Surveying surgeon practices and perspectives on extent of intraoperative nodal evaluation in non–small cell lung cancer

Lyndon C. Walsh, BA,[a,b] Alessandro Brunelli, MD,[c] Biniam Kidane, MD, MSc,[d] Jazmin Eckhaus, MBBS,[e] Pierre Olivier Fiset, MD, PhD,[f] Jonathan D. Spicer, MD, PhD,[b] and Mara B. Antonoff, MD[a]

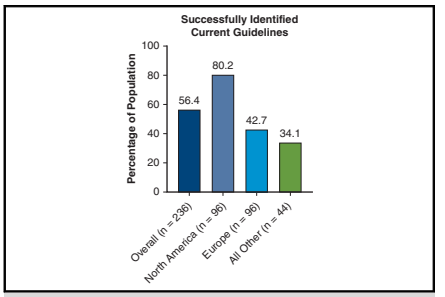
ABSTRACT

Objective: The National Comprehensive Cancer Network and Commission on Cancer guidelines encourage surgeons to obtain tissue from 1 or more N1 and 3 N2 nodal stations during resection for non–small cell lung cancer. We aimed to characterize surgeons' familiarity with and adherence to recommended guidelines and to elucidate factors influencing surgical practices globally.

Methods: A questionnaire was designed to assess surgeon behaviors regarding intraoperative nodal assessment decisions during lung cancer resection. Survey items included demographics, case-based scenarios, self-perceived behaviors regarding nodal decision-making, and knowledge-based questions regarding nodal assessment guidelines. The survey was distributed to the General Thoracic Surgical Club, European Society of Thoracic Surgeons, Canadian Association of Thoracic Surgeons, and Australian & New Zealand Society of Cardiac & Thoracic Surgeons.

Results: Altogether, 236 of 2396 surgeons (9.8%) from 46 countries responded. The majority were men (192/236) and general thoracic surgeons (204/236). Participants were subcategorized into North America (n = 96), Europe (n = 96), and All Other (n = 44). The importance of 4 variables that impact lymph node excision varied by region: length of procedure ($P = .04$), patient age ($P = .0004$), patient frailty ($P = .0034$), and institutional guidelines ($P = .01$). Surgeons stated that in patients who received neoadjuvant treatment, most would opt for a full lymphadenectomy. A total of 80.5% (n = 190) claimed familiarity with guidelines, yet only 56.4% (n = 133) could identify the guidelines.

Conclusions: The variables driving intraoperative decision-making for nodal dissection vary by region. Moreover, surgeons tend to overstate their knowledge of existing guidelines. To optimize cancer care around the world, education needs to be provided uniformly to drive positive patient outcomes. (JTCVS Open 2025;24:376-82)



A knowledge gap exists pertaining to NSCLC intraoperative LN evaluation guidelines.

CENTRAL MESSAGE

Surgeons' tendencies regarding the extent of intraoperative LN evaluations are variable in terms of adherence to the published guidelines and are dependent on a number of variables.

PERSPECTIVE

The NCCN and Commission on Cancer recommend evaluation of nodal tissue from 1 or more N1 and 3 N2 stations during lung cancer resection. We explored factors impacting guideline implementation, identifying gaps in surgeon familiarity with guidelines as well as nuanced factors that impact intraoperative decisions regarding extent of lymphadenectomy.

Recognizing the value of characterizing the presence of malignant cells within nodal tissue as well as the location and number of involved nodes, thoracic surgeons have tracked the site of resected lymph nodes (LNs) for decades. Resections performed for non–small cell lung cancer (NSCLC) have been guided by early mapping diagrams of LNs by

From the [a]Department of Cardiovascular and Thoracic Surgery, The University of Texas MD Anderson Cancer Center, Houston, Tex; [b]Department of Thoracic Surgery, Montréal General Hospital, Montréal, Québec, Canada; [c]Department of Thoracic Surgery, St James's University Hospital, Leeds, United Kingdom; [d]Section of Thoracic Surgery, University of Manitoba, Winnipeg, Manitoba, Canada; [e]Department of Cardiothoracic Surgery, St Vincent's Hospital, Melbourne, Victoria, Australia; and [f]Department of Pathology, McGill University Health Centre, Montréal, Québec, Canada.

Research Ethics Board: 2025-10640; May 31, 2024.

Read at The American Association for Thoracic Surgery International Thoracic Surgical Oncology Summit 2024, New York, New York, September 27-28, 2024.

Received for publication Sept 25, 2024; revisions received Dec 8, 2024; accepted for publication Dec 24, 2024; available ahead of print Feb 26, 2025.

Address for reprints: Mara B. Antonoff, MD, Department of Thoracic and Cardiovascular Surgery, MD Anderson Cancer Center, 1400 Pressler St, Unit 1489, Houston, TX 77030 (E-mail: mbantonoff@mdanderson.org).

2666-2736

https://doi.org/10.1016/j.xjon.2025.01.010

Abbreviations and Acronyms
LN = lymph node
NCCN = National Comprehensive Cancer Network
NSCLC = non–small cell lung cancer

Naruke[1] in 1967 and later the Mountain and Dresler[2] map in 1997 to guide excision and labeling of potential metastasis within the lymphatic system. As a result of discrepancies between these maps, LNs were subsequently categorized in a uniform manner by the International Association for the Study of Lung Cancer into 3 groups of stations based on their anatomic position within the chest: intrapulmonary (N1), mediastinal (N2), and extrathoracic or contralateral mediastinal/hilar (N3).[3]

To pathologically assess LNs, surgeons can perform a complete dissection, defined as removing all LNs within the basin, or perform a sampling of nodes, where the surgeon removes limited tissue from 1 or more node within each station evaluated. The landmark American College of Surgery Oncology Group Z0030 trial assessed whether there was a difference between dissection and sampling, finding that complete mediastinal LN dissection did not improve survival outcomes provided that those mediastinal and hilar LNs are found to be negative for malignancy.[4] These findings led the National Comprehensive Cancer Network (NCCN) and later the American College of Surgeons Commission on Cancer to release updated guidelines stating that surgeons performing curative intent pulmonary resection for lung cancer should collect tissue from 1 or more N1 and 3 N2 stations by sampling or complete LN dissection.[5,6]

Although guidelines regarding LN evaluation for NSCLC have been established for a number of years, the extent of surgeons' familiarity with these guidelines as well as their degree of implementation have not been previously characterized. Moreover, although we hypothesized that patient- and disease-related factors may impact the rigor of any given lymphadenectomy, these issues have not been explored. Finally, it is unknown whether such practices may be impacted by regional variation or cultural practice patterns. Thus, we aimed to assess surgeon understanding of existing recommendations, to clarify their practice patterns, to elucidate the variables impacting their intraoperative decisions, and to ascertain how surgical practices vary globally pertaining to intraoperative nodal evaluation.

MATERIAL AND METHODS

Survey

A brief electronic survey (Online Data Supplement) was developed by a team of 2 thoracic surgeons, a thoracic pathologist, and a research fellow with previous experience and education in survey research. The survey consisted of 3 sections. First, they were provided with realistic fictional case studies for which respondents were to provide a plan regarding the approach to nodal evaluation. Second, they were provided a number of potential clinical patient-, disease-, and intraoperative-related variables that may potentially influence surgical decision-making and asked to provide relative rankings of importance using an anchored Likert scale. Finally, they were assessed on their knowledge of and perceived self-adherence to the NCCN's and Commission on Cancer's guidelines on LN evaluation. This study was reviewed by a Research Ethics Board (2025-10640; May 31, 2024) and subsequently reviewed and approved by each individual society's research committee.

The survey was then uploaded onto Qualtrics, an electronic survey distribution software, and distributed via this software to members of the General Thoracic Surgical Club, European Society of Thoracic Surgeons, Canadian Association of Thoracic Surgeons, and Australia & New Zealand Society of Cardiac & Thoracic Surgeons via their membership email distribution lists. A modified Dillman survey distribution method was used.[7] Survey distribution took place between March 28, 2024, and August 13, 2024.

Data Analyses

Data were exported from Qualtrics to analyze both in aggregate and subdivided into regions of practice. No incomplete surveys were used for analysis. Countries of practice were grouped to a continent based on the United Nations geoscheme.[8] Statistical analysis and figure generation were carried out using Prism 9 by GraphPad (2022, version 9.4.1). For categorized variables, frequency statistics are reported to assess demographic variables and frequency of responses to categorical questions. For inter-regional quantitative analyses of Likert scale questions, Kruskal–Wallis statistical tests were used to analyze intergroup differences. Kruskal–Wallis was used under the assumption that the ordinal Likert-scale responses were nonparametric in nature in each group and that 3 groups (regions) were being compared. Control of confounding variables was performed for a number of years in practice and the academic versus nonacademic setting of the respondents were done using multiple variable regression models and intergroup nonparametric *t* tests.

RESULTS

The questionnaire was distributed to 2396 surgeons across the 4 professional societies, of whom 236 surgeons (9.8% response rate; Online Data Supplement) responded from 46 different distinct regions around the world. Respondents were predominantly men (81.4%; 192), were aged 35 to 54 years (60.6%; 143), and most frequently reported clinical practices defined as general thoracic surgery (86.4%; 204; Table 1). The average years in practice of the respondents was 17.5 years (SD, 10.85). Subjects were categorized into the geographic regions of North America (n = 96), Europe (n = 96), and All Other (n = 44) for analyses (Online Data Supplement).

Respondents answered questions examining the importance of variables in relation to intraoperative LN excision by using a Likert scale of 1 to 5, with 5 indicating extreme importance and 1 indicating not important at all. The responses indicated that surgeons across the world are in concordance that known nodal positivity is the most important variable influencing their extent of LN excision (ranked

TABLE 1. Demographics

	N = 236 total
Gender	
Men	192 (81.4%)
Women	42 (17.8%)
Prefer not to answer	2 (0.8%)
Specialty	
General Thoracic	204 (86.4%)
Cardiothoracic	26 (11.0%)
General Surgery	6 (2.6%)
Age range, y	
30-34	12 (5.0%)
35-44	79 (33.5%)
45-54	64 (27.1%)
55-64	62 (26.3%)
≥65	19 (8.1%)
Mean years in practice (±SD)	17.45 ± 10.85
Practice setting	
Academic university	148 (62.7%)
Nonacademic hospital	44 (18.6%)
Private practice	8 (3.4%)
Government hospital	15 (6.4%)
Hospital employee	19 (8.1%)
Other*	2 (0.8%)

*Other practice setting represents respondents who do not fit into 1 specific previously listed category: hybrid academic and private (n = 1) and hybrid private and government hospital setting (n = 1).

4.2 on 5-point scale; Table 2). Four features were found to be valued differently between regions. Length of procedure was most important to surgeons from countries outside of North American and Europe with a mean score of 2.50 (SD, 1.32), followed closely by Europeans at 2.47 (SD, 1.21), and the lowest ranked impact of length of procedure was for North American surgeons at a mean of 2.05 (SD, 1.03; $P = .0412$). Patient age was also significant with North Americans assigning it the lowest impact at an average of 2.27 (SD, 1.12) versus Europeans at 2.95 (SD, 1.27) and the rest of the world at 2.98 (SD, 1.42; $P = .0004$). Patient frailty similarly followed this trend with North American surgeons ranking it at an impact level of 2.95 (SD, 1.19) versus Europeans at 3.53 (SD, 1.26) and all other countries at 3.32 (SD, 1.19; $P = .003$). Institutional guidelines changed the trend slightly with European surgeons ranking it at the highest impact mean level of 3.45 (SD, 1.26) when compared with North Americans at 3.01 (SD, 1.36) and All Other at 2.73 (SD, 1.53; $P = .013$). No significant differences were found among the other 9 variables assessed. Multiple linear regression models found that these results are not driven by the number of years in practice the respondent has or their academic status (Online Data Supplement).

The case studies section elucidated a number of important caveats. In the era of neoadjuvant treatment followed by resection, surgeons overall stated a strong preference for performing a full lymphadenectomy as opposed to LN sampling (4.13 ± 1.14; Online Data Supplement: C8). Surgeons, in general, also stated that their selection of an LN excision technique had little dependence on the restaging of the patient after neoadjuvant treatment (2.41 ± 1.31; Online Data Supplement: C10). In case 8, a female patient with a history of a right middle lobectomy, now undergoing a wedge resection for a 1.4-cm tumor in the posterior apical left upper lobe, with fluorodeoxyglucose uptake at level 5, surgeons globally were divided over whether or not they would perform additional dissection to obtain nodes from multiple N1 stations, such as opening the fissure to access level 11. In total, 47.5% (n = 112) stated that they would pursue multiple N1 stations and 52.5% (n = 124) stated they would not. This split opinion was observed across all regions of the world.

Altogether, 80.5% (n = 190; Table 3 and Figure 1) of surgeons stated they were familiar with the current guidelines surrounding intraoperative LN evaluation, but only 56.4% (n = 133) successfully identified the NCCN guidelines from a list of options. North American surgeons had the highest success rate of identifying the guidelines at 80.2% (n = 77), whereas surgeons outside of North America and Europe had the lowest success rate at 34.1% (n = 15). Overall, 65.7% (n = 155) of surgeons generally preferred to perform a complete LN dissection as opposed to an LN sampling. The highest preference for complete lymphadenectomy was found in Europe at 74.0% (n = 71) followed closely by all other countries at 72.7% (n = 32). North American surgeons had the lowest preference for LN dissection over LN sampling at 54.2% (n = 52). Overall, 50.4% (n = 119) of surgeons stated that their institution monitored compliance with guidelines pertaining to intraoperative nodal evaluations. Of those 119 surgeons who stated their institution monitored compliance with LN evaluation guidelines, only 60.5% (n = 72) correctly identified the correct guidelines.

DISCUSSION

Our findings suggest that familiarity with and adherence to guidelines vary significantly between surgeons and by world regions. Moreover, when asked whether certain variables impacted intraoperative decisions, surgeons' responses did not necessarily correspond with their application of these concepts to realistic patient scenarios. Furthermore, the variables of length of procedure, patient age, patient frailty, and institutional guidelines influence surgeons' decision making surrounding nodal excision disproportionately. It is clear that although the NCCN and Commission on Cancer guidelines as a concept are well publicized around the world, actual knowledge and implementation of the guidelines have yet to achieve global recognition.

TABLE 2. Likert ranking of variables influencing nodal excision

Variables	Overall (n = 236) Mean ± SD Median (IQR)	North America (n = 96) Mean ± SD Median (IQR)	Europe (n = 96) Mean ± SD Median (IQR)	All other (n = 44) Mean ± SD Median (IQR)	*P* value
Length of procedure	2.31 ± 1.18 2 (1-3)	2.05 ± 1.03 2 (1-3)	2.47 ± 1.21 2 (1-4)	2.50 ± 1.32 2 (2-3)	**.0412***
Patient age	2.67 ± 1.28 2 (2-4)	2.27 ± 1.12 2 (1-3)	2.95 ± 1.27 3 (2-4)	2.98 ± 1.42 3 (2-4)	**.0004*****
Frailty	3.25 ± 1.26 4 (2-4)	2.95 ± 1.19 3 (2-4)	3.53 ± 1.26 4 (2.25-4.75)	3.32 ± 1.29 4 (2-4)	**.0034****
Difficulty of resection	2.64 ± 1.24 2 (2-4)	2.63 ± 1.21 2 (2-4)	2.61 ± 1.27 2 (2-4)	2.73 ± 1.28 3 (2-4)	.8817
Histology	2.60 ± 1.38 2 (1-4)	2.49 ± 1.32 2 (1-4)	2.61 ± 1.38 2 (1-4)	2.80 ± 1.50 3 (1-4)	.5292
Consolidation-to-tumor ratio	3.00 ± 1.36 3 (2-4)	2.90 ± 1.35 3 (2-4)	2.94 ± 1.32 3 (2-4)	3.39 ± 1.43 4 (2-4)	.1018
Approach	2.00 ± 1.30 1 (1-3)	1.93 ± 1.28 1 (1-3)	2.04 ± 1.26 2 (1-3)	2.09 ± 1.44 1 (1-3)	.6391
Extent of resection	2.53 ± 1.36 2 (1-4)	2.48 ± 1.26 2 (1-4)	2.50 ± 1.38 2 (1-4)	2.70 ± 1.55 2 (1-4)	.7344
Knowledge of PET scan	3.26 ± 1.41 4 (2-4)	3.46 ± 1.37 4 (2-4.75)	3.13 ± 1.42 3 (2-4)	3.11 ± 1.47 3 (2-4)	.2134
Knowledge of an EBUS/mediastinoscopy	3.32 ± 1.35 4 (2-4)	3.53 ± 1.38 4 (2-5)	3.10 ± 1.33 3 (2-4)	3.34 ± 1.26 3 (2-4.75)	.0651
Institutional guidelines	3.14 ± 1.38 3 (2-4)	3.01 ± 1.36 3 (2-4)	3.45 ± 1.26 4 (3-4)	2.73 ± 1.53 3 (1-4)	**.013***
Tumor size	3.49 ± 1.35 4 (2-5)	3.49 ± 1.34 4 (2-4.75)	3.41 ± 1.36 4 (2-4.75)	3.66 ± 1.40 4 (2-5)	.4629
Known nodal positivity	4.17 ± 1.34 5 (4-5)	4.29 ± 1.26 5 (4-5)	4.06 ± 1.39 5 (4-5)	4.16 ± 1.40 5 (4-5)	.4513

Surgeons ranked the importance of these variables on a scale of 1 to 5 with 5 indicating high importance and 1 indicating not important at all. North America, Europe, and all other cohorts are compared using a Kruskal–Wallis test. Effect sizes are shown in Online Data Supplement. *IQR*, Interquartile range; *PET*, positron emission tomography; *EBUS,* endobronchial ultrasound. *$P < .05$; **$P < .01$; ***$P < .001$.

Outside of major North American–based institutions that release surgical guidelines, the most recent guidelines from the European Society of Thoracic Surgeons date back over a decade to 2007 with a later revision in 2014 and focus on preoperative staging rather than intraoperative nodal evaluation.[9,10] However, the European Society of Thoracic Surgeons guidelines mention 5 surgical techniques that surgeons should consider for performing an LN excision—LN sampling, systematic LN biopsy, extended LN dissection, systematic LN dissection, and lobe-specific LN

TABLE 3. Evaluation of knowledge of current guidelines

Knowledge of guidelines	Overall (n = 236)	North America (n = 96)	Europe (n = 96)	All other (n = 44)
Claim to be familiar with current guidelines	n = 190 (80.5%)	n = 89 (92.7%)	n = 70 (72.9%)	n = 31 (70.5%)
Claim their institutions' records compliance with guidelines	n = 119 (50.4%)	n = 67 (69.8%)	n = 39 (40.6%)	n = 13 (29.5%)
Successfully identified current guidelines	n = 133 (56.4%)	n = 77 (80.2%)	n = 41 (42.7%)	n = 15 (34.1%)
Preference for dissection over sampling	n = 155 (65.7%)	n = 52 (54.2%)	n = 71 (74.0%)	n = 32 (72.7%)

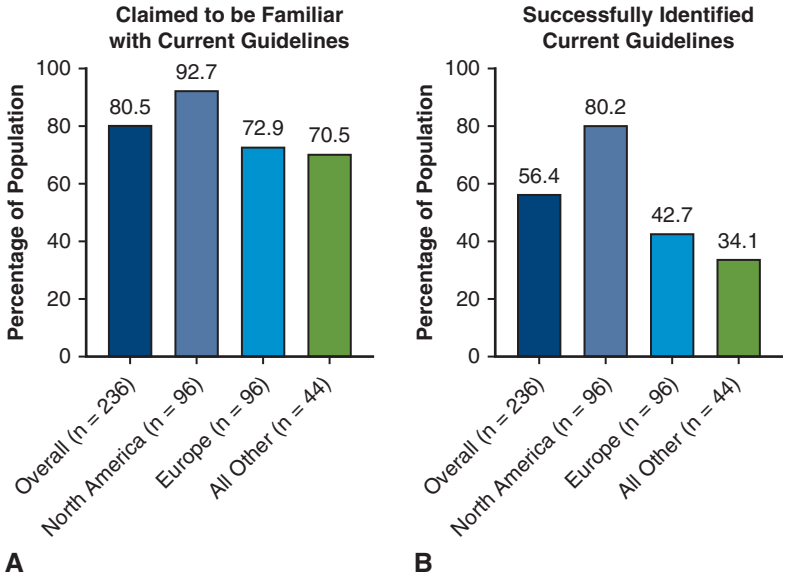


FIGURE 1. Surgeons who claimed familiarity with guidelines and surgeons who successfully identified guidelines. A, Surgeon familiarity. B, Rate of surgeon successful identification. Bar graphs visually represent the percentage of each population who responded to the questions are shown in Table 3.

dissection—but these guidelines' limited focus continues to leave a gap in guidance surrounding intraoperative LN excisions and evaluation.

A promising result in regard to global education of the guideline updates is that only 5 surgeons (2.1%) selected the guideline option that states "Ten lymph nodes total," demonstrating a strong adoption of the modern LN station model. However, the Union for International Cancer Control in 2017 recommended a minimum evaluation of 3 N1 stations and 3 N2 stations, leading 22.0% (n = 52) of participants in our study to select this option from the list.[11] Although we acknowledge that the NCCN and the Commission on Cancer guidelines, which both recommend evaluation of 1 or more N1 and 3 N2 stations, are not the sole guidelines in existence for LN evaluation in NSCLC, they are the most up-to-date evidence-driven guidelines in the field.

Surgeons in North America were able to identify the guidelines the most frequently out of any group surveyed, and they were the cohort with the highest preference for sampling. This may suggest that familiarity with the guidelines and current data in the literature suggesting noninferiority of sampling over dissection may in turn make surgeons more confident in performing LN sampling.[12] Comfort with sampling may play a role in the shift of clinical practice toward less-invasive LN excisions. Recent data suggest that extensive LN dissections alter the patient's tumor microenvironment immunosurveillance and in some cases might hinder the efficacy of immunotherapies.[13] Despite this preliminary article suggesting a possible microenvironment benefit to preserving LNs, our results demonstrate that surgeons still prefer to perform a lymphadenectomy after neoadjuvant treatment. Rationale for this continued tendency is likely multifactorial. Nonetheless, as new data come to light, familiarity with the most recent consensus guidelines will be imperative as the field of thoracic surgery for NSCLC continues to investigate and modify practice as a result of understanding the tumor microenvironment better.

Only 60.5% (n = 72) of the individuals who reported their institution monitors compliance with intraoperative nodal assessment guidelines successfully identified the guidelines. Lack of institutional pressure to follow guidelines could possibly explain why half of the survey respondents are unfamiliar with guidelines, but more than half who say they do have that pressure still cannot recognize the guidelines. This may suggest that education efforts surrounding the guidelines have deficiencies at both a national and local institution/hospital level. Research has shown that to promote positive changes to surgical practice, environmental (institutional) opportunities and pressure need to work in unison with knowledge of the topic at hand.[14] It is likely that departments worldwide are monitoring compliance of their surgeons but not providing the adequate education to achieve compliance. Education programs and projects about this policy ignorance need to be researched further to directly harmonize care globally.

Surgeons consistently ranked known nodal positivity as the most impactful factor influencing the extent of lymphadenectomy, demonstrating a strong awareness of its impact on the likelihood of recurrence for patients. Tumor size, the second-highest ranked factor, further reinforces this focus on oncological outcomes driving intraoperative LN excision decision-making. However, when length of procedure,

patient age, and frailty were evaluated, these operative risks varied significantly among surgeons worldwide. This reflects a divergence in how operative risks are weighed against oncological priorities intraoperatively.

It is a challenging, yet important task of surgeons to balance the patient's safety with the oncological outcomes of NSCLC. Achieving this balance requires a thorough understanding of the patient, the disease characteristics, and the patient's overall health to ensure that the lymphadenectomy's benefits outweigh the risks. Guidelines exist to assist surgeons in making well-advised personalized care decisions for their patients, but, as we have shown, they may not be used or understood uniformly across practices. One study found that 5-year overall survival was improved for patients who received NCCN-compliant lymphadenectomies versus those who did not, justifying the necessity of these guidelines.[15] Some of the differences in balancing operative risks with oncological outcomes may be a larger concern at lower resource facilities that do not have access to care regimens, technology, or providers with advanced training. Addressing these disparities requires ongoing efforts to standardize guidelines and to ensure that evidence-based care is homogenized globally.

Surgical societies might very well be the best organizations to spearhead these initiatives as our study has demonstrated the global reach of their membership. Previous publications and meta-analyses have suggested that barriers to clinical practice guidelines adherence often point toward a lack of knowledge resources and leadership to disseminate and enforce guidelines.[16] This is likely the case for the NCCN and Commission on Cancer guidelines because they are North American in origin and institutions do not have the resources to dedicate to specific guideline training. A rural hospital in Maine took the simple approach of implementing a new surgeon-scrub, nurse-circulating nurse checklist to the operating room to increase compliance with NCCN guidelines.[17] We encourage thoracic society leaders and department chairs worldwide to investigate novel ways they can increase compliance across their institutions.

Limitations

Surveys inherently are limited by a level of response bias. Our study attempts to eliminate response bias by containing neutrally worded and direct questions that leave little to nothing to be interpreted by the respondent. We acknowledge there also exists a level of convenience sampling within our cohort. The vast majority of our participants identified as working in an academic university and were members of Western academic societies. However, the academic versus nonacademic status of the respondent does not appear to change how surgeons responded (Online Data Supplement). The response rate of 9.8% could be viewed as a limitation, because it introduces a possibility of nonresponse bias. To address this concern, we recruited responses from 46 regions across 6 continents to provide a global understanding of how the NCCN and Commission on Cancer guidelines have been disseminated and implemented into practice. Although the response rate does warrant caution, as it should in any survey study, we would like to highlight that to date, this study evaluates the most countries pertaining to nodal guidelines in the literature. The survey was also only offered in the English language, which could have been a barrier for certain individuals to participate. Although this is a limitation to the range of individuals we could have captured from this survey, all the major societies that were used to facilitate the questionnaire distribution use English as their working language. As such, we believe English language comprehension did not have a serious effect on the results collected.

CONCLUSIONS

The variables driving intraoperative decision-making for nodal dissection vary by clinical factors related to the patients, their disease, and nuanced factors encountered on the day of surgery. In addition, we note that these detailed caveats are impacted by the region of the world where surgical care is provided. Although surgeons tend to overstate their understanding of and familiarity with existing guidelines, it is clear that patient safety must balance short-term intraoperative risks with long-term oncologic risks. To optimize consistent cancer care for patients around the world, it is imperative to ensure that education is provided uniformly and that environmental nuances influencing choices are elucidated and barriers addressed.

Conflict of Interest Statement

The authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

References

1. Naruke T. The spread of lung cancer and its relevance to surgery. *Nippon Kyobu Geka Gakkai Zasshi*. 1967;68:1607-1621.
2. Mountain CF, Dresler CM. Regional lymph node classification for lung cancer staging. *Chest*. 1997;111:1718-1723.
3. Rusch VW, Asamura H, Watanabe H, Giroux DJ, Rami-Porta R, Goldstraw P. The IASLC lung cancer staging project: a proposal for a new international lymph node map in the forthcoming seventh edition of the TNM classification for lung cancer. *J Thorac Oncol*. 2009;4:568-577.
4. Darling GE, Allen MS, Decker PA, et al. Randomized trial of mediastinal lymph node sampling versus complete lymphadenectomy during pulmonary resection in the patient with N0 or N1 (less than hilar) non-small cell carcinoma: results of the American College of Surgery Oncology Group Z0030 Trial. *J Thorac Cardiovasc Surg*. 2011;141:662-670.
5. National Comprehensive Cancer Network. *NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines): Non-Small Cell Lung Cancer*; 2024. Version 1.2024.

6. American College of Surgeons Commission on Cancer. *Optimal Resources for Cancer Care 2020 Standards*. Accessed December 7, 2024. https://www.facs.org/quality-programs/cancer-programs/commission-on-cancer/standards-and-resources/2020/
7. Hoddinott SN, Bass MJ. The dillman total design survey method. *Can Fam Physician*. 1986;32:2366-2368.
8. United Nations Statistics Division (UNSD). *Standard Country or Area Codes for Statistical Use (M49)*. Geographic Regions; 2024. Accessed December 7, 2024. unstats.un.org/unsd/methodology/m49/overview/
9. De Leyn P, Dooms C, Kuzdzal J, et al. Revised ESTS guidelines for preoperative mediastinal lymph node staging for non-small-cell lung cancer. *Eur J Cardiothorac Surg*. 2014;45:787-798.
10. Lardinois D, De Leyn P, Van Schil P, et al. ESTS guidelines for intraoperative lymph node staging in non-small cell lung cancer. *Eur J Cardiothorac Surg*. 2006;30:787-792.
11. Brierley J, Gospodarowicz MK, Wittekind C. *TNM Classification of Malignant Tumours*. 8th ed. Wiley Blackwell/John Wiley & Sons, Inc; 2017:108.
12. Heiden BT, Eaton DB, Chang S-H, et al. Assessment of updated commission on cancer guidelines for intraoperative lymph node sampling in early stage NSCLC. *J Thorac Oncol*. 2022;17:1287-1296.
13. Deng H, Zhou J, Chen H, et al. Impact of lymphadenectomy extent on immunotherapy efficacy in postresectional recurred non-small cell lung cancer: a multi-institutional retrospective cohort study. *Int J Surg*. 2024;110:238-252.
14. Arroyo NA, Gessert T, Hitchcock M, et al. What promotes surgeon practice change? A scoping review of innovation adoption in surgical practice. *Ann Surg*. 2021;273:474-482.
15. Wang X, Yan S, Phan K, et al. Mediastinal lymphadenectomy fulfilling NCCN criteria may improve the outcome of clinical N0–1 and pathological N2 non-small cell lung cancer. *J Thorac Dis*. 2016;8:342-349.
16. Zhou P, Chen L, Wu Z, et al. The barriers and facilitators for the implementation of clinical practice guidelines in healthcare: an umbrella review of qualitative and quantitative literature. *J Clin Epidemiol*. 2023;162:169-181.
17. Kennedy Kc, Bolbolan K, Galvez-Padilla C. P1.25-12 Adequacy of mediastinal lymph node dissection in the setting of new NCCN guidelines: simplified method from a rural hospital. *J Thorac Oncol*. 2023;18:S274.

Key Words: guidelines, lung cancer, lymph node dissection, lymph node excision, nodal evaluation