

Assessing the Status of Thoracic Surgical Research and Quality Improvement Programs: A Survey of the Members of the Canadian Association of Thoracic Surgeons

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OBJECTIVES: Assessing the degree of involvement and participation in thoracic surgical research as well as surgical quality improvement conducted across Canadian institutions is difficult as no common data collection system and no prior studies exist. As a pilot investigation, we designed and conducted a membership survey of the Canadian Association of Thoracic Surgeons (CATS) to evaluate the extent of participation in research and quality improvement processes among thoracic surgeons.

DESIGN, SETTING, AND PARTICIPANTS: A 45-item needs assessment survey was mailed to all national members of CATS ($n = 86$) in August 2009. Questions primarily focused on clinical research programs and research activity, research funding, database use and interest, and other methods of quality monitoring.

RESULTS: The 49 completed surveys represented a 57.0% response rate and 28 institutions across Canada. Research in basic and clinical science is conducted by 17.0% and 80.9% of the respondents, respectively. The annual budget of research funds is most commonly between \$5000 and \$50,000. A total of 72.0% ($n = 18$) of institutions do not have a formal surgery quality assessment program and 92.3% ($n = 24$) do not participate in a national or international thoracic surgery database. Ten institutions (38.6%) have a local thoracic surgery database for quality monitoring. Other systems of monitoring surgical quality include formal morbidity and mortality rounds (69.2%; $n = 8$ institutions), formal evaluation of surgical wait times (73.1%; $n = 19$ institutions), and patient satisfaction surveys (71.4%; $n = 10$ institutions). Overall, 97.8% of surgeons

would be willing to share data on morbidity and mortality with other centers, and 73.1% have a high or very high level of interest in participating in a national thoracic surgery quality database.

CONCLUSIONS: A high level of interest and participation exists in thoracic surgery research. However, more robust quality improvement processes are needed for thoracic surgical oncology services. A national thoracic surgery quality improvement database offers a potential means to improve practice effectiveness, standardize surgical outcomes, and promote thoracic research across Canada. (J Surg 68:258-265. © 2011 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: thoracic surgery, quality assurance, needs assessment statistics, numerical data

COMPETENCIES: Practice Based Learning and Improvement, Professionalism, Systems-Based Practice

INTRODUCTION

Surgical practice is characterized by a strong culture of quality assurance and improvement. In surgery, quality assurance is defined as the process whereby the profession ensures that standards of medical care are upheld and raised when necessary.¹ Quality assurance has been at the forefront for surgeons in all specialities, and to this day, it remains a primary objective of their professional careers.¹ Surgeons have advanced a highly refined system of sustaining and improving the quality of their practice—this is achieved through formal morbidity and mortality (M&M) conferences, where open collegial discussion not only helps to facilitate the improvement of surgical outcomes but also enhances surgical education of trainees. Furthermore, surgeons are required to attend conferences and self-study proj-

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ects to maintain competency. This is to meet the standards defined by the Royal College of Physicians and Surgeons of Canada.¹

It is increasingly important to monitor and compare the quality of health care delivery among the various institutions. In the United States, the practice of thoracic surgery has had several state and federal programs that have been implemented to monitor and improve thoracic surgical outcomes explicitly. The National Surgical Quality Improvement Program (NSQIP)² of the Department of Veterans Affairs and the Society of Thoracic Surgeons (STS)³ database are two examples of initiatives that provide hospitals and thoracic surgeons with information on risk-adjusted M&M rates from cardiothoracic surgical practices nationwide. This aggregate information provides a national standard to benchmark individual results and promote quality improvement.³ NSQIP and STS databases provide the next level of quality improvement programs—enabling standardization and interinstitutional comparison. M&M conferences help an individual surgeon and a division, whereas the larger initiatives represent a broader, collective means to enhance quality.

Thoracic surgery is one of the smallest subspecialty groups in all Canadian surgery⁴ and is largely performed in high-volume academic centers, where specialized care is required to manage complex diseases. Accordingly, the lack of a common data collection system in Canada is the very reason for the little information available to determine the full scope of thoracic surgical research, the resources and funding required for it, and the programs designed for thoracic surgical quality improvement. An unabated need exists for quality initiatives relating to thoracic oncology services, both benign and malignant, to improve surgical outcomes and improve efficiency of care.⁵ Increased volumes of thoracic surgery are expected in Canada in the near future because of a growing and aging population, and the rapidly rising cost of medical care, further accentuate this imperative.

In a pilot investigation, to better understand the current state of Canadian thoracic surgical research and initiatives aimed at quality improvement, a needs assessment survey was designed and sent to all national members of the Canadian Association of Thoracic Surgeons (CATS) in August 2009.

METHODS

Survey Instrument

A 10-page, web-based needs assessment survey was developed by the thoracic surgical team at the Ottawa Hospital. The website <http://surveymonkey.com> (Portland, Oregon) was used to create the web-based questionnaire. Questions primarily focused on clinical research programs and quality monitoring in thoracic surgery. Several questions were also asked relating to thoracic surgical manpower and thoracic surgical volumes. All survey items were self-reported. Survey items contained 1) open-ended responses, 2) Likert-type formats (5-point scales),

and (3) dichotomous yes/no responses. The survey instrument could be completed without reference to any other source material, but respondents were able to refer to their own institutional databases as necessary to ensure accuracy of case numbers required for some questions. The Ottawa Hospital Research Ethics Board approved this study.

Study Population and Survey Administration

The membership of CATS includes full-time practitioners of general (noncardiac) thoracic surgery, along with qualified general and cardiovascular surgeons whose practice includes more than 50% thoracic surgery.⁶ This study involved a survey of all active members of CATS practicing in Canada; thus, a total of 86 surveys were mailed in August 2009. Nine international members were excluded from the study to have the appropriate and applicable group survey answers for specific questions. The CATS master file, provided by the executive committee, was used in developing a mailing list of the target surgeons.

An initial e-mail was sent with a link to the survey at the start of August 2009, and 3 reminder e-mails were sent each week thereafter. Eligible CATS members, who did not have valid e-mail addresses, were sent a survey package by postal service. As a token of gratitude, each survey respondent received a \$10 gift certificate to any Tim Horton's coffee shop across Canada.

Statistical Analysis

All survey data collected was carefully entered using quality control and verification measures into a secure database. Partially, completed surveys were included in the statistical analysis and proportional data were analyzed with regard to the number of respondents who answered a particular question. The primary data analysis consisted of univariate descriptive statistics, including the calculation of frequencies, means, and standard deviations using SAS 9.2 software (SAS Inc, Cary, NC). Only data that had actually been entered onto the survey instrument by respondents who were actively engaged in the practice of thoracic surgery were extracted and analyzed. No information from other sources was considered.

RESULTS

Response Rate and Demographics

From the 86 national members, 49 surveys were returned completed (57.0%) within the time frame permitted for response, which was 4 weeks. The 49 surveys cited 28 participating centers. Individual questions varied in the number of responses. Of the 86 national CATS members, 27 (31.4%) are also members of the STS.

Thoracic Surgical Manpower Available for Research

In all surgical specialities, including thoracic surgery, an adequate number of practicing surgeons is necessary to meet the

needs of the patient population, and an objective evaluation of manpower plays an essential role in strategic planning and surgical quality assessment.⁶ Survey results indicate that 3 (± 1 ; range 1-6) is the average number of full-time thoracic surgeons at each institution that provide appropriate perioperative care (Table 1). Eight institutions (28.6%) have a residency training program, 5 institutions (20.0%) have a formal residency research program—implying that residents are required to complete at least 1 project before completion of residency—and 10 institutions (47.6%) require their residents to perform research at some point during their residency (Table 1).

Clinical Research Programs and Research Activity

Twenty-one institutions (75.0%) are directly involved in research. The average number of active research studies per institution is between 1 and 5 studies ($n = 17$; 63.0%) (Table 2). More specifically, 8 respondents (17.0%) personally participate in basic science research, 23 respondents (47.9%) participate in tumor banking, and 38 respondents (80.9%) personally participate in clinical research, of which 35 respondents (92.1%) participate in retrospective chart reviews, 25 respondents (65.8%) participate in prospective observational studies, and 25 respondents (65.8%) participate in randomized control trials (Table 2). Areas of expertise or strong interest in clinical research include minimally invasive surgery, critical care medicine, quality of care, and clinical epidemiological research. Areas of expertise or strong interest in basic science research include clinical trials in lung cancer, lung cancer genomics, and regenerative medicine.

Funding Opportunities. Survey results indicate that 17 institutions (63.0%) have research accounts with funds that are available to support existing or potential research projects (Table 3). Sources of research funds are equally received from grants, de-

partment, and industry. The annual budget of research funds is between \$5000 and \$50,000 at most institutions (70.6%; $n = 12$) (Table 3).

Database Use and Interest

The CATS membership survey revealed that of the 21 (75.0%) institutions that are directly involved in research, 10 (38.5%) have a local thoracic surgery database (Table 4). Surgeons from 20 institutions (76.9%) expressed a high or very high interest in initiating or improving their local thoracic surgical database. Most institutions do not participate in a national or international thoracic surgery database (92.3%; $n = 24$). However, 19 institutions (73.1%) have a high or very high level of interest in participating in a national thoracic surgery database. Similarly, 17 institutions (65.4%) have a high or very high level of interest in initiating or improving on a national thoracic surgery database (Table 4).

Quality Monitoring. Survey results revealed that most institutions (73.1%; $n = 19$) do not have a formal surgery quality assessment program but do however monitor M&M regularly (69.2%; $n = 18$) and would be willing to share data on M&M With other centers (100.0%; $n = 26$) (Table 4). Evaluation of thoracic M&M takes place through monthly conferences at most institutions (42.3%; $n = 11$). Retrospective evaluation of morbidity on selected patient populations is performed at 17 institutions (65.4%) (Table 4).

To better comprehend the burden of illness on the delivery of thoracic surgical oncology services, surgeons were asked about wait time monitoring. Survey results revealed that 19 institutions (73.1%) have a formal evaluation of surgical wait times. Specifically, regular feedback regarding wait times is received at 18 institutions (72.0%) (Table 4). Monthly and quarterly conferences indicate the frequency of regular feedback regarding surgical wait times at most institutions (88.9%; $n = 16$) (Table 4).

TABLE 1. Survey Questions Relating to Thoracic Surgical Manpower

Survey Item	Mean or Frequency	
	Total Respondents (%)	Total Institutions (%)
Thoracic Surgical Manpower		
1. What is the number of full-time thoracic surgery staff members at your institution?	N/A*	3 ± 1
2. Do you have a residency training program? Yes	N/A	28 8 (28.6)
3. If you have a residency training program, how many thoracic surgery residents are at your institution? 1 resident per year 1 resident every 2 years 2 residents per year Other	N/A	8 1 (12.5) 6 (75.0) 1 (12.5) 0 (0)
4. Do you have a formal residency research program? Yes	N/A	25 5 (20.0)
5. Are your residents required to perform research at some point during their residency? Yes	N/A	21 10 (47.6)

*Not applicable.

TABLE 2. Survey Questions Relating to Clinical Research Programs

Survey Item	Mean or Frequency	
Clinical Research Programs	Total Respondents (%)	Total Institutions (%)
1. Are you directly involved in research?	49	28
Yes	37 (75.5)	21 (75.0)
2. If you answered yes to the above question, please check all that apply:	37	N/A*
Principal investigator	22 (59.5)	
Coinvestigator	19 (51.4)	
Collaborator	26 (70.3)	
Participant	18 (48.6)	
Other	2 (5.4)	
3. Do you have a thoracic surgery research director?	48	N/A
Yes	18 (37.5)	
4. Are you currently a thoracic surgery research director?	48	N/A
Yes	4 (8.3)	
5. Do you have a clinical research coordinator?	49	N/A
Yes	23 (46.9)	
6. If yes, what is their contract?	24	N/A
0.2 FTE (1 day per wk)	3 (12.5)	
0.4 FTE (2 day per wk)	2 (8.3)	
0.6 FTE (3 day per wk)	4 (16.7)	
0.8 FTE (4 day per wk)	2 (8.3)	
1.0 FTE (5 day per wk)	13 (54.2)	
7. Do you personally participate in basic science research?	47	N/A
Yes	8 (17.0)	
8. If you answered yes to the above question, please check all that apply:	8	N/A
Molecular biology, genomics	2 (25.0)	
Intracellular pathways, signaling, proteomics	3 (37.5)	
Cell cultures	3 (37.5)	
Animal models	4 (50.0)	
Human tissue	6 (75.0)	
Other	2 (25.0)	
9. Do you participate in tumor banking?	48	N/A
Yes	23 (47.9)	
10. Do you personally participate in clinical research?	47	N/A
Yes	38 (80.9)	
11. If you answered yes to the above questions, please check all that apply:	38	N/A
Retrospective chart reviews	35 (92.1)	
Prospective observational studies	25 (65.8)	
Randomized control trials	25 (65.8)	
Other	0 (0)	
12. What is the average number of active research studies that are ongoing at your center in a given year?	N/A*	27
0 studies	4 (14.8)	
1–5 studies	17 (63.0)	
6–10 studies	2 (7.4)	
11–20 studies	2 (7.4)	
>20	2 (7.4)	
13. What percentage of research studies have the principal investigator that is an attending thoracic surgeon at your institution?	N/A	24
<25%	19 (79.2)	
25% to 50%	2 (8.3)	
50% to 75%	1 (4.2)	
>75%	2 (8.3)	

*Not applicable.

TABLE 3. Survey Questions Relating to Funding Opportunities

Survey Item	Survey Item	
Funding Opportunities	Total Respondents (%)	Total Institutions (%)
1. Are there research accounts with funds available to support existing or potential research projects at your institution?	N/A*	27
Yes		
2. What is the source of these research funds (check all that apply)?	N/A	17 (63.0) 21
Grants		10 (47.6)
Department		10 (47.6)
Industry		10 (47.6)
Other		7 (33.3)
3. What is the annual budget of your research accounts?	N/A	17
Up to \$5,000		2 (11.8)
\$5,000-\$50,000		12 (70.6)
\$50,000-\$100,000		3 (17.6)
\$100,000 to \$500,000		0 (0)
>\$500,000		0 (0)

*Not applicable.

Provision of Thoracic Surgical Oncology Services

Surgical quality is closely tied to the volume of thoracic surgical procedures performed at an institution. Study results indicate that 183 (± 127.4 ; range 40-600) is the average number of anatomic pulmonary resections performed at each institution per year, and 25 (± 16.1 ; range 0-50) is the average number of esophagectomies performed at each institution per year, across Canada (Table 5).

Minimally invasive thoracic surgery is available and used at 25 institutions (96.2%). Survey results reveal that up to 50% of lobectomies are performed via video-assisted thoracoscopic surgery (73.1%; n = 19 institutions). Similarly, 25% to 50% of paraesophageal hernias are repaired via laparoscopy (37.5%; n = 9 institutions) (Table 5).

DISCUSSION

This is the first study of this nature that has concentrated exclusively on the need for research and quality assessment of a contemporary workforce in the speciality of thoracic surgery. To evaluate clinical research and funding, and methods of quality assessment, we designed a comprehensive, web-based survey and sent it to a national thoracic surgery association. A response rate of 57.0% was generated and reflects the importance of this work to the thoracic surgical workforce. The results of the study offer current and previously unavailable information and provide a better understanding of thoracic surgical research and quality monitoring processes.

Through a consensus-based approach, an expert panel has agreed that the practice setting should have an adequate volume of thoracic surgery to preserve the skills of surgeons in both complex cancer surgery and thoracic surgery.⁵ Survey results

indicate that thoracic surgeons across Canada perform a significant number of general thoracic procedures on significant case volumes each year to preserve their surgical skills as well as to uphold institutional quality standards. Moreover, hospitals providing oncological and benign thoracic services should have sufficient infrastructure support for surgeon participation in both local and national databases to maintain ongoing clinical research.⁵ Survey results indicate that most institutions are directly involved in research, and many surgeons are avid participants in basic and clinical research through involvement in retrospective chart reviews, prospective observational studies, and randomized controlled trials. However, more robust quality improvement processes are needed for thoracic surgical services, in particular, as the disease burden in Canada requiring thoracic oncology services is likely to increase as our population ages and baby boomers enter their senior years.⁷ Quality assurance in the thoracic surgical speciality must evolve and engender greater participation, as 72.0% of Canadian institutions do not have a formal surgery quality assessment program and 92.3% of institutions do not participate in a national or international thoracic surgery database. Nevertheless, surgeons from 19 institutions (73.1%) are willing to participate in and lead quality processes, and possess a high level of interest in initiating a national thoracic surgery database (65.4%).

To ensure consistent quality in the thoracic surgical speciality, an ongoing commitment to continuous quality improvement is essential. Continuous quality improvement, in health care, is the repetitive cycle of outcomes and process measurement, design and implementation of interventions to improve the processes of care, and reassessment to evaluate the effect on quality of care.⁸ One way for thoracic surgeons to continuously evaluate and improve upon their practice is to compare themselves with evidence-based national

TABLE 4. Survey Questions Relating to Database Use and Interest and Quality Monitoring

Survey Item	Mean or Frequency	
	Total Respondents (%)	Total Institutions (%)
Quality Monitoring		
1. Do you have your own local thoracic surgery database?	47	26
Yes	22 (46.8)	10 (38.5)
2. Rate your level of interest in initiating or improving your local thoracic surgical database.	47	26
Very low	1 (2.1)	1 (3.8)
Low	0 (0)	0 (0)
Neutral	8 (17.0)	5 (19.2)
High	23 (48.9)	12 (46.2)
Very high	15 (31.9)	8 (30.8)
3. Do you participate in a national or international thoracic surgery database?	47	26
Yes	2 (4.3)	2 (7.7)
4. Rate your level of interest in initiating or improving on a national thoracic surgery database.	46	26
Very low	0 (0)	0 (0)
Low	5 (10.9)	2 (7.7)
Neutral	10 (21.7)	7 (26.9)
High	16 (34.8)	8 (30.8)
Very high	15 (32.6)	9 (34.6)
5. Rate your level of interest in participating in a national thoracic surgery database.	47	26
Very low	0 (0)	0 (0)
Low	1 (2.1)	1 (3.8)
Neutral	10 (21.3)	6 (23.1)
High	21 (44.7)	10 (38.5)
Very high	15 (31.9)	9 (34.6)
6. Do you have a formal surgery quality assessment program?	46	25
Yes	18 (39.1)	7 (28.0)
7. Do you monitor morbidity and mortality (M&M) regularly?	47	26
Yes	36 (76.6)	18 (69.2)
8. Please rate the frequency of the evaluation of thoracic surgery morbidity and mortality (M&M) at your institution.	47	26
Weekly	4 (8.5)	2 (7.7)
Monthly	24 (51.1)	11 (42.3)
Quarterly	9 (19.1)	5 (19.2)
Infrequently	9 (19.1)	7 (26.9)
Never	1 (2.1)	1 (3.8)
9. Would you be willing to share data on M&M with other centers?	46	26
Yes	45 (97.8)	26 (100)
10. Do you perform retrospective evaluation of morbidity on selected patient populations?	47	26
Yes	34 (72.3)	17 (65.4)
11. Is there a formal evaluation of surgical wait times at your institution?	47	26
Yes	36 (76.6)	19 (73.1)
12. Do you receive regular feedback regarding wait times?	47	25
Yes	35 (74.5)	18 (72.0)
13. If yes, how often?	35	18
Monthly	14 (40.0)	8 (44.4)
Quarterly	17 (48.6)	8 (44.4)
Biannually	1 (2.9)	1 (5.6)
Annually	1 (2.9)	0 (0)
Other	2 (5.7)	1 (5.6)
14. Are there other systems of monitoring surgical quality (check all that apply)?	23	14
NSQIP	8 (34.8)	7 (50.0)
Patient satisfaction surveys	17 (73.9)	10 (71.4)
Other	6 (26.1)	3 (21.4)

TABLE 5. Survey Questions Relating to Provision of Thoracic Surgical Oncology Services

Survey Item	Mean or Frequency	
Provision of Thoracic Surgical Oncology Services	Total Respondents (%)	Total Institutions (%)
1. Indicate the average number of anatomic pulmonary resections performed at your institution per year.	N/A*	183 ± 127.4
2. Indicate the average number of esophagectomies performed at your institution per year.	N/A	25 ± 16.1
3. Indicate the average number of days available to your thoracic surgery division per week.	N/A	4 ± 1.5
4. Is minimally invasive thoracic surgery performed at your institution?	47	26
Yes	46 (97.9)	25 (96.2)
5. What is the percentage of lobectomies done by video-assisted thorascopic surgery?	47	26
<25%	18 (38.3)	12 (46.2)
25% to 50%	19 (40.4)	7 (26.9)
50% to 75%	5 (10.6)	4 (15.4)
>75%	5 (10.6)	3 (11.5)
6. What is the percentage of paraesophageal hernias repaired via laparoscopy?	46	24
<25%	11 (23.9)	7 (29.2)
25% to 50%	18 (39.1)	9 (37.5)
50% to 75%	5 (10.9)	0 (0)
>75%	12 (26.1)	8 (33.3)
7. Which of the following do you perform routinely in the staging of lung cancer (check all that apply)?	47	26
CT scan chest and abdomen	47 (100)	26 (100)
Mediastinoscopy	34 (72.3)	18 (69.2)
Pet/CT	29 (61.7)	18 (61.5)
MRI of the brain	9 (19.1)	5 (19.2)
CT head	25 (53.2)	11 (42.3)
EBUS (endobronchial ultrasound)	10 (21.3)	5 (19.2)
EUS (esophageal ultrasound)	3 (6.4)	2 (7.7)
8. Which of the following do you perform routinely in the staging of esophageal cancer (check all that apply)?	46	25
CT scan chest and abdomen	46 (100)	25 (100)
Mediastinoscopy	0 (0)	0 (4.0)
Pet/CT	29 (63.0)	17 (68.0)
MRI of the brain	0 (0)	0 (0)
CT head	18 (39.1)	9 (36.0)
EBUS (endobronchial ultrasound)	3 (6.5)	2 (8.0)
EUS (esophageal ultrasound)	18 (39.1)	12 (48.0)

*Not applicable.

guidelines through data generated from large patient databases. The development of a national database is progressively being recognized as fundamental to the practice, review, and quality assessment of thoracic oncology services across Canada. A system of regular review of perioperative patient care is crucial for the attainment of optimal patient outcomes. A national database would enhance multidisciplinary communication and allow for design and implementation of programs to improve surgical quality locally and nationally. Our results indicate that 97.8% of surgeons are willing to share data on M&M, representing 100% of all institutions. Moreover, prospective research using a national database can help to answer questions that previously could not be answered because of inadequate sample sizes.⁹ For

instance, if surgeons do not know the rate of atrial fibrillation or prolonged air leak after lobectomy, how can they monitor their effort to improve it and document it? How does an institution's mortality for esophagectomy compare with other institutions in the same region? How are surgeons doing among their colleagues? Active participation in a national database can lead to quality improvements in thoracic surgical care and facilitate objective comparison between common surgical procedures, and between surgeons and centers over time.⁹

We recognize several limitations of the use of a survey instrument for evaluating research and standards of practice in thoracic surgery across Canada. First, the question of how complete, accurate, and representative is the data set must be

addressed. This membership study only reflects a snapshot in time and overlooks the various interacting factors affecting the numbers of actively practicing thoracic surgeons. Recall bias also is a relevant concern that may compromise the accuracy of results, as survey responses can be highly dependent on how a question is worded.

Although demographics and case volume have been previously studied in Canada, information on methods of quality assessment has been limited, thus, limiting opportunities for comparison and trending over time. Future needs assessment studies must continue to monitor the trends that have already been documented so that appropriate and strategic initiatives can be planned and implemented.

The analysis captured in this report provides an overview of the current research and the methods used for the evaluation of thoracic surgical quality in Canada. The information rendered enhances our ability to strategically plan. Implementation of a national database and the collection of valid data at the national level may be of value for future quality assessment processes in thoracic surgery. Data are essential to document the efficacy and quality of thoracic surgical procedures that are performed and a national database is a necessary tool for quality assurance and for the continued success of thoracic surgical practice. We hope that the results of our membership survey will play an essential first step in that process.

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REFERENCES

1. Gumpert JR. Why on Earth do surgeons need quality assurance? *Ann R Coll Surg Engl.* 1988;70:85-92.
2. Khuri SF, Daley J, Henderson W. The Department of Veterans Affairs' NSQIP: the first national, validated, outcome-based, risk-adjusted, and peer-controlled program for the measurement and enhancement of the quality of surgical care. *Ann Surg.* 1998;228:491-507.
3. Caceres M, Braud RL, Garrett HE Jr. A short history of the Society of Thoracic Surgeons national Cardiac Database: perceptions of a practicing surgeon. *Ann Thorac Surg.* 2010; 89:332-339.
4. Schieman C, Kelly E, Gelfand G, et al. Thoracic surgery training in Canada according to the residents: the Thoracic Surgery Resident Survey, of the Canadian Thoracic Manpower and Education Study (T-Med). *J Surg Educ.* 2010; 67:325-334.
5. Sundaresan S, Langer B, Oliver T, et al. Standards for thoracic surgical oncology in a single-payer healthcare system. *Ann Thorac Surg.* 2007;84:693-701.
6. Darling GE, Maziak DE, Clifton JC, Finley RJ. Canadian Association of Thoracic Surgery: the practice of thoracic surgery in Canada. *Can J Surg.* 2004;47:438-445.
7. Shemin RJ, Dziuban SW, Kaiser LR, et al. Thoracic surgery workforce: snapshot at the end of the twentieth century and implications for the new millennium. *Ann Thorac Surg.* 2002;73:2014-2032.
8. Ferguson TB Jr, Peterson ED, Coombs LP, et al. Use of continuous quality improvement to increase use of process measures in patients undergoing coronary artery bypass graft surgery: a randomized controlled trial. *JAMA.* 2003; 290:49-56.
9. Wright CD, Edwards FH. The Society of Thoracic Surgeons general Thoracic Surgery Database. *Ann Thorac Surg.* 2002;83:893-894.