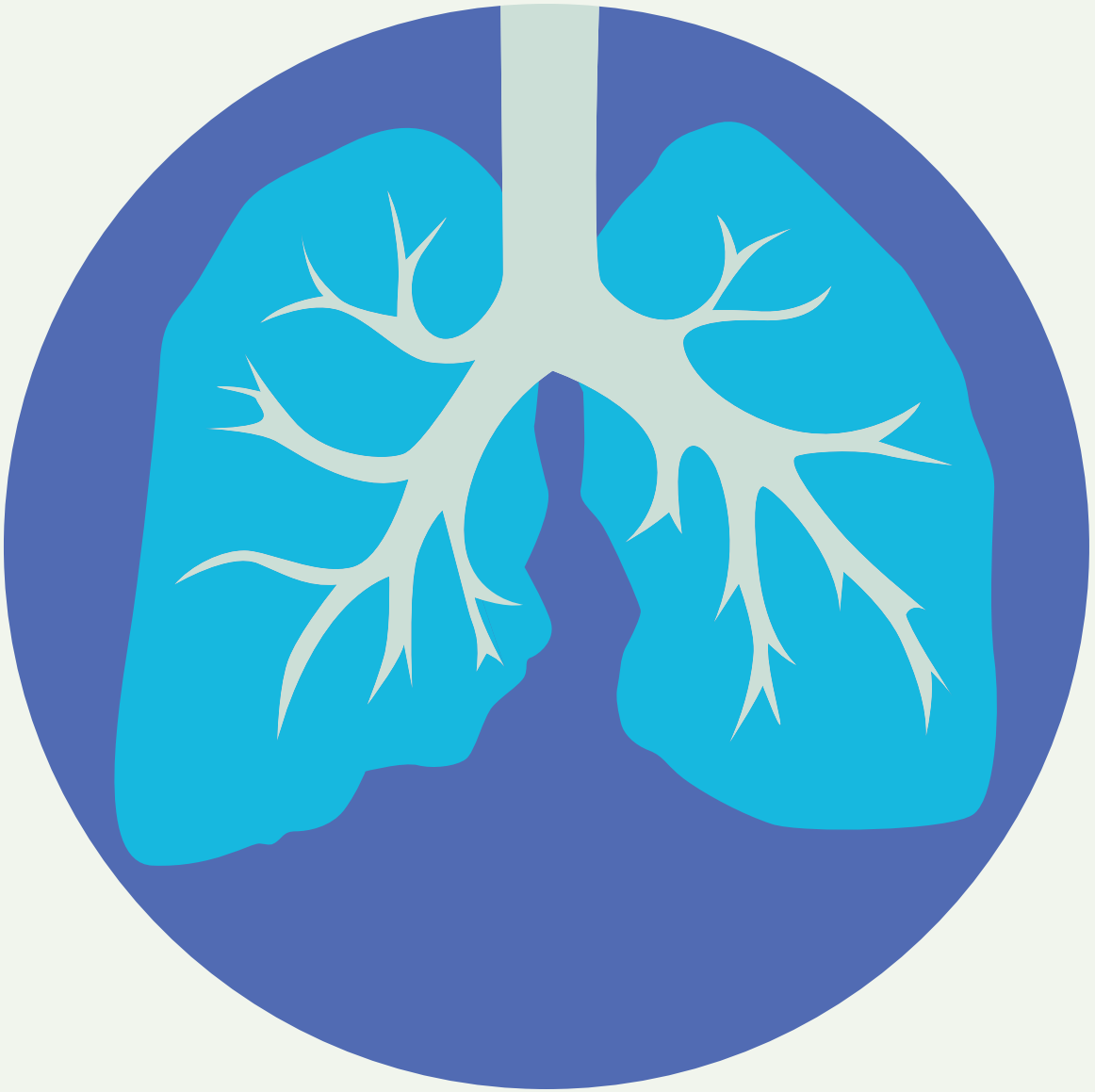
Pan-Canadian Standards for Thoracic Surgery



CANADIAN PARTNERSHIP AGAINST CANCER
PARTENARIAT CANADIEN CONTRE LE CANCER

L'Association Canadienne de Chirurgie Thoracique
CATS
Canadian Association of Thoracic Surgeons

March 2018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Message from Dr. Christian Finley

Expert Lead, Clinical Measures, Canadian Partnership Against Cancer

I am pleased to introduce the Pan-Canadian Standards for Thoracic Surgery. This is Canada's first evidence-based, comprehensive national standards for thoracic surgery that can be tailored according to local health systems. In efforts to build on the great work done to date, existing standards and published journals in thoracic surgery have served as a foundation for the development of the national standards.

Lung cancer kills more people than prostate, colon and breast combined. Since lung cancer is particularly complex, it has been associated with a high risk of adverse outcomes. Findings from the November 2015 report, Approaches to High-Risk, Resource Intensive Cancer Surgical Care in Canada, culminated in the development of pan-Canadian standards for thoracic surgery. Report findings highlighted the tremendous variability in how each province in Canada delivers cancer care services, resulting in disparities in patient outcomes. Thus, deliberate approaches are needed to improve the organization of complex surgeries in a way that optimizes patient outcomes and reduces the burden on health care resources.

It is our hope that this document will serve as a decision-making resource to support the delivery of consistent, high-quality care to all Canadians requiring thoracic surgery. The document provides high-level guidance and discussion on the foundational resources and requirements that need to be in place to improve cancer surgical care and outcomes. It is our goal that the actionable recommendations included herein will help address current gaps, be forward thinking (serve as a document for the future) and elevate the delivery of thoracic surgical care in Canada.

Development of the standards has been informed by environmental scans, literature review and evidence-informed expert consensus. The document emphasizes on a number of key areas such as Royal College of Physicians and Surgeons of Canada's (RCPSC) system for evaluating and formally certifying training in thoracic surgery. Thoracic surgery is a 'team sport'; in addition to the thoracic surgeon, the health care team should be well-trained and adequately resourced to provide timely access to care. In particular, in the diagnostic phase of care of thoracic malignancies, there is a heavy reliance on diagnostic imaging, pathology and other ancillary services whose resource allocation and governance falls to the region and institution. As such, implementation of any standard depends on the successful collaboration of the thoracic surgeons with those bodies. The document also highlights the importance of advanced human resource support, allied health professionals, and that manpower planning needs to comprehensive and systematic to meet targets for care.

Quality processes, such as routine data collection and population of a national database, should be thoughtfully embedded into existing health care processes to catalyze self-evaluation and continuous quality improvement. In addition, careful consideration should be given to regionalizing specialized services to improve patient outcomes while accounting for patient choice and travel time.

Health care planners and providers can utilize this information to organize care in a way that maximizes patient outcomes while maintaining reasonable access to care. This report is one component of a family of reports to be developed for disease-site specific national standards of surgical cancer care.

I look forward to working with you to improve the quality of complex surgical cancer care in Canada.

Dr. Christian Finley
Expert Lead, Clinical Measures
Canadian Partnership Against Cancer

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Acknowledgments

The production of this report was made possible through the dedicated efforts of many individuals. We express our gratitude to them for their contributions and assistance in the development of these recommendations.

We would like to acknowledge the invaluable contributions of the **Thoracic Surgery Expert Panel Members** and the **Canadian Association of Thoracic Surgeons (CATS)** for their input and guidance in the production of this document. The Thoracic Surgery Expert Panel was instrumental in the development of recommendations through a comprehensive review of academic literature, objective analysis, in-person discussions and document review.

There were also several additionalindividuals who contributed to the development of the national standards, including **Laura Banfield**, Librarian at McMaster University who conducted a comprehensive literature at the onset of this project. Leaders in thoracic surgery were also consulted including: **Dr. Gail E. Darling**, Professor Thoracic Surgery at University of Toronto, Thoracic Surgeon at University Health Network and Director of Thoracic Surgery Clinical Research at Toronto General Hospital; **Dr. Sean Grondin**, President of CATS, Zone Clinical Department Head and Academic Department Head, Department of Surgery, Alberta Health Services and Canadian Director of the Society of Thoracic Surgeons; **Dr. Najib Safieddine**, Staff Surgeon, Toronto East General Hospital, Assistant Professor, University of Toronto, Division of Thoracic Surgery.
To leverage the great work done to date, development of the national standards has been informed by published work: "The practice of thoracic surgery in Canada," and "Thoracic Surgical Oncology Standards" from Ontario.[1, 2]

Strategic oversight around the development of this document was provided by the Canadian Partnership Against Cancer (CPAC) by: **Dr. Heather Bryant**, Vice-President, Cancer Control. Process development, report production and dissemination were led by the Quality Initiatives, Diagnosis & Clinical Care team at CPAC: **Corinne Daly**, **Dr. Mary Argent-Katwala**, Director; **Anubha Prashad**, Program Manager; **Michele Mitchell**, **Natasha Camuso**, Analyst; and **Mridula Suri**, Delivery Manager.

Introduction

Lung cancer kills more people than prostate, colon and breast cancer combined. Lung cancer currently represents 14% of all diagnosed cancer cases in Canada, but represents 27% of all cancer deaths, with a five-year survival estimate (2006-2008) of 14% for males and 20% for females, which makes it the leading cause of death from cancer.[3]

Although the incidence of esophageal cancer is relatively low, it is the 6th leading cause of cancer deaths in men with a high case fatality ratio.[4]

The core expertise of Thoracic Surgeons is the comprehensive management, from diagnosis to treatment, of diseases of the structures within the thorax. A large amount of thoracic surgical practice is related to lung and esophageal cancer. Due to the nature of these cancers, the patient relative comorbidities and age, these surgeries are by their nature particularly complex and are associated with a higher risk of adverse outcomes for patients. However, surgery is the primary means of curative intent treatment and as such the optimal delivery of surgical care for these cancers is paramount.

A recently published report entitled, Approaches to High-Risk, Resource Intensive Cancer Surgical Care in Canada, highlights major disparities in care patterns that exist across the country for several types of cancer that are considered high-risk and resource-intensive.[5, 6] Evidence shows an inverse relationship of hospital volume on the risk of in-hospital mortality for both lung and esophageal cancers. In response to such evidence, certain provinces have taken steps to regionalize care for lung cancer, and thoracic surgery in general.[5] However, it was acknowledged that the move toward regionalization and treatment in high-volume centres, by specialized surgeons, could lead to greater travel times and complications with respect to access of care for those living far from a major cancer centre or for those from vulnerable populations. These factors are important to take into consideration when considering changes to models of care in any jurisdiction.[5] Additional factors to regionalization or centralization of care should also be considered including human resource requirements to ensure timely access to care, necessary training and maintenance of competency for thoracic surgeons, availability of required equipment and services, and quality assurance processes and measurement capabilities.

Based on the evidence supporting improved outcomes and patient safety in higher volume centres, as well as the disparities in care across the country, there is a need for a set of pan-Canadian standards to ensure consistent, high-quality care for all Canadians requiring thoracic surgery. As such, this document seeks to not only define thoracic surgeons but also highlight the features of a thoracic surgical centre needed to elevate the delivery of high quality care in a contemporary Canadian context.

SCOPE OF STANDARDS

The scope of this document includes:

> Thoracic surgery in general, with emphasis on cancer surgery
> Timely access to care from a pre-, peri- and post-operative Scope of Standards
> Training and maintenance of competencies for thoracic surgeons
> Access to services and equipment
> Access to oncologists, other physicians and, allied health
> Resources for patients and families (e.g. smoking cessation programs)
> Quality processes, including multidisciplinary tumour board rounds

The scope of this document does not include:

> Management of care pathways by cancer type or tumor site
> Assessment of drugs and treatment options
> Assessment of technology and equipment used to deliver care

This document is intended to provide high-level guidance to the Ministries of Health, thoracic surgeons, local health authorities and hospital administrators on the foundational resources and requirements that need to be in place to support high quality care delivery. It is recognized that these standards will need to be tailored according to local health system characteristics.

Expert panel members acknowledged that the readers of this document may want thresholds and/or concrete numbers to demonstrate specific volume-outcome relationships. However, the expert panel members did not feel a specific number could be derived from the various published thresholds that would be applicable in all Canadian jurisdictions. Thus, the expert panel has rather highlighted important factors that would support the achievement of optimal outcomes.

INTENDED USERS/ TARGET AUDIENCE

The primary intended users/target audience of this document are thoracic surgeons in Canada. Secondary users include Ministries of Health, as well as other physicians and collaborating specialties (e.g. anesthesiologists, radiologists, pathologists). Other users that might benefit from this document include thoracic surgeons from other countries, hospital administrators and local cancer authorities.

Methodology

LITERATURE REVIEW AND ENVIRONMENTAL SCAN

A literature search was performed using Medline and Embase with publications restricted to between 1946 to June 2016, and 1996 to June 2016, respectively. A comprehensive search strategy was developed to assess the literature to examine evidence. The search strategy incorporated medical subject headings (MeSH), Boolean operators, and wild cards. Results were excluded if they were duplicate findings or were not deemed relevant after review (Fig. 1).

EXPERT DISCUSSIONS

The standards herein were developed through consultation with an expert panel of thoracic surgeons from across Canada. The expert panel members reviewed literature search findings for relevance and identified key evidence to be evaluated and incorporated to support the standards, where appropriate. An in-person meeting was held to develop standard statements (27 standards developed) and achieve consensus on standard statements to be included, followed by an electronic survey to validate and vote on the results from the in-person meeting. Based on the electronic survey and follow-up meeting discussions, two (2) standard statements were combined and one (1) removed, resulting in 25 standards included in this document. A targeted review period was held to seek additional feedback and endorsement from the Canadian Association of Thoracic Surgeons (CATS).

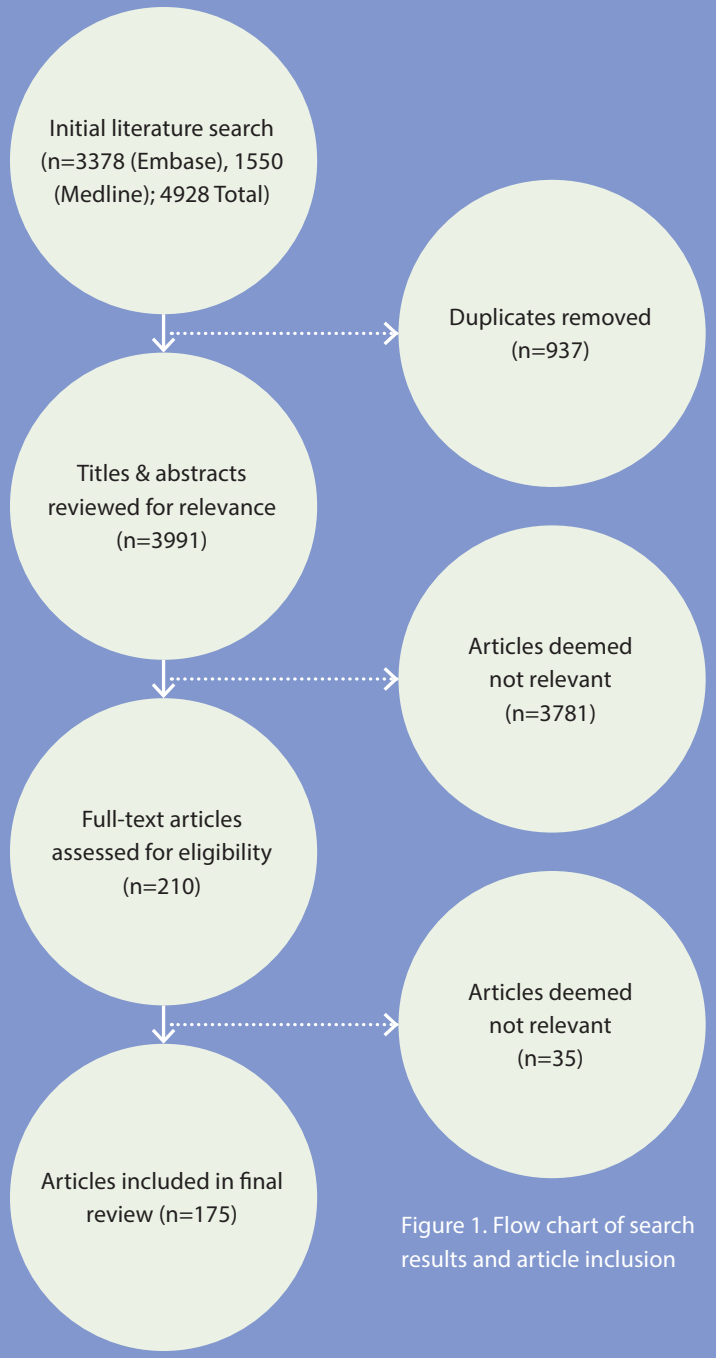
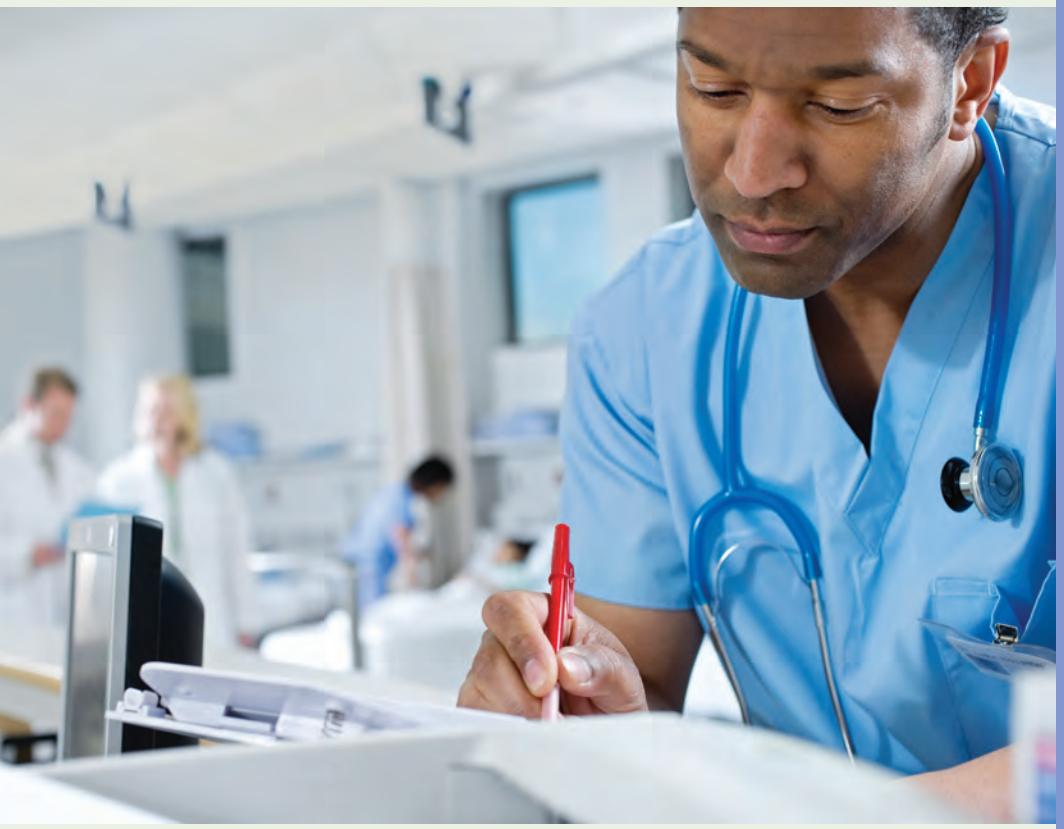


Figure 1. Flow chart of search results and article inclusion

SURGEON CRITERIA

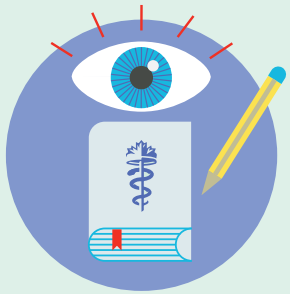


1.1 REQUISITE TRAINING & COMPETENCY FOR PRACTICE

Thoracic surgeons need to be qualified, well-trained and the associated healthcare team needs to be adequately resourced. Manpower planning has to be comprehensive and systematic; thought has to be put into the composition of the team (i.e. full-time equivalence etc.) with a clear emphasis that this is a 'team sport.' It should be noted that attempts to address this issue in a non-comprehensive manner is likely to yield sub-optimal outcomes. It warrants clear emphasis that this is a 'team sport' and attempts to address this issue in a non-comprehensive manner is less likely to yield optimal outcomes. Please see the Human Resources and Quality Processes (Multidisciplinary sub-heading) sections for more details on the composition of the care team.

1.1.1 A thoracic surgeon should have contemporary knowledge of the diseases of the thorax and foregut as defined by the Objectives of Training in the Subspecialty of Thoracic Surgery in the Royal College of Physicians and Surgeons of Canada (RCPSC).[2, 7, 8]

1.1.2 Thoracic surgeons' participation in the maintenance of certification is mandatory and must be in accordance with provincial and national standards.



1.1.3 Canadian thoracic surgeons will have complete training, and hold formal certification in General Thoracic Surgery equivalent with RCPSC. For those not trained in Canada, a similar regimented and accredited training program must be completed and certified by RCPSC.[7-9]

The technical skills and knowledge to safely and competently deliver thoracic surgery requires that the practitioner has completed compre-hensive training in the full scope of thoracic surgery. Thus, thoracic surgeons must maintain and update their skills and knowledge and participate in peer review. Where possible, training completed in Canada is preferred. Although the expert panel acknowledges that in the United States and Internationally there are many excellent training programs, their scope, training and evaluation are sufficently different to make them not completely transferable. Training obtained outside of Canada should utilize the appropriate Royal College avenue for evaluation.

Many publications have examined the components of care from thoracic surgeons that result in superior short and long term outcomes to those without thoracic training. The evidence suggests superior outcomes when care is delivered by specialty trained and certified thoracic surgeons although these studies were not completed in the Canadian system.[5-12]

Board certification in thoracic surgery should be used to demonstrate competence. Surgeons should maintain expertise and competence through ongoing education in available Continuing Professional Development programs, such as the Maintenance of Certification program of the Royal College of Physicians and Surgeons of Canada.[10] Routine Continuing Medical Education (CME) is considered a necessary factor to improve outcomes.[11]

1.2 SURGERY & MANAGEMENT

1.2.1 Thoracic surgeons should be intimately involved in the diagnostic assessment and management of benign and malignant lung, esophageal and other thoracic tumours, where only the thoracic surgeon makes the decision of operability and resectability.

1.2.2 Resections for lung cancer and esophageal cancer should only be performed by thoracic surgeons in designated thoracic surgical centres.

Many international case studies, as well as expert experience, have shown that models of care that include thoracic surgeons in decisions of operability and resectability have superior rates of resection and suggest superior survivals for lung cancer.[5-12] Where care is informally given, or where lung cancer evaluation and treatment is not standardized, the patients often have less chance of being offered curative modalities. As such, it is the recommendation of the expert panel that all patients with lung and esophageal cancer in Canada be evaluated in a systematic way such that care can be standardized. Within this model, thoracic surgeons have an early and primarily role in the diagnosis and decision making process.

It is the opinion of the expert panel that while there are instances where non-thoracic surgeons in Canada have excellent training and experience in lung and esophageal surgeries, elective resections for thoracic malignancies should be limited to thoracic surgeons in centres that comply with these standards in order to optimize outcomes.

PRACTICESETTINGS

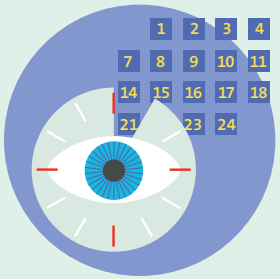
2.1 ORGANIZATIONAL CRITERIA

2.1.1 Recognizing regional needs, a thoracic centre should have a minimum of three thoracic surgeons. Recruitment of additional surgeons and/or adequate human resource supports may be warranted based on certain factors/thresholds:[12]

- **Significant increase in surgeon workload which may compromise their ability to provide timely and effective patient care**
- **Non-clinical responsibilities of education, research or leadership**
- **Significant and sustained increase in the number of referrals compromising the delivery of care**
- **Increased wait times for cancer patients**

In a balance of Canadian geography, patient, surgeon and hospital factors, it is felt that there should be a minimum of three thoracic surgeons on staff to provide diagnostic assessment and management of thoracic issues.[10, 13-17] Workforce planning is inexact and very dependent on local circumstances, scope of work and other non-clinical activities. As such, providing any exact number is difficult. While there are no clinical trials or scientific studies that are able to determine when to add additional surgeons beyond a minimum of three, real-world evidence and local expert opinion should be sought to maintain a high level of quality care based on access. Clinical responsibility beyond cancer can rapidly increase the need to recruit additional surgeons.

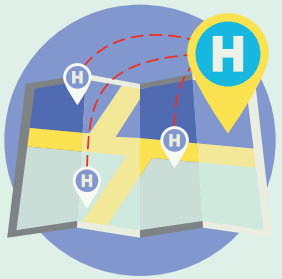
2.1.2 Thoracic centres should set targets to monitor and evaluate wait times and timely access to care.



Understanding that targets are a mutual responsibility of the surgeon, other disciplines with direct responsibilities to the patient and the facility, expert panel members recommend the following targets for triage and screening to facilitate timely ordering of diagnostic and appropriate referral to consultants:

- A referral to a thoracic centre should be triaged within a week.
- Those with high risks of malignancies (advanced and symptomatic cancer) should be seen within a week of triage.
- 90th percentile wait time from referral to decision to treat should be 4 weeks. It is the joint responsibility of the region, institution and surgeon to provide appropriate supports and timely access to services (from suspicion to diagnosis to treatment) to support achievement of defined wait times.
- Referral for benign disease should be seen within a time compatible with the underlying illness.

2.1.3 Within the geographic limitations of a health authority, specialized services should be concentrated and regionalized.



Ideally, specific information on the quality of surgery and care would guide the regionalization process within the geographic limitations of a health authority. Currently available information would suggest that the most robust modifiable variable in the model of patient care is regionalizing patients to high-volume hospitals for select high-risk procedures to improve outcomes. High-volume centres tend to have more highly trained surgeons, better infrastructure, better-staffed patient units, more resources, and increased collaborations with multidisciplinary teams. These factors have reportedly reduced mortality rates and improved long-term survival rates.[18-27] It is likely that it is not the volume but the associated factors outlined in this document that make the difference in patient care.

2.1.4 Thoracic centres should participate in regionally and provincially integrated and established networks of care to ensure appropriate care is provided closer to home.

Geographic isolation, within the Canadian context, can prohibit the delivery of high quality care to vulnerable populations. Availability of a functional network of care including ready access to telehealth and other technological solutions can help mitigate the deficiencies and provide care closer to home. Thus, regionalization of services should take into consideration patient choice and the distance that patients are willing to travel as these patients often need ongoing health care services.[28, 13] Innovative regional programs that leverage existing networks are important to ensure that patients get optimal care. Whether through diagnostic assessment pathways, integrated home care models, or active involvement of the patient's primary care team, many existing programs can bridge these potential care gaps.

2.1.5 Infrastructure should be in place to support the participation of patients in clinical research.

Infrastructure, such as the availability of disease-specific clinical trial networks, should be in place to support and increase the participation of patients in clinical research. For treatment of lung cancer, particular focus should be given to availability and funding of clinical trials as this disease is under resourced relative to its mortality and incidence.[11]

2.2 PHYSICAL RESOURCES AND COLLABORATING SERVICES

2.2.1 All thoracic centres need timely access to diagnostics so that all testing (e.g. PET scan, CT, percuta-neous biopsies, bronchoscopy and EBUS, cranial imaging etc.) can be completed within defined wait times for cancers. It is the joint responsibility of the region, insti-tution and surgeon to provide appropriate supports and timely access to services (from suspicion to diagnosis to treatment). A region with thoracic centres needs to be committed to supporting adequate workforce and resources to provide high quality care.

A thoracic centre should be well-resourced so that timely diagnosis and earlier intervention can occur. Full spectrum of diagnostic services and radiologic imaging should be available. These include, but are not limited to: conventional x-ray and immediate portable chest x-ray access 24/7 for emergencies, CT scan, magnetic resonance imaging, ultrasound, nuclear medicine, and vascular imaging.[10] In addition, onsite laboratory for timely pulmonary function tests and cardiac diagnostic assessment services, including nuclear imaging should be available.[10] It is the expectation that Canadian thoracic surgeons have the expertise to undertake comprehensive diagnostic and staging evaluation for thoracic malignancy. Endoscopy and bronchoscopy resources, including interventional techniques, are also required. Thoracic surgeons should have ready access to CT scan for timely staging.[29, 30] Low dose CT will be increasingly required as lung cancer screening and surveillance is adopted.

2.2.2 The following resources and collaborating services are considered to be reasonable criteria for thoracic centres to provide comprehensive and timely care:

- **Dedicated geographically defined thoracic surgical unit with a consolidated unit of dedicated beds to ensure an appropriate level of nursing, physiotherapy, and respiratory therapy expertise with the expectation that all elective cases should be placed with dedicated thoracic beds so that their care is standardized.**
- **Step-down beds when necessary to support the volume of patients treated.**
- **24 hours a day/7 days a week access to the operating room, interventional radiology and critical care.**
- **Access to rapid response laboratory (i.e. biochemistry, cytology, hematology, transfusion and microbiology) services.**
- **Onsite pathology and frozen sections to support operative room.**
- **Timely access to appropriate immuno-histochemistry and genomics.**
- **Access to advanced endoscopy (flexible and rigid, EBUS, EUS, stenting) and ambulatory services.**
- **Access to interventional endoscopy with the inclusion of ablation and/or mucosal resection.**

The issue of where patients are most safely cared for in thoracic surgery is multifaceted and influenced by case volume, hospital resources and historic relationships. Within that construct, it is the collective opinion that patients undergoing thoracic surgery are best served where they are geographically together to concentrate expertise. The specialized nature of thoracic surgery and the unique nature of the complications and/or adverse events necessitates expertise at all levels of care. By geographically concentrating patients within the dedicated healthcare facility, all members of the care team can notice deviances from ideal care and can intervene early and appropriately to avoid significant adverse events from occurring. It is the expectation that the majority of elective thoracic patients could be cared for in this area (i.e. thoracic dedicated floor in critical care area). Contingency plans to cover issues of surge capacity and hospital flow should be incorporated into the design of these models. The issue of higher level care needs to be equally defined. Many thoracic patients need "step down" or equivalent critical care beds to ensure optimal care and minimize mortality. As such, those beds need to be resourced adequately to ensure timely and optimal care.

2.2.3 All thoracic centres should have well-maintained and adequately resourced open, minimally invasive and advanced endoscopic equipment.

2.2.4 Capital expenditures must be available to provide contemporary equipment and be re-evaluated as there are changes in workforce.

2.2.5 As recommended by the pathology community, all thoracic-related pathology reports should be reported in a synoptic format and should be completed and communicated within 2 weeks of operation.

All thoracic-related pathology reports should be reported in a synoptic format within two (2) weeks of operation. Electronic synoptic pathology reports are standardized checklists that capture information at the point of care and once completed, are promptly transmitted to other health care professionals.[31]

Captured information can be used by surgeons to assess adherence to evidence and safety procedures and assess the delivery of high quality care and patient outcomes.[31]

2.3 HUMAN RESOURCES

2.3.1 Treatment of patients by a multidisciplinary team is extremely important. For every patient, availability of advanced health care professionals is mandatory.

Thoracic surgery patients need access to 24/7 intensive care unit services. Advanced human resource supports include, but not limited to:

- **Respiratory therapists;**
- **Dietary and nutritional support;**
- **Home care and social work;**
- **Allied health professionals such as physician assistants, nurse practitioners and advanced practice nurses at each thoracic centre with adequate numbers to support care of patients;**
- **Allied health support staff including dedicated thoracic nurses and chest physiotherapists available 7 days a week;**
- **Ready access to on-site palliative care services;**
- **Thoracic anesthesiologists, pathologists and radiologists with an interest in thoracic surgery (preferably with thoracic fellow-ship training and/or mentored by professionals experienced in thoracic surgery);**
- **Formalized partnerships and access to oncology resources including medical oncologists and radiation oncologists;**
- **Timely access to other medical specialists including gastro-enterologists, infectious disease specialists, cardiologists, neur-ologists, pulmonary medicine specialists, intensivists, thoracic pathology, and radiologists with a subspecialty interest in diagnostic and interventional procedures of the chest;**
- **Cancer patient navigators/ co-ordinators.**

Critical to successful patient care is the team involved in managing them. Thoracic surgeons recognize that while their role of the surgeon is one of leadership, knowledge and technical excellence, the entire care team executes prevention of mortality and morbidity and rescue from an adverse event. "Failure to rescue" is an institutional failing as much as a physician one. Although the thoracic surgeon has an integral role to play, collaboration with other specialities, consultants and clinical nurse specialists is key to providing high quality thoracic surgical care.[32] The relationship with physiotherapy, respiratory therapy and advanced practice nurses is of particular importance in thoracic surgery. Each of those professions is critical to the care of patients. Twenty four hour a day need for respiratory therapy coverage should be the standard of care for thoracic patients as they can provide critical and time-sensitive care that can rescue and prevent deterioration of patients. Seven day a week access to physiotherapy similarly may prevent respiratory adverse events, the most common postoperative complication in thoracic surgery. The issue of advanced practice nurses is multifaceted and important. Due to the inherent vulner-ability of the patient population, they are at increased risk of gaps in care that are bridged by these professionals. Allied health professionals such as advanced practice nurses, nurse practitioners, or physician assistants can help in the education and evalu-ation of patients in the diagnostic aspects of care, and inpatient standard-ization of perioperative management with significant contributions in identification and prevention of adverse events. They also contribute to the management and timely discharge of patients to ensure optimal patient flow while minimizing readmissions.

For services not immediately available in the institution, knowledge and/or formal relationships with centres that can provide these services in the region is important.

2.4 TREATMENT AT ONCOLOGY CENTRES AND RELATIONSHIP WITH AFFILIATED CENTRES

2.4.1 Relationship with a cancer centre with access to consultation from medical and radiation oncologists. There should be a mechanism in place to provide urgent inpatient consultation and treatment.

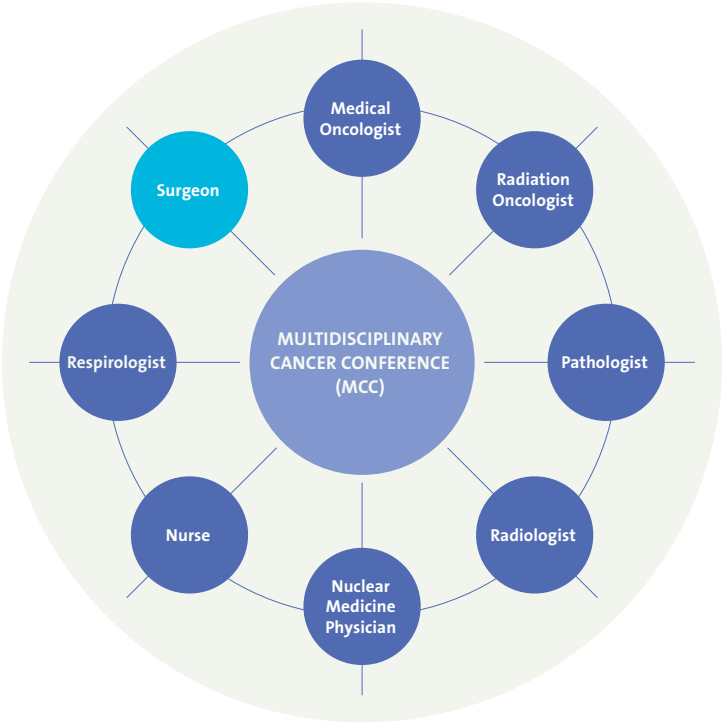
Barriers in geography or available beds should not impede the necessary consultation or treatment. Although a thoracic centre should be equipped with adequate resources to manage the full range of thoracic surgical care, in the instance that this is not the case, a formal working relationship or association with a regional cancer centre should be in place.[10, 11] This includes affiliation with a regional cancer center that has access to radiation therapy equipment, and where consultation with medical and radiation oncologists is also readily available.[10]

QUALITY PROCESSES

Collaboration and knowledge sharing are essential for those involved in patient care. Collaboration between specialties has shown to enhance patient outcomes as well as significantly reduce the time from diagnosis to treatment.[11, 33-45] It is critical that nurses, respirologists, radiologists, medical oncologists, radiation oncologists and surgeons formulate a unified, evidenced-based management plan for patients.[36] Communication between the members of the multidisciplinary teams needs to be timely to ensure compliance to agreed-upon patient pathways, including personalized case management and compliance with definitive treatment.[46]

3.1 MULTIDISCIPLINARY DISCUSSION AND EVALUATION [OF CASES]

3.1.1 All complex lung and esophageal cancers and other thoracic malignancies should be discussed in a multidisciplinary format with an attending staff thoracic surgeon. Participation in a multidisciplinary cancer conference (MCC) should include medical and radiation oncologists a pathologist, radiologist and/or nuclear medicine physician, to achieve of optimal outcomes.



3.2 DATA COLLECTION AND CONTINUOUS QUALITY IMPROVEMENT

3.2.1 **Institutions and regions that have thoracic centres need to support quality processes such that financial barriers are not a limitation to participation.**

3.2.2 **It is the joint responsibility of the thoracic centres and thoracic surgeons to actively monitor patient complications and for human resources to have quality processes in place to support quality improvement. Every thoracic centre needs to have a system in place to identify adverse events and outcomes early in the patient's journey and rescue the patients to avoid further more serious events.**

3.2.3 **There should be an implementation of a national, data-driven approach to deliver best practice care and for health authorities to provide appropriate supports to institutions to achieve the best practice. Routine data collection on process and outcomes should be systematically and prospectively captured and benchmarked against national and international standards in a risk-adjusted manner. This includes systematic classification of adverse events, regular review of morbidity and mortality rounds, and periodic review of data to allow for self-evaluation and to promote continuous cyclical improvement (through audit and feedback). Best practice approaches should be utilized and shared to ensure high quality care.**

3.2.4 **Institutions should support adequate collection and measurement of patient experience data.**

3.2.5 **There is an expectation that techniques and processes of care will change over time. Adoption should be done in a systematic manner to support standardized implementation with a need for credentialing where significant changes in technologies are introduced.[47] It is the expectation that when adopting new technologies and techniques active tracking of adverse events and outcomes will be completed.**

3.2.6 Institutions should have ready access to smoking cessation supports and surgeons should actively encourage or refer patients to smoking cessa-tion programs.

3.2.7 Federal, provincial and institutions should identify patients at high-risk for negative outcomes, in particular those from vulnerable populations, and develop appropriate pathways and monitor compliance.

Although difficult to precisely define, quality improvement is often measured by components of structure, outcomes, and process.[48] One way for thoracic surgeons to evaluate their practices is to compare themselves with evidence-based national guidelines.[48] Quality data is often generated from entry into large patient databases.[48] This data, around quality care, process and outcome measures, can provide meaningful information regarding surgical outcomes and quality. Upon regular monitoring, it can help predict surgical morbidity and mortality.[48] Routine collection of data will over time improve data quality and therefore lead to better patient care. However, outcome not only depends upon surgeon and hospital volume, but also involves patient factors (e.g. comorbidities), involvement of integrated multidisciplinary health professionals (e.g. physiotherapy and respiratory therapy), and access to critical care services. The comple-mentary skill set of the surgeon (e.g. MIS, endoscopy) may also influence lung and esophagectomy outcomes.[49] Thus, data collection at various points of the patient journey and benchmarking against national and international standards/targets can support the delivery of high quality patient-centered care.

The goal of data collection, evaluation and monitoring is to help improve surgical and hospital performance in a non-punitive manner and to steer away from a 'blame and shame' approach. When adopting new techniques or technologies, risk to patient needs to be balanced against the amount and significance of that innovation. A review and regular of audit of data and monitoring of complications in a standardized way have been shown to improve outcomes.[50, 51] Institution-level data should be fed back into the system to improve quality and minimize inter-provincial barriers, as well as to local participants providing thoracic services, to help improve quality. Monitoring outcomes data can help the clinicians identify which processes they have followed or not which have directly impacted patient outcome.[52]

Recognizing that there is considerable variation in the evaluation of quality of care, the uniform use of well-defined quality of care indicators to measure and monitor performance holds the promise of improving outcome in patients who undergo thoracic surgeries.[26]

FUTURE DIRECTIONS

This document is intended to act as an informational and decision-making resource to elevate and standardize the delivery of thoracic surgery in Canada. Following publication, future work will include wide dissemination and identification of strategies to catalyze systematic and comprehensive adoption to help narrow the gap and address current deficiencies and variability in care.

Efforts will be underway to develop an evaluation framework to measure uptake and to explore the role of CATS and Accreditation Canada as a mechanism to promote and offer accreditation process to enforce the recommended standards.

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Lung cancer kills more people than prostate, colon and breast combined.

This document provides high-level guidance on the foundational resources and requirements that need to be in place to improve cancer surgical care and outcomes. It will serve as a decision-making resource to support the delivery of consistent, high-quality care to all Canadians requiring thoracic surgery.

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