcinoid tumour resections, up from 226 cases (4% of total) in 2014.

The number of lung cancer operations has continued to increase over the past decade. The information in Fig 2 uses data from the whole of the UK and Ireland, collected by the SCTS thoracic registry project. The numbers are therefore higher than the LCCOP figures, which apply only to operations within NHS hospitals in England.

Fig 2 Changes in number of lung cancer operations by year from 1980 to 2015*



*Source: SCTS thoracic registry project

Demographics

Analysis of the data submitted to the audit allows a detailed description of the population of patients who had lung cancer surgery in 2015:

- **Age**
  The median age of a patient having a lung cancer operation in 2015 was 69 years. The interquartile age range was 63–75 years.
- **Sex**
  There were more female than male patients, as shown in Table 2.

Table 2 Number of patients by gender

Gender	Number of patients having lung cancer resections	Proportion of patients (%)
Male	2,905	48.9
Female	3,031	51.1

Performance status

The World Health Organization (WHO) performance status (PS) is a standardised method of assessing a patient's overall fitness. The score ranges from 0 (no symptoms) to 4 (bed-bound). Although simple to calculate, the PS correlates well with the risk of complications after surgery, with less fit patients at higher risk. 91% of patients undergoing surgery whose PS was recorded had a score of 0 or 1.

Some units might be operating on patient populations with higher rates of ill health than others. For this reason, the analyses have been adjusted to account for this variable.

The PS data are only partially complete (see Table 3). Following a change of data collection methodology in 2014, the recording of performance status has been lower than in previous years. This has been a focus for improvement by lung cancer teams and this year we have seen lower levels of missing data (23%) than in 2014 (43.8%). We anticipate that this will improve further in the next report to only approximately 10% missing data.

Table 3 Patients with a recorded performance status (of 5,936 resections)

Performance status	Number of patients	Proportion of patients (%)
0	2,021	34.1
1	2,068	34.8
2	416	7.0
3	57	1.0
4	7	0.1
Missing	1,367	23.0

Types of lung cancer operations performed in 2015

Lobectomy is the treatment of choice for early lung cancer. Pneumonectomy (removal of the whole lung) is reserved for tumours that cannot be removed by lobectomy, generally because of their size or position. These are bigger operations, which can have a greater impact on patients, and carry a higher mortality risk. Sublobar operations, such as wedge or segmental resections, are usually reserved for less fit patients who may not tolerate lobectomy, and for very early or multiple-site tumours. The proportion of surgical operation types performed is shown in Table 4 and Fig 3. The commonest operations were lobectomies or bilobectomies, including sleeve lobectomies.

Five per cent of operations were pneumonectomies. The pneumonectomy rate varied across hospitals, with a median rate of 4.5 (IQR 3–7). Two smaller units performed no pneumonectomies in 2015.

We are not certain that the very small 'complex' group is capturing all relevant procedures. This grouping is intended to capture extended operations, for example lung resections with removal of portions of chest wall or other local structures for advanced tumours. However, the SCTS thoracic registry, which collects data on broadly the same patient group, reported 138 lung resections with chest wall (one form of complex operation) for lung cancer in England in 2015–16, but only 11 complex cases were coded in LCCOP. It is possible that some complex cases are being reported in the larger procedure groups.

Fig 4 shows survival at 30 days, 90 days and 1 year by the type of operation performed in 2015.

Fig 3 Types of lung resection performed as a percentage of all lung cancer operations 2013–15

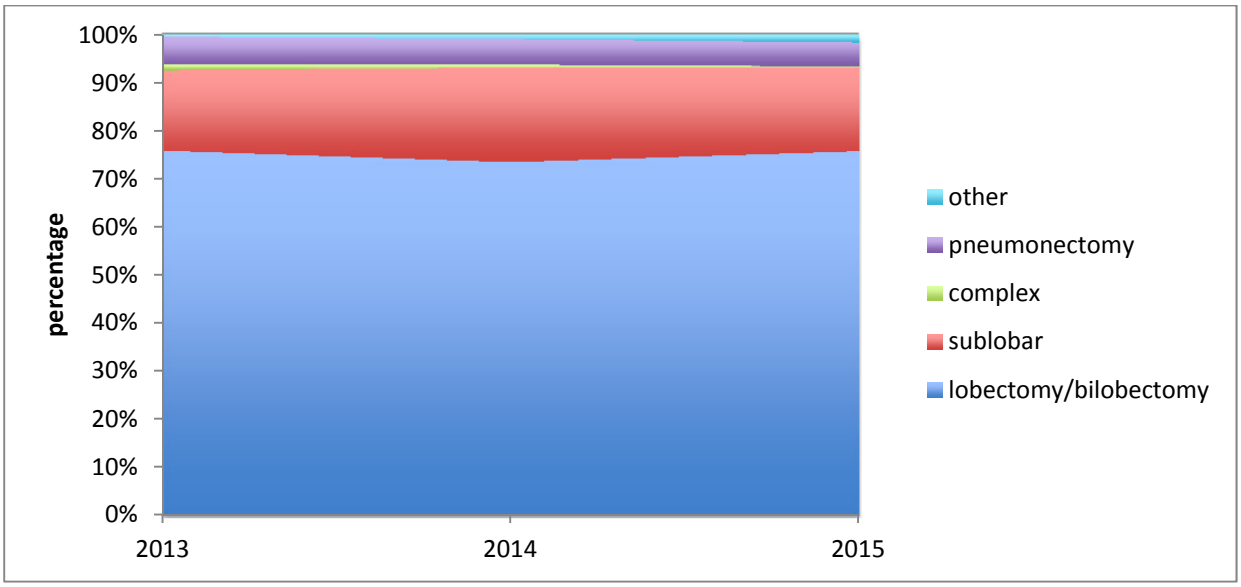


Table 4 Types of lung cancer surgery performed in 2015, 2014 and 2013

Type of surgery	Proportion performed in 2015 (%)	Proportion performed in 2014 (%)	Proportion performed in 2013 (%)
Bilobectomy / lobectomy / sleeve resection	75.8	73.5	75.9
Wedge and multiple wedge resection / segmental resection	17.4	19.7	16.7
Complex resections	0.2	0.6	1.2
Pneumonectomy	5.0	5.3	5.8
Other resections	1.6	0.9	0.4

Fig 4 Survival at 30 days, 90 days and 1 year by type of surgery performed in 2015

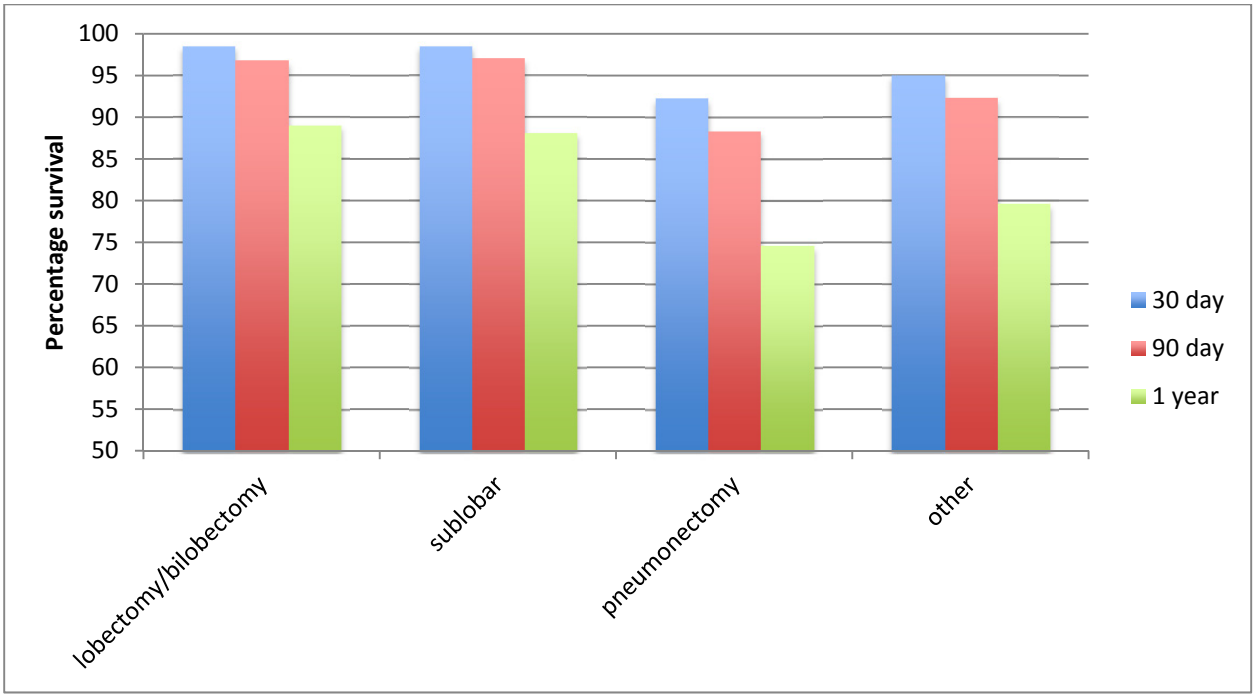


Table 5 Survival rates after surgery by procedure performed in 2015

Type of surgery	Number performed	30-day survival (%)	90-day survival (%)	1-year survival (%)
Bilobectomy / lobectomy / sleeve resection	4,498	98.5	96.8	89.0
Wedge and multiple wedge resection / segmental resection	1,031	98.5	97.0	88.1
Carinal resection / lung resection with resection of chest wall	11	100.0	100.0	100.0
Pneumonectomy	298	92.3	88.4	74.6
Other resections	98	95.0	92.3	79.6

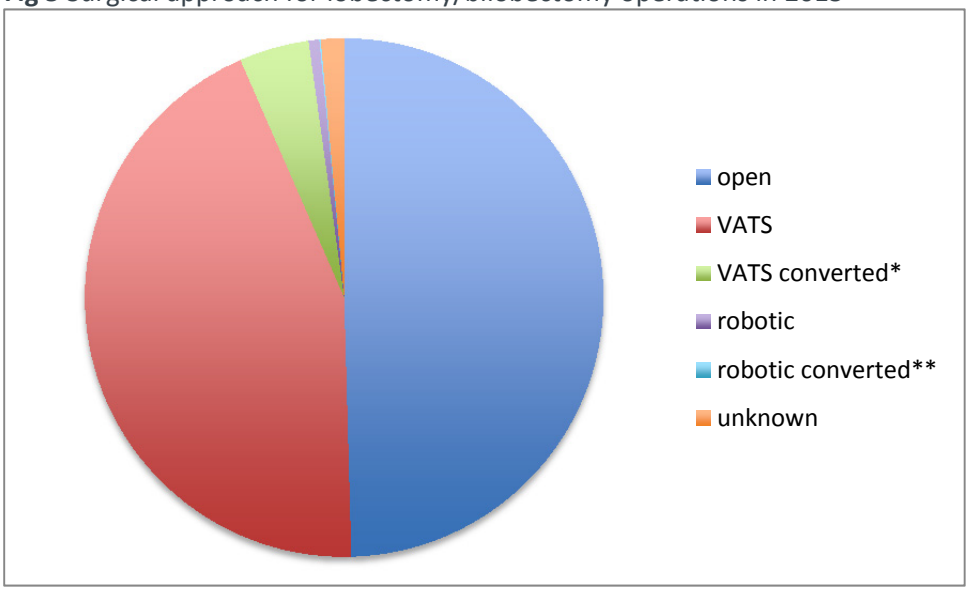
The lower survival rates seen after pneumonectomy compared with lesser resections (shown in Table 5) have been seen in similar databases, including the SCTS thoracic registry project (**www.scts.org**: SCTS in hospital survival UK and Ireland 2010–15 pneumonectomy 94.7, open lobe 97.9, VATS lobe 99.0).

Surgical approach for lobectomy and bilobectomy operations

This year, for the first time, we have data on the approach used for the commonest kind of lung cancer surgery – lobectomy and bilobectomy (Fig 5 and Table 6). We have classified cases as having been performed via open surgery (usually using a cut between the ribs and spreading of the ribs to gain access to the chest), by VATS (video-assisted thoracic surgery, using cameras and specific instruments to operate using 1–4 small incisions) or with the assistance of a surgical robot (using incisions similar to VATS surgery). Two other groups record conversions during an operation from a robotic or VATS approach to open surgery.

A total of 9.0% of the 2,425 operations commenced by VATS, and 11.8% of the 34 cases commenced robotically were converted to an open approach during surgery.

Fig 5 Surgical approach for lobectomy/bilobectomy operations in 2015



*VATS converted = VATS operations converted to an open approach
**robotic converted = robotic operations converted to an open approach during surgery

Table 6 Lobectomy: unadjusted length of stay and survival by surgical approach

Approach	Number of resections (% of total)	Median length of stay (IQR)	% survival 30 days	% survival 90 days	% survival 1 year
Open	2,229 (49.6)	7 (5–10)	97.9	95.8	86.8
Completed VATS	1,974 (43.9)	5 (4–8)	99.1	97.8	91.3
VATS converted to open	196 (4.3)	8 (5.5–12)	99.5	96.9	88.3
Completed robotic	30 (0.7)	5 (4–7)	96.7	96.7	93.3
Robotic converted to open*	4 (<0.1)	-	-	-	-
Unknown	65 (1.4)	8 (6–10)	96.9	95.4	90.8

*outcomes not presented due to the very small numbers available for analysis

We have not adjusted these data to account for patient factors. It is quite likely that patients selected for VATS and robotic surgery were systematically different from patients who had open surgery, for example they may have had smaller tumours. We plan to look at this in subsequent reports.

Survival rates

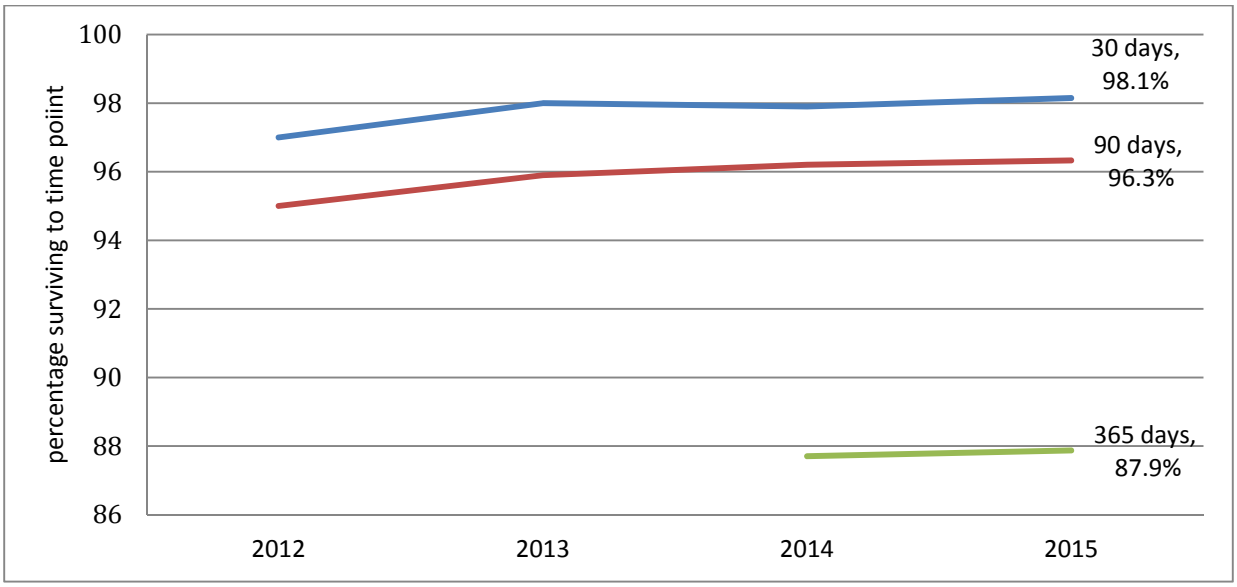
Results show that survival rates following lung cancer surgery in England are high. In 2015, 98.1% of patients were alive at 30 days and 96.3% were alive at 90 days after surgery, compared with 97.9% and 96.2% respectively in 2014 (Fig 6).

In total, 720 patients died within 1 year of lung resection, giving a national 1-year survival rate of 87.9%, compared with 87.7% in 2014.

We expect that other factors outside the surgical procedure itself also affect 1-year survival, for example access to adjuvant treatments such as chemotherapy and radiotherapy, and the availability of supportive care.

These results (Fig 6) are similar to those in our last report. It is encouraging that, despite operating on more patients, survival rates at all measured time points continue to increase slightly. Changes in perioperative care, for example increasing rates of minimal access surgery, modern regional anaesthesia or enhanced recovery pathways, might have contributed to this.

Fig 6 Percentage survival at 30 days, 90 days and 1 year after surgery 2012–2015

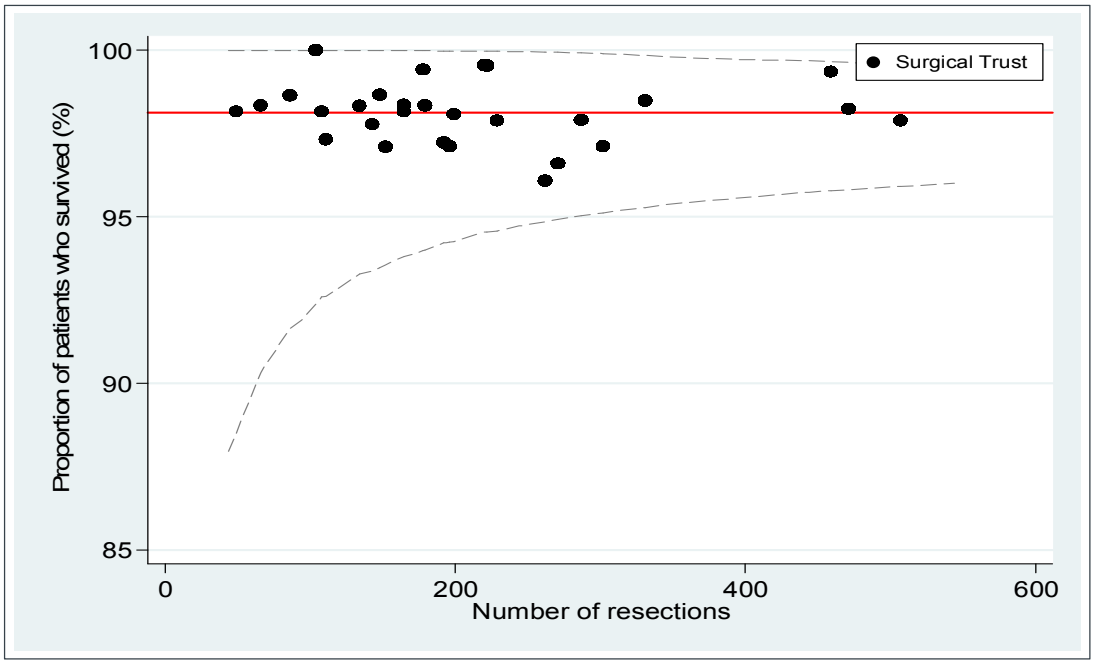


Survival rates were similar across all surgical units. Figs 7 and 8 show that all units are within expected levels of survival at both 30 and 90 days.

Figs 7, 8 and 9 are funnel plots showing adjusted 30-day, 90-day and 1 year survival rates by surgical unit. The dotted lines signify the level of survival that would be outside the expected range. The funnel plot does not include units with 100% survival.

The adjusted results include ORs of 30-day and 90-day survival in specified trusts, relative to the whole LCCOP resection population.

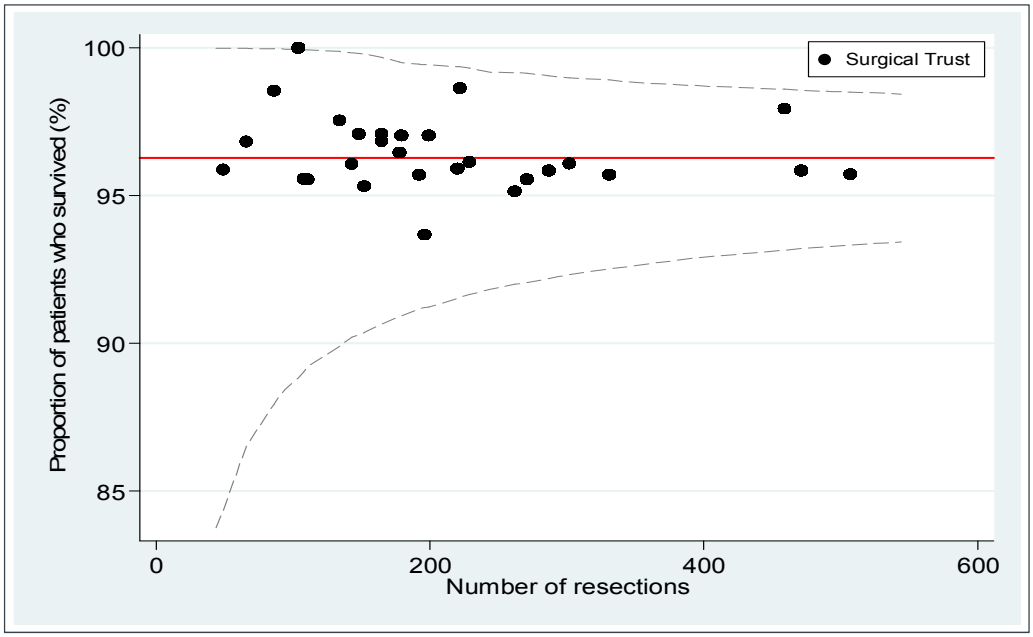
Fig 7 Adjusted 30-day postoperative survival by surgical unit



The plotted control limits represent 99.8% confidence intervals of the adjusted odds ratios. The Y axis shows adjusted survival.

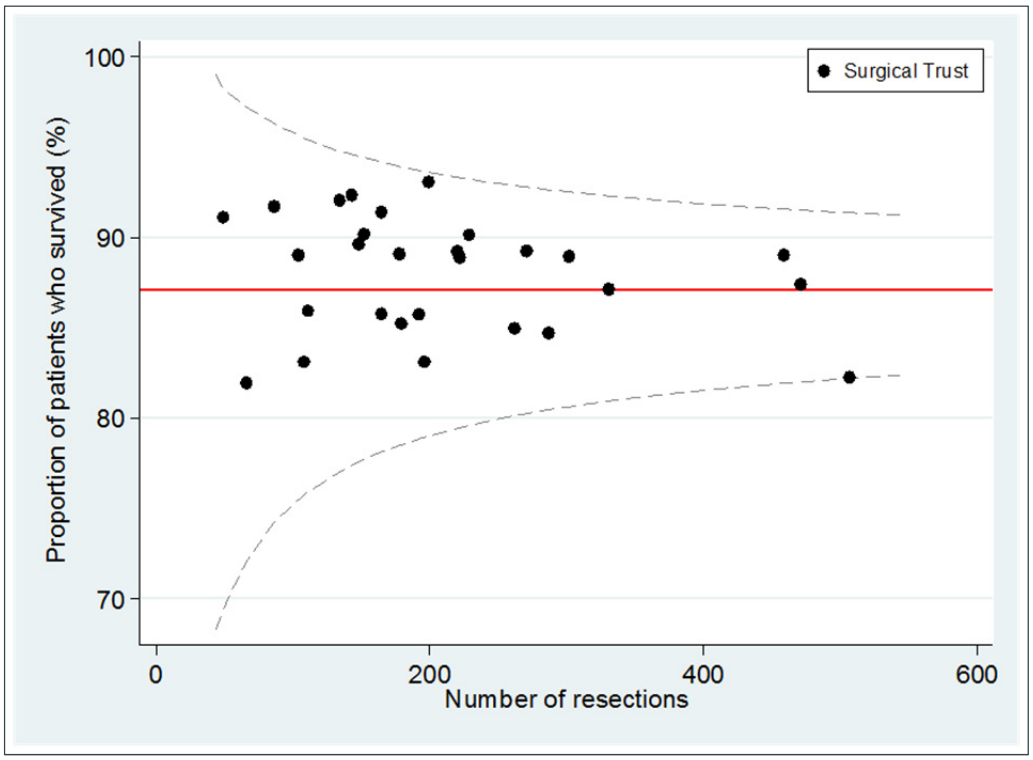
The 30-day survival data was adjusted for the composition of the population in terms of age, sex, performance status, stage, laterality, FEV1 percentage, comorbidity and socioeconomic status.

Fig 8 Adjusted 90-day postoperative survival by surgical unit



The plotted control limits represent 99.8% confidence intervals of the adjusted odds ratios. The Y axis shows adjusted survival. The 90-day survival data was adjusted for the composition of the population in terms of age, sex, performance status, stage, laterality, FEV1 percentage, comorbidity and socioeconomic status.

Fig 9 Adjusted 1-year postoperative survival by surgical unit



The plotted control limits represent 99.8% confidence intervals of the adjusted odds ratios. The Y axis shows adjusted survival.

The 1-year survival data was adjusted for the composition of the population in terms of age, sex, performance status, stage, laterality, FEV1 percentage, comorbidity and socioeconomic status.

Length of stay

This is the number of nights that patients spend in hospital during their admission for lung cancer surgery.

Length of stay data were available for 4,595 resections; 78.64% of the 5,843 procedures performed. Median length of stay for these 4,595 patients was 6 days, with an interquartile range of 4–9 days. In 2014 the median length of stay was also 6 days (IQR 5–10).

The length of stay data used were obtained from HES (Hospital Episode Statistics) data. Not all cases included in LCCOP mapped to records in HES and therefore the data are incomplete. The percentage completeness is given for each trust in Appendix 2.

Despite the data being incomplete, the length of stay information is important to patients and their families. It is also related to the cost of treatment.

Detailed results, listed by hospital trust, are available on **www.scts.org**.

Appendix 1: Early outcomes for surgical resection units in England

Surgical trust	Trust code	Number of resections	30-day survival adjusted (%)	30-day survival significance	90-day survival adjusted (%)	90-day survival significance
Barts Health NHS Trust	R1H	148	98.7	→	97.1	→
Basildon and Thurrock University Hospital NHS FT	RDD	104	100.0	→	100.0	→
Blackpool Teaching Hospitals NHS FT	RXL	178	99.4	→	96.5	→
Guy's and St Thomas' NHS FT	RJ1	459	99.4	→	97.9	→
Heart of England NHS FT	RR1	271	96.6	→	95.6	→
Hull and East Yorkshire Hospitals NHS Trust	RWA	165	98.2	→	97.1	→
Imperial College Healthcare NHS Trust	RYJ	152	97.1	→	95.3	→
Leeds Teaching Hospitals NHS Trust	RR8	302	97.1	→	96.1	→
Liverpool Heart and Chest Hospital NHS Foundation Trust	LLCU	507	97.9	→	95.7	→
Norfolk and Norwich University Hospitals NHS FT	RM1	143	97.8	→	96.1	→
Nottingham University Hospital NHS Trust	RX1	229	97.9	→	96.1	→
Oxford University Hospitals NHS Trust	RTH	111	97.3	→	95.6	→
Papworth Hospital NHS FT	RGM	165	98.4	→	96.8	→
Plymouth Hospitals NHS Trust	RK9	86	98.6	→	98.6	→
Royal Brompton and Harefield NHS FT	RT3	331	98.5	→	95.7	→
Royal Devon and Exeter NHS FT	RH8	49	98.2	→	95.9	→
Sheffield Teaching Hospitals NHS FT	RHQ	220	99.6	→	95.9	→
South Tees Hospitals NHS FT	RTR	134	98.3	→	97.5	→
St George's Healthcare NHS Trust	RJ7	199	98.1	→	97.0	→
The Newcastle Upon Tyne Hospitals NHS FT	RTD	262	96.1	→	95.1	→
The Royal Wolverhampton NHS Trust	RL4	108	98.2	→	95.6	→
University College London Hospitals NHS FT	RRV	179	98.4	→	97.0	→
University Hospitals of North Midlands NHS Trust	RJE	196	97.1	→	93.7	→
University Hospital of South Manchester NHS FT	RM2	471	98.2	→	95.9	→
University Hospital Southampton NHS FT	RHM	287	97.9	→	95.8	→
University Hospitals Bristol NHS FT	RA7	222	99.6	→	98.7	→
University Hospitals Coventry and Warwickshire NHS Trust	RKB	66	98.3	→	96.8	→
University Hospitals of Leicester NHS Trust	RWE	192	97.2	→	95.7	→
England		**5,936**	**98.1**		**96.3**	

→ **Not statistically significantly different to expected**

Appendix 2: One-year survival and length of stay after surgical resection in England

Surgical trust	Trust code	1-year survival adjusted (%)	1-year survival significance	Median length of stay	IQR*	Number of records available	% completeness of length of stay data
Barts Health NHS Trust	R1H	89.6	→	8	(6–11)	117	79.1
Basildon and Thurrock University Hospital NHS FT	RDD	89.0	→	5	(4.5–8)	68	65.4
Blackpool Teaching Hospitals NHS FT	RXL	89.1	→	7	(6–11)	145	81.5
Guy's and St Thomas' NHS FT	RJ1	89.0	→	6	(4–9)	242	52.7
Heart of England NHS FT	RR1	89.3	→	5	(3–7)	199	73.4
Hull and East Yorkshire Hospitals NHS Trust	RWA	85.8	→	7	(5–9)	92	55.8
Imperial College Healthcare NHS Trust	RYJ	90.2	→	8	(5–11)	129	84.9
Leeds Teaching Hospitals NHS Trust	RR8	89.0	→	6	(4–8)	236	78.1
Liverpool Heart and Chest Hospital NHS Foundation Trust**	LLCU	82.3	↓	6	(5–9)	449	88.6
Norfolk and Norwich University Hospitals NHS FT	RM1	92.4	→	5.5	(4–7)	130	90.9
Nottingham University Hospital NHS Trust	RX1	90.1	→	6	(5–9)	210	91.7
Oxford University Hospitals NHS Trust	RTH	86.0	→	5	(4–8)	101	91.0
Papworth Hospital NHS FT	RGM	91.4	→	5	(4–9)	148	89.7
Plymouth Hospitals NHS Trust	RK9	91.7	→	8.5	(7–13)	74	86.0
Royal Brompton and Harefield NHS FT	RT3	87.1	→	7	(5–10)	278	84.0
Royal Devon and Exeter NHS FT	RH8	91.1	→	7	(4–9.5)	48	98.0
Sheffield Teaching Hospitals NHS FT	RHQ	89.2	→	6	(4–8)	187	85.0
South Tees Hospitals NHS FT	RTR	92.0	→	6	(4–10)	111	82.8
St George's Healthcare NHS Trust	RJ7	93.1	→	5	(3–8)	64	32.2
The Newcastle Upon Tyne Hospitals NHS FT	RTD	85.0	→	7	(5–10)	228	87.0
The Royal Wolverhampton NHS Trust	RL4	83.1	→	6	(5–9.5)	68	63.0
University College London Hospitals NHS FT	RRV	85.2	→	7	(5–10)	161	89.9
University Hospital of North Midlands NHS Trust	RJE	83.1	→	6	(5–9)	166	84.7
University Hospital of South Manchester NHS FT	RM2	87.4	→	5	(4–8)	318	67.5
University Hospital Southampton NHS FT	RHM	84.7	→	4	(3–6)	245	85.4
University Hospitals Bristol NHS FT	RA7	88.9	→	5	(4–8)	189	85.1

Surgical trust	Trust code	1-year survival adjusted (%)	1-year survival significance	Median length of stay	IQR*	Number of records available	% completeness of length of stay data
University Hospitals Coventry and Warwickshire NHS Trust	RKB	82.0	→	8	(6–12)	42	63.6
University Hospitals of Leicester NHS Trust	RWE	85.7	→	6.5	(5–10)	150	78.1
England		**87.9**		**6**	**(4–9)**	**4,595**	

→ **Not statistically significantly different to expected** ↓ **Significantly worse than expected**

***IQR = interquartile range**

****Survival at the Liverpool Heart and Chest Hospital was lower than expected (defined as an odds ratio for survival outside 99.8% confidence intervals) at 1 year, but within expected levels at 30 and 90 days after surgery. Please see further comment on this metric under 'Survival rate' in the 'Background' section of this report.**

Appendix 3: Resection rates by surgical trust and by trust first seen, from the NLCA main report (2015 data)

Surgical trust	Surgical trust code	Lung MDT host trust	MDT trust code	All cases per MDT	MDT resection rate (all comers)	Resection rate significance**
Liverpool Heart and Chest Hospital NHS FT	LHCH	Warrington and Halton Hospital NHS FT	RWW	210	19.5	→
		Countess of Chester Hospital NHS FT	RJR	189	20.1	→
		Aintree University Hospital NHS FT	REM	334	23.1	→
		Wirral University Teaching Hospitals NHS FT	RBL	341	18.5	→
		Liverpool Heart and Chest Hospital NHS FT	LLCU	462	21.6	→
		Southport and Ormskirk Hospital NHS FT	RVY	176	13.6	→
		St Helens and Knowsley Hospitals NHS FT	RBN	304	13.2	→
Oxford University Hospitals NHS Trust	RTH	Oxford University Hospitals NHS Trust	RTH	370	25.9	→
		Hampshire Hospitals NHS FT	RN5	178	18.5	↑
Heart of England NHS FT	RR1	University Hospitals Birmingham NHS FT	RRK	309	20.4	→
		Worcestershire Acute Hospitals NHS Trust	RWP	356	16.3	→
		Sandwell and West Birmingham Hospitals NHS Trust	RXK	248	11.3	→
		Walsall Healthcare NHS Trust	RBK	172	11.6	→
		Wye Valley NHS Trust	RLQ	100	14.0	→
		Heart of England NHS FT	RR1	513	17.7	→
		Gloucestershire Hospitals NHS FT	RTE	353	16.7	→
Imperial College Healthcare NHS Trust	RYJ	London North West Healthcare NHS Trust	R1K	195	25.1	↑
		West Middlesex University Hospital NHS Trust	RFW	72	23.6	→
		Imperial College Healthcare NHS Trust	RYJ	338	21.9	↑
Guy's and St Thomas' NHS FT	RJ1	Guy's and St Thomas' NHS FT	RJ1	462	35.3	↑
		Lewisham Healthcare NHS Trust	RJ2	203	6.4	↓
		Royal Berkshire NHS FT	RHW	191	13.6	→
		King's College Hospital NHS FT	RJZ	203	10.3	↓
		Maidstone and Tunbridge Wells NHS Trust	RWF	266	17.7	→
		Brighton and Sussex University Hospitals NHS Trust	RXH	280	12.5	→
		Ashford and St Peter's Hospitals NHS FT	RTK	181	17.7	→
		East Kent Hospitals University NHS FT	RVV	479	7.5	↓

Surgical trust	Surgical trust code	Lung MDT host trust	MDT trust code	All cases per MDT	MDT resection rate (all comers)	Resection rate significance**
		East Sussex Healthcare NHS Trust	RXC	318	12.6	→
University Hospitals of Leicester NHS Trust	RWE	Kettering General Hospital NHS FT	RNQ	216	21.3	↑
		University Hospitals of Leicester NHS Trust	RWE	555	14.1	→
		Burton Hospitals NHS FT	RJF	141	24.1	↑
		Peterborough and Stamford Hospitals NHS FT	RGN	207	12.1	↓
		Northampton General Hospital NHS Trust	RNS	178	18.5	↑
The Newcastle Upon Tyne Hospitals NHS FT	RTD	Newcastle Upon Tyne Hospitals NHS FT	RTD	405	15.1	→
		County Durham and Darlington NHS FT	RXP	471	10.4	↓
		North Cumbria University Hospitals NHS Trust	RNL	248	15.7	→
		Northumbria Healthcare NHS FT	RTF	411	12.9	↓
		City Hospitals Sunderland NHS FT	RLN	367	12.8	→
		South Tyneside NHS FT	RE9	137	11.7	↓
		Gateshead Health NHS FT*	RR7	235	10.2	↓
Plymouth Hospitals NHS Trust	RK9	Royal Cornwall Hospitals NHS Trust	REF	285	8.4	↓
		South Devon Healthcare NHS FT	RA9	213	9.4	↓
		Plymouth Hospitals NHS Trust	RK9	333	13.8	↓
Hull and East Yorkshire Hospitals NHS Trust	RWA	Hull and East Yorkshire Hospitals NHS Trust	RWA	417	18.9	→
		Northern Lincolnshire and Goole Hospitals NHS FT	RJL	319	13.5	↓
		York Hospitals NHS FT	RCB	333	12.0	↓
University Hospitals Bristol NHS FT	RA7	University Hospitals Bristol NHS FT	RA7	178	24.2	→
		Gloucestershire Hospitals NHS FT	RTE	353	16.7	→
		Royal United Hospital Bath NHS Trust	RD1	243	16.0	→
		North Bristol NHS Trust	RVJ	267	18.7	→
		Taunton and Somerset NHS FT	RBA	204	15.2	→
		Weston Area Health NHS Trust	RA3	99	6.1	↓
		Yeovil District Hospital NHS FT	RA4	113	15.0	→
Blackpool Teaching Hospitals NHS FT	RXL	Blackpool Teaching Hospitals NHS FT	RXL	299	17.4	→
		University Hospitals of Morecambe Bay	RTX	272	14.7	→

Surgical trust	Surgical trust code	Lung MDT host trust	MDT trust code	All cases per MDT	MDT resection rate (all comers)	Resection rate significance**
		East Lancashire Hospitals NHS Trust	RXR	339	14.7	→
		Lancashire Teaching Hospitals NHS FT	RXN	313	15.0	→
Basildon and Thurrock University Hospitals NHS FT	RDD	Basildon and Thurrock University Hospitals NHS FT	RDD	254	13.0	→
		Colchester Hospital University NHS FT	RDE	318	12.6	→
		Southend University Hospitals NHS FT	RAJ	258	12.4	→
		Mid Essex Hospital Services NHS Trust	RQ8	223	16.6	→
The Royal Wolverhampton NHS Trust	RL4	The Royal Wolverhampton NHS Trust	RL4	269	22.3	↑
		Worcestershire Acute Hospitals NHS Trust	RWP	356	16.3	→
		The Dudley Group NHS FT	RNA	249	12.9	→
Norfolk and Norwich University Hospitals NHS FT	RM1	Ipswich Hospital NHS Trust	RGQ	202	11.4	↓
		James Paget University Hospitals NHS FT	RGP	202	12.9	↓
		Queen Elizabeth Hospital King's Lynn NHS FT	RCX	181	8.8	→
		Norfolk and Norwich University Hospitals NHS FT	RM1	431	16.0	→
Sheffield Teaching Hospitals NHS FT	RHQ	Chesterfield Royal Hospital NHS FT	RFS	198	13.6	→
		Barnsley Hospital NHS FT	RFF	188	14.4	→
		Rotherham NHS FT	RFR	177	14.7	↓
		Sheffield Teaching Hospitals NHS FT	RHQ	514	16.0	→
		Doncaster and Bassetlaw NHS FT	RP5	403	14.9	→
Papworth Hospital NHS FT*	RGM	Papworth Hospital NHS FT*	RGM	104	50.0	→
		West Suffolk NHS FT	RGR	152	17.1	→
		East and North Hertfordshire NHS Trust	RWH	270	5.6	↓
		Peterborough and Stamford Hospitals NHS FT	RGN	207	12.1	↓
		Bedford Hospital NHS Trust	RC1	117	12.0	→
		Cambridge University Hospitals NHS FT	RGT	185	15.1	→
		Hinchingbrooke Health Care NHS Trust	RQQ	102	15.7	→
Royal Brompton and Harefield NHS FT*	RT3	Royal Brompton and Harefield NHS FT*	RT3	105	61.9	↑
		West Hertfordshire Hospitals NHS Trust	RWG	221	14.0	→
		Royal Free London NHS FT	RAL	314	14.3	→

Surgical trust	Surgical trust code	Lung MDT host trust	MDT trust code	All cases per MDT	MDT resection rate (all comers)	Resection rate significance**
		Luton and Dunstable Hospital NHS FT	RC9	207	20.8	→
		Frimley Park Hospital NHS FT	RDU	422	15.2	→
		Buckinghamshire Healthcare NHS Trust	RXQ	211	13.7	→
		The Hillingdon Hospitals NHS FT	RAS	105	7.6	→
		Colchester Hospital University NHS FT	RDE	318	12.6	→
		Milton Keynes Hospital NHS FT	RD8	143	23.8	↑
		Great Western Hospitals NHS FT	RN3	185	10.8	→
		East and North Hertfordshire NHS Trust	RWH	270	5.6	↓
		Chelsea and Westminster Hospital NHS FT	RQM	88	9.1	↓
Royal Devon and Exeter NHS FT	RH8	Royal Devon and Exeter NHS FT	RH8	302	10.6	↓
		Northern Devon Healthcare NHS Trust	RBZ	129	10.9	→
University Hospital of North Staffordshire NHS Trust	RJE	University Hospital of North Staffordshire NHS Trust	RJE	567	21.7	↑
		Shrewsbury and Telford Hospital NHS Trust	RXW	270	24.4	↑
Barts Health NHS Trust	R1H	Barts Health NHS Trust	R1H	411	17.5	↑
		Barking, Havering and Redbridge University Hospitals NHS Trust	RF4	364	14.6	↑
		Homerton University Hospital NHS FT	RQX	91	18.7	→
St George's Healthcare NHS Trust	RJ7	St George's Healthcare NHS Trust	RJ7	180	25.0	→
		Royal Surrey County Hospital NHS Trust	RA2	119	21.0	→
		Western Sussex Hospitals NHS Trust	RYR	330	11.8	→
		Ashford and St Peter's Hospitals NHS FT	RTK	181	17.7	→
		Kingston Hospital NHS Trust	RAX	137	14.6	→
		Surrey and Sussex Healthcare NHS Trust	RTP	221	10.0	↓
		Epsom and St Helier University Hospitals NHS FT	RVR	116	16.4	→
		Croydon Health Services NHS Trust	RJ6	135	16.3	→
		Royal Marsden NHS FT*	RPY	248	6.9	↓
Leeds Teaching Hospitals NHS Trust	RR8	Harrogate and District NHS FT	RCD	114	19.3	→
		Mid-Yorkshire Hospitals NHS Trust	RXF	488	15.4	→
		Leeds Teaching Hospitals NHS Trust	RR8	610	14.3	↓

Surgical trust	Surgical trust code	Lung MDT host trust	MDT trust code	All cases per MDT	MDT resection rate (all comers)	Resection rate significance**
		Airdale NHS FT	RCF	149	16.1	→
		Calderdale and Huddersfield NHS FT	RWY	281	14.6	→
		Bradford Teaching Hospital NHS FT	RAE	255	12.2	↓
South Tees Hospital NHS FT	RTR	South Tees Hospital NHS FT	RTR	393	14.0	→
		North Tees and Hartlepool NHS FT	RVW	318	16.7	→
		County Durham and Darlington NHS FT	RXP	471	10.4	↓
University College London Hospitals NHS FT	RRV	North Middlesex University Hospital NHS Trust	RAP	126	6.3	→
		University College London Hospitals NHS FT	RRV	198	36.4	↑
		The Whittington Hospital NHS Trust	RKE	64	26.6	↑
University Hospital of South Manchester NHS FT	RM2	Pennine Acute Hospitals NHS Trust	RW6	681	16.7	→
		University Hospital of South Manchester NHS FT	RM2	274	25.2	→
		Central Manchester University Hospitals NHS FT	RW3	221	16.7	→
		Stockport NHS FT	RWJ	206	18.4	→
		Bolton NHS FT	RMC	251	16.7	→
		Tameside Hospital NHS FT	RMP	184	14.7	→
		Salford Royal NHS FT	RM3	257	17.5	→
		East Cheshire NHS Trust	RJN	93	19.4	↑
		Wrightington, Wigan and Leigh NHS FT	RRF	286	20.3	→
		Mid Cheshire Hospitals NHS FT	RBT	194	14.9	→
University Hospitals Coventry and Warwickshire NHS Trust	RRV	George Eliot Hospital NHS Trust	RLT	109	11.0	→
		University Hospitals Coventry and Warwickshire NHS Trust	RKB	283	13.8	→
		South Warwickshire NHS FT	RJC	127	11.0	→
University Hospital Southampton NHS FT	N60	University Hospital Southampton NHS FT	RHM	361	16.9	→
		Dorset County Hospital NHS FT	RBD	115	16.5	→
		Royal Bournemouth and Christchurch Hospitals NHS FT	RDZ	241	14.1	→
		Poole Hospital NHS FT	RD3	169	18.9	→

Surgical trust	Surgical trust code	Lung MDT host trust	MDT trust code	All cases per MDT	MDT resection rate (all comers)	Resection rate significance**
		Isle of Wight NHS Trust	R1F	117	16.2	→
		Portsmouth Hospitals NHS Trust	RHU	376	13.0	↓
		Salisbury NHS FT	RNZ	127	18.1	→
		Hampshire Hospitals NHS FT	RN5	202	16.8	→
Nottingham University Hospitals NHS Trust	RX1	Nottingham University Hospitals NHS Trust	RX1	573	17.5	→
		United Lincolnshire Hospitals NHS Trust	RWD	378	10.8	↓
		Sherwood Forest Hospitals NHS Foundation Trust	RK5	186	6.5	→
		Derby Hospitals NHS FT	RTG	342	17.3	→
All England					**16.0**	

*denotes a tertiary trust. These provide treatment for lung cancer patients, but where patients are not usually first seen. The cases may have been incorrectly allocated to this trust, and instead first seen at another trust in the region. The data should be interpreted with caution.

** Statistical significance of resection rate compared with the whole of England, after adjustment for age, sex, stage, performance status, socio-economic status and co-morbidity.

→ **Not statistically significantly different to expected** ↓ **Significantly worse than expected** ↑ **Significantly better than expected**

Appendix 4: Glossary

Adjuvant chemotherapy	Chemotherapy given after initial treatment for cancer, especially to suppress secondary tumour formation.
ASA grade	The American Society of Anaesthesiologists physical status classification system. A 1–6 grade system to categorise physical fitness before surgery.
Bilobectomy	Removal of two of the three lobes of the right lung, either upper and middle together or lower and middle.
Biopsy	Removal and examination of tissue, usually microscopic, to establish a precise (**pathological**) **diagnosis**.
Carinal resection	Removal of part of the windpipe at the point where it divides into the left and right lungs.
Casemix	Refers to the different characteristics of patients seen in different hospitals (for example age, sex, disease stage, social deprivation and general health). Knowledge of differing casemix enables a more accurate method of comparing quality of care (see also **casemix adjustment**).
Casemix adjustment	A statistical method of comparing quality of care between organisations that takes into account important and measurable patient characteristics.
Diagnosis	Confirming the presence of the disease (see also **pathological diagnosis**).
Enhanced recovery pathway	Initiatives to improve patient outcomes and speed up a patient's recovery after surgery.
FEV1	Forced expiratory volume in the first second – a measurement of lung capacity used to determine how healthy a patient's lungs are. It can be measured as an absolute amount, or as a percentage predicted (based on gender, age, height).
Hospital trust	An organisation providing secondary healthcare services in England. A hospital trust may be made up of one or several hospitals within a region.
Length of stay	Total number of nights spent in hospital during an admission for lung cancer surgery, both before and after the operation.
Lobectomy	Removal of one lobe of the lung. This is the commonest type of lung cancer operation.
MDT	Multidisciplinary team; a group of healthcare professionals working in a coordinated manner for patient care.
NLCA	National Lung Cancer Audit.
Non-small-cell lung cancer (NSCLC)	A group of types of lung cancer sharing certain characteristics, which makes up 85–90% of all lung cancers. Includes squamous carcinoma and adenocarcinoma (see also **small-cell lung cancer**).
Odds ratio (OR)	Refers to the chance of an outcome happening after risk adjustment, compared with the national average.
Pathological diagnosis	A diagnosis of cancer based on pathological examination of a tissue (histology) or fluid (cytology), as opposed to a diagnosis based on clinical assessment or non-pathological investigation.
Performance status (PS)	The World Health Organization's systematic method of recording the ability of an individual to undertake the tasks of normal daily life compared with that of a healthy person.

Perioperative care	The care that is given before, during and after surgery.
Pneumonectomy	Removal of a whole lung.
Resection	Surgical treatment of a lung cancer, where a surgeon removes a tumour.
Risk adjustment	A statistical process that takes into account underlying health status.
RCP	Royal College of Physicians, the professional body of doctors practising general medicine and its subspecialties.
Secondary care	Care provided by a hospital, as opposed to that provided in the community by a GP and allied staff (primary care).
Sleeve resection	This is removal of a lobe of lung or a whole lung, together with a 'sleeve' of main airway or pulmonary artery, the ends of which are then stitched together. Sleeve lobectomy can sometimes be used to avoid removing a whole lung (see **pneumonectomy**).
Small-cell lung cancer (SCLC)	A type of lung cancer making up around 10–15% of all lung cancers (see also **non-small-cell lung cancer**).
SCTS	Society for Cardiothoracic Surgery in Great Britain and Ireland. This is the specialty organisation representing cardiac and thoracic surgery in the UK and Ireland.
Staging/stage	The anatomical extent of a cancer.
Surgical resection	An operation to remove abnormal tissues or organs.
Surgical unit	A department within a hospital that provides surgery for lung cancer patients.
Tertiary trust	Hospitals that specialise in diagnosis and treatment of specific conditions, often handling very complex cases. Other hospitals may refer patients to these centres for specialist treatment.
Townsend index	A score used to describe material deprivation, incorporating levels of unemployment, car and home ownership and overcrowding in an area
VATS	Video-assisted thoracic surgery. Uses a surgical telescope attached to a video camera and specially made instruments to perform surgery through 1–4 small incisions, usually without spreading the ribs.
Wedge resection	A lung resection in which only the lesion and a small piece of lung are removed. The artery, vein and airway supplying that piece of lung are not dissected (as distinct from a **lobectomy** or segmentectomy).

Appendix 5: Society for Cardiothoracic Surgery unit audit leads

Name	Hospital trust
Doug Aitchison	Basildon and Thurrock University Hospitals
Elizabeth Belcher	John Radcliffe Hospital
Ehab Bishay	Heart of England NHS Foundation Trust
Alex Brunelli	Leeds Teaching Hospitals
Shilly Ghosh	North Staffordshire Royal Infirmary
Kelvin Lau	St Bartholomew's Hospital
Joe Marzouk	University Hospitals Coventry and Warwickshire NHS Trust
Kandadai Rammohan	University Hospital of South Manchester
Sion Barnard	Freeman Hospital
Carol Tan	St George's Hospital
Marc VanLeuvan	Norfolk and Norwich University Hospital
Lukacs Veres	Guy's and St Thomas' NHS Foundation Trust
Steve Wooley	Liverpool Heart and Chest Hospital
Tim Batchelor	University Hospitals Bristol NHS FT
Andy Chukwuemeka	Imperial College Healthcare
Aman Coonar	Papworth Hospital
John Duffy	Nottingham City Hospital
Andy Duncan	Blackpool Teaching Hospitals NHS Foundation Trust
Joel Dunning	James Cook University Hospital
Jonathan Edwards	Northern General Hospital
Martin Hayward	University College Hospital London
Eric Lim	Royal Brompton and Harefield NHS Foundation Trust
Mahmoud Loubani	Castle Hill Hospital
Adrian Marchbank	Derriford Hospital
Sri Rathinam	Glenfield Hospital
Edwin Woo	Southampton General Hospital
Patrick Yiu	The Royal Wolverhampton NHS Trust

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