



Royal College  
of Physicians



Society for Cardiothoracic Surgery  
in Great Britain and Ireland

# Lung cancer clinical outcomes publication 2016 (for the 2014 audit period)

December 2016



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Publication date	December 2016
Target audience	General public; lung cancer patients, their families and their carers; NHS staff in lung cancer multidisciplinary teams; hospital managers and chief executives; commissioners; lung cancer researchers
Description	This is the third 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 2014
Related publications	National Lung Cancer Audit annual reports: <a href="http://www.rcplondon.ac.uk/NLCA">www.rcplondon.ac.uk/NLCA</a>
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## Foreword

This is the third lung cancer clinical outcomes publication. It reports the outcomes of operations to remove lung cancer in English NHS hospitals during the 2014 calendar year.

There have been some important additions since our last report. For the first time, we have reported perioperative survival rates for trusts, adjusted for patient variables that may influence survival. The analysis team have also had access to the Hospital Episode Statistics (HES) dataset, which they have been able to cross-reference with the data available in the cancer registry.

This year, we also report length of stay during surgery for lung cancer resection by unit. This is derived from the HES dataset.

We continue to report survival at 30 and 90 days after surgery, together with the number of operations that surgeons have performed. We also plan to publish the resection rates (the chances of a lung cancer patient being treated by surgery) for cancer teams, alongside the names of the surgeons who work within them. There is evidence that surgical units who operate on a greater proportion of patients achieve better overall survival rates for the populations that they serve, making this an important marker of the quality of a surgical service. The results for resection rates will be available in early 2017.

The data show encouraging improvements in the service provided to NHS patients in England. The number of operations performed has risen again, from 4,895 resections in 2013 to 5,657 in 2014, a 16% year-on-year increase. Survival at 90 days after surgery has risen to 96.2%, while 30-day survival is broadly static at 97.9%. These results compare favourably with similar databases in other countries.

We have included some new data at national level this year, including survival rates 1 year after surgery and the type of procedure performed.

We hope that these new outcomes will be useful to patients, clinical teams and other stakeholders. We also hope to start a debate on which additional outcomes should be included at unit level in subsequent years.

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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 or GP 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.

This is the third report on individual activity of surgeons or their specific 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 2014. The report has been prepared from data collected by NHS hospitals and submitted to the National Lung Cancer Audit (NLCA) via the National Cancer Registration and Analysis Service (NCRAS) in collaboration with the Society for Cardiothoracic Surgery in Great Britain and Ireland (SCTS).

## Outcome measures

The following outcomes are reported for surgeons and their hospitals:

- 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 and 90 days after their operation
- length of stay in hospital following an operation.

Resection rates by the multidisciplinary teams (MDTs) within the specialist hospitals will be published in early 2017 using data collected in 2015. Results will be available on [www.nhs.uk](http://www.nhs.uk) and [www.scts.org](http://www.scts.org).

For the first time, 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 performance status (PS) of a patient, and the stage of the disease.

The full data are available on [www.nhs.uk](http://www.nhs.uk) and [www.scts.org](http://www.scts.org).

## Background

### Data collection

NHS hospitals submit the details for all lung cancer patients, including patients undergoing lung cancer surgery, to the 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.

### 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 2014, there were 28 such hospitals in England (see Appendix 1).

### 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 a type of lung cancer called non-small-cell lung cancer.
- 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 2014.

### 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.nhs.uk](http://www.nhs.uk) and [www.scts.org](http://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 a national breakdown of operations by subtype:

- bilobectomy / lobectomy / sleeve resection
- wedge and multiple wedge resection / segmental resection
- carinal resection / lung resection with resection of chest wall
- pneumonectomy
- other open resection on lungs.

### Survival rates

Survival rates at 30 days and 90 days 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. For these reasons, we believe that the best assessment of the quality of care is to look at the results of the whole team or unit combined.

### Risk adjustment

For the first time, 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 surgeons operate on, including the age, sex, PS, comorbidity and socio-economic status of a patient, and laterality of the lung cancer.

We also present odds ratio (OR) data, which refer to the chance of an outcome happening after risk adjustment. The OR of 30-day and 90-day survival is calculated by unit and relative to the whole LCCOP population. For example, if a unit has a 30-day survival rate of 98.9% with an OR of more than 1, this suggests that the 30-day survival rate is higher than the national average once the casemix of patients has been taken into account.

Further information on the risk adjustment methods used is available in our methodology report, which can be downloaded from [www.scts.org](http://www.scts.org).

## **Length of stay in hospital**

For the first time, 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 also provides important information for patients and their families to inform them about what is to be expected after the procedure.

## **Resection rates**

The resection rate for lung cancer is the number of operations performed, expressed as a proportion of all the lung cancer patients diagnosed at the unit. This applies to all units that diagnose lung cancer, not just those that provide surgical treatment. 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 as possible are referred for surgery.

Data on hospital resection rates are published in the NLCA annual report. Data from 2015 will be used for the purpose of calculating resection rates for this report and will be available in 2017 on [www.nhs.org](http://www.nhs.org) and [www.scts.org](http://www.scts.org).

## Results

### Total number of operations for lung cancer

The NLCA cancer registry identified 5,740 lung cancer resections that took place within the NHS in England in 2014. 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), 5,542 patients who had 5,657 resections were included in the final dataset for publication. This is a 16% increase on the 4,895 patients treated in 2013.

Every thoracic surgical unit in the English NHS has validated and returned their data for this audit period.

In total, 125 consultant surgeons were identified as performing lung cancer resections in 2014. The mean (average) number of cases performed by each surgeon was 45.2. Individual activity ranged from 1 to 157 cases.

There are many possible reasons for high and low volumes. Surgeons starting in practice or retiring during the year may record low numbers. Many surgeons have other commitments, for example academic or management responsibilities, or 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 overall time that they spend on lung cancer operations.

### Reasons for cases not being included in the analyses

The data returned from surgical units were examined for data cleaning. The reasons for exclusion included invalid or inconsistent identifier, surgery that did not take place in 2014, no valid surgery recorded, no MDT host 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.

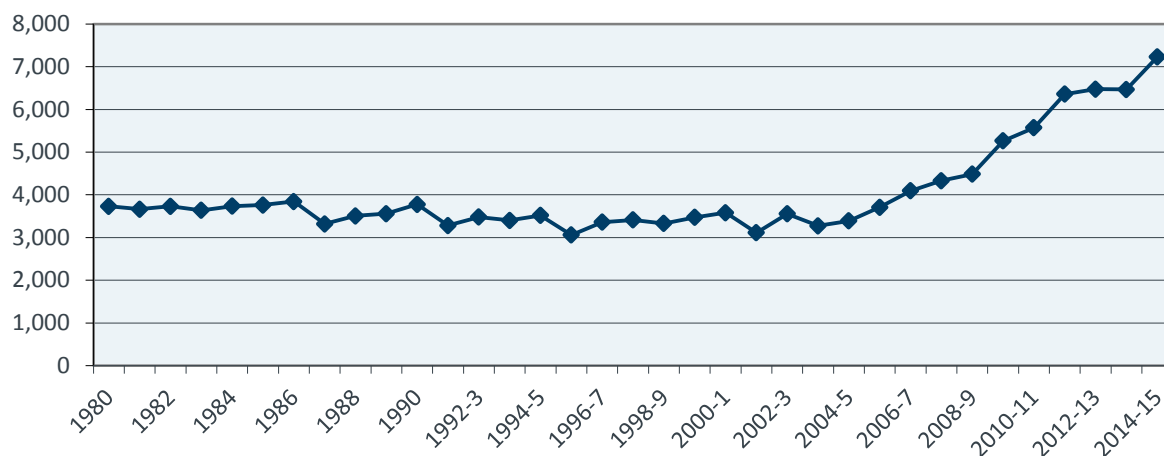
### Breakdown of cases by pathological classification

**Table 1** Breakdown of patients by cancer type

Lung cancer type	Number of patients	Proportion of patients (%)
Non-small-cell lung cancer	5,342	94.4
Carcinoid	226	4.0
Small-cell lung cancer	89	1.6

The number of lung cancer operations has continued to increase over the past decade. The information in Fig 1 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 English NHS hospitals.

**Fig 1** Changes in number of lung cancer operations 1980–2015



Source: the 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 2014.

#### Age

The mean age of a patient having a lung cancer operation in 2014 was 67.9 years. The interquartile age range was 63–75 years.

#### Sex

**Table 2** Number of patients by gender

Sex	Number of patients having lung cancer resections	Proportion of patients (%)
Male	2,738	48.4
Female	2,919	51.6

### 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. In general, surgery is most appropriate in patients with PS scores of 0 and 1.

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

The PS data are only partially complete (see Table 3). Of patients with a status recorded, the great majority have a PS of 0 or 1.

**Table 3** Patients with a recorded performance status

Performance status	Number of patients	Proportion of patients (%)
0	1,521	26.9
1	1,409	24.9
2	203	3.6
3	38	0.7
4	8	0.1
Missing	2,478	43.8

### Types of lung cancer operations performed in 2014

The proportion of surgical operation types performed is shown in Table 4. The commonest operations were lobectomies or bilobectomies (including sleeve lobectomies). Only about one in 20 operations removed the whole lung (pneumonectomy). These are bigger operations, which can have a greater impact on patients, and carry a higher mortality risk.

Lobectomy is the treatment of choice for early lung cancer. Pneumonectomy is reserved for tumours that cannot be removed by lobectomy, generally because of size or position. 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.

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

Type of surgery	Proportion performed in 2014 (%)	Proportion performed in 2013 (%)
Bilobectomy / lobectomy / sleeve resection	73.5	75.9
Wedge and multiple wedge resection / segmental resection	19.7	16.7
Carinal resection / lung resection with resection of chest wall	0.6	1.2
Pneumonectomy	5.3	5.8
Other open resection on lungs	0.9	0.4

**Table 5** Survival rates after surgery by procedure performed in 2014

Type of surgery	Number performed	30-day survival (%)	90-day survival (%)
Bilobectomy / lobectomy / sleeve resection	4,157	98.0	96.3
Wedge and multiple wedge resection / segmental resection	1,115	99.0	97.7
Carinal resection / lung resection with resection of chest wall	33	97.0	97.0
Pneumonectomy	302	93.0	89.7
Other resections	50	100.0	96.0

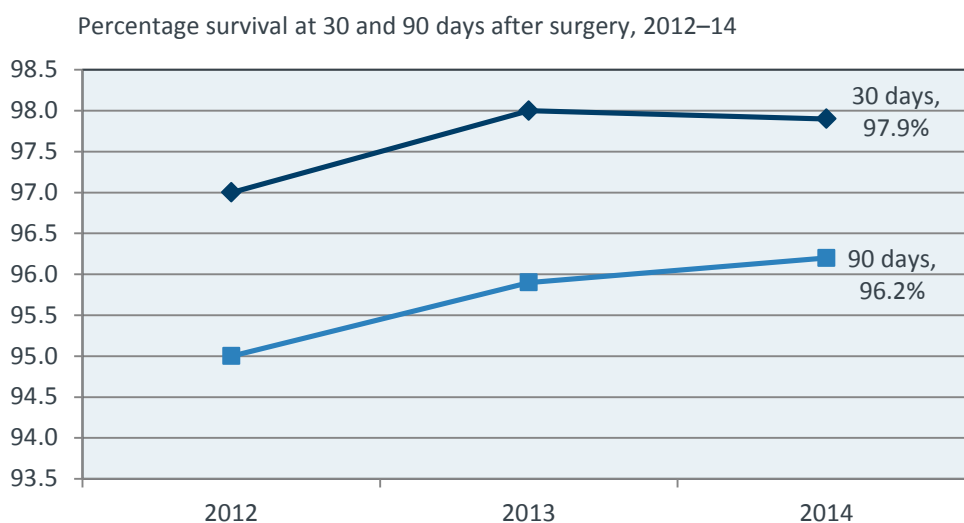
The higher mortality seen after pneumonectomy compared with lesser resections is seen in other similar databases, including the SCTS thoracic registry project ([www.scts.org](http://www.scts.org)).

### 30-day and 90-day survival rates

Results show that survival rates following lung cancer surgery in England are high. In 2014, 97.9% of patients were alive at 30 days and 96.2% were alive at 90 days after surgery, compared with 98.0% and 95.9% respectively in 2013. In 2012, survival was around 97% at 30 days and 95% at 90 days.

These results are very similar to those in our last report (Fig 2). It is encouraging that, despite operating on more patients, survival rates have been maintained. Changes in perioperative care, for example increasing rates of minimal access surgery, modern regional anaesthesia or enhanced recovery pathways, might have contributed to this achievement.

**Fig 2** Changes in 30-day and 90-day survival



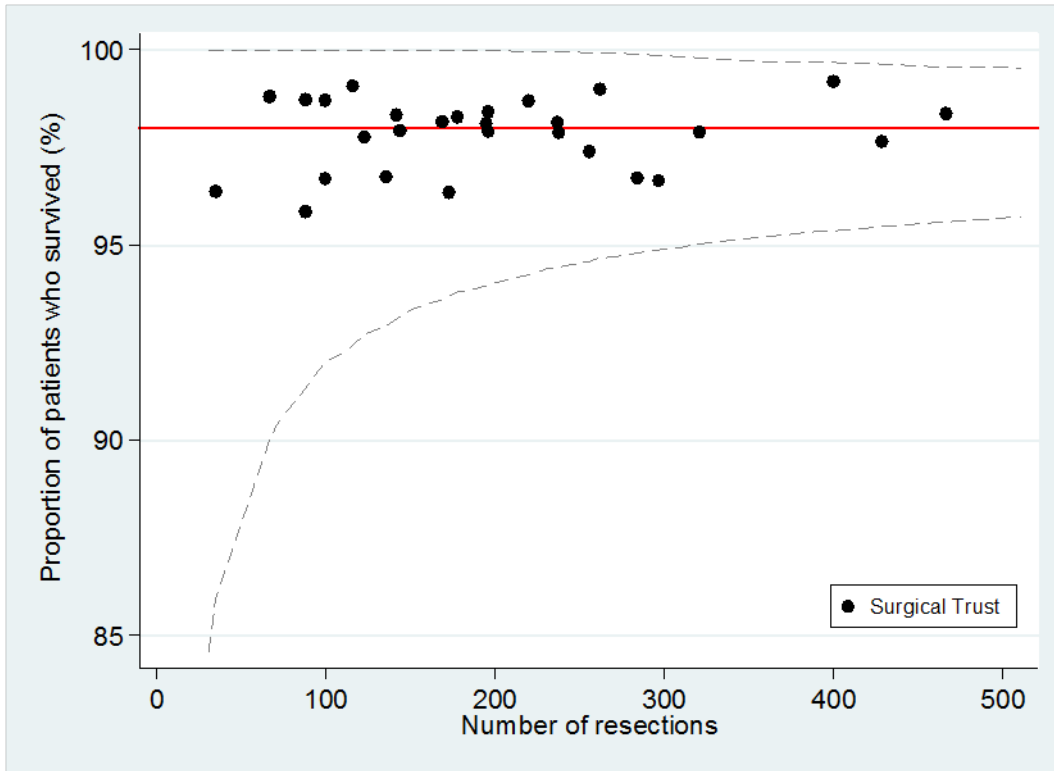
Survival rates were similar across all surgical units. Figs 3 and 4 show that all units are within expected levels of survival at both 30 and 90 days.

We have seen another small improvement in survival at 90 days again this year, although the 30-day figure has remained broadly static.

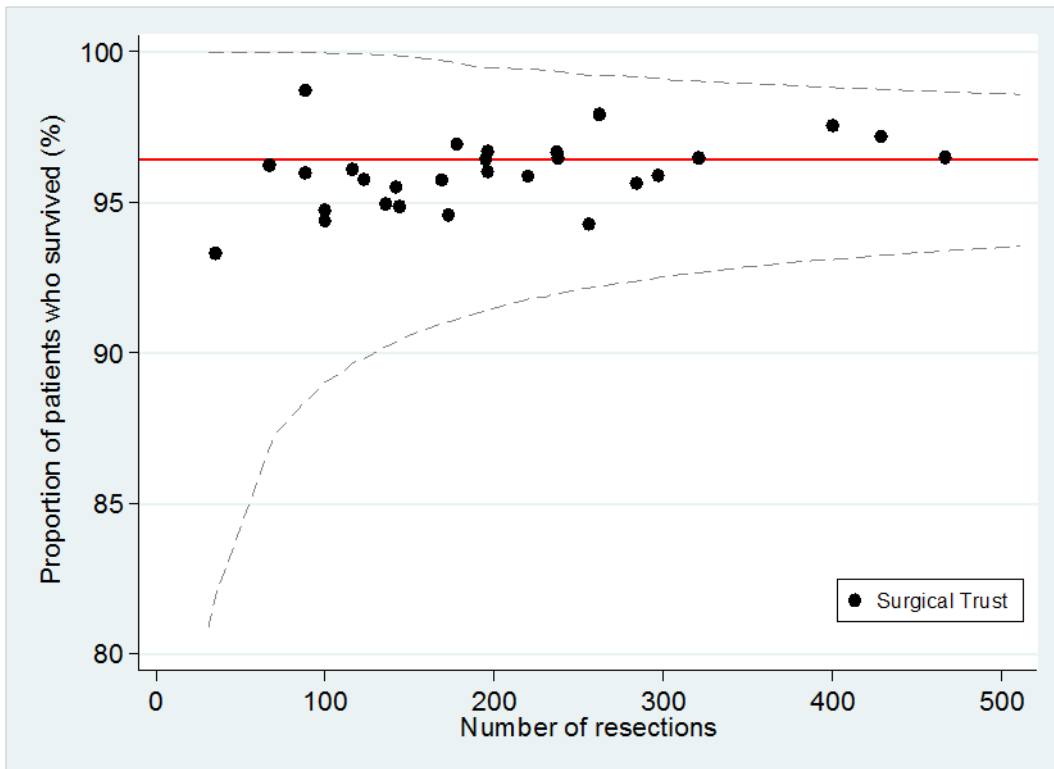
Figs 3 and 4 are funnel plots showing adjusted 30-day and 90-day survival rates by surgical unit. The dotted lines signify the level of survival that would be outside the expected range. The funnel plot does not include units with 100% survival.

The adjusted results include ORs of 30-day and 90-day survival in specified trusts, relative to the whole LCCOP resection population, adjusted for composition of population in terms of age, sex, PS, stage, laterality, comorbidity and socio-economic status.

**Fig 3** Adjusted 30-day postoperative survival by surgical trust



**Fig 4** Adjusted 90-day postoperative survival by surgical trust



## **One-year survival after surgical resection of lung cancer**

In total, 698 patients died within 1 year of lung resection, giving a national 1-year survival rate of 87.7%.

We expect that other factors outside the surgical procedure itself also affect 1-year survival, for example access to other treatments such as chemotherapy and radiotherapy, other supportive care and the overall fitness of patient populations. We may examine this metric further in future reports.

## **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 4,229 resections, 74.8% of the 5,657 procedures performed. Median length of stay in these 4,229 patients was 6 days, with an interquartile range of 5–10 days.

The length of stay data used were obtained from HES 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 1.

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.

We would like to include more information on length of stay in future reports.

Detailed results, listed by hospital trust, are available at My NHS and NHS Choices: [www.nhs.uk](http://www.nhs.uk) and [www.scts.org](http://www.scts.org).

## Appendix 1: Outcomes for surgical resection units in England

Trust or hospital	Number of resections	Median length of stay in days (IQR*)	Length of stay data completeness (%)	30-day survival adjusted (%)	Odds ratio**	99.8% confidence intervals for the OR	90-day survival adjusted (%)	Odds ratio**	99.8% confidence intervals for the OR
Barts Health NHS Trust	142	7 (5–12)	82	98.3	1.28	(0.42–3.90)	95.5	0.84	(0.42–1.67)
Bristol Royal Infirmary	238	5 (3–7)	65	97.9	0.99	(0.41–2.38)	96.5	1.09	(0.53–2.23)
Liverpool Heart and Chest Hospital NHS Foundation Trust <sup>†</sup>	400	7 (5–9)	88	99.2	2.79	(1.03–7.57)	97.5	1.67	(0.97–2.88)
Essex Cardiothoracic Centre	100	6 (5–10)	77	96.7	0.62	(0.20–1.92)	94.4	0.66	(0.27–1.61)
Papworth Hospital	196	6 (4–8)	94	97.9	1.03	(0.39–2.69)	96.7	1.18	(0.53–2.63)
Royal Devon and Exeter Hospital	35	6 (5–8)	94	96.4	0.56	(0.07–4.40)	93.3	0.56	(0.14–2.17)
Southampton General Hospital	237	4 (3–6)	88	98.1	1.16	(0.44–3.00)	96.7	1.18	(0.57–2.45)
Northern General Hospital	256	6 (5–9)	85	97.4	0.80	(0.39–1.63)	94.3	0.65	(0.40–1.06)
Guy's Hospital	429	7 (5–10)	43	97.6	0.90	(0.50–1.63)	97.2	1.27	(0.65–2.49)
St George's Hospital (Tooting)	178	7 (5–10)	47	98.3	1.24	(0.40–3.84)	96.9	1.27	(0.52–3.09)
Royal Stoke University Hospital	173	7 (5–10)	84	96.4	0.58	(0.30–1.13)	94.6	0.70	(0.40–1.23)
Derriford Hospital	88	8 (7–12)	85	98.7	1.67	(0.24–11.7)	98.7	3.07	(0.44–21.6)
University Hospital (Coventry)	88	7 (5–11)	78	95.9	0.50	(0.17–1.51)	96.0	0.96	(0.31–2.94)
New Cross Hospital	67	6 (4–10)	88	98.8	1.79	(0.23–14.1)	96.2	1.03	(0.30–3.54)
Norfolk and Norwich University Hospital	116	7 (5–10)	97	99.1	2.30	(0.31–16.8)	96.1	0.98	(0.35–2.74)
Wythenshawe Hospital	467	6 (4–8)	52	98.4	1.35	(0.69–2.66)	96.5	1.14	(0.71–1.82)
Heartlands Hospital	262	6 (4–8)	74	99.0	2.16	(0.70–6.65)	97.9	1.95	(0.89–4.28)
St James's University Hospital	297	6 (4–8)	73	96.6	0.62	(0.33–1.13)	95.9	0.94	(0.53–1.65)
Heart Hospital	195	7 (5–8)	81	98.1	1.12	(0.41–3.06)	96.4	1.10	(0.52–2.32)
Royal Brompton and Harefield NHS Foundation Trust	321	7 (5–10)	93	97.9	1.01	(0.46–2.21)	96.5	1.11	(0.59–2.07)

Trust or hospital	Number of resections	Median length of stay in days (IQR*)	Length of stay data completeness (%)	30-day survival adjusted (%)	Odds ratio**	99.8% confidence intervals for the OR	90-day survival adjusted (%)	Odds ratio**	99.8% confidence intervals for the OR
Freeman Hospital	284	8 (5–11)	68	96.7	0.57	(0.27–1.21)	95.6	0.81	(0.43–1.55)
John Radcliffe Hospital	100	6 (4–8)	81	98.7	1.67	(0.24–11.6)	94.8	0.73	(0.29–1.86)
James Cook University Hospital	123	7 (5–9)	87	97.8	0.91	(0.28–2.91)	95.8	0.88	(0.39–1.99)
Castle Hill Hospital	169	8 (5–12)	64	98.2	1.14	(0.36–3.53)	95.7	0.88	(0.42–1.85)
Glenfield Hospital	196	7 (5–10)	71	98.4	1.43	(0.46–4.42)	96.0	0.90	(0.38–2.15)
Nottingham University Hospital City Campus	220	6 (5–9)	90	98.7	1.67	(0.55–5.13)	95.9	0.94	(0.49–1.82)
Blackpool Victoria Hospital	144	9 (7–12)	80	97.9	0.99	(0.32–3.08)	94.9	0.71	(0.32–1.55)
Hammersmith Hospital	136	8 (6–13)	78	96.8	0.65	(0.26–1.61)	94.9	0.76	(0.35–1.61)
<b>Overall English NHS data</b>	<b>5,657</b>	<b>6 (5–10)</b>	<b>75</b>	<b>97.9</b>	<b>1.00</b>		<b>96.2</b>	<b>1.00</b>	

\*IQR = interquartile range

\*\*Odds ratios are expressed relative to the entire national data

†Survival rates 30 days after surgery at the Liverpool Heart and Chest Hospital in 2014 were significantly better than the national average. This unit is therefore a positive outlier on his measure

## Appendix 2: Glossary

<b>Bilobectomy</b>	Removal of two of the three lobes of the right lung, either upper and middle together or lower and middle.
<b>Biopsy</b>	Removal and examination of tissue, usually microscopic, to establish a precise <b>(pathological) diagnosis</b> .
<b>Carinal resection</b>	Removal of part of the windpipe at the point where it divides into the left and right lungs.
<b>Casemix</b>	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 ( <b>casemix adjustment</b> ).
<b>Casemix adjustment</b>	A statistical method of comparing quality of care between organisations that takes into account important and measurable patient characteristics.
<b>Diagnosis</b>	Confirming the presence of the disease (see <b>pathological diagnosis</b> ).
<b>Enhanced recovery pathway</b>	Initiatives to improve patient outcomes and speed up a patient's recovery after surgery.
<b>Hospital trust</b>	An organisation providing secondary healthcare services in England. A hospital trust may be made up of one or several hospitals within a region.
<b>Length of stay</b>	Total number of nights spent in hospital during an admission for lung cancer surgery, both before and after the operation.
<b>Lobectomy</b>	Removal of one lobe of the lung. This is the commonest type of lung cancer operation.
<b>MDT</b>	Multidisciplinary team; a group of healthcare professionals working in a coordinated manner for patient care.
<b>NLCA</b>	National Lung Cancer Audit.
<b>Non-small-cell lung cancer (NSCLC)</b>	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 <b>small-cell lung cancer</b> .
<b>Odds ratio (OR)</b>	Refers to the chance of an outcome happening after risk adjustment, compared with the national average.
<b>Pathological diagnosis</b>	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.
<b>Performance status (PS)</b>	A systematic method of recording the ability of an individual to undertake the tasks of normal daily life compared with that of a healthy person.
<b>Perioperative care</b>	The care that is given before, during and after surgery.
<b>Pneumonectomy</b>	Removal of a whole lung.
<b>Resection</b>	Surgical treatment of a lung cancer, where a surgeon removes a tumour.
<b>RCP</b>	Royal College of Physicians, the professional body of doctors practising general medicine and its subspecialties.

<b>Secondary care</b>	Care provided by a hospital, as opposed to that provided in the community by a GP and allied staff (primary care).
<b>Sleeve resection</b>	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 <b>pneumonectomy</b> ).
<b>Small-cell lung cancer (SCLC)</b>	A type of lung cancer making up around 10–15% of all lung cancers. See also <b>non-small-cell lung cancer</b> .
<b>SCTS</b>	Society for Cardiothoracic Surgery is Great Britain and Ireland. This is the specialty organisation representing cardiac and thoracic surgery in the UK and Eire.
<b>Staging/stage</b>	The anatomical extent of a cancer.
<b>Surgical resection</b>	An operation to remove abnormal tissues or organs.
<b>Surgical unit</b>	A department within a hospital that provides surgery for lung cancer patients.
<b>Wedge resection</b>	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 <b>lobectomy</b> or segmentectomy).

### Appendix 3: Society for Cardiothoracic Surgery unit audit leads

<b>Name</b>	<b>Hospital trust</b>
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
Sasha Stamenkovic	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	Bristol Royal Infirmary
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
Peter Froeschle	Royal Devon and Exeter NHS Trust
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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