



Royal College  
of Physicians

National Lung  
Cancer Audit

National Lung Cancer Audit

# Spotlight report on curative intent treatment of stage I–IIIa non-small-cell lung cancer

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In partnership with:



Public Health  
England



The University of  
Nottingham

Commissioned by:



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This work uses data that has been provided by patients and collected by the NHS as part of their care and support. The data is collated, maintained and quality assured by the National Cancer Registration and Analysis Service (NCRAS), which is part of Public Health England (PHE). Access to the data was facilitated by the PHE Office for Data Release.  
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Royal College of Physicians  
11 St Andrews Place  
Regent's Park  
London NW1 4LE

[www.rcplondon.ac.uk](http://www.rcplondon.ac.uk)  
Registered Charity No 210508

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## Executive summary

In 2017, the National Lung Cancer Audit (NLCA) ran its first spotlight audit to understand why patients diagnosed between 1 January and 31 December 2015 with stage I and II disease were not receiving surgery despite having a good performance status (PS), and what alternative treatments they received. The audit examined 751 patients and showed that almost half of patients did undergo curative-intent treatment with radiotherapy, and that for many patients it was a personal choice not to undergo treatment.

This spotlight audit again focuses on patients with early-stage disease and good PS, who did not receive surgery to see if progress has been made. In addition, the audit also investigates the complex management of patients with stage IIIa disease.

A total of 133 NHS trusts were invited to take part in the study and asked to provide data on at least 15 cases for patients who fit the audit criteria and were diagnosed between 1 January 2017 and 30 June 2018. Of those invited, 59% (78/133) of trusts took part, providing data on 1,056 patients with stage Ia–IIb non-small-cell lung cancer (NSCLC) and 851 patients with stage IIIa disease.

### Key findings include:

- > 62% (46% in 2015) of patients with early-stage disease who did not have surgery received radiotherapy, while 35% (46% in 2015) still received no specific anticancer treatment.
- > 15% declined surgery due to patient wishes (versus 31% in 2015).
- > Of 212 patients with stage IIIa disease in whom we obtained complete staging data, only 35% underwent an endobronchial ultrasound (EBUS) and 10% had a magnetic resonance imaging (MRI) scan of the brain, as recommended by national guidelines.
- > There was considerable missing data which hampered these analyses and the number of recommendations. For example, data on comorbidities was missing in approximately 75% of patients so this could not be reliably adjusted for in the survival analyses.

## Recommendations

Recommendation	Result / page in the report	Standard/guidance	Key audience
1 MDTs should review the case records of patients with early-stage disease and good PS who do not receive treatment with curative intent.*	Page 10	NICE lung cancer quality standard (updated 2019) statement 5	Clinical leads, respiratory physicians, thoracic surgeons, clinical oncologists, lung cancer managers
2 Patients who are borderline for surgery should undergo physiological testing in line with national guidelines.	Page 10	NICE lung cancer guideline (updated 2019) recommendations 1.4.5–1.4.18	Clinical leads, respiratory physicians, thoracic surgeons, clinical oncologists, lung cancer managers
3 MDTs should review the case records of patients with inoperable stage IIIa disease who do not undergo concurrent chemoradiotherapy.*	Page 13	NICE lung cancer guideline (updated 2019) recommendations 1.4.28	Clinical leads, respiratory physicians, clinical oncologists, lung cancer managers
4 Patients with stage IIIa NSCLC should undergo staging EBUS and an MRI scan of the brain prior to treatment decision.	Page 13	NICE lung cancer guideline (updated 2019) recommendations 1.3.20 and 1.3.25	Clinical leads, respiratory physicians, thoracic surgeons, clinical oncologists, radiologists, lung cancer managers

\*Consider using the NLCA improvement toolkit, to be published in August 2020

EBUS = endobronchial ultrasound; MDT; multidisciplinary team; MRI = magnetic resonance imaging; NICE = National Institute for Health and Care Excellence; NSCLC = non-small-cell lung cancer; PS = performance status

## Introduction

### Background

It is established that surgery and other treatments delivered with curative intent offer the best chance of long-term survival for patients with early-stage lung cancer. However, survival for patients with early-stage disease in the UK has been lower than other developed nations despite similar healthcare spending,<sup>1</sup> and this may be in part explained by lower treatment rates. Delivering curative-intent treatment to these patients is now a NICE 2019 quality standard.<sup>2</sup>

The 2017 spotlight audit (2015 data)<sup>3</sup> demonstrated that guidelines for assessment of patients with borderline fitness were not being adhered to, with few patients undergoing guideline-recommended physiological assessments. It also showed that survival was improved when patients received radical radiotherapy compared with no treatment, after adjustment for age, PS, stage, deprivation index and comorbidity index. Therefore, improving the treatment rates of patients with early-stage disease is likely to improve outcomes from lung cancer. In this current spotlight audit the NLCA sought to reassess a similar group of patients to those in the previous audit, to evaluate whether practice had changed.

In addition to patients with stage I and II disease, the NLCA were interested to examine the real-world management of stage IIIa disease. While the optimal treatment of this patient group is an area of controversy, recent NICE guidance<sup>4</sup> recommends multimodality treatment. However, recent data from the NLCA showed that very few patients receive multimodality treatment.<sup>5</sup> This is particularly important with new data showing a significant survival benefit from immunotherapy following concurrent chemoradiotherapy in patients with inoperable stage III disease.<sup>6</sup>

This report provides recommendations which multidisciplinary teams can implement for quality improvement with the aim of improving treatment rates as well as quality of treatment for patients with early-stage disease.

## Methods

Full details of the methods can be found on the NLCA website <https://nlca.azurewebsites.net/AnnualReport>. All 133 NHS trusts that see patients with lung cancer in England were invited to take part in this spotlight audit. In collaboration with Public Health England, a dedicated online portal was created to enable trusts in England to input data securely. The portal was pre-populated with all cases matching the audit criteria, as identified by the National Cancer Registration and Analysis Service (NCRAS), and trusts were then asked to complete data on at least 15 cases.

A slightly longer audit period of 18 months (12 months in 2015) ensured that data was available for trusts to have a large enough cohort of patients.

Audit criteria included:

- 1 patients diagnosed with NSLC between 1 January 2017 and 30 June 2018; **and either**
- 2 patients with stage I–IIIa, PS 0–2, and not treated with surgery; **or**
- 3 patients with stage IIIa, with PS 0–2, and treated with surgery only.

NICE and the British Thoracic Society guidelines<sup>7</sup> provide recommendations on the management of patients with stage I–IIIa disease. To compare current practice with these guidelines, the audit aimed to carry out the following pre-specified analyses:

- 1 analysis of treatments for patients with stage I–IIb
- 2 analysis of treatments for patients with stage IIIa
- 3 proportion of patients with stage Ia–IIb having a second surgical opinion
- 4 proportion of patients with stage IIIa disease having staging EBUS
- 5 proportion of patients with stage IIIa disease having brain imaging
- 6 identify the reasons why patients did not undergo treatment with curative intent.

## Results

Of the 133 trusts invited, data was received from 59% (78/133) trusts. There were data available on 1,056 patients with stage Ia–IIb NSCLC and 851 patients with stage IIIa NSCLC.

### Patients with stage Ia–IIb NSCLC

The demographic details for patients with stage Ia–IIb NSCLC who did not undergo surgery are summarised in Table 1. Of these 1,056 patients, 372 (35%) received no specific anticancer treatment while 657 (62%) received some form of radiotherapy, the majority of which was delivered with apparent curative intent (Fig 1).

Twenty-seven patients (3%) received chemotherapy alone. In this cohort, patients from the most-deprived quintile were almost twice as likely to receive radiotherapy as those from the least-deprived quintile (OR 1.98, 95% CI 1.24–3.14),\* after adjustment for covariates including age, sex, stage and PS. A PS of 1 was also associated with higher rates of radiotherapy (OR 1.55, 95% CI 1.05–2.28) although this was not seen for patients with a PS of 2.

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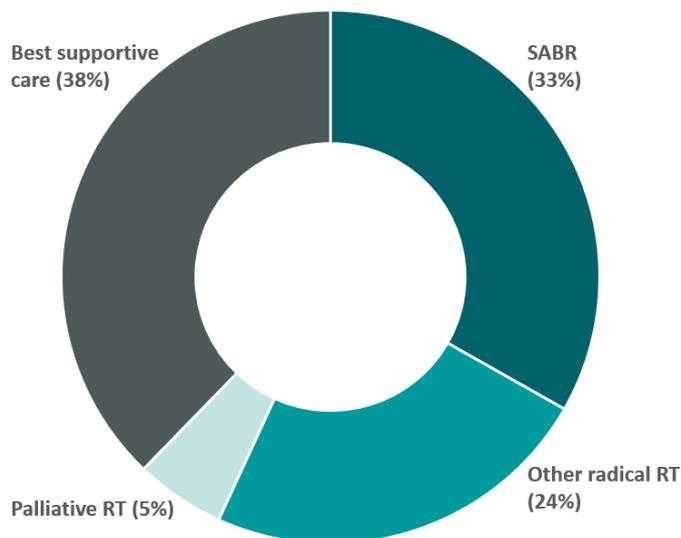
\* OR = odds ratio; CI = confidence interval

**Table 1. Demographics of patients with stage Ia–IIb NSCLC who did not undergo surgery**

Patient features	All patients with stage Ia–IIb PS 0–2 lung cancer not receiving surgery (n=1,056)	%
<b>Sex</b>		
Female	547	51.8
Male	509	48.2
<b>Age (years)</b>		
<65	117	11.1
65–75	347	32.9
>75	592	56.1
<b>Ethnicity</b>		
White	967	91.6
Asian / British Asian	15	1.4
Black / black British	9	0.9
Mixed	1	0.1
Other	19	1.8
Unknown	45	4.3
<b>IMD quintile</b>		
1	139	13.2
2	193	18.3
3	229	21.7
4	246	23.3
5 (most deprived)	249	23.6
<b>Performance status</b>		
0	153	14.5
1	460	43.6
2	443	42.0
<b>Stage</b>		
Ia	516	48.9
Ib	221	20.9
IIa	96	9.1
IIb	223	21.1
<b>FEV1 percentage</b>		
Median (IQR)	70 (51–90)	N/A

FEV1 = forced expiratory volume in 1 second; IMD = index of multiple deprivation; IQR = interquartile range; NSCLC = non-small-cell lung cancer; PS = performance status

Fig 1. Treatments received by patients with stage Ia–IIb PS 0–2 NSCLC



RT = radiotherapy; SABB = stereotactic ablative radiotherapy

**Recommendation 1: MDTs should review the case records of patients with early-stage disease and good performance status who do not receive treatment with curative intent.**

In this cohort, 6% of patients underwent a cardiopulmonary exercise test, 1% had a V/Q scan and 21% had an echocardiogram. Five per cent of patients received a second opinion from a thoracic surgeon, with less than 1% receiving that opinion from a surgeon from a different unit.

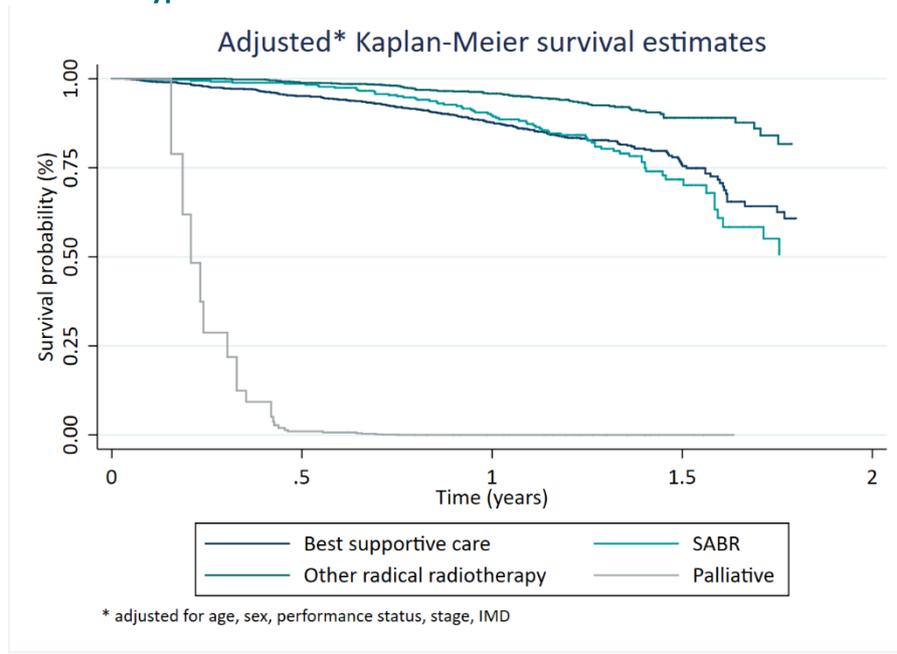
**Recommendation 2: Patients who are borderline for surgery should undergo physiological testing in line with national guidelines (NICE lung cancer guideline (updated 2019) recommendations 1.4.5–1.4.18).**

Comorbidities were reported as being a reason for not having surgery in 11% of patients. Six per cent of patients had mild to moderate chronic obstructive pulmonary disease (COPD), with 3% of patients having moderate or severe ischaemic heart disease or heart failure. Patient preference was the documented reason for not having surgery in 15% of patients. However, 75% of patients had no data provided for the field which asked about the reason for not having surgery.

An analysis comparing survival in patients undergoing SABB, conventional radical radiotherapy and best supportive care was also carried out. The 1-year survival for patients having best supportive care only was 53%, for SABB it was 80%, for other radical radiotherapy it was 67% and for those undergoing palliative radiotherapy only 25% of patients were alive at 1 year. Survival was adjusted for age, gender, PS, stage and deprivation index. This showed that SABB

(OR 0.45, 95% CI 0.34–0.60) and other radical radiotherapy (OR 0.75, 95% CI 0.66–0.85) both improved survival compared with best supportive care in these patients. Figure 2 demonstrates that the overall survival benefit for patients receiving other radical radiotherapy compared with best supportive care persisted over time.

**Fig 2. Adjusted survival of 1,056 patients with stage Ia–IIb PS 0–2 disease according to treatment type**

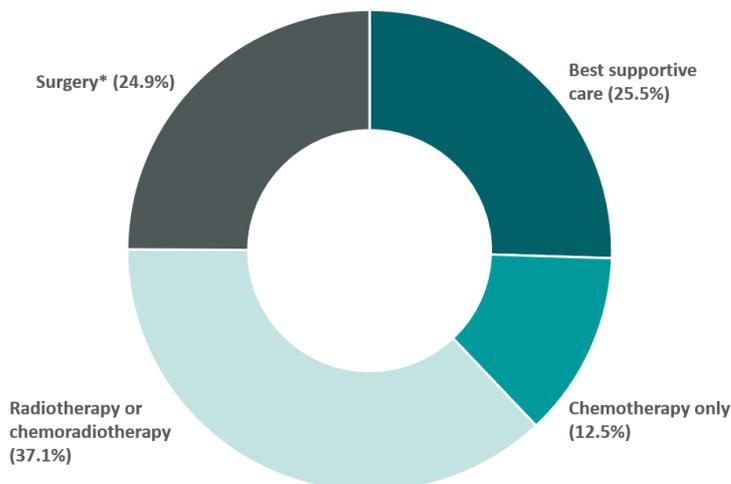


IMD = index of deprivation; SABR = stereotactic ablative radiotherapy

### Patients with stage IIIa NSCLC

Data was available on 851 patients with stage IIIa NSCLC from 78 trusts. The patient demographics are shown in Table 2 and treatments received are shown in Fig 3.

**Fig 3. Treatments received by patients with stage IIIa NSCLC**



\*17 patients included in the surgery category also received radiotherapy.

**Table 2. Demographics of patients with stage IIIa NSCLC**

Patient features	All patients with stage IIIa PS 0–2 (n=851)	%
<b>Sex</b>		
Female	389	45.7
Male	462	54.3
<b>Age (years)</b>		
<65	164	19.3
65–75	358	42.1
>75	329	38.7
<b>Ethnicity</b>		
White	782	91.9
Asian / British Asian	17	2.0
Black / black British	9	1.1
Mixed	5	0.6
Other	11	1.3
Unknown	27	3.2
<b>IMD quintile</b>		
1	111	13.0
2	154	18.1
3	156	18.3
4	183	21.5
5 (most deprived)	247	29.0
<b>Performance status</b>		
0	210	24.7
1	429	50.4
2	212	24.9
<b>FEV1 percentage</b>		
Median (IQR)	74 (57–91)	N/A

FEV1 = forced expiratory volume in 1 second; IMD = index of multiple deprivation; IQR = interquartile range; PS = performance status

In the cohort of 851 stage IIIa patients, 212 (25%) received surgery alone. Of the remaining 639 patients, 75 (12%) of these underwent concurrent chemoradiotherapy with 62 (10%) undergoing sequential chemoradiotherapy. After adjustment for age, sex, PS and deprivation index, men were more than three times more likely to receive concurrent chemoradiotherapy than women (OR 3.44, 95% CI 1.50–7.89). As would be predicted, those aged over 75 years (OR 0.24, 95% CI 0.10–0.61) were less likely to receive concurrent chemoradiotherapy than those under the age of 65. Additionally, those with a PS of 2 (OR 0.14, 95% CI 2.53–21.77) were considerably less likely to receive concurrent chemoradiotherapy compared with those with a PS of 0.

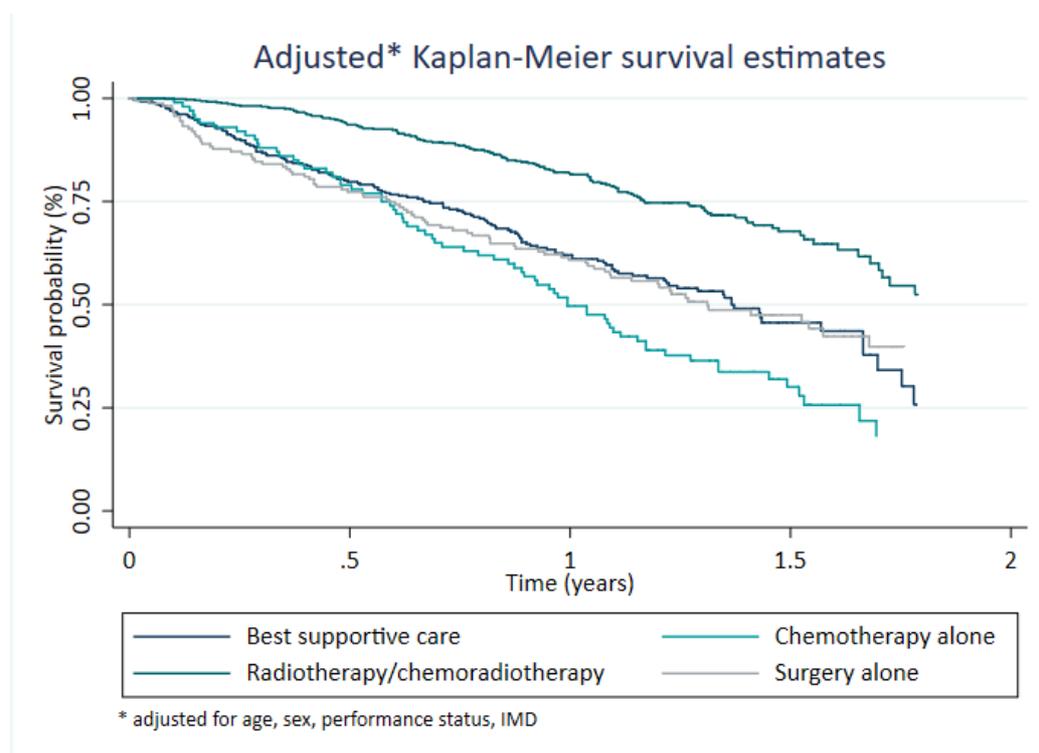
**Recommendation 3: MDTs should review the case records of patients with inoperable stage IIIa disease who do not undergo concurrent chemoradiotherapy.**

Approximately 75% of patients in the stage IIIa cohort had missing data on staging techniques. Excluding these patients, 35% underwent an EBUS and 10% had a mediastinoscopy. Ten per cent of patients had an MRI scan of the brain and 22% had a computed tomography (CT) scan of the brain.

**Recommendation 4: Patients with stage IIIa NSCLC should undergo staging EBUS and MRI scan of the brain prior to treatment decision.**

The adjusted survival of patients with stage IIIa disease in this cohort is shown in Fig 4. The median survival for patients receiving best supportive care was 0.9 years, chemotherapy alone was 1.08 years, radiotherapy or chemoradiotherapy was 1.52 years and those having surgery alone was 1.68 years.

**Fig 4. Adjusted survival of 851 patients with stage IIIa disease by treatment modality, excluding those who had surgery and adjuvant treatment**



## Commentary

In comparison with other countries in Europe, England's long-term survival for people with lung cancer requires improvement, ranking 26th out of 29 countries.<sup>8</sup> While further progress is required in anticancer therapies and early detection, focus should also be applied to better implementation of current evidence and guidelines which would result in improved outcomes.

This spotlight audit focuses on patients with early-stage disease and good PS who did not receive treatment with curative intent. This follows on from the first spotlight audit carried out on patients with stage Ia–IIb NSCLC who did not undergo surgery. Improving curative treatment rates in this patient group may significantly improve long-term outcomes and a recent update from NICE included curative treatment of patients with stage I and II NSCLC as a new quality standard. It is also a measure by which outliers are analysed by the NLCA and shared with the Care Quality Commission.

This spotlight audit highlights that 62% of patients with early-stage disease who did not have surgery, instead received radiotherapy (mostly with curative intent), while 35% still received no specific anticancer treatment. This is an improvement from results in the previous spotlight audit (2015 data) when 46% received no treatment. According to these data, prevalence of significant comorbidities was low and only 15% declined surgery due to patient wishes. This is also lower than 31% who declined surgery in 2015. However, very few patients are offered a second surgical opinion.

The reduction in proportion receiving no treatment is encouraging, however, the audit also highlights important inequalities in lung cancer care. After adjustment for covariates including age, sex, stage and PS, patients from the most-deprived quintile were almost twice as likely to receive radiotherapy as those from the least-deprived quintile. It has previously been shown that patients from higher socioeconomic backgrounds are more likely to undergo surgery.<sup>9</sup> It is therefore recommended that MDTs still place emphasis on reviewing patients with early-stage disease and good performance who are not offered treatment with curative intent.

For the first time, the spotlight audit has also included patients with stage III disease. Data were not collected on those with stage IIIa disease undergoing surgery followed by chemotherapy, since this is an established standard of care in some circumstances. It found that a quarter of remaining patients underwent surgery alone and that the proportion of patients (12%) receiving concurrent chemoradiotherapy is low. The addition of durvalumab to concurrent chemoradiotherapy is known to improve survival for patients with inoperable stage IIIa disease,<sup>6</sup> however, this audit shows that very few patients in this cohort would be eligible to receive this. Multivariate analysis suggested an important gender inequality in this patient group with men 3.4 times more likely to receive concurrent radiotherapy than women. It is important that MDTs review patients with inoperable stage IIIa disease to clarify why patients are not receiving concurrent chemoradiotherapy. Anticipated consensus guidelines from the Royal College of Radiologists should help MDTs to ensure optimal assessment and treatment in these patients.

Current NICE quality standards also recommend accurate diagnosis and staging which includes an MRI scan of the brain and EBUS for patients with stage IIIa disease. In 212 patients with stage IIIa disease and completed staging data, only 35% of patients underwent an EBUS and 10% had an MRI scan of the brain. In this cohort, 1-year survival of patients undergoing chemoradiotherapy (concurrent or sequential) was 65%, compared with 75% 1-year survival for patients in the control arm of the PACIFIC trial.<sup>6</sup> This highlights that significant improvements can be made if more patients can be offered treatment with curative intent.

This spotlight audit has several limitations. First, there is likely to be some selection bias. Responses were received from 78 out of 133 trusts and it is possible that these are better performing trusts. However, data were returned on over 1,000 patients. Second, there was considerable missing data which has hampered the analysis and number of recommendations. For example, data on comorbidities were missing in approximately 75% of patients so this could not be reliably adjusted for in the survival analyses. Finally, data for this audit were collected on patients diagnosed across 2017 to 2018 prior to the updated NICE guidance and UK approval of durvalumab.

National efforts are ongoing to improve early detection of lung cancer through lung health checks and other initiatives. However, the majority of patients with lung cancer are still likely to present via routine clinical pathways. It is vital that these patients have accurate diagnosis and staging in a timely fashion, with optimisation of comorbidities with a view to offering treatment with curative intent whenever possible. For patients with borderline fitness, regional MDTs would provide a second surgical opinion and ensure appropriate physiological testing. Regional MDTs could also be utilised for the management of stage III disease and their national implementation should be considered and evaluated. In the meantime, this spotlight audit highlights several areas of quality improvement for MDTs to review with the intention of better adherence to national guidelines and improvement in the proportion of patients who receive treatment with curative intent.

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## Document purpose

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<b>Document purpose</b>	To disseminate results from the spotlight audit investigating the curative-intent treatment of stage I–IIIa non-small-cell lung cancer.
<b>Title</b>	National Lung Cancer Audit. <i>Spotlight report audit investigating the curative intent treatment of stage I–IIIa non-small-cell lung cancer, July 2020.</i>
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<b>Publication date</b>	July 2020.
<b>Target audience</b>	NHS staff in lung cancer multidisciplinary teams; hospital managers and chief executives; commissioners; lung cancer researchers; patients.
<b>Related publications</b>	Spotlight audit 2017 (see pages 25-26 of the 2017 annual report) <a href="https://nlca.azurewebsites.net/AnnualReport">https://nlca.azurewebsites.net/AnnualReport</a>
<b>Contact</b>	<a href="mailto:nlca@rcplondon.ac.uk">nlca@rcplondon.ac.uk</a>

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## Glossary

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<b>Durvalumab</b>	A type of immunotherapy used in the treatment of lung cancer
<b>EBUS</b>	Endobronchial ultrasound (EBUS) is a procedure used to diagnose lung cancer (and other diseases) and uses high frequency sound waves to create pictures of the lungs
<b>Performance status</b>	A measure of how well a person is able to carry on with ordinary daily activities
<b>SABR</b>	Stereotactic ablative radiotherapy (SABR) is a way of giving a very high dose of radiotherapy to a small portion of the lung
<b>Staging techniques</b>	Techniques used to determine the extent of the cancer including physical examination, imaging testing (such as X-rays and CT scans) and tumour biopsies

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CT = computed tomography

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### Care Quality Improvement Department, Royal College of Physicians

Dr Neal Navani, consultant respiratory physician, National Lung Cancer Audit clinical lead  
Dr Paul Beckett, consultant respiratory physician, National Lung Cancer Audit senior clinical lead  
Dr Susan Harden, consultant clinical oncologist, National Lung Cancer Audit clinical lead  
Rachel Tebay, National Lung Cancer Audit programme manager  
Karina Pall, National Lung Cancer Audit project manager  
Hannah Jones, National Lung Cancer Audit coordinator

### National Cancer Registration and Analysis Service

Natasha Wood, audit project manager  
Eleanor Fitzgerald, cancer intelligence analyst  
Chloe Bright, BCoC senior analyst  
Esther Farmer, administration officer  
Brian Shand, developer

### Faculty of Medicine and Health Sciences, University of Nottingham

Aamir Khakwani, post-doctoral research fellow  
Aisha Jallow, analyst  
Emily Peach, researcher

### NLCA Programme Board members

Teena Chowdhury, operations director, audit and accreditation, Royal College of Physicians  
Jane Youde, clinical director, audit and accreditation, Royal College of Physicians  
Rachel Tebay, programme manager, NLCA, Royal College of Physicians  
Paul Beckett, clinical lead, NLCA, Royal College of Physicians  
Neal Navani, senior clinical lead, NLCA, Royal College of Physicians  
Susan Harden, co-clinical lead, NLCA, Royal College of Physicians  
Richard Booton, consultant respiratory physician, British Thoracic Oncology Group  
Julia McAdam, Macmillan lung cancer clinical nurse specialist, National Lung Cancer Forum for Nurses  
Jem Rashbass, national director for disease registration, Public Health England  
Lorraine Dallas, director of information and support, Roy Castle Lung Cancer Foundation  
Jesme Fox, medical director, Roy Castle Lung Cancer Foundation  
Doug West, thoracic surgery audit lead, Society for Cardiothoracic Surgery  
Richard Hubbard, professor of respiratory epidemiology, University of Nottingham  
Gareth Collier, consultant respiratory physician, Wales Cancer Network  
Mick Peake, clinical director, Centre for Cancer Outcomes, University College London Hospitals Cancer Collaborative  
Sarah Walker, project manager, National Clinical Audit and Patient Outcomes Programme, HQIP  
James Campbell, associate director, National Clinical Audit and Patient Outcomes Programme, HQIP

NLCA@rcplondon.ac.uk

**The National Lung Cancer Audit (NLCA)**

Royal College of Physicians

11 St Andrews Place

Regent's Park

London NW1 4LE



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