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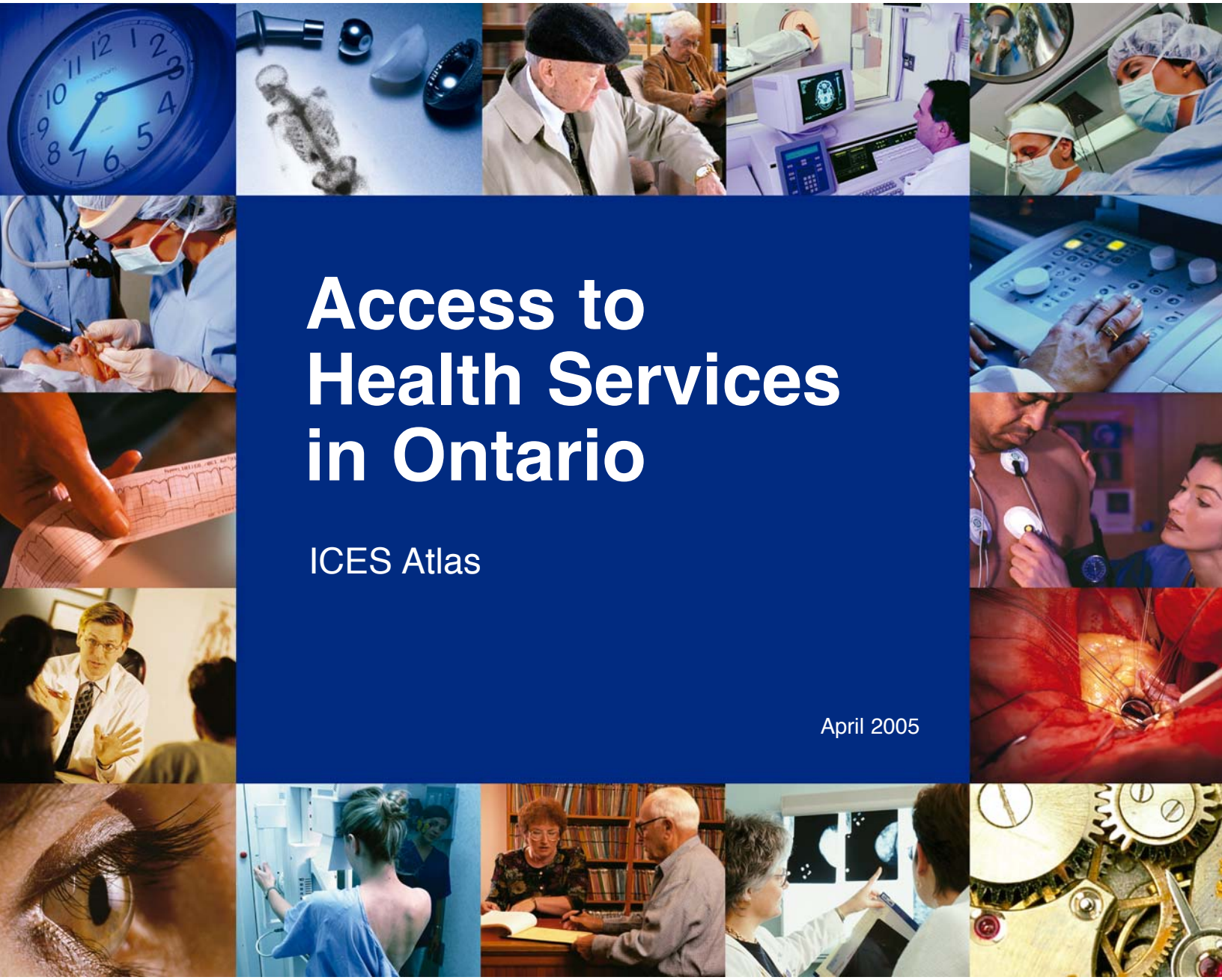

Access to Health Services in Ontario

ICES Atlas

April 2005

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Editors

Jack V. Tu, MD, PhD, FRCPC
S. Patricia Pinfold, MSc
Paula McColgan, MHA, CHE
Andreas Laupacis, MD, MSc, FRCPC

Authors

David A. Alter, MD, PhD, FRCPC
Chaim M. Bell, MD, PhD, FRCPC
Robert B. Bourne, FAAOS, FRCSC
Geta Cernat, MD
Eric A. Cohen, MD, FRCPC
Donald DeBoer, MMath
Kevin W. Glasgow, MD, MBA, MHSc, CCFP, FACPM, FRCPC
Yanyan Gong, MSc
Wendy V. Hatch, OD, MSc
Gillian Hawker, MD, MSc, FRCPC
David Hodgson, MD, MPH, FRCPC
M. Anne Keller, MD, FRCPC
Hans Kreder, MD, MPH, FRCSC
Nizar Mahomed, MD, ScD, FRCSC
J. Michael Paterson, MSc
Raymond Przybysz, MSc
Linda Rabeneck, BSc, MD, MPH, FRCPC
Samuel Shortt, MPA, MD, PhD
Shaun Singer, MD, FRCSC
Pamela M. Slaughter, MA, MSc
Terry Sullivan, PhD
David R. Urbach, MD, MSc, FRCSC, FACS
Susan Warner, MEd
Jack Williams, PhD

Publication Information

Canadian cataloguing in publication data

Access to Health Services in Ontario: ICES Atlas

Includes bibliographical references.

ISBN: 0-9730491-9-7

i. Tu, Jack V. 1965
ii. Pinfold, S. Patricia 1946
iii. McColgan, Paula 1967
iv. Laupacis, Andreas 1954

How to cite this publication

The production of *Access to Health Services in Ontario: ICES Atlas* was a collaborative venture. Accordingly, to give credit to individual authors, please cite individual chapters and title, in addition to editors and book title. For example: Alter DA, Cohen EA, Cernat G, DeBoer D et al. Cardiac Procedures. In: Tu JV, Pinfold SP, McColgan P, Laupacis A, editors. Access to Health Services in Ontario: ICES Atlas. Toronto: Institute for Clinical Evaluative Sciences; 2005.

Institute for Clinical Evaluative Sciences (ICES)
G1 06, 2075 Bayview Avenue
Toronto, ON M4N 3M5
Telephone: 416-480-4055
www.ices.on.ca

Contents

Authors' affiliations

David A. Alter, MD, PhD, FRCPC
Scientist
Institute for Clinical Evaluative Sciences

Assistant Professor
Department of Medicine, University of Toronto

Staff Cardiologist
Schulich Heart Centre, Sunnybrook and Women's College Health Sciences Centre

Chaim M. Bell, MD, PhD, FRCPC
Adjunct Scientist
Institute for Clinical Evaluative Sciences

Assistant Professor
Departments of Medicine, and Health Policy, Management and Evaluation, University of Toronto

Staff Physician
Division of General Internal Medicine, Department of Medicine, St. Michael's Hospital

Robert B. Bourne, FAAOS, FRCSC
Chair/Chief
Division of Orthopaedic Surgery, The University of Western Ontario

Medical Director
Ontario Joint Replacement Registry

Geta Cernat, MD
Programmer/Analyst
Institute for Clinical Evaluative Sciences

Eric A. Cohen MD, FRCPC
Director
Cardiac Catheterization Laboratory, Sunnybrook and Women's College Health Sciences Centre

Associate Professor
Department of Medicine, University of Toronto

Medical Officer
Cardiac Care Network of Ontario

Donald DeBoer, MMath
Director
Programming & Biostatistics, Institute for Clinical Evaluative Sciences

Kevin W. Glasgow, MD, MBA, MHSc, CCFP, FACPM, FRCPC
Chief Executive Officer
Cardiac Care Network of Ontario

Lecturer
Department of Public Health Sciences, University of Toronto

Yanyan Gong, MSc,
Analyst 2
Institute for Clinical Evaluative Sciences

Wendy V. Hatch, OD, MSc
Clinical Instructor
Department of Ophthalmology, University of Toronto

Research Associate
Ophthalmology, Toronto Western Hospital, University Health Network

Gillian Hawker, MD, MSc, FRCPC
Senior Adjunct Scientist
Institute for Clinical Evaluative Sciences

Investigator
Arthritis Community Research and Evaluation Unit

Associate Professor
Departments of Medicine, and Health Policy, Management and Evaluation, University of Toronto

Staff Rheumatologist and Director, FM Hill Chair
Academic Women's Medicine, Osteoporosis Research Program, Sunnybrook and Women's College Health Sciences Centre

David Hodgson, MD, MPH, FRCPC
Adjunct Scientist
Institute for Clinical Evaluative Sciences

Radiation Oncologist
Princess Margaret Hospital

M. Anne Keller, MD, FRCPC
Deputy Chief
Department of Medical Imaging, University Health Network

Hans Kreder, MD, MPH, FRCSC
Adjunct Scientist
Institute for Clinical Evaluative Sciences

Associate Professor
Departments of Surgery, Health Policy, Management and Evaluation, and Clinical Epidemiology, University of Toronto

Chair
Orthopaedic Clinical Epidemiology, University of Toronto, Sunnybrook and Women's College Health Sciences Centre

Director
Orthopaedic Research Group, Division of Orthopaedic Surgery, Sunnybrook and Women's College Health Sciences Centre

Andreas Laupacis, MD, MSc, FRCPC
President and CEO
Institute for Clinical Evaluative Sciences

Professor
Faculty of Medicine, University of Toronto

Senior Scientist
Clinical Epidemiology and Health Care Research Unit, Sunnybrook and Women's College Health Sciences Centre

Nizar Mahomed, MD, ScD, FRCSC
Adjunct Scientist
Institute for Clinical Evaluative Sciences

Investigator
Arthritis Community Research and Evaluation Unit

Associate Professor
Department of Surgery, University of Toronto

Smith & Nephew Chair in Orthopaedic Research

Orthopaedic Surgeon and Medical Director
Musculoskeletal Health and Arthritic Program, Toronto Western Hospital, University Health Network

Paula McColgan, MHA, CHE
Vice-President
Policy and External Relations, Institute for Clinical Evaluative Sciences

J. Michael Paterson, MSc
Senior Research Coordinator
Institute for Clinical Evaluative Sciences

S. Patricia Pinfold, MSc
Director
Research Projects, Institute for Clinical Evaluative Sciences

Raymond Przybysz, MSc
Research Coordinator
Institute for Clinical Evaluative Sciences

Linda Rabeneck, BSc, MD, MPH, FRCPC
Senior Scientist
Institute for Clinical Evaluative Sciences

Professor
Department of Medicine, University of Toronto

Director
Division of Gastroenterology, University of Toronto

Head
Division of Gastroenterology, Sunnybrook and Women's College Health Sciences Centre

Samuel Shortt, MPA, MD, PhD
Director
Centre for Health Services and Policy Research, Queen's University

Shaun Singer, MD, FRCSC
Assistant Professor
Faculty of Medicine, Department of Ophthalmology and Vision Sciences, University of Toronto

Director
Comprehensive Ophthalmology and Cataract Surgery, Toronto Western Hospital, University Health Network

Pamela M. Slaughter, MA, MSc
Senior Research Coordinator, Privacy Officer
Institute for Clinical Evaluative Sciences

Terry Sullivan, PhD
President and CEO
Cancer Care Ontario

Jack V. Tu, MD, PhD, FRCPC
Senior Scientist
Institute for Clinical Evaluative Sciences

Canada Research Chair Tier II in Health Services Research

Professor
Departments of Medicine, Public Health Sciences, and Health Policy, Management, and Evaluation, University of Toronto

Staff Physician
Division of General Internal Medicine, Department of Medicine, Sunnybrook and Women's College Health Sciences Centre

David R. Urbach, MD, MSc, FRCSC, FACS
Assistant Professor
Departments of Surgery, and Health Policy, Management and Evaluation, University of Toronto

Staff Surgeon
Minimally Invasive Surgery Program, Division of General Surgery, University Health Network

Scientist
Cancer Care Ontario

Scientist
Division of Clinical Decision Making and Health Care, Toronto General Hospital Research Institute

Adjunct Scientist
Institute for Clinical Evaluative Sciences

Susan Warner, MEd
Managing Director
Ontario Joint Replacement Registry

Jack Williams, PhD
Scientist Emeritus
Institute for Clinical Evaluative Sciences and Clinical Epidemiology and Health Care Research Unit, Sunnybrook and Women's College Health Sciences Centre

Acknowledgments

The authors wish to thank the following individuals and organizations for their contributions to the success of this project, and apologize in advance for any inadvertent omissions.

Critical Review

David Naylor (Chapter 7—Summary of Findings)

Data Support

Cancer Care Ontario
Cardiac Care Network of Ontario
Ontario Joint Replacement Registry
Southeastern Ontario Academic Medical Organization
University of Western Ontario

We would also like to extend special thanks to managers and staff at Ontario's acute care hospitals who worked with us to verify the numbers of procedures delivered at individual hospitals.

Production

Institute for Clinical Evaluative Sciences

Editor
Carolynne Varney

Design and layout
Laura Benben

Mapping
Ping Li

Internal Review
Ruth Croxford
Linda Donovan
Hadas Fischer
Kinwah Fung
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About the Institute for Clinical Evaluative Sciences (ICES)

Ontario's resource for informed health care decision-making

ICES is an independent, non-profit organization that conducts research on a broad range of topical issues to enhance the effectiveness of health care for Ontarians. Internationally recognized for its innovative use of population-based health information, ICES knowledge provides evidence to support health policy development and changes to the organization and delivery of health care services.

Unbiased ICES evidence provides fact-based measures of health system performance; a clearer understanding of the shifting health care needs of Ontarians; and a stimulus for discussion of practical solutions to optimize scarce resources.

Key to ICES' research is our ability to link anonymous population-based health information on an individual patient basis, using unique encrypted identifiers that ensure privacy and confidentiality. This allows scientists to obtain a more comprehensive view of specific health care issues than would otherwise be possible. Linked databases reflecting 12 million of 30 million Canadians allow researchers to follow patient populations through diagnosis and treatment, and to evaluate outcomes.

ICES brings together the best and the brightest talent under one roof. Many of our faculty are not only internationally recognized leaders in their fields, but are also practising clinicians who understand the grassroots of health care delivery, making ICES knowledge clinically-focused and useful in changing practice. Other team members have statistical training, epidemiological backgrounds, project management or communications expertise. The variety of skill sets and educational backgrounds ensures a multi-disciplinary approach to issues management and creates a real-world mosaic of perspectives that is vital to shaping Ontario's future health care.

ICES collaborates with experts from a diverse network of institutions, government agencies, professional organizations and patient groups to ensure research and policy relevance.

INSIDE

1

Chapter

Overview

Jack V. Tu, MD, PhD, FRCPC, and Andreas Laupacis, MD, MSc, FRCPC

Introduction

Surveys suggest that many Canadians believe they wait too long for health care services and are concerned that should they become seriously ill, the health care system may not be able to provide the required services in a timely manner.[1] Surveys of Canadian physicians echo these findings, as physicians report that many of their patients face unreasonable delays for access to diagnostic tests and important procedures such as hip and knee replacements or cardiac surgery.[2] While waiting lists are the most publicized aspect of the health care access issue, other dimensions such as appropriateness and outcomes of care also need to be considered to fully address whether or not Canadians have timely and appropriate access to high-quality care.

Providing timely access to high-quality health care by reducing wait times is one of the top priorities of health care policy makers in Canada. At the 2004 First Ministers' Conference on Health, a commitment was made to develop a National Waiting Times Reduction Strategy.[3] The strategy includes collection of meaningful information, delivery of progress reports to Canadians, and the creation of evidence-based benchmarks for medically acceptable wait times for defined health services.

The Ministry of Health and Long-Term Care (MOHLTC) has developed an Ontario Wait Time Strategy focused on reducing wait times for 5 key health services. As part of this provincial strategy, the Institute for Clinical Evaluative Sciences (ICES), an independent arm's-length health services research agency based in Toronto, compiled this report, *Access to Health Services in Ontario: ICES Atlas,* to document the state of access for each of the following health care services:

- Selected cancer surgeries: large bowel resection, mastectomy, radical prostatectomy, hysterectomy;
- Selected cardiac procedures: coronary angiography; percutaneous coronary intervention (PCI) or angioplasty; coronary artery bypass graft surgery (CABG);
- Cataract surgery;
- Total hip and knee replacements; and,
- CT (computed tomography) and MRI (magnetic resonance imaging) scans.

In addition to 5 chapters pertaining to the key identified services, this atlas features a summary of findings chapter and a concluding chapter that provides reflections and recommendations on potential next steps.

Framework for Discussion of Access to Health Services

To describe patient access in Ontario to cancer surgery, cardiac procedures, cataract surgery, hip/knee total joint replacements and CT/MRI scanning, this report adopted a framework using the following 6 dimensions:

- Rates of service provision;
- Wait times;
- Appropriateness;
- Urgency;
- Unmet need; and,
- Patient outcomes.

The next sections provide a description of each dimension, its rationale, and the methods and tools used for measurement. In this report, the focus is primarily on the rates and wait times, for which data was most readily available. Over the next few years, it is anticipated that data on most of the other dimensions of care will become available through research conducted for the Ontario Wait Time Strategy, and will be presented in subsequent reports.

Rates of provision for key health services

Rates of provision for key health services are discussed in terms of overall rates per 100,000 population, by age group, sex, socioeconomic status, and Local Health Integration Network (LHIN). These data are based on the past 3 fiscal years (2001/02 to 2003/04) to illustrate recent trends in overall rates of service provision.

Service rates per 100,000 population

The crudest and simplest measure of access to a service is the rate at which it is provided, for example, the rate of hip replacement or cataract surgery per 100,000 Ontarians. If the rate increases over time this would suggest that access to the service is improving over time. If the rates vary across regions, this would suggest that some regions might have better access to the service than other regions. One might expect that higher rates of service would tend to be associated with shorter wait times, but this is often not the case. For example, some areas of the province may have both high service rates and long waits for service because the burden of disease in that region is especially high or because the threshold for performing a procedure (e.g., elective surgery) is different in that part of the province. Increasing rates of service over time may not necessarily lead to shorter waits if the number of patients referred for a service (i.e., demand) increases disproportionately over time.

Service rates by Local Health Integration Networks

As part of its plan to transform health care in Ontario, in October 2004, the MOHLTC announced plans to better integrate and coordinate health services at the local level through the formation of Local Health Integration Networks (LHINs). Across the province, LHINs will be the principal organizations responsible for planning, coordinating, integrating and funding the delivery of health care services within their geographic areas. To assist health planners and managers in these new networks, service rates are provided by LHIN for fiscal year 2003/04, using geographic boundaries defined by the MOHLTC in December 2004.[4]

Service rates by age group and sex

Most diseases have a different prevalence in men and women, and among age groups, which impacts the rates of services.

Service rates by socioeconomic status

Measuring access to care by socioeconomic status (SES) is important because it helps determine whether the Ontario health care system is providing health services in an equitable manner, or preferentially, to subgroups such as the wealthy. Previous studies of cardiac care and cancer care in Ontario have shown that the burden of disease is the highest in the poorest parts of Ontario and yet residents of these areas may not have the same degree of access to the system as those living in wealthier parts of Ontario.[5,6] In this report's analyses, Ontario's neighbourhoods are classified into 1 of 5 approximately equal-sized groups (quintiles) ranging from the poorest to the wealthiest, using an SES index developed by Statistics Canada.[7]

Although some regional variation in rates of services is to be expected, marked variations between LHINs may be of concern as they could suggest under-provision of services in low rate areas, over-provision of services in high rate areas, or differences in the underlying burden of disease, among possible explanations. Ensuring equitable access to health care services across LHINs, based on clinical need, should be a key consideration in future health care policy and funding decisions for these services.

Wait times

This report provides new wait time data for cancer surgery, cardiac procedures, cataract surgery, and hip and knee joint replacement. However, due to lack of data, this information is not provided for CT/MRI scans.

Although prolonged wait times are perceived to be a major problem facing Canada's health care system, there is little high-quality information available on how long Canadians actually wait for most health care services. Several factors contribute to this information gap including a lack of consensus on how to define and measure wait times, and a lack of dedicated databases

to track and measure wait times. There are, however, a few notable exceptions such as the Cardiac Care Network of Ontario cardiac procedure registry.[8] In the absence of population-based clinical registries to measure wait times for cancer surgery, cataract surgery, and hip and knee joint replacements, administrative databases including the Ontario Health Insurance Plan (OHIP) physician billing database and the Canadian Institute for Health Information (CIHI) hospital discharge abstract database, have been used as the primary data sources in this report.

In general, wait times for these services were defined as the time between the last surgical consultation billed in the OHIP database and the date a service was provided according to the OHIP and/or CIHI database, with additional procedure-specific modifications as specified in each chapter. This method assumes that the decision to proceed was made at the last patient-surgeon consultation before the intervention took place. This method allows the measurement of wait times from consultation to procedure on a population-based basis without having to wait for the development of a service-specific clinical waiting list registry in Ontario. Similar methods have been used to retrospectively measure wait times in other Canadian provinces.[9,10]

In this report, the estimated wait times measured were validated by comparing data from the administrative databases to the following:

- The waiting list data in the Ontario Joint Replacement Registry;
- The cataract surgery waiting list database of St. Joseph's Health Centre in London, Ontario; and,
- Wait times from a Cancer Care Ontario pilot study of cancer surgery wait times involving 8 Greater Toronto Area hospitals.[11]

These and other Canadian validation studies suggest that use of the administrative databases in this manner provides a very good method of estimating wait times at the population level.[9,12] However, it should be noted that in some cases, the date of decision does not correspond to the date of the last surgical consultation, and thus, the actual wait time is different. The exact frequency of this mismatch is unknown, although it would require a large number of cases to markedly change the median wait times reported in this study.

A significant limitation of this research atlas is that it focuses on the interval from surgeon consultation to procedure, but not on other intervals important to patients, such as waiting for access to a primary care physician, time from initial investigation to definitive diagnosis, and time between referral and actual visit with a specialist physician. (See Figure 1.1) Province-wide data on these wait times are currently not available in Ontario.

Appropriateness

An important consideration in interpreting service rates and wait times is determining the "appropriateness" of a procedure (i.e., whether it should have been performed in the first place). As the population-based rate of an intervention increases over time, the risk that procedures might be performed for inappropriate reasons may also increase. In general, policy makers wish to fund medically appropriate interventions but do not wish to fund inappropriate interventions. The challenge lies in defining appropriate care.[13] Appropriateness is often a difficult construct to measure, and many interventions (e.g., diagnostic imaging) are conducted in a grey zone where clinical science neither definitely supports nor refutes the rationale for doing them.[14] Furthermore, views on clinically appropriate indications for a service may vary depending upon the specialty of a physician, the country of practice, and the patient's/family's perspective.[13] Defining appropriateness can also be a challenge as what was previously considered inappropriate might suddenly be considered appropriate with the emergence of new studies or refinement of existing technologies.

RAND Corporation methodology

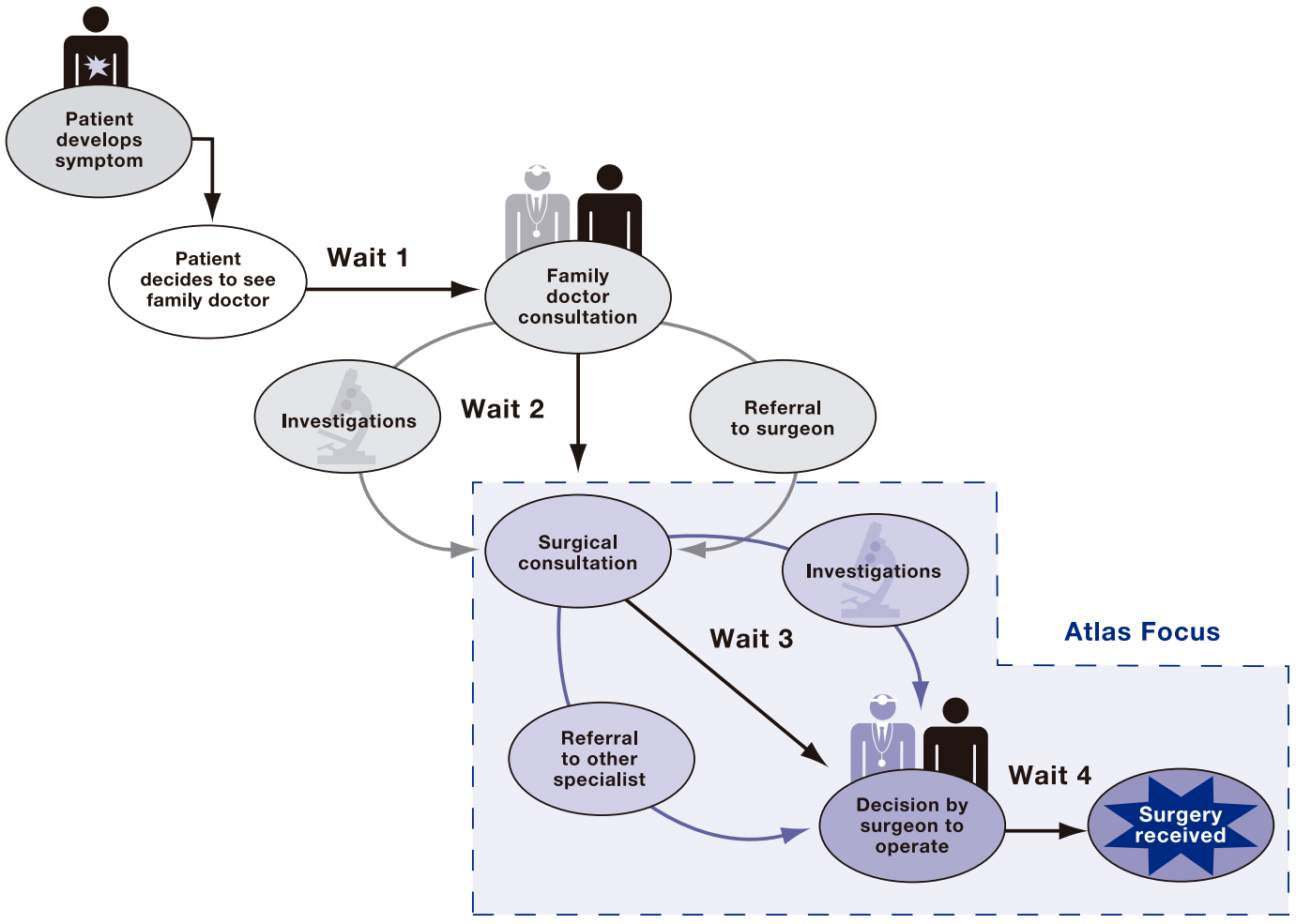
The RAND Corporation is a world leader in the development of methods to measure the appropriateness of clinical interventions. According to RAND/UCLA criteria, an appropriate procedure is defined as one in which the expected benefits of the procedure outweigh the anticipated risks.[15] RAND/UCLA appropriateness studies typically employ a 9-member expert consensus panel process to review summaries of clinical literature which are used to develop explicit criteria to rate procedures. Usually applied in chart reviews, these criteria rate procedures as being performed for appropriate, uncertain, or inappropriate indications. Although the RAND/UCLA method is very labour-intensive, it is considered the best available method to measure appropriateness; the RAND/UCLA criteria have been tested and validated in many research studies.[16,17] An important limitation of the RAND/UCLA methodology is that intervention costs are not considered in the definition of appropriateness. This is of increasing concern, given limited societal resources for health care.

Other methods

Other research groups have proposed simpler methods for determining appropriateness, such as: whether the patient meets recommended clinical indications identified in clinical practice guidelines and has no contraindications for performing a procedure;[18] and, measuring a patient's health status before and after a procedure using patient surveys.[19]

In this report, chapter authors comment on the studies of appropriateness available for the 5 key identified services (cancer surgery, cardiac procedures, cataract surgery, hip/knee total joint replacements and CT/MRI scanning) in Ontario and/or Canada.

Figure 1.1 Surgical Wait Time Continuum



Urgency

In an ideal waiting list management system, each patient is assigned an urgency rating category that defines the relative urgency with which the required service should be delivered. For example, urgent or emergent patients should receive highest priority because there is a greater risk of the condition worsening if the wait is prolonged. For each of the 5 key services, the chapter authors discuss the current state of urgency rating or patient prioritization systems in Ontario and/or in other jurisdictions.

These systems are typically derived from a consensus of clinical experts who define the types of patients with the most critical need for the service, based on clinical experience and data from the scientific literature.[20] These systems often provide Recommended Maximum Wait Times (RMWT) by which the service should be provided. Where such systems exist and have been validated, they provide an important tool for managing patients on the waiting list. Unfortunately in Ontario, a formal well-established urgency rating system does not exist, with the exception of the Cardiac Care Network of Ontario cardiac bypass and coronary angiography triage system.[21,22]

Wait time benchmarks

Wait time benchmarks for medical tests and procedures, based on clinical need, are an important component of any patient prioritization system.[20] Target timeframes help guide administrators and clinicians as they work to improve the timeliness of health care delivery, and allow patients, the public and payers to see how the health care system is performing. However, it is critical that patients and the public understand the legitimate reasons why some patients will wait beyond a benchmark wait time. For example, some patients may prefer an extended wait time for personal or family reasons, while some may require more time to determine their physical fitness for surgery. Further, it is

important that it be understood that benchmarks are not care guarantees, and 100% compliance should not be expected. Finally, patients and the public should also be made aware that the majority of patients that wait beyond a benchmark will likely have excellent outcomes, as the effect of most prolonged waits is on pre-surgery quality of life as opposed to peri-operative outcomes.

An important facet of establishing wait time benchmarks is setting realistic targets in recognition of limited health care resources. Optimal service benchmarks may legitimately differ in jurisdictions across Canada depending on the size of waiting lists and the local health care resources—human and financial—available. There is also concern that patients will become unduly alarmed when a procedure/service is not received within the benchmark wait time. However, for many years, the Cardiac Care Network of Ontario (CCN) has publicly reported wait times for coronary artery bypass surgery, and while a significant minority of patients have always waited longer than recommended, there is no evidence that patients or the public were overly alarmed.

It is important to note the different terminology used by various groups in Canada to describe benchmark wait times. For example, CCN uses Recommended Maximum Wait Time (RMWT), the Western Canada Waiting List (WCWL) project uses Maximum Acceptable Wait Time, and the Saskatchewan Surgical Care Network uses Target Wait Time. In this report, RMWT was selected as the preferred term. The term "recommended" recognizes that not only is considerable judgment used to establish benchmarks, but as with all recommendations, they may change over time. The term "maximum" indicates that the health care system should strive to provide most surgery or diagnostic imaging sooner than the RMWT.

In Ontario, RMWTs for coronary artery bypass surgery and coronary angiography were established through a rigorous expert consensus panel approach. This is not the case for cancer surgery, cataract extraction or joint replacement. For the latter two, the authors of this report based RMWTs on: a review of other jurisdictions' recommendations; a review of literature about the consequences of waiting for these procedures; and the best judgment of clinicians and researchers. There is recognition that further work on this topic needs to be conducted in Ontario, including defining wait time benchmarks for different patient urgency levels conditional upon an appropriate indication for a procedure or service. For cancer surgery (Chapter 2), no RMWTs are provided, as the literature was unclear about such determinations, and the benchmarks will likely vary by type of cancer.

Unmet need

Regional variation in the rates and wait times for various key services could reflect regional differences in the underlying burden of disease or clinical need for an intervention, rather than variation in the rates of appropriate or inappropriate care. Lower rates of service could reflect unmet need in certain regions. For example, if an Ontario region's rate of colorectal cancer is high, its rate of colon resections would also be expected to be high. A lower than expected rate of surgery in that region likely reflects unmet need. A complete analysis of regional differences in access to care should ideally incorporate regional differences in the burden of disease and the clinical need for an intervention, but these data are often not readily available.

Unmet need refers to the population of individuals that would benefit from a service or procedure but are not accounted for within current waiting lists because their physician has not referred them, or they are not aware of the potential benefits. Defining the need for various interventions can be challenging, although researchers have attempted to do so for certain procedures. For example, researchers have suggested that the rate of hospital admission for heart attack is a good surrogate marker for measuring the clinical need for cardiac procedures.[23] Similarly, the prevalence of severe arthritis in a community may indicate the relative need for hip or knee joint replacements.[24]

A high prevalence of unmet need may explain the phenomenon that occurs when waiting lists and wait times actually grow, despite significant new investments in funding for health care services. When resources are severely constrained and waiting lists are extremely long, clinicians may be reluctant to refer patients for a given clinical service despite the potential benefits—feeling there is little point in doing so. However, as the service becomes more available, clinicians may become more enthusiastic about referring patients. Thus, the rate of referral to a waiting list increases, exceeds the rate of increased supply, and paradoxically causes the access problem to appear to grow.

Similarly, expanding scientific indications for an intervention could also lead to increased need for a service, thereby, exceeding a fixed available supply. An aging Canadian population is also likely to increase the clinical need for many key health services. In each chapter of *Access to Health Services in Ontario,* the authors comment on the evidence of unmet need for services in Ontario based on available data.

Patient outcomes

The final dimension of the framework of this report is patient outcomes. This refers to the impact or result of a clinical intervention, such as survival rates after surgery or the degree to which quality of life has been improved. While it is intuitive that reducing prolonged wait times for key health care services may reduce patient anxiety and stress, thus improving a patient's quality of life prior to an intervention, it is important to measure patient outcomes after clinical interventions to document that the expected outcome was achieved and that the patient received high-quality care. For example, tracking outcomes such as quality of life and mortality rates after cardiac surgery are important to determine whether or not patients benefited from the procedure.[25] Measuring visual function before and after cataract surgery enables one to determine whether the procedure benefited the patient.[26] While not every patient will benefit from every clinical intervention and some risk of adverse outcomes is to be expected, the vast majority of patients should benefit in a measurable way from clinical interventions.

The authors of this report comment on the available patient outcomes data in Ontario for each of the 5 identified key service areas. For areas for which outcome data are not available, the authors suggest outcomes that could be measured in the future to ensure that Ontario patients are receiving a high standard of care.

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INSIDE

2

Chapter

Cancer Surgery

David Hodgson, MD, MPH, FRCPC, David Urbach, MD, MSc, FRCSC, FACS, Raymond Przybysz, MSc, Yanyan Gong, MSc, Terry Sullivan, PhD and Linda Rabeneck, BSc, MD, MPH, FRCPC

Executive Summary

Issue

Surgery is a critical component of the curative treatment of most cancers. Delays in the provision of surgery are stressful for patients and may be viewed as an indicator of inadequate access to necessary health care services.

Study

This study used administrative health data to examine the numbers and rates of cancer surgery, as well as wait times (defined as the interval between the date of consultation with a surgeon and the date of surgery), in Ontario. The data used in the analysis were drawn from the Canadian Institute for Health Information (CIHI) Discharge Abstract Database (DAD) and National Ambulatory Care Reporting System (NACRS), and the Ministry of Health and Long-Term Care (MOHLTC) Ontario Health Insurance Plan (OHIP) database of physician billings. A procedure was considered cancer-related when a relevant cancer was recorded in the CIHI data as one of the diagnoses during the hospital admission when the procedure was performed.

The following cancer-related procedures selected for this report had the highest frequency in the OHIP billing database:

- Large bowel resection (surgical removal of the diseased portion of the large intestine/colon);
- Mastectomy (surgical removal of a breast);
- Radical prostatectomy (surgical removal of the entire prostate gland and some of surrounding tissue); and,
- Hysterectomy (surgical removal of the uterus).

The numbers of these procedures are presented for fiscal years 1993/94 to 2003/04. Rates of cancer surgery and surgery wait times were calculated for the province as a whole and for individual Local Health Integration Networks (LHINs) for the fiscal years 2001/02 to 2003/04. A detailed description of the methods is provided in Appendix 2.A.

Key findings

- Among the procedures studied, the number of surgeries performed in Ontario increased by almost 50% from 1993/94 to 2003/04. The largest increase occurred with radical prostatectomy (171%) and the smallest with mastectomy (22%) and hysterectomy (21%).
- From 2001/02 to 2003/04, the age- and sex-adjusted rates of cancer surgery were generally stable in the province of Ontario.
- In 2003/04, there were substantial differences among LHINs in the rates of the cancer surgeries studied.
- In 2003/04, the median wait times for surgery were: large bowel resection (26 days); mastectomy (29 days); hysterectomy (46 days); radical prostatectomy (87 days).
- Median wait times varied substantially among LHINs. Some LHINs had consistently long or short median wait times for individual procedures over the 2001/02–2003/04 period, but none had consistently longer or shorter median wait times for all procedures.

Implications

The number of cancer surgeries performed in Ontario increased significantly over the last decade. As the incidence of cancer increases with the aging population, the demand for cancer surgery will continue to grow.

There is significant variation in the median wait time for cancer surgery among Ontario regions. There is also significant variation in the wait time for different types of cancer surgery. No single wait time benchmark is appropriate for all cancer operations, because the impact of waits on outcomes varies by the type of cancer.

Introduction

In 2004, more than 54,000 Ontarians were diagnosed with cancer. It is the second leading cause of death in Ontario, claiming 25,000 lives in 2004.[1] With the aging of the population, the annual number of new cases is expected to reach 68,000 by 2010.

For most cancers, surgery is a vital component of curative treatment. This chapter describes procedure rates and wait times (from surgical consultation to surgery) for the most common operations performed for cancer in Ontario: large bowel resection, mastectomy, radical prostatectomy, and hysterectomy. Although lung cancer is a major cause of morbidity and mortality in Ontario, only a minority of lung cancer patients undergoes potentially curative surgery. Consequently, lung cancer resection was not among the 4 most common cancer-related procedures. Patients receiving chemotherapy and/or radiation therapy within the 6 months before surgery, and those who had emergency surgery, were excluded from the wait times analysis.

In the case of breast cancer, it is important to note that, taken together, all forms of local excision (i.e., lumpectomy —surgical removal of a lump from the breast) are more commonly used than mastectomy. However, due to the numerous OHIP physician billing codes for these procedures and their use for benign breast disease, only mastectomy was analyzed for this report.

Over 97% of procedures studied were performed for patients aged 40 years and older, therefore the rates are presented for this population only.

Waiting for surgery is stressful for patients, and it is possible that delays in surgery are viewed as a form of rationing within the health care system. In light of growing public concern regarding waits for medical services, investigators in several regions of Canada have undertaken projects to monitor surgical wait times.[2-9] The Cancer Quality Council of Ontario, in partnership with Cancer Care Ontario (CCO), has produced a 4-point strategy to improve access to cancer services in Ontario.[10]

Among Canadian studies of wait times, several consistent findings are reported. First, numerous factors contribute to the length of time that occurs between the initial surgical consultation and the date of tumour resection (removal), including the need for the following services: biopsy; pathology review; imaging tests to determine the extent of disease; and, evaluation of the patient's fitness for surgery. Consequently, long waits for cancer surgery may not reflect a shortage of surgeons or operating room availability, but may indicate a delay in obtaining these services.

Second, when measuring wait times, it is difficult to establish which time interval is most relevant. For example, while the date of surgery is the obvious endpoint, the waiting start point has been variously reported as: the date of referral to a surgeon; the date of first surgical consultation; the date of the last surgeon visit before surgery; and, the date of the decision to proceed with surgery. Moreover, some significant dates, such as the date of referral and the date of the decision to operate, cannot be directly ascertained from existing provincial administrative data.

Third, there is significant variation in wait times depending on the type of cancer. This likely represents the variation in the number of tests required to evaluate newly diagnosed patients, the utilization of other cancer treatments, and the varying clinical urgency of operating on different tumour types.

Studies examining whether delays in cancer surgery are associated with reduced cure rates have produced conflicting results.[11] While some found worse outcomes for patients with longer delays, others found worse outcomes associated with a shorter interval between surgical consultation and surgery. It could be that surgeons prioritize patients with more aggressive tumours to have surgery sooner, thereby creating a paradoxical association between short wait time and lower cure rates.

Findings and Discussion

Rates of service provision

Exhibit 2.1: Annual numbers of procedures by year

This exhibit shows the numbers of the 4 major cancer surgeries from 1993/94 to 2003/04 for the entire Ontario population. Over this period the annual number of the cancer resections (removal of part/all of organ or tissue) studied in this report rose steadily. The increases in procedures were as follows: large bowel resections (43%); mastectomies (22%); radical prostatectomies (171%); and hysterectomies (21%). The marked upsurge in the number of radical prostatectomies between 1993/94 and 2003/04 was likely influenced by the increased detection of prostate cancer via prostate specific antigen (PSA) screening.

Exhibits 2.2a–d and 2.3a–d: Rates by LHIN

Exhibits 2.2a–d demonstrate the absolute numbers and rates of procedures by LHIN, standardized for age and sex within the population aged 40 years and older for 2001/02–2003/04. During this period, the absolute number of hysterectomies, large bowel resections, and radical prostatectomies increased slightly, while the number of mastectomies decreased. Province-wide age- and sex- adjusted rates were generally stable over this interval.

There was significant variation in the rates of different procedures among LHINs. During the 3-year period studied:

- North East and South West had consistently high rates of large bowel resection;
- North East and Erie St. Clair had consistently high rates of mastectomy, while Mississauga Oakville and Central West had low rates;
- Central West and South West had consistently high rates of radical prostatectomy, while the South East had consistently low rates.
- North West had consistently low rates of hysterectomy;
- No LHIN had cancer surgery rates that were consistently very high or very low for all procedures.

It is not possible to infer whether these rate variations reflect inappropriate under- or over-utilization among LHINs.

For 2003/04, Exhibits 2.3a–d show that there was substantial geographic variation in the standardized procedure rates among LHINs, often approaching or exceeding 2-fold. Mississauga Oakville was among the 3 LHINs with the lowest rates for 3 of the 4 procedures studied. In contrast, North East and Erie St. Clair were among the 3 LHINs with the highest rates for 3 of the 4 procedures.

Exhibits 2.4a–d: Age- and sex-specific rates by LHIN

Variations in procedure rates reflect the expected age-related incidence of the associated cancers, as well as the alternative treatment options available. As would be expected based on population-based incidence data, Exhibit 2.4a demonstrates the rising rate of large bowel resection for men of increasing age. The rate of surgery for colorectal cancer declines little among the elderly, probably because there is no widely accepted curative alternative to surgery for these patients.

Mastectomy rates (Exhibit 2.4b) vary with age, as would be expected with the age-related variation in the incidence of breast cancer. Note that the rate decreases among people older than 85 years.

Most significant in this set of exhibits, is the substantial decline in the rate of radical prostatectomy among men aged 75 years and older. (Exhibit 2.4c). This likely reflects the use of radiation or hormonal therapy rather than surgery as the primary treatment for elderly prostate cancer patients. The greater degree of rate variation seen among the very elderly for all cancer procedures except radical prostatectomy, likely reflects the small number of cases and citizens in the highest age category, making calculations of procedure rates more unstable and sensitive to small changes in case volume.

Exhibit 2.4d shows the increase in the rate of hysterectomy among women older than 64 years, and is in keeping with the rising incidence of gynecologic cancer with increasing age. The decline in the rate of surgery after age 74 may reflect a decrease in the proportion of patients fit for surgery, or perhaps the greater utilization of primary radiation therapy rather than surgery for cervical cancer among the elderly.

Exhibit 2.5: Rates by neighbourhood income quintile

A significant association between procedure rates and socioeconomic status (SES) was observed for radical prostatectomy. The rate of radical prostatectomy increased from 80 per 100,000 men in the poorest neighbourhoods to 135 per 100,000 in the most affluent neighbourhoods. This finding likely represents the greater utilization of PSA screening (not covered by OHIP) among the more affluent, and the resulting detection of early stage cancers more amenable to surgery. There was no association between SES and surgery rates for the other procedures.

Exhibit 2.6: Number of procedures by hospital

This exhibit shows the number of surgeries performed by hospital corporations in Ontario for 2003/04.

Wait times

The following exhibits show the wait times (interval between the pre-surgical consultation and the date of surgery) for the 4 cancer procedures. This interval was calculated for the cohort of patients that underwent 1 of the surgical procedures within 6 months of the OHIP billing date for new patient consultation by a relevant surgeon. This interval reflects more than simply the availability of operating room time, for example, the time required for tests necessary to evaluate the clinical appropriateness of surgical resection (e.g., tumour staging, and evaluation of fitness for surgery). Patients who underwent emergency surgery, and those who received radiation therapy or chemotherapy (with the exception of outpatient hormonal therapy among prostate cancer patients) within the 6 months preceding surgery were excluded. Cases in which consultation occurred more than 6 months before surgery were excluded as these likely represent special clinical situations rather than true waits for planned surgery.

Exhibit 2.7: Proportion of procedures performed within wait time ranges

For large bowel resection, mastectomy and hysterectomy, 27%–54% of surgeries occurred within 4 weeks following surgical consultation, and the majority (84–94%) of these 3 procedures occurred within 12 weeks.

Exhibits 2.8a–d: Median wait times by LHIN

In 2003/04, the median intervals between surgical consultation and surgery were: large bowel resection (26 days); mastectomy (29 days); hysterectomy (46 days); and, radical prostatectomy (87 days). There were substantial variations in median wait times for different procedures among LHINs. The absolute difference between longest and shortest median wait times between LHINs ranged from 12 days for large bowel resection (North West = 34 days; Toronto Central = 22 days), to 46 days for radical prostatectomy (Champlain = 118 days; Erie St. Clair = 72 days).

For large bowel resection and hysterectomy, there were increases (3–4 days) in the median wait time from 2001/02 to 2003/04. There was no increase for mastectomy or radical prostatectomy. These findings are in keeping with a prior Ontario study that found a linear increase in surgical wait time from 1993 to 2000 for colorectal cancer surgery and breast cancer surgery, but not for radical prostatectomy.[7]

For mastectomy and large bowel resection, LHIN North West had median wait times above the overall Ontario median for 3 consecutive years from 2001/02 through 2003/04. However, the same LHIN had low median wait times compared to the overall Ontario median for hysterectomy over these years. Compared to the provincial average, some LHINs had either low or high median wait times consistently over the 3-year interval for individual procedures.

Some of the difference between type of surgery and median wait time likely reflects variation in the urgency of surgery and the appropriateness of non-surgical management for different cancer types. The interval between surgical consultation and surgery was the greatest for radical prostatectomy. This is likely due to several factors. It is probable that a large proportion of patients were referred to a urologist after the finding of an elevated PSA level in a blood test, but without biopsy-proven cancer. Consequently, for many patients, the wait interval may include the wait for biopsy in addition to the subsequent wait for radical prostatectomy. Further, in many cases it may be medically appropriate to undertake a period of watchful waiting to observe the rate of PSA rise to determine the clinical aggressiveness of the tumour before deciding on surgery. In addition, patients eligible for radical prostatectomy may also consider radiation therapy instead. Approximately 15% of the prostate cancer patients studied had 1 physician billing from a radiation oncologist in the 6 months preceding the surgery, suggesting that for many prostate cancer patients, the interval reported here included time in which they were considering non-surgical treatment rather than purely waiting for surgery. In contrast, a diagnosis of breast or colorectal cancer leads directly to surgical resection (after appropriate staging investigations are complete) in the large majority of patients.

Variation in wait times among different procedures illustrates important challenges in monitoring and reducing cancer surgery wait times. Several factors contribute to the interval between surgical consultation and surgery, such as the possibility of too few functioning operating rooms, the time required for pathological evaluation of biopsies, the performance of imaging tests for staging, and evaluation to assess patient fitness for surgery. A Quebec study found that an increasing number of pre-operative tests performed before surgery contributed significantly to lengthening surgical wait times.[12] Strategies to reduce cancer surgery wait times will need to address all sources of waiting. The absence of data regarding the time spent waiting for imaging tests is a significant limitation in understanding contributors to wait times for cancer treatment.

Wait time benchmarks

Important differences in the management of different cancer types prohibit the development of a single target wait time between consultation and surgery for all cancer procedures. Moreover, there is no scientific evidence to support recommendations about the maximum acceptable wait time

for cancer surgery. The prognosis of cancer is dependent upon stage and numerous other factors, and it is difficult to know the natural rate of spread from local to distal sites for most cancers. Large numbers of patients with variations in wait time and long-term follow-up would need to be studied to determine the impact of surgical delay on outcome. Consequently, it is very difficult to determine an evidence-based maximum acceptable wait.

Even so, several standards have been proposed for a reasonable interval of time between consultation with a surgeon and the date of surgery. A Canadian Society for Surgical Oncology position statement recommends that treatment, including surgery, be initiated within 2 weeks of completion of any necessary pre-operative tests.[13] The National Health Service of the UK Department of Health proposed a target wait of 1 month from diagnosis to treatment for all cancers by 2005.[14] These guidelines represent the consensus of stakeholders to keep cancer treatment wait times as low as reasonably achievable, recognizing that definitive scientific evidence supporting a single cancer surgery benchmark is not currently available. In view of the absence of data to support defined "safe" wait times, as well as the variation in current and acceptable waits that occurs among different types of cancer, it may be preferable to set a proportional reduction in median wait time to be attained within a specified period.

Appropriateness

For a small number of circumstances, very basic inferences about the appropriateness of cancer surgery can be made with administrative data in Ontario. For example, in this study, rate of radical prostatectomy was very low among men 75 years and older in 2003/04. Since alternative treatment options with fewer side effects are available for these patients, it seems appropriate that the rate of radical prostatectomy is much lower among the elderly.

For the large majority of cases, however, administrative data in Ontario are not sufficiently detailed to make inferences regarding the appropriateness of the cancer surgery being performed. The extent of tumour spread (cancer stage), is generally an important consideration in the appropriate management of cancer, and the Ontario Cancer Registry (OCR) does not routinely collect this information for most new cancer cases. Cancer registries in other jurisdictions collect tumour stage information, for example, the Surveillance, Epidemiology and End Results (SEER) cancer registry of the US National Institutes of Health. This has been linked to population-based administrative data to examine variations in provision of surgery for colorectal cancer and breast cancer that may reflect suboptimal care. In Ontario, complete stage reporting has been proposed as a performance indicator for large hospitals treating cancer patients.[15] However, even the availability of tumour stage information is not sufficient to accurately evaluate the appropriateness of care, since many other clinical factors contribute to the decision to provide surgery.

Urgency

There is some indirect evidence that surgeons prioritize cancer operations to reduce wait times for patients with more aggressive cancers. As discussed previously, the difference in wait times between radical prostatectomies and large bowel resections found in this study suggests that cancer surgical wait times in Ontario, in part, reflect clinical urgency. However, there are no widely accepted urgency rating scales that distinguish among different types of cancer surgery. Creating a priority scale that distinguishes among different types of cancer would require consideration of the diversity of cancer types and clinical situations requiring cancer surgery. The number of patients required to validate any such guidelines would be substantial, and guideline implementation would be logistically complicated.

A straightforward approach to prioritizing cancer surgery has been adopted by the Saskatchewan Surgical Care Network, in which all cancer operations are considered "urgent".[16] This appropriately reflects the fact that for most cancers (e.g., breast, lung, colorectal), surgery is a necessary component of curative treatment. A major goal of the Network is to perform 95% of cancer and suspected cancer surgeries within 3 weeks of the decision to operate.[16]

Unmet need

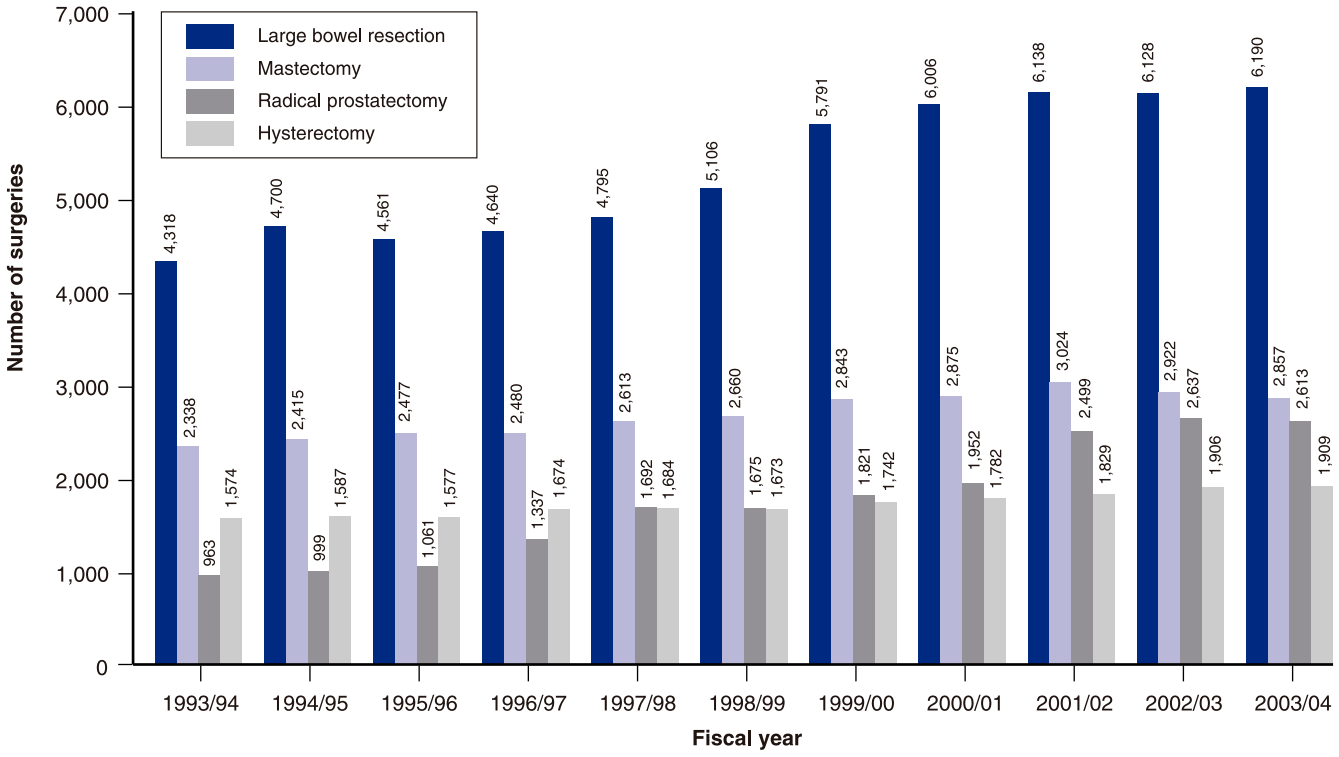
It is unlikely that there is a large population of cancer patients with potentially operable tumours not being referred for surgery. Although age- and sex-adjusted rates of cancer surgery per 100,000 population are presented here, utilization could be better described by examining the proportion of newly diagnosed cancer patients that had surgery. To conduct this analysis, linkage between CIHI or OHIP procedure data and incidence data from the OCR would be required. The OCR is able to produce accurate regional projections of cancer incidence that could be linked to data regarding the number of cancer operations to conduct timely analyses of utilization. Moreover, the OCR recently began collecting pathology reports electronically from several laboratories through the Pathology Information Management System (PIMS). An estimated 70% of available oncologic pathology reports in Ontario are received by this system, and further investment should significantly enhance the timeliness of data and the possibility of conducting up-to-date analyses of cancer surgery utilization.

Patient outcomes

An analysis of the outcomes of cancer surgery is beyond the scope of this report. The outcome of cancer surgery can be described using administrative data by measuring length of hospital stay, mortality within 30 days of surgery, or long-term (e.g., 2-year) survival. These data are available in Ontario, and have been selectively reported, although in some cases it was necessary to supplement administrative data with information obtained from medical records.[4, 9,17-23]

Chapter 2—List of Exhibits

2.1a Total annual number of four frequently performed cancer surgeries in Ontario, 1993/94–2003/04



Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System

2.2a Number and age- and sex-adjusted rate of large bowel resection for cancer per 100,000 population aged 40 years and older, by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

Local Health Integration Network	2001/02		2002/03		2003/04	
	Number of Large Bowel Resections	Rate per 100,000 Population	Number of Large Bowel Resections	Rate per 100,000 Population	Number of Large Bowel Resections	Rate per 100,000 Population
1. Erie St. Clair	319	116	322	115	341	120
2. South West	540	124	583	131	558	123
3. Waterloo Wellington	293	114	272	103	295	109
4. Hamilton Niagara Haldimand Brant	775	120	770	117	760	114
5. Central West	268	113	240	100	249	97
6. Mississauga Oakville	362	109	378	108	369	101
7. Toronto Central	552	117	485	101	511	107
8. Central	581	113	559	104	595	107
9. Central East	758	113	780	113	772	109
10. South East	211	98	225	103	236	107
11. Champlain	593	116	597	113	565	105
12. North Simcoe Muskoka	236	122	238	121	240	118
13. North East	370	136	369	134	414	149
14. North West	117	110	120	111	130	118
Invalid*	83	–	80	–	78	–
All Ontario	**6,058**	**118**	**6,018**	**114**	**6,113**	**113**

* Includes: out of province, missing age and postal code information

Summary statistics (2003/04)	Value	P-value
Extremal Quotient	1.5	
Coefficient of Variation (%)	9.7	
Systematic Component of Variation	8.7	
Adjusted Chi-square (likelihood ratio)	52.6	<0.0001

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

2.2b Number and age- and sex-adjusted rate of mastectomy for cancer per 100,000 population aged 40 years and older, by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

Local Health Integration Network	2001/02		2002/03		2003/04	
	Number of Mastectomies	Rate per 100,000 Population	Number of Mastectomies	Rate per 100,000 Population	Number of Mastectomies	Rate per 100,000 Population
1. Erie St. Clair	235	87	167	60	184	65
2. South West	266	63	312	72	278	63
3. Waterloo Wellington	161	62	158	59	138	51
4. Hamilton Niagara Haldimand Brant	322	52	261	41	269	42
5. Central West	102	40	84	31	94	34
6. Mississauga Oakville	158	45	119	32	118	30
7. Toronto Central	186	39	226	47	223	46
8. Central	250	48	264	49	239	42
9. Central East	374	55	361	51	306	43
10. South East	116	56	101	49	102	48
11. Champlain	306	59	302	57	351	65
12. North Simcoe Muskoka	114	63	99	53	113	58
13. North East	163	61	187	70	175	64
14. North West	44	43	68	66	71	67
Invalid*	47	–	45	–	32	–
All Ontario	**2,844**	**55**	**2,754**	**52**	**2,693**	**50**

* Includes: out of province, missing age and postal code information

Summary statistics (2003/04)	Value	P-value
Extremal Quotient	2.2	
Coefficient of Variation (%)	23.3	
Systematic Component of Variation	52.8	
Adjusted Chi-square (likelihood ratio)	139.6	<0.0001

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

2.2c Number and age-adjusted rate of radical prostatectomy for cancer per 100,000 men aged 40 years and older, by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

Local Health Integration Network	2001/02		2002/03		2003/04	
	Number of Radical Prostatectomies	Rate per 100,000 Population	Number of Radical Prostatectomies	Rate per 100,000 Population	Number of Radical Prostatectomies	Rate per 100,000 Population
1. Erie St. Clair	104	82	105	81	91	69
2. South West	288	148	290	146	287	142
3. Waterloo Wellington	131	107	139	111	138	108
4. Hamilton Niagara Haldimand Brant	235	83	280	97	236	81
5. Central West	166	130	174	129	192	136
6. Mississauga Oakville	152	87	160	88	181	97
7. Toronto Central	179	85	173	81	189	88
8. Central	265	108	266	105	287	110
9. Central East	433	133	433	130	403	118
10. South East	69	74	71	73	72	73
11. Champlain	201	82	226	90	216	84
12. North Simcoe Muskoka	104	114	100	107	99	102
13. North East	97	75	127	95	145	108
14. North West	34	66	50	97	45	87
Invalid*	31	–	41	–	29	–
All Ontario	**2,489**	**103**	**2,635**	**106**	**2,610**	**103**

* Includes: out of province, missing age and postal code information

Summary statistics (2003/04)	Value	P-value
Extremal Quotient	2.0	
Coefficient of Variation (%)	20.3	
Systematic Component of Variation	36.7	
Adjusted Chi-square (likelihood ratio)	106.7	<0.0001

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

2.2d Number and age-adjusted rate of hysterectomy for cancer per 100,000 women aged 40 years and older, by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

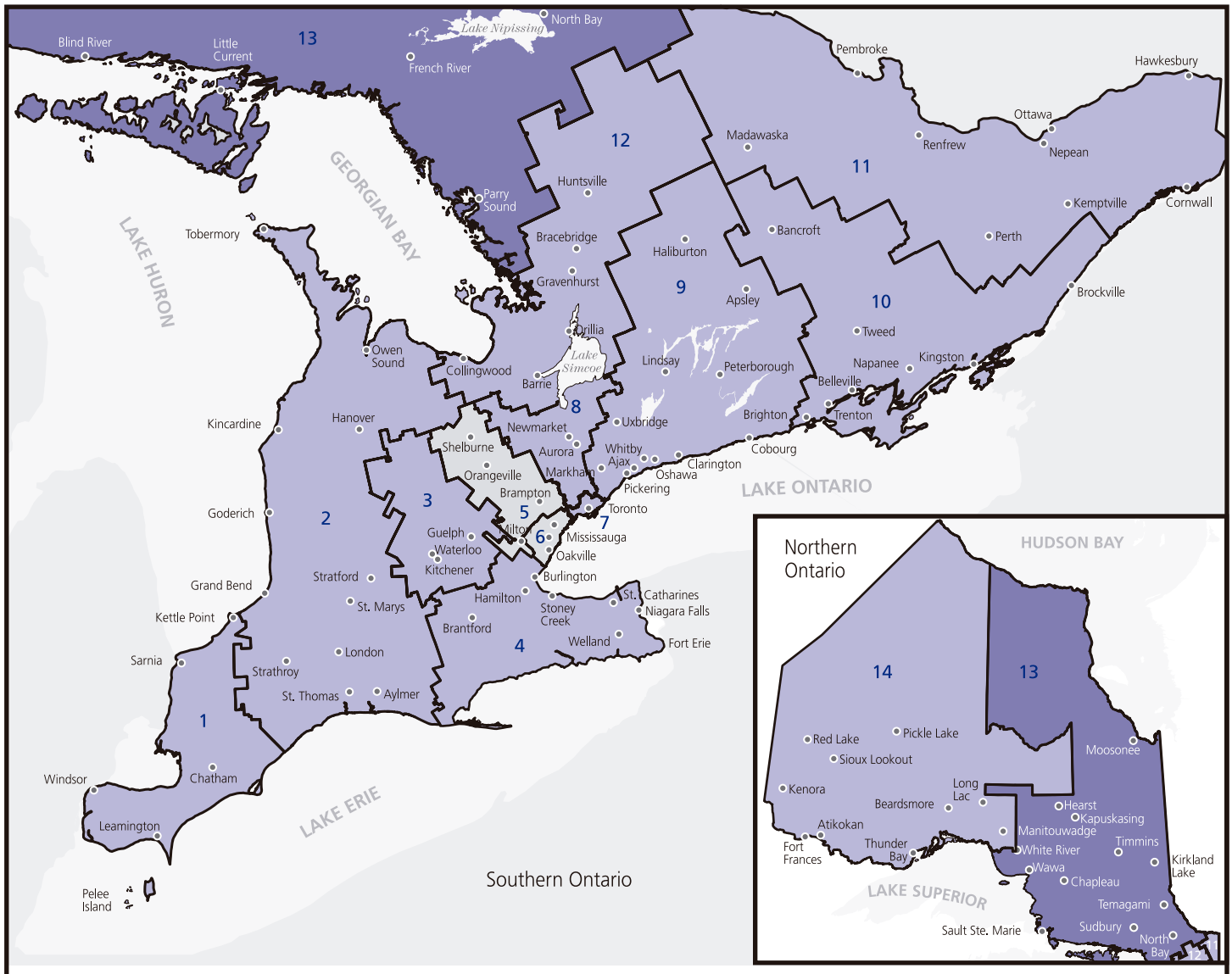
Local Health Integration Network	2001/02		2002/03		2003/04	
	Number of Hysterectomies	Rate per 100,000 Population	Number of Hysterectomies	Rate per 100,000 Population	Number of Hysterectomies	Rate per 100,000 Population
1. Erie St. Clair	89	62	99	69	98	67
2. South West	139	63	134	59	130	56
3. Waterloo Wellington	95	69	91	65	93	64
4. Hamilton Niagara Haldimand Brant	191	59	231	70	219	65
5. Central West	69	50	91	64	84	60
6. Mississauga Oakville	113	61	133	67	124	58
7. Toronto Central	168	68	184	74	158	62
8. Central	185	67	158	55	177	59
9. Central East	232	64	229	61	231	60
10. South East	78	73	57	53	89	81
11. Champlain	173	63	182	65	165	58
12. North Simcoe Muskoka	56	58	65	65	65	63
13. North East	86	62	87	62	101	70
14. North West	26	48	25	46	24	44
Invalid*	22	–	23	–	32	–
All Ontario	**1,722**	**64**	**1,789**	**64**	**1,790**	**63**

* Includes: out of province, missing age and postal code information

Summary statistics (2003/04)	Value	P-value
Extremal Quotient	1.8	
Coefficient of Variation (%)	9.4	
Systematic Component of Variation	5.9	
Adjusted Chi-square (likelihood ratio)	14.8	0.320

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

2.3a Age- and sex-adjusted rate of large bowel resection for cancer per 100,000 population aged 40 years and older, by Local Health Integration Network, in Ontario, 2003/04



Local Health Integration Networks (LHINs)

1. Erie St. Clair
2. South West
3. Waterloo Wellington
4. Hamilton Niagara Haldimand Brant
5. Central West
6. Mississauga Oakville
7. Toronto Central
8. Central
9. Central East
10. South East
11. Champlain
12. North Simcoe Muskoka
13. North East
14. North West

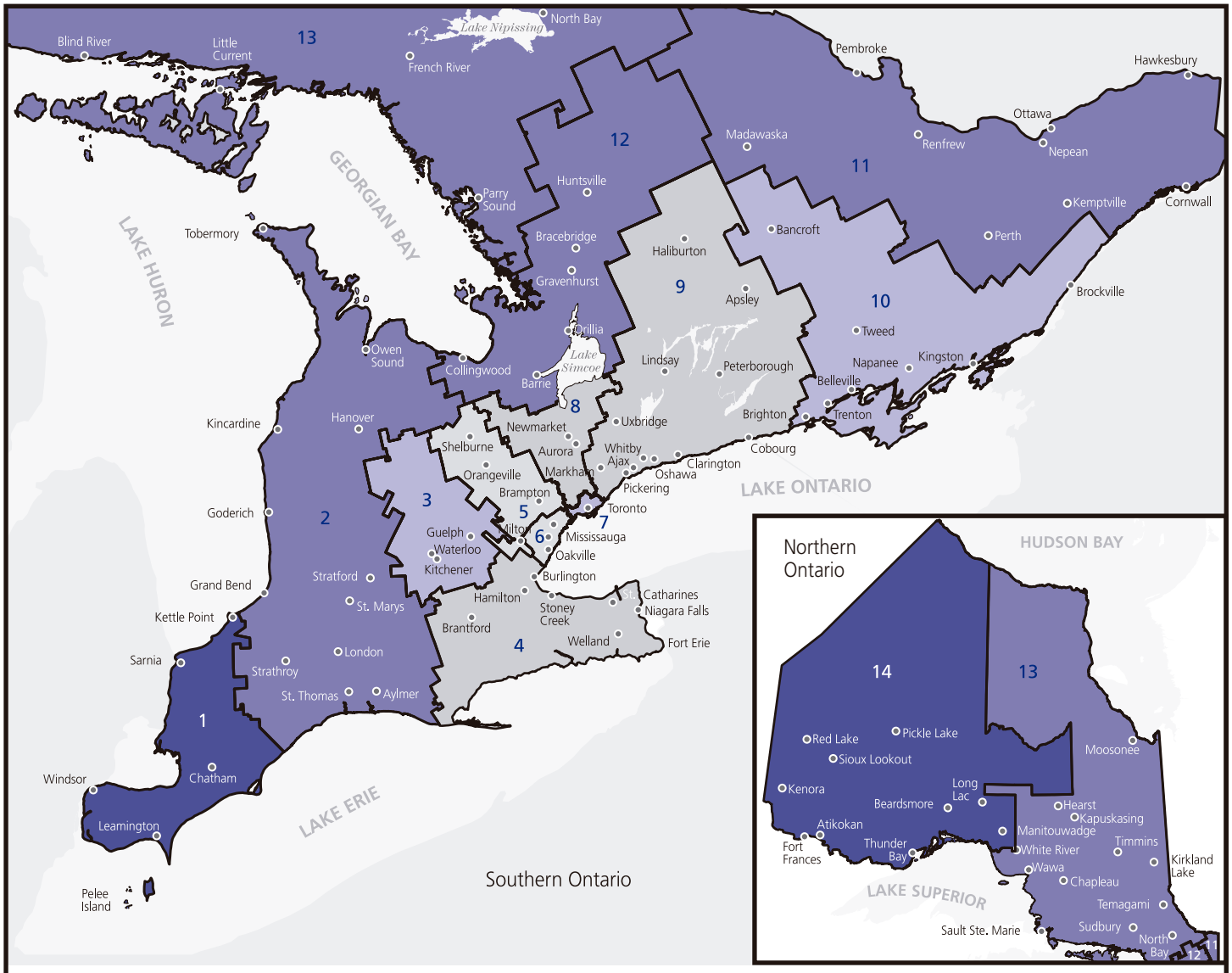
Age- and sex-adjusted rates for large bowel resection for cancer per 100,000 population aged 40 years and older, by Local Health Integration Network, in Ontario, 2003/04

Rate per 100,000 population	Comparative rate ratio	Number of LHINs in each category
≥ 147.3	≥ 1.3	(1)
102.0 to 124.6	0.9 to 1.1	(11)
35.0 to 102.0	0.75 to 0.9	(2)

Ontario rate = 113.3/100,000 persons

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

2.3b Age- and sex-adjusted rate of mastectomy for cancer per 100,000 population aged 40 years and older, by Local Health Integration Network, in Ontario, 2003/04



Local Health Integration Networks (LHINs)

1. Erie St. Clair
2. South West
3. Waterloo Wellington
4. Hamilton Niagara Haldimand Brant
5. Central West
6. Mississauga Oakville
7. Toronto Central
8. Central
9. Central East
10. South East
11. Champlain
12. North Simcoe Muskoka
13. North East
14. North West

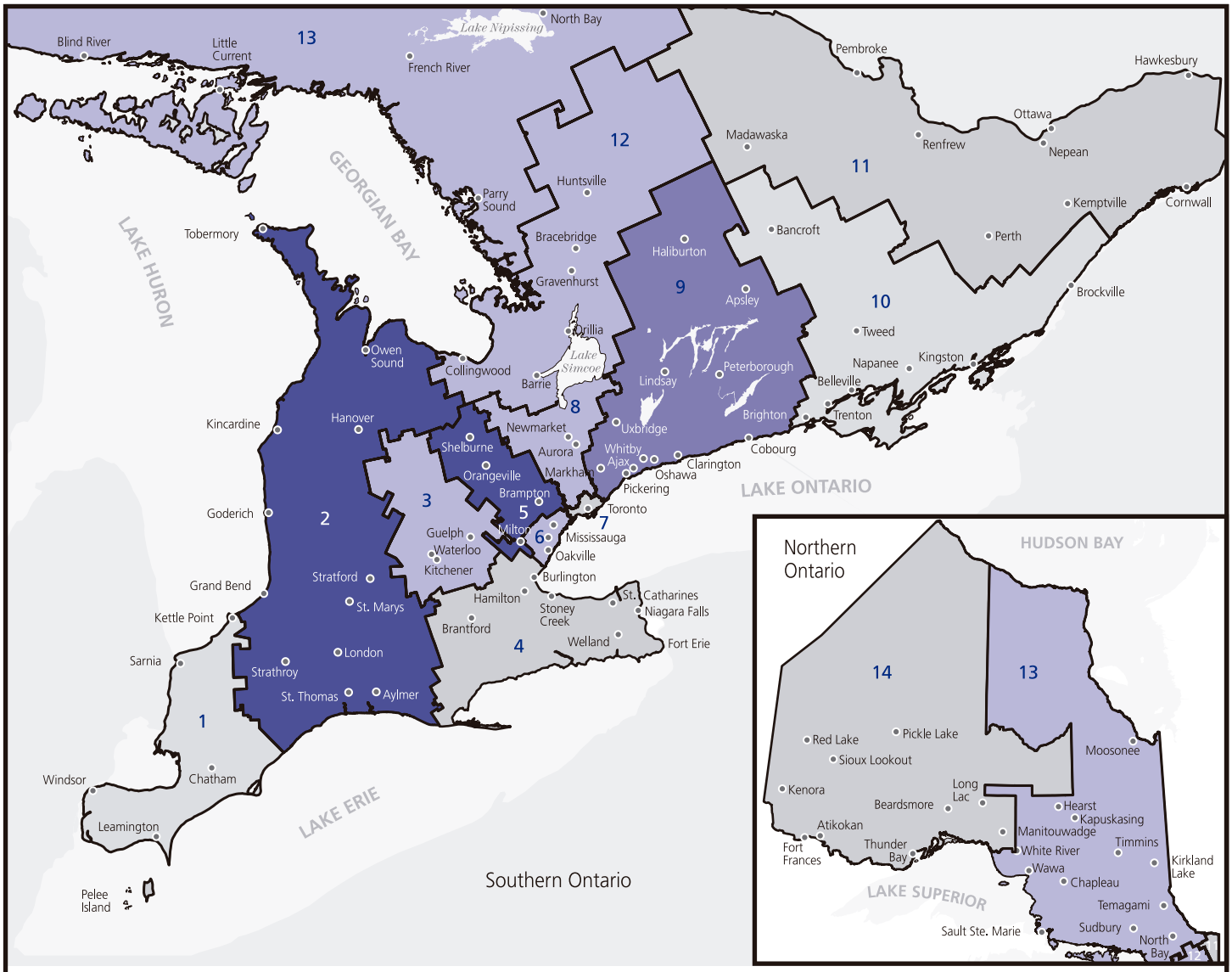
Age- and sex-adjusted rates for mastectomy for cancer per 100,000 population aged 40 years and older, by Local Health Integration Network, in Ontario, 2003/04

Rate per 100,000 population	Comparative rate ratio	Number of LHINs in each category
≥ 64.9	≥ 1.3	(2)
54.9 to 64.9	1.1 to 1.3	(4)
44.9 to 54.9	0.9 to 1.1	(3)
37.4 to 44.9	0.75 to 0.9	(3)
< 37.4	< 0.75	(2)

Ontario rate = 49.9/100,000 persons

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

2.3c Age-adjusted rate of radical prostatectomy for cancer per 100,000 men aged 40 years and older, by Local Health Integration Network, in Ontario, 2003/04



Local Health Integration Networks (LHINs)

1. Erie St. Clair
2. South West
3. Waterloo Wellington
4. Hamilton Niagara Haldimand Brant
5. Central West
6. Mississauga Oakville
7. Toronto Central
8. Central
9. Central East
10. South East
11. Champlain
12. North Simcoe Muskoka
13. North East
14. North West

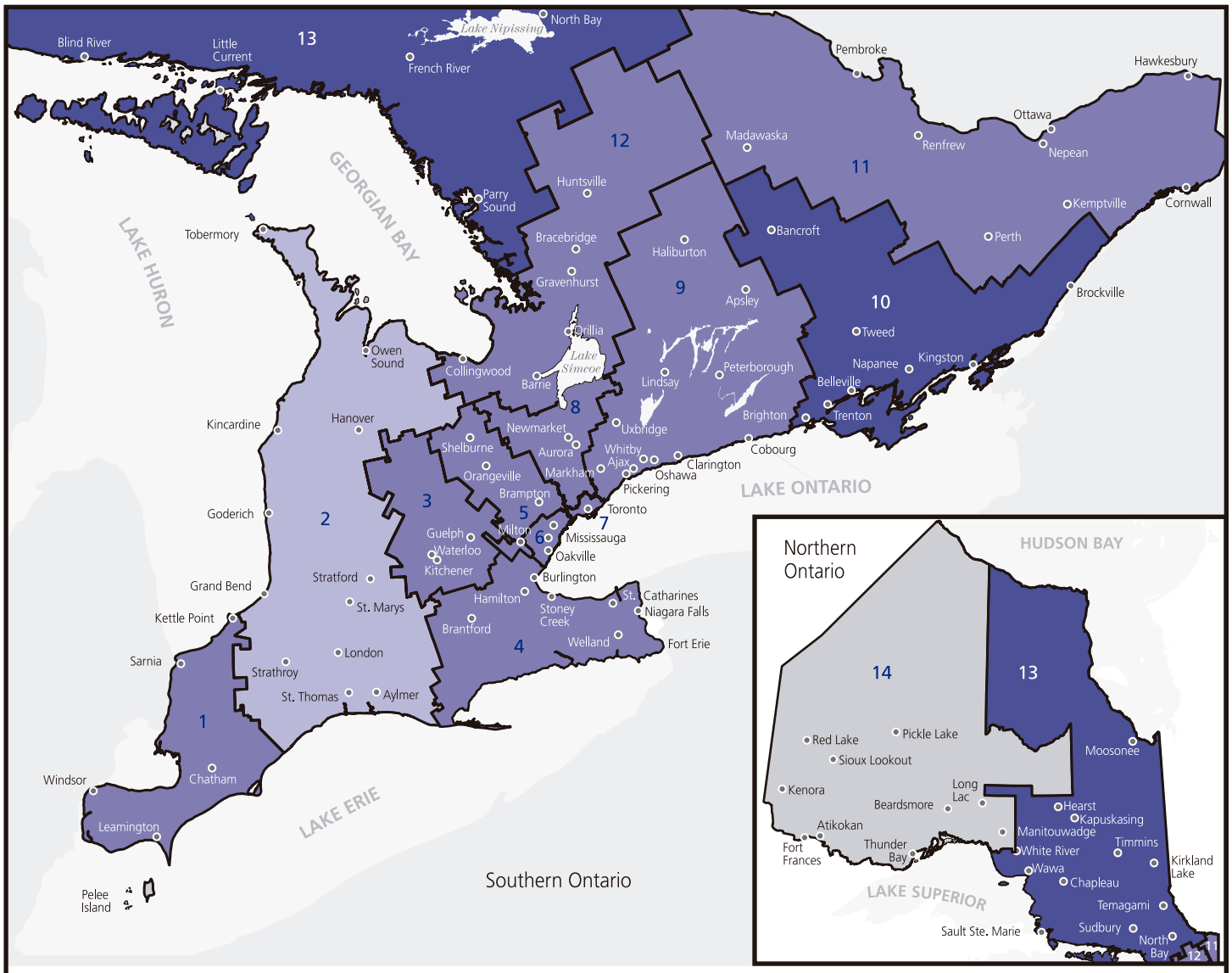
Age-adjusted rates for radical prostatectomy for cancer per 100,000 men aged 40 years and older, by Local Health Integration Network, in Ontario, 2003/04

Rate per 100,000 population	Comparative rate ratio	Number of LHINs in each category
≥ 133.5	≥ 1.3	(2)
113.0 to 133.5	1.1 to 1.3	(1)
92.5 to 113.0	0.9 to 1.1	(5)
77.0 to 92.5	0.75 to 0.9	(4)
< 77.0	< 0.75	(2)

Ontario rate = 102.7/100,000 persons

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

2.3d Age-adjusted rate of hysterectomy for cancer per 100,000 women aged 40 years and older, by Local Health Integration Network, in Ontario, 2003/04



Local Health Integration Networks (LHINs)

1. Erie St. Clair
2. South West
3. Waterloo Wellington
4. Hamilton Niagara Haldimand Brant
5. Central West
6. Mississauga Oakville
7. Toronto Central
8. Central
9. Central East
10. South East
11. Champlain
12. North Simcoe Muskoka
13. North East
14. North West

Age-adjusted rates for hysterectomy for cancer, per 100,000 women aged 40 years and older, by Local Health Integration Network, in Ontario, 2003/04

Rate per 100,000 population	Comparative rate ratio	Number of LHINs in each category
69.2 to 81.8	1.1 to 1.3	(2)
56.6 to 69.2	0.9 to 1.1	(10)
47.2 to 56.6	0.75 to 0.9	(1)
< 47.2	< 0.75	(1)

Ontario rate = 62.9/100,000 persons

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

2.4a Overall and age- and sex-specific rate of large bowel resection for cancer per 100,000 population aged 40 years and older, by Local Health Integration Network, and for the province of Ontario, 2003/04

Local Health Integration Network	Women & Men Overall		Women by Age Group Rate of Large Bowel Resection				Women Overall		Men by Age Group Rate of Large Bowel Resection				Men Overall	
	Number of Large Bowel Resections	Rate per 100,000 Population	Age 40-64	Age 65-74	Age 75-84	Age 85+	Number of Large Bowel Resections	Rate per 100,000 Population	Age 40-64	Age 65-74	Age 75-84	Age 85+	Number of Large Bowel Resections	Rate per 100,000 Population
1. Erie St. Clair	341	122	50	150	313	273	158	108	60	342	385	371	183	138
2. South West	558	129	48	183	345	354	277	121	59	310	402	294	281	138
3. Waterloo Wellington	295	106	39	151	293	328	138	94	46	285	445	405	157	118
4. Hamilton Niagara Haldimand Brant	760	121	41	166	269	299	341	102	61	311	389	389	419	141
5. Central West	249	85	30	124	295	182	102	68	60	269	297	175	147	103
6. Mississauga Oakville	369	91	35	188	243	120	164	77	49	287	345	360	205	106
7. Toronto Central	511	107	37	192	259	264	249	98	42	326	369	326	262	118
8. Central	595	105	40	146	267	288	266	89	55	277	383	410	329	124
9. Central East	772	106	33	174	325	226	350	91	58	293	366	304	422	122
10. South East	236	113	54	177	331	145	124	113	55	235	313	134	112	113
11. Champlain	565	103	35	147	316	237	262	90	49	290	368	426	303	116
12. North Simcoe Muskoka	240	121	40	144	386	392	113	110	56	242	449	547	127	133
13. North East	414	151	67	244	225	369	179	126	86	357	520	640	235	179
14. North West	130	120	39	178	277	351	56	101	61	278	551	220	74	140
Invalid*	78	–	–	–	–	–	39	–	–	–	–	–	39	–
All Ontario	**6,113**	**113**	**41**	**173**	**297**	**278**	**2,818**	**99**	**56**	**303**	**389**	**367**	**3,295**	**128**

* Includes: out of province, missing age and postal code information

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

2.4b Overall and age-specific rate of mastectomy for cancer per 100,000 population aged 40 years and older, by Local Health Integration Network, and for the province of Ontario, 2003/04

	Rate of Mastectomy per 100,000 Population					
	Age 40–64	Age 65–74	Age 75–84	Age 85+	Overall	
Local Health Integration Network					Number of Mastectomies	Rate per 100,000 Population
1. Erie St. Clair	52	78	140	69	184	66
2. South West	47	95	114	112	278	64
3. Waterloo Wellington	32	90	110	75	138	49
4. Hamilton Niagara Haldimand Brant	31	61	83	48	269	43
5. Central West	25	56	64	18	94	32
6. Mississauga Oakville	24	40	58	35	118	29
7. Toronto Central	40	56	65	85	223	47
8. Central	35	46	90	45	239	42
9. Central East	31	66	86	53	306	42
10. South East	35	67	99	71	102	49
11. Champlain	44	103	132	126	351	64
12. North Simcoe Muskoka	41	65	143	88	113	57
13. North East	47	94	121	109	175	64
14. North West	41	86	187	126	71	66
Invalid*	-	-	-	-	32	-
All Ontario	**37**	**72**	**101**	**74**	**2,693**	**50**

* Includes: out of province, missing age and postal code information

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

2.4c Overall and age-specific rate of radical prostatectomy for cancer per 100,000 men aged 40 years and older, by Local Health Integration Network, and for the province of Ontario, 2003/04

	Rate of Prostatectomy per 100,000 Men					
	Age 40–64	Age 65–74	Age 75–84	Age 85+	Overall	
Local Health Integration Network					Number of Radical Prostatectomies	Rate per 100,000 Population
1. Erie St. Clair	51	191	17	0	91	69
2. South West	111	374	**	0	287	141
3. Waterloo Wellington	76	322	9	0	138	104
4. Hamilton Niagara Haldimand Brant	81	130	10	0	236	80
5. Central West	111	343	0	0	192	134
6. Mississauga Oakville	76	240	22	**	181	93
7. Toronto Central	73	208	20	0	189	85
8. Central	79	317	18	0	287	108
9. Central East	91	310	22	0	403	117
10. South East	77	106	0	0	72	73
11. Champlain	75	180	0	0	216	83
12. North Simcoe Muskoka	85	248	0	0	99	104
13. North East	94	247	0	0	145	111
14. North West	69	228	0	0	45	85
Invalid*					29	
All Ontario	**84**	**253**	**11**	******	**2,610**	**101**

* Includes: out of province, missing age and postal code information
** Cell sizes with fewer than 6 procedures were suppressed to ensure confidentiality

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

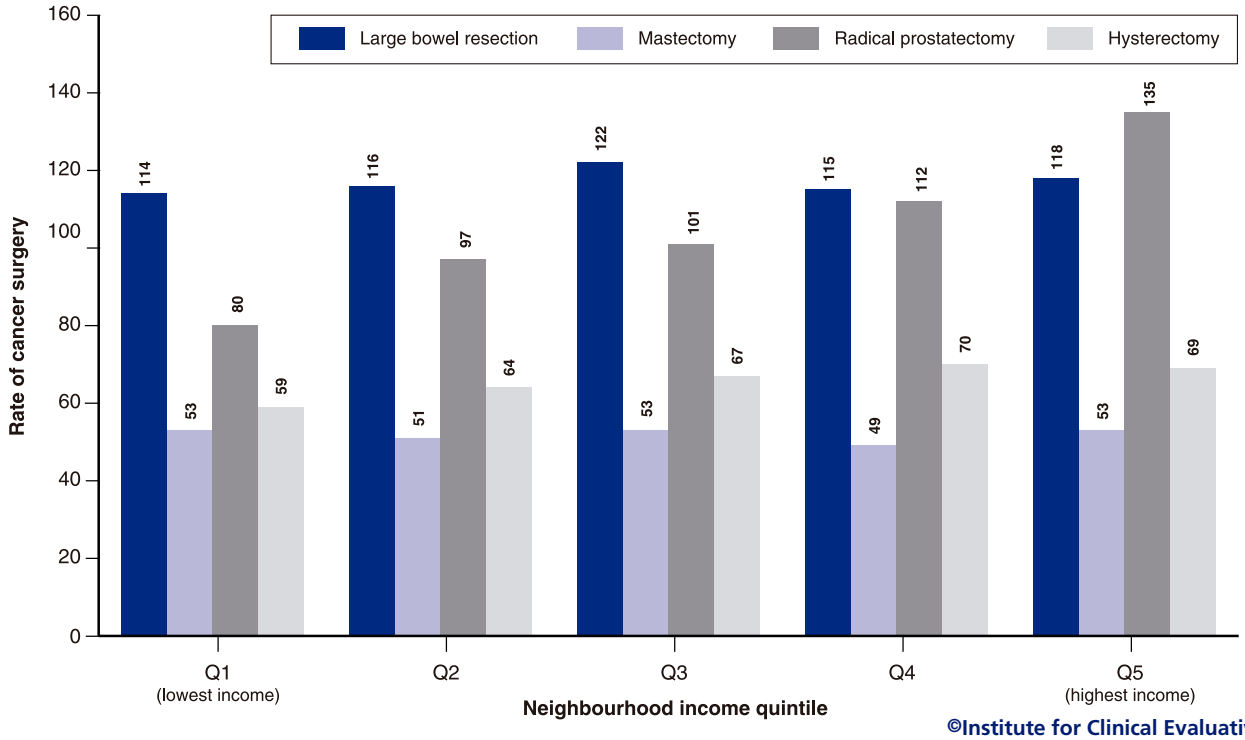
2.4d Overall and age-specific rate of hysterectomy for cancer per 100,000 women aged 40 years and older, by Local Health Integration Network, and for the province of Ontario, 2003/04

Local Health Integration Network	Rate of Hysterectomy per 100,000 Women					
	Age 40–64	Age 65–74	Age 75–84	Age 85+	Overall	
					Number of Hysterectomies	Rate per 100,000 Population
1. Erie St. Clair	62	95	66	48	98	67
2. South West	37	109	106	37	130	57
3. Waterloo Wellington	52	104	79	73	93	64
4. Hamilton Niagara Haldimand Brant	58	86	87	42	219	66
5. Central West	44	69	126	104	84	56
6. Mississauga Oakville	60	82	26	0	124	58
7. Toronto Central	54	81	94	40	158	62
8. Central	50	96	78	20	177	59
9. Central East	54	80	71	55	231	60
10. South East	76	96	103	42	89	81
11. Champlain	45	104	78	34	165	57
12. North Simcoe Muskoka	43	104	146	0	65	64
13. North East	61	95	112	19	101	71
14. North West	39	83	31	0	24	43
Invalid*	-	-	-	-	32	-
All Ontario	**53**	**95**	**85**	**39**	**1,790**	**63**

* Includes: out of province, missing age and postal code information

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

2.5 Age- and sex-adjusted rate of cancer surgery per 100,000 population aged 40 years and older, by type of surgery and neighbourhood income quintile, in Ontario, 2003/04



Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

2.6 Number of procedures for cancer among patients aged 40 years and older, by hospital corporation, and type of surgery, in Ontario, 2003/04

Hospital Corporation	City	Number of Large Bowel Resections	Number of Mastectomies	Number of Radical Prostatectomies	Number of Hysterectomies
Academic					
Hamilton Health Sciences Corporation	Hamilton	242	86	38	129
Kingston General Hospital	Kingston	101	21	41	61
London Health Sciences Centre	London	208	73	226	139
Mount Sinai Hospital	Toronto	143	56	*	28
St. Joseph's Health Care London	London	89	62	47	7
St. Joseph's Healthcare Hamilton	Hamilton	89	48	27	29
St. Michael's Hospital	Toronto	99	26	39	25
Sunnybrook and Women's College Health Sciences Centre	Toronto	153	111	113	197
The Ottawa Hospital	Ottawa	276	152	124	131
University Health Network	Toronto	151	109	211	147
Community					
Alexandra Marine & General Hospital	Goderich	13	*	*	*
Algonquin Health Services	Huntsville	21	*	*	*
Bluewater Health	Sarnia	82	30	24	11
Brant Community Healthcare System	Brantford	59	12	34	18
Brockville General Hospital	Brockville	26	12	*	8
Cambridge Memorial Hospital	Cambridge	53	22	15	*
Chatham-Kent Health Alliance	Chatham	52	29	*	9
Collingwood General and Marine Hospital	Collingwood	38	7	*	*
Cornwall Community Hospital	Cornwall	17	12	14	*
Credit Valley Hospital, The	Mississauga	83	26	32	18
Grand River Hospital Corporation	Kitchener	93	35	15	33
Grey Bruce Health Services	Owen Sound	70	26	37	7
Groves Memorial Community Hospital	Fergus	7	*	*	*
Guelph General Hospital	Guelph	90	26	39	22
Halton Healthcare Services Corporation	Oakville	88	30	46	15
Hawkesbury & District General Hospital	Hawkesbury	14	*	*	*
Headwaters Health Care Centre	Orangeville	26	9	*	*
Hôpital Notre-Dame Hospital (Hearst)	Hearst	*	*	*	*
Hôpital Régional de Sudbury Regional Hospital Corporation	Sudbury	153	70	65	31
Hotel Dieu Grace Hospital, Windsor	Windsor	110	78	*	9
Hotel Dieu Health Sciences Hospital, Niagara	St. Catharines	*	*	16	*
Hotel Dieu Hospital, Kingston	Kingston	10	32	*	*
Humber River Regional Hospital	Toronto	177	46	79	38
Huron Perth Healthcare Alliance	Stratford	57	39	38	8
Joseph Brant Memorial Hospital	Burlington	112	49	57	29
Kirkland and District Hospital	Kirkland Lake	*	*	*	*
Lake of the Woods District Hospital	Lake of the Woods	14	*	*	*
Lakeridge Health Corporation	Oshawa	136	63	99	30
Leamington District Memorial Hospital	Leamington	20	8	*	8
Lennox and Addington County General Hospital	Napanee	13	*	*	*
Listowel – Wingham Hospital Alliance (Listowel)	Listowel	*	8	*	*
Listowel – Wingham Hospital Alliance (Wingham)	Wingham	*	*	*	*
Markham Stouffville Hospital	Markham	63	13	48	19
Montfort Hospital	Ottawa	71	28	12	*
Niagara Health System	Niagara Falls	210	66	44	46
Norfolk General Hospital	Simcoe	37	11	*	*
North Bay General Hospital	North Bay	85	18	33	19
North Simcoe Health Alliance	Midland	17	18	*	*
North Wellington Health Care Corporation	Mount Forest	*	*	*	*
North York General Hospital	Toronto	119	76	31	58
Northumberland Hills Hospital	Cobourg	20	9	*	*
Orillia Soldiers' Memorial Hospital	Orillia	69	23	14	18
Pembroke Regional Hospital	Pembroke	35	23	*	17
Perth & Smiths Falls District Hospital	Smiths Falls	53	*	*	*
Peterborough Regional Health Centre	Peterborough	123	44	79	24

2.6 Number of procedures for cancer among patients aged 40 years and older, by hospital corporation, and type of surgery, in Ontario, 2003/04 (continued)

Hospital Corporation	City	Number of Large Bowel Resections	Number of Mastectomies	Number of Radical Prostatectomies	Number of Hysterectomies
Queensway-Carleton Hospital	Ottawa	63	93	54	6
Quinte Healthcare Corporation	Belleville	98	43	27	25
Red Lake Margaret Cochenour Memorial Hospital	Red Lake	*	*	*	*
Renfrew Victoria Hospital	Renfrew	14	6	*	*
Riverside Health Care Facilities	Fort Frances	16	8	*	*
Ross Memorial Hospital	Lindsay	52	17	*	*
Rouge Valley Health System	Toronto	143	51	24	21
Royal Victoria Hospital of Barrie, The	Barrie	83	54	64	22
Sault Area Hospitals	Sault Ste. Marie	54	48	*	10
Sensenbrenner Hospital	Kapuskasing	*	*	*	*
Sioux Lookout Meno-Ya-Win Health Centre	Sioux Lookout	*	*	*	*
South Bruce Grey Health Centre	Kincardine	*	7	*	*
South Muskoka Memorial Hospital	Bracebridge	17	*	*	*
Southlake Regional Health Centre	Newmarket	82	36	47	18
St. Joseph's General Hospital (Elliot Lake)	Elliot Lake	12	8	*	*
St. Joseph's Health Centre (Toronto)	Toronto	123	22	29	20
St. Mary's General Hospital	Kitchener	71	40	62	*
St. Thomas-Elgin General Hospital	St. Thomas	35	31	*	7
Strathroy Middlesex General Hospital	Strathroy	23	14	*	*
Temiskaming Hospital	Temiskaming	15	*	*	*
The Scarborough Hospital	Toronto	225	93	107	30
Thunder Bay Regional Health Sciences Centre	Thunder Bay	87	53	41	20
Tillsonburg District Memorial Hospital	Tillsonburg	16	8	*	*
Timmins & District Hospital	Timmins	46	12	*	12
Toronto East General Hospital	Toronto	104	28	46	21
Trillium Health Centre	Mississauga	186	45	54	30
Weeneebayko Health Ahtuskaywin/ Weeneebayko General Hospital	Moosonee	*	*	*	*
West Lincoln Memorial Hospital	Grimsby	21	8	*	*
West Parry Sound Health Centre	Parry Sound	13	*	*	7
William Osler Health Centre	Brampton	194	66	197	36
Winchester District Memorial Hospital	Winchester	11	10	*	*
Windsor Regional Hospital	Windsor	55	33	32	35
Woodstock General Hospital	Woodstock	47	26	24	7
York Central Hospital	Richmond Hill	67	21	52	16
Small					
Alexandra Hospital	Ingersoll	*	*	*	*
Almonte General Hospital	Almonte	*	*	*	*
Arnprior and District Memorial Hospital	Arnprior	13	*	*	*
Carleton Place & District Memorial Hospital	Carleton Place	*	9	*	*
Dryden Regional Health Centre	Dryden	11	*	*	*
Haldimand War Memorial Hospital	Dunnville	*	*	*	*
Hanover and District Hospital	Hanover	6	*	*	*
Stevenson Memorial Hospital	Alliston	*	*	*	*
TOTAL		**6,113**	**2,693**	**2,610**	**1,790**

*Cell sizes with fewer than 6 procedures performed were suppressed to ensure confidentiality

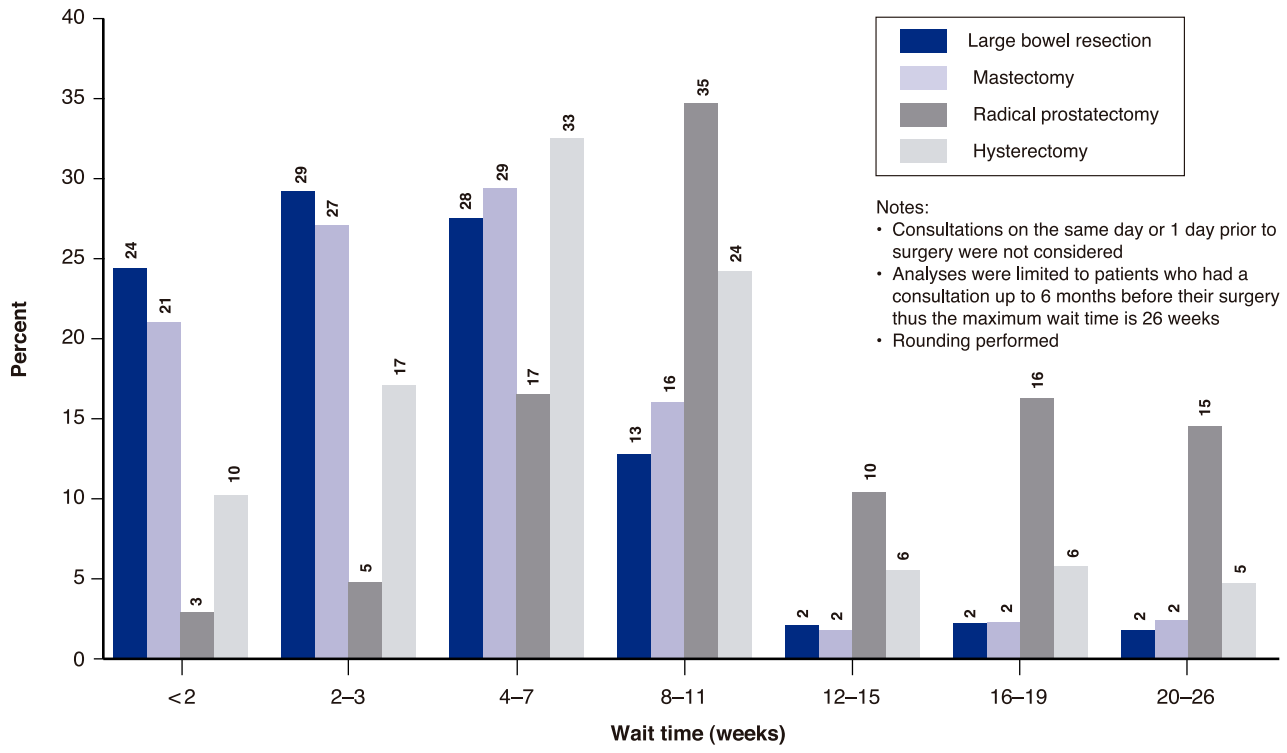
Academic hospitals: University-affiliated facilities; members of the Council of Academic Hospitals of Ontario (CAHO)

Community hospitals: All other hospitals

Small hospitals: Facilities that generally provide less than 3,500 weighted cases, have a referral population of less than 20,000 people, and are the only hospital in their community, as defined by the Joint Policy and Planning Committee (JPPC)

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Registered Persons Database

2.7 Proportion of cancer surgeries performed within specified wait time ranges, by type of surgery, in Ontario, 2003/04



Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

2.8a Median, 25th and 75th percentile wait times among patients aged 40 years and older with large bowel resection for cancer, by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

	Wait Times for Large Bowel Resection								
	2001/02			2002/03			2003/04		
Local Health Integration Network	25th Percentile	Median Wait Time (Days)	75th Percentile	25th Percentile	Median Wait Time (Days)	75th Percentile	25th Percentile	Median Wait Time (Days)	75th Percentile
1. Erie St. Clair	13	25	47	12	25	51	13	25	48
2. South West	14	25	46	13	26	41	15	25	44
3. Waterloo Wellington	14	24	45	16	27	44	20	31	57
4. Hamilton Niagara Haldimand Brant	13	22	43	13	25	46	15	29	52
5. Central West	14	27	47	15	25	41	13	26	45
6. Mississauga Oakville	14	24	42	13	23	47	13	25	48
7. Toronto Central	16	25	41	15	24	41	13	22	39
8. Central	14	26	44	15	25	45	15	27	43
9. Central East	13	22	39	15	25	45	13	23	43
10. South East	16	24	43	17	27	41	20	32	50
11. Champlain	13	20	36	14	23	39	15	26	43
12. North Simcoe Muskoka	12	20	39	17	30	57	18	32	57
13. North East	14	24	41	16	30	56	16	28	46
14. North West	24	37	65	21	37	65	23	34	73
All Ontario	**13**	**23**	**43**	**15**	**26**	**45**	**15**	**26**	**47**

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database, Statistics Canada–2001 Census and Postal Code Conversion File

2.8b Median, 25th and 75th percentile wait times among patients aged 40 years and older with mastectomy for cancer, by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

	Wait Times for Mastectomy								
	2001/02			2002/03			2003/04		
Local Health Integration Network	25th Percentile	Median Wait Time (Days)	75th Percentile	25th Percentile	Median Wait Time (Days)	75th Percentile	25th Percentile	Median Wait Time (Days)	75th Percentile
1. Erie St. Clair	13	22	44	13	22	45	13	19	45
2. South West	14	28	49	13	24	45	11	22	42
3. Waterloo Wellington	15	28	48	17	34	56	19	32	68
4. Hamilton Niagara Haldimand Brant	14	27	50	17	29	51	19	29	51
5. Central West	23	34	64	18	26	48	17	33	54
6. Mississauga Oakville	19	33	49	12	29	45	18	30	56
7. Toronto Central	20	40	62	20	32	64	22	33	64
8. Central	16	32	51	21	39	62	21	41	66
9. Central East	16	29	50	15	30	51	15	32	54
10. South East	21	31	60	21	33	47	21	35	55
11. Champlain	13	27	46	18	27	45	17	29	51
12. North Simcoe Muskoka	13	24	44	13	23	48	14	27	54
13. North East	13	25	52	20	32	50	15	27	46
14. North West	24	38	52	25	33	51	21	37	73
All Ontario	**15**	**29**	**50**	**16**	**29**	**50**	**16**	**29**	**52**

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

2.8c Median, 25th and 75th percentile wait times among men aged 40 years and older with radical prostatectomy for cancer, by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

	Wait Times for Radical Prostatectomy								
	2001/02			2002/03			2003/04		
Local Health Integration Network	25th Percentile	Median Wait Time (Days)	75th Percentile	25th Percentile	Median Wait Time (Days)	75th Percentile	25th Percentile	Median Wait Time (Days)	75th Percentile
1. Erie St. Clair	41	95	125	46	88	123	50	72	118
2. South West	55	87	115	59	88	117	64	90	123
3. Waterloo Wellington	50	81	119	52	85	117	64	97	124
4. Hamilton Niagara Haldimand Brant	49	85	118	55	89	120	51	77	113
5. Central West	50	79	113	62	88	116	65	92	123
6. Mississauga Oakville	50	84	116	50	87	122	59	80	114
7. Toronto Central	57	80	115	61	85	120	49	78	113
8. Central	54	82	122	52	84	122	52	79	115
9. Central East	69	95	122	64	91	124	56	85	117
10. South East	89	113	147	84	98	133	62	91	113
11. Champlain	76	104	146	83	114	139	84	118	145
12. North Simcoe Muskoka	44	72	106	57	78	106	51	85	117
13. North East	56	78	104	50	85	125	52	88	118
14. North West	61	85	100	61	87	113	64	82	120
All Ontario	**57**	**88**	**120**	**58**	**90**	**123**	**58**	**87**	**120**

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

2.8d Median, 25th and 75th percentile wait times among women aged 40 years and older with hysterectomy for cancer, by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

	Wait Times for Hysterectomy								
	2001/02			2002/03			2003/04		
Local Health Integration Network	25th Percentile	Median Wait Time (Days)	75th Percentile	25th Percentile	Median Wait Time (Days)	75th Percentile	25th Percentile	Median Wait Time (Days)	75th Percentile
1. Erie St. Clair	28	50	78	32	50	73	32	56	78
2. South West	31	43	76	28	47	70	24	44	76
3. Waterloo Wellington	25	47	69	21	44	71	30	50	88
4. Hamilton Niagara Haldimand Brant	22	44	71	18	42	67	22	39	83
5. Central West	29	50	71	28	39	66	34	54	91
6. Mississauga Oakville	26	41	71	29	43	68	27	55	77
7. Toronto Central	20	41	72	30	44	66	31	46	71
8. Central	28	38	64	28	48	78	32	60	99
9. Central East	22	43	76	27	51	81	31	50	82
10. South East	24	38	58	27	37	55	28	48	71
11. Champlain	22	31	52	26	36	53	24	34	50
12. North Simcoe Muskoka	29	51	83	29	45	73	23	42	82
13. North East	17	45	68	23	36	57	27	48	94
14. North West	13	28	85	11	25	31	13	22	34
All Ontario	**23**	**42**	**70**	**26**	**42**	**69**	**27**	**46**	**79**

Data sources: Canadian Institute for Health Information–Discharge Abstract Database and National Ambulatory Care Reporting System; Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

Conclusions and Next Steps

Compared to surgical procedures for medical conditions for which incidence data are not readily available (e.g., cataracts), monitoring cancer surgery utilization is facilitated by the routine collection of cancer incidence data. Ideally, utilization rates would be expressed as the proportion of new cancer patients undergoing surgery. However, for such rates to be calculated in a timely manner, rapid ascertainment of new cancer cases in the OCR, and linkage to CIHI surgical data would be necessary. Investment in the OCR's electronic PIMS should facilitate this possibility. Moreover, improved use of cancer incidence projections could aid the expansion of cancer system resources according to need.[10]

While administrative data can be used to calculate cancer surgery wait times, they do not contain sufficient detail to indicate required interventions to reduce wait times. For example, to evaluate the extent to which tests contribute to the wait time between surgical consultation and surgery, it is possible to link cancer data presented here with data for use of CT or MRI.[12] However, as noted in chapter 6 (CT and MRI Scanning), wait time data are not routinely collected in Ontario. Alternatively, cancer surgery waits could be calculated from the last visit with the surgeon preceding surgery, rather than from the date of initial consultation.[8] Using this interval would eliminate the component of waiting caused by tests, however, it would not reflect the patient's perception of time spent waiting for surgery.

Certain details regarding cancer surgery waits could be better understood by obtaining information on a subset of cases from individual institutions. A pilot study conducted by CCO prospectively collected detailed surgical wait time data from 4 participating centres in the Greater Toronto Area over 3 months in 2004.[24] Surgeons were asked to contribute wait time data, however, fewer than 50% of cancer surgeries performed in the participating centres were included in the study. Heavy workload was commonly cited as the reason for non-participation among surgeons. This demonstrates the difficulty of prospectively collecting comprehensive data from individual hospitals without enhancing the infrastructure needed to perform the additional work.[24] However, it may be more feasible to: collect data on selected cases to confirm the accuracy of administrative data; quantify the contribution of different tests or procedures to cancer surgery wait time; and examine extreme cases in detail. In particular, it is thought that very long waits found in administrative data may be caused by special clinical circumstances that do not reflect access to surgery. However, collection of detailed information is necessary to confirm this. Collecting data for diagnostic imaging waits would illuminate wait interval data from administrative sources. Moreover, evaluation of quality indicators of cancer treatment generally requires more detailed data than are available in administrative datasets.[25]

Although this report has focused on cancer surgery rates and wait intervals, full access to appropriate and timely cancer care is comprised of numerous other factors, including cancer screening, imaging, timely pathology reporting, radiation therapy and chemotherapy. Enhancing access to cancer services in Ontario will involve expanding the supply of treatment resources, reducing demand for some treatments through early cancer detection, and utilizing resources in a more efficient and coordinated manner.[10]

Appendix 2.A

How the Research was Done

Data validation and study limitations

The use of administrative data to examine wait times has the benefit of allowing the examination of the majority of cancer surgeries in Ontario, thereby reducing the selection bias that can occur with the use of local sources of data. However, the data used in these analyses have some limitations that warrant consideration.

CIHI diagnosis codes were used as the indicator that a procedure was done to treat cancer, since complete data from the OCR was not available for the 2003/04 fiscal year. Using this method, about 3%–11% of cancer diagnoses are estimated as possibly misclassified. These are cases for which there was: a change in diagnosis following hospital admission; misclassification of the diagnosis by the CIHI medical record abstractor; or failure to report pathologically confirmed cancers to the OCR. However, this misclassification is likely to have occurred consistently over the study period and should not impact temporal trends across LHINs.

For breast cancer procedures, only mastectomy was examined in this report. Local excision (i.e., lumpectomy) is more commonly performed than mastectomy for the management of breast cancer, although it is also used for removal of benign breast lesions. The exclusion of lumpectomy procedures should reduce the proportion of surgeries studied that were not for cancer. Data from Nova Scotia indicate that wait times for mastectomy and lumpectomy for breast cancer do not differ significantly in that province.[2]

Wait times were calculated for cases in which the surgeon who performed the operation had billed a surgical consultation to OHIP no more than 6 months before surgery. When a consultation billing could not be found from the operating surgeon, the most recent surgery-specific consultation from another surgeon was used. A surgical consultation billed to OHIP was used as the start time for the wait interval. Limiting the wait time analysis only to cases for which the consultation from the actual operating surgeon could be identified did not change the median wait times significantly. Also, for some regions of the province, surgeons are remunerated through alternate payment plans; thus, OHIP consultation billings may not be available to be used in the wait time calculation. For example, this may apply to surgeons working for the Southeastern Ontario Academic Medical Organization (SEAMO) in Kingston, Ontario, though only 2–4% of the procedures studied were done in SEAMO hospitals. While this may have affected wait time estimates for LHIN South East, it would have minimal impact on Ontario-wide wait time estimates.

Other sources of data suggest that the wait times reported here are valid. An Ontario study using a comparable analysis plan found that in 2000, the median wait times for surgery for colorectal cancer, breast cancer and prostate cancer were 19 days, 19 days, and 83 days, respectively.[7] In comparison, in this report, waits for surgery for these cancers in the 2001/02 fiscal year were 4–10 days longer. The prospective CCO pilot study of 4 participating centres in the Greater Toronto Area over 3 months in 2004 reported wait times that were within 1 week of those in this report for LHIN Toronto Central, except for radical prostatectomy.[24] Although the wait times reported in the CCO pilot study were generally shorter, fewer than 50% of cancer surgeries performed in the participating centres were included in the study. It is possible that patients with longer waits were more likely to be excluded from that study.[24]

The analyses in this report apply to common cancer-related surgeries, and patterns of surgical referral for less common cancers (e.g., esophagus or pancreas) may differ substantially. Thus, the regional and institutional distributions of cases for less common cancers are likely quite different from the distributions described here.

Data sources

Identification of cancer surgeries

Files for 4 commonly performed cancer surgeries were abstracted from the CIHI DAD and NACRS for the entire Ontario population. Selection of these surgeries was based on ICES work conducted for the Cancer Care Ontario Quality Council for fiscal years 1993/94–2003/04 (April 1 to March 31).

Procedures and corresponding cancer diagnostic codes that occurred during the same hospital admission were identified (Tables 2.1–2.4).

All surgeries were counted (including same-day surgeries from CIHI DAD/NACRS) even if they were not fully completed (abandoned), and a date was recorded for each procedure. If a date was missing, the date of the first procedure for that admission was used. If that date was absent, the date of patient's admission was recorded. All procedures on different days were counted.

Age, sex, socioeconomic status and Local Health Integration Network (LHIN)

Only patients 40 years and older were included in these analyses. For each surgery, patient age, sex and postal code at the time of surgery were obtained from the Ministry of Health and Long-Term Care Registered Persons Database (RPDB). The RPDB contains contact and administrative data for all OHIP beneficiaries. Postal codes were converted into Dissemination Areas (DA) using Statistics Canada conversion files, and DAs were converted into LHINs. Income quintiles were obtained by using patients' postal codes and Statistics Canada conversion files. Patients were grouped into 4 age groups: 40–64, 65–74, 75–84, and 85+ years.

Wait times

Only the first CIHI surgery for each patient was used. All patients that had an emergency visit as identified by CIHI DAD/NACRS were excluded (these patients were not placed on waiting lists). Only patients 40 years and older were included in these analyses. (Table 2.5)

OHIP files were abstracted for the patients from the CIHI DAD/NACRS cohort from October 1, 2000 to March 31, 2004. Only patients with valid OHIP numbers were included. Patients who had chemotherapy and/or radiation therapy up to 6 months before their first surgery were excluded (this applied mostly to patients with mastectomies or large bowel resection). (Table 2.6)

Identification of surgical consultations

For patients without chemotherapy or radiation therapy codes within 6 months before surgery, the CIHI DAD/NACRS-recorded surgeries were matched with OHIP-recorded surgeries (physicians can only be identified through OHIP). If a match was found for a specific surgery in both files, a physician number(s) from OHIP for that surgery was used. If there were 2 or more physicians involved in that surgery, all identifiers were used. (Table 2.7)

OHIP files were examined for new patient consultations with surgeon up to 6 months before a surgery performed by the same surgeon. Consultations on the same day or 1 day before the surgery were excluded. When a consultation was not found for the same surgeon who performed the procedure, the most recent surgery-specific consultation code (Table 2.8) up to 6 months before the surgery was used. Patients for whom no surgical consultations were found for the 6-month period before the surgery were excluded from analyses.

Wait time was defined as an interval between a patient's last surgical consultation and the first surgery. Each patient was recorded only once.

Analyses

Comparison of cancer patients from CIHI DAD/ NACRS and OCR files

Before running the frequency and wait time analyses, the CIHI DAD/NACRS and OCR files were compared for concordance in identification of cancer patients. Each patient is recorded once only in OCR for a given primary cancer type (reoccurrence is not re-registered). Using the methods described previously, CIHI DAD/NACRS files were abstracted for the calendar years 2000–2002 (January 1–December 31). The reason for these dates was the availability of similar OCR data. Analyses were limited to patients with valid OHIP numbers, and to 1 (the earliest) primary cancer per patient.

Patients found in CIHI DAD/NACRS were compared with those found in OCR by surgery and diagnostic code (first 3 digits). For each patient, the record in OCR was searched up to 10 years before and 1 year after the surgery. The 10-year period took into account possible recurrences. Each surgery from CIHI DAD/NACRS had to match a corresponding ICD-9 code in OCR (Table 2.9).

There was an acceptable agreement between the CIHI and OCR data. CIHI data identifies more cancer cases than OCR (this might be suspected cases). However, as all cancer surgery candidates (including suspected cases) were placed on waiting lists in the same way, the inclusion of all of these patients was considered appropriate, and only CIHI DAD/NACRS files were used in the analyses. Additionally, analyses using OCR files could not be completed, as 9 months of OCR data were missing for fiscal year 2003/04. (Table 2.10)

Table 2.1 Procedure and diagnostic classification codes—large bowel resection

1993/94–2001/02		2002/03–2003/04	
CCP* prcode1–prcode10		**CCI*** incode1–incode20**	
57.50	Partial excision of large intestine	1NM87	Excision partial, large intestine (except for endoscopic – 1NM87BA)
57.51	Multiple segmental resection of large intestine	1NM89	Excision total, large intestine
57.52	Cedectomy	1NM91	Excision radical, large intestine
57.53	Right hemicolectomy	1NQ87	Excision partial, rectum (except for endoscopic – 1NQ87BA)
57.54	Resection of transverse colon	1NQ89	Excision total, rectum
57.55	Left hemicolectomy	1NQ90	Excision total with reconstruction, rectum
57.56	Sigmoidectomy	**and**	
57.59	Other partial excision of large intestine	**Diagnosis (ICD-10)**	
60.40	Abdominoperineal resection of rectum	C18	Malignant neoplasm of colon
60.50	Other resection of rectum	C19	Malignant neoplasm of rectosigmoid junction
60.51	Anterior resection with concomitant colostomy	C20	Malignant neoplasm of rectum
60.52	Other anterior resection	C21	Malignant neoplasm of anus and anal canal
60.53	Posterior resection		
60.54	Duhamel resection		
60.55	Hartmann resection		
60.59	Other resection of rectum NEC		
and			
Diagnosis (ICD-9)**			
153	Malignant neoplasm of colon		
154	Malignant neoplasm of rectum, rectosigmoid junction, and anus		

* Canadian Classification of Diagnostic, Therapeutic, and Surgical Procedures
** International Classification of Diseases
*** Canadian Classification of Health Interventions

Table 2.2 Procedure and diagnostic classification codes—mastectomy

1993/94–2001/02		2002/03–2003/04	
CCP* prcode1–prcode10		**CCI*** incode1–incode20**	
97.12	(Unilateral) complete mastectomy	1YM89	Excision total, breast
97.13	Bilateral complete mastectomy	1YM90	Excision total with reconstruction, breast
97.14	(Unilateral) extended simple mastectomy	1YM91	Excision radical, breast
97.15	Bilateral extended simple mastectomy	1YM92	Excision radical with reconstruction, breast
97.16	(Unilateral) radical mastectomy	**and**	
97.17	Bilateral radical mastectomy	**Diagnosis (ICD-10)**	
97.18	(Unilateral) extended radical mastectomy	C50	Malignant neoplasm of breast
97.19	Bilateral extended radical mastectomy		
and			
Diagnosis (ICD-9)**			
174	Malignant neoplasm of female breast		

* Canadian Classification of Diagnostic, Therapeutic, and Surgical Procedures
** International Classification of Diseases
*** Canadian Classification of Health Interventions

Table 2.3 Procedure and diagnostic classification codes—radical prostatectomy

1993/94–2001/02		2002/03–2003/04	
CCP* prcode1–prcode10		**CCI*** incode1–incode20**	
72.40	Radical prostatectomy **and**	1QT91	Excision radical, prostate **and**
Diagnosis (ICD-9)**		**Diagnosis (ICD-10)**	
185	Malignant neoplasm of prostate	C61	Malignant neoplasm of prostate

* Canadian Classification of Diagnostic, Therapeutic, and Surgical Procedures
** International Classification of Diseases
*** Canadian Classification of Health Interventions

Table 2.4 Procedure and diagnostic classification codes—hysterectomy

1993/94–2001/02		2002/03–2003/04	
CCP* prcode1–prcode10		**CCI*** incode1–incode20**	
80.30	Total abdominal hysterectomy	1RM89	Excision total, uterus and surrounding structures
80.40	Vaginal hysterectomy (subtotal) (total)	1RM91	Excision radical, uterus and surrounding structures **and**
80.50	Radical abdominal hysterectomy	**Diagnosis (ICD-10)**	
80.60	Radical vaginal hysterectomy **and**	C53	Malignant neoplasm of cervix uteri
Diagnosis (ICD-9)**		C54	Malignant neoplasm of corpus uteri
180	Malignant neoplasm of cervix uteri	C55	Malignant neoplasm of uterus, part unspecified
182	Malignant neoplasm of body of uterus	C56	Malignant neoplasm of ovary
183	Malignant neoplasm of ovary and other uterine adnexa		

* Canadian Classification of Diagnostic, Therapeutic, and Surgical Procedures
** International Classification of Diseases
*** Canadian Classification of Health Interventions

Table 2.5 Exclusion of patients with admission codes (emergency room) based on CIHI DAD/NACRS

2001/02	2002/03–2003/04*
if admcat = 'E' up to fiscal year 2001/02	if admcat = 'U' for fiscal year 2002/03

* Prior to 2002, E (Emergent) patients with life threatening condition requiring immediate assessment and treatment and U (Urgent) patients with a condition requiring immediate assessment but for whom delayed action would not be life threatening were reported separately, but starting in 2002, only one code, "U", was used to denote Emergent/Urgent patients.

Table 2.6 Exclusion of patients with chemotherapy or radiation therapy codes based on OHIP

2001/02	2002/03–2003/04*
Chemotherapy before first surgery = G281, G345, G359, G381	
The total of 3 or more radiation oncology consultations* before the first surgery = A340, A343, A345, A346, A348, A745, C342, C343, C344, C345, C346, C348, C745	Radiation therapy before first surgery (any of these codes) = X310, X311, X312, X313

* Radiation therapy codes came into effect on April 1, 2002 so they only apply to fiscal years 2002/03 and 2003/04. For 2001/02, all patients who had 3 or more consultations (any code) with any radiation oncologist were excluded.

Table 2.7 List of OHIP-based surgery fee codes that correspond to CIHI surgeries

2001/02–2003/04		
Large bowel resection	S166	Exc – anasto – sm. & lg. intest. –term ileum/caecum/asc colon – Rt. Gemicolect'y
	S167	Exc – anasto – Large Intestine – any portion
	S168	Ileostomy, subtotal colectomy
	S169	Total colectomy/ileo – rectal anastomosis
	S170	Exc – Ileostomy & tot. colectomy & abd – perin resect
	S171	Exc – lt. hemicolectomy with ant. resect/anast
	S172	Total colectomy with loop ileostomy
	S173	Exc – same as S170 – 2 surgeon team – abdominal
	S174	Same as S170 – 2 surgeon team – perineal
	S188	Exc – bowel resect without anastomosis
	S213	Exc – proctectomy – ant resect/proctosigmoidectomy
	S214	Exc – proctectomy – abdomino-perineal resect/pull thru
	S215	Exc – proctectomy – 2 surg team abdominal surgeon
	S216	Exc – proctectomy – 2 surg team – perineal surgeon
	S217	Exc – proctectomy – Hartmann procedure
	S218	Exc – proctectomy – colon reconstr foll Hartmann proc
	S222	Presacral/trans-sacral proctomy & exc lesion
Mastectomy	R108	Mastectomy – female (with/out biopsy) – simple
	R109	Mastectomy – rad/modified rad (with/out biopsy)
	R117	Mastectomy – female (with/out) biopsy – subcut/nipple preservation
	R146	Mastectomy – male (benign) – unilateral – simple
	R147	Mastectomy – male (benign) – unilateral – subcutaneous with nipple preservation
	R148	Mastectomy – male – unilateral – for treatment of pathological male breast disease – simple
	R149	Mastectomy – male – unilateral – for treatment of pathological male breast disease – subcutaneous with nipple preservation
Radical prostatectomy	S641	Transp tot prostatovesiculectomy, pelv lymph node dissect.
	S645	Prostate – exc – prostatectomy – perineal incl. vasectomy
	S646	Prostate – exc – prostatectomy – perineal w/vesiculectomy
	S647	Exc – prostatectomy/vasectomy – suprapubic 1 stage
	S648	Exc – prostatect/vasect – suprapubic 2 stages – 1st stage
	S649	Exc – prostatect/vasect – suprapubic 2 stages – 2nd stage
	S650	Exc – prostatectomy/vasectomy – retropubic simple
	S651	Exc – prostatectomy/vasectomy – retropubic radical
Hysterectomy	S710	Corpus Uteri – exc – hysterectomy – total w/omentectomy
	S757	Corpus Uteri – inc/exc – hysterectomy – total/subtotal abd/vag
	S758	Corpus Uteri – inc/exc – hysterectomy – total/subtotal – A&P
	S759	Corpus Uteri – Inc/exc – hysterectomy – total – A&P rep
	S762	Hysterectomy radical trachelectomy
	S763	Corpus Uteri Inc – exc – hysterect – rad (Wertheims)

Table 2.8 OHIP-based surgical consultation codes

2001/02–2003/04		
Large bowel resection	A035	Consult. – gen. surg.
	A036	Re-consult. – gen. surg.
Mastectomy	A035	Consult. – gen. surg.
	A036	Re-Consult. – gen. surg.
Radical prostatectomy	A355	Consult. – urol.
	A356	Re-Consult. – urol.
Hysterectomy	A205	Consult. – obs. & gyn.
	A206	Re-Consult. – obs. & gyn.

Table 2.9 Diagnostic codes used to identify cancer-directed surgery

Surgery in CIHI DAD/NACRS	Diagnostic Codes (ICD-9) in OCR
Large bowel resection	153 or 154
Mastectomy	174
Radical prostatectomy	185
Hysterectomy	180, 182, or 183

Table 2.10 Validation of cancer procedures in the Canadian Institute for Health Information Discharge Abstract Database and National Ambulatory Care Reporting System and cancer cases from the Ontario Cancer Registry, among the population aged 40 years and older, in Ontario, 2000–2002

Calendar year	Procedure	Number of procedures in CIHI DAD/NACRS (with cancer-specific diagnoses)	Number of patients in DAD/NACRS	DAD/NACRS patients with matching diagnosis in OCR in the past 10 years up to 10 years before surgery		Patients found only in DAD/NACRS	
				Number	Percent	Number	Percent
2000	Hysterectomy	1,629	1,629	1,465	89.9	164	10.1
	Large bowel resection	5,860	5,824	5,224	89.7	600	10.3
	Mastectomy	2,685	2,658	2,429	91.4	229	8.6
	Radical prostatectomy	1,843	1,842	1,777	96.5	65	3.5
2001	Hysterectomy	1,686	1,685	1,530	90.8	155	9.2
	Large bowel resection	6,012	5,887	5,289	89.8	598	10.2
	Mastectomy	2,814	2,765	2,498	90.3	267	9.7
	Radical prostatectomy	2,433	2,433	2,353	96.7	80	3.3
2002	Hysterectomy	1,818	1,817	1,630	89.7	187	10.3
	Large bowel resection	6,053	5,839	5,204	89.1	635	10.9
	Mastectomy	2,781	2,729	2,493	91.4	236	8.6
	Radical prostatectomy	2,565	2,563	2,454	95.7	109	4.3

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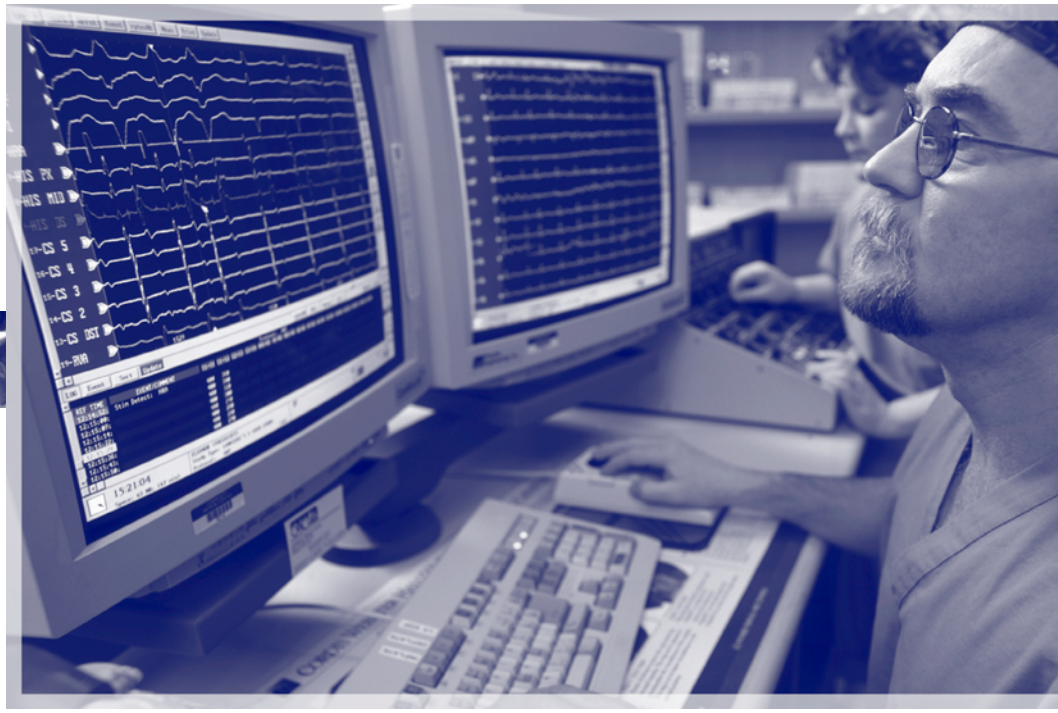
INSIDE

3

Chapter

Cardiac Procedures

David A. Alter, MD, PhD, FRCPC, Eric A. Cohen, MD, FRCPC, Geta Cernat, MD, Donald DeBoer, MMath, Kevin W. Glasgow, MD, MHSc, CCFP, FACPM, FRCPC, Pamela M. Slaughter, MA, MSc, and Jack V. Tu, MD, PhD, FRCPC



Executive Summary

Issue

In the face of increasing public scrutiny of wait times for health services, this chapter reviews recent Ontario data to determine current patient utilization of, and access to, selected cardiac procedures:

- Coronary angiography (an X-ray with injection of contrast dye);
- Percutaneous coronary intervention (PCI) or angioplasty (a balloon device is used to reduce or clear blockages in one or more arteries, after which a metal stent is often inserted to keep the arteries open); and,
- Coronary artery bypass graft (CABG) surgery, "bypass surgery" (use of artery or vein grafts, typically from the leg, to reroute blood around clogged arteries).

Study

Trends in rates and wait times were studied for fiscal years 2001/02 to 2003/04 using data collected by the Cardiac Care Network of Ontario.

Findings

There has been a marked increase in the rates of coronary angiography and angioplasty over the past decade in Ontario. Bypass surgery rates have not increased to the same degree and have actually fallen 8% over the past 3 years. Rates of procedures vary 2-fold across Local Health Integration Networks (LHINs) in Ontario. Wait times for these procedures have generally been stable or have fallen slightly over the past 3 years in Ontario. In 2003/04, median wait times for coronary angiography, angioplasty and bypass surgery were 6 days, 3 days, and 12 days, respectively. Only 56% of patients receiving coronary angiography and 72% of patients receiving bypass surgery, did so within recommended maximum wait times (RMWT).

Implications

Access to cardiac procedures such as coronary angiography and angioplasty has improved in Ontario during the past 3 years although a significant number of patients still had wait times that exceeded RMWT benchmarks. Wide regional variation in rates and wait times for these procedures continues across the province. Reducing regional inequities in access to cardiac procedures should be a priority for future policy initiatives in Ontario.

Introduction

Heart disease is the leading cause of death among Canadians. Coronary artery disease, one of the main forms of heart disease, develops over time, and is caused by narrowing of the blood vessels (coronary arteries) that supply the heart. Often there are no symptoms until the disease is advanced and patients present with chest pain (angina), shortness of breath or even sudden death. Heart attacks (acute myocardial infarction) occur when a blood clot obstructs 1 or more blood vessels supplying the heart. If not resolved, this obstruction causes destruction of heart muscle.

The degree of heart disease and the extent of the coronary artery narrowing and blockage can be assessed using coronary angiography. Patients with significant blockages are treated by 2 main revascularization procedures (angioplasty or bypass surgery). Many patients with less severe heart disease are treated with medications alone.

The main benefit of these procedures is improved quality of life for patients (i.e., reduced chest pain), although long-term survival is improved in certain types of patients. For example, bypass surgery has been shown to improve survival for patients with 3 or more blockages involving the main coronary artery.[1] Angioplasty has been shown to improve survival when administered as immediate treatment for heart attack.[1] Recent studies have also suggested modest benefits (in survival, recurrent heart attacks and angina episodes) associated with earlier and more aggressive use of cardiac procedures following an initial heart attack or angina-related hospital admission.[7-10] However, the overall population-benefit and the cost-effectiveness of aggressive strategies have been questioned by some.[11]

History of the Cardiac Care Network of Ontario (CCN)

Access to bypass surgery in Ontario has been a topic of considerable public concern in the past. In the latter part of the 1980s, a number of cases of patients dying while on the waiting list for cardiac surgery attracted considerable media attention. This led to the creation, in the early 1990s, of the CCN, a centralized province-wide registry of all patients waiting for cardiac surgery in Ontario. In support of this initiative, scientists from the Institute for Clinical Evaluative Sciences (ICES), led the development of a prioritization system (urgency rating score), for patients awaiting bypass surgery and coronary angiography.[12] As a treatment guideline, each type of cardiac patient was assigned a score indicating how urgently a procedure should be received, and a Recommended Maximum Wait Time (RMWT). At the time, angioplasty was an emerging technology, and a corresponding urgency rating score was not developed. The CCN approach to monitoring wait times and prioritizing patients has been emulated in a number of other provinces and countries, and has served as a model for waiting list management systems in Canada.

Rates and waits in the twenty-first century

In this chapter, temporal trends in utilization rates and wait times for coronary angiography, angioplasty, and bypass surgery are reviewed with a focus on fiscal years 2001/02 to 2003/04, a period of significant growth in capacity, particularly for coronary angiography and angioplasty services in Ontario. Access to coronary angiography and angioplasty has been especially important in the past few years, as recent advances, such as the development of stents, have made angioplasty a safer and more effective procedure.[13] In 2000, a CCN Target Setting Panel recommended a significant increase in capacity for coronary angiography and angioplasty in Ontario, with minimum procedure target rates for 2003/04 of 500 per 100,000 population for coronary angiography, 140 per 100,000 for angioplasty, and 107 per 100,000 for bypass surgery.[14] Increased capacity for coronary angiography and angioplasty in Ontario was achieved by expanding existing facilities, adding new facilities, and increasing the number of invasive cardiologists performing coronary angiography at community hospitals. Simultaneously, the CCN cardiac procedure registry was expanded to include data on wait times for patients receiving coronary angiography and angioplasty in Ontario.

Findings and Discussion

Rates of service provision

Exhibit 3.1: Annual numbers of procedures by year

Over the past 10 years, the total numbers of coronary angiography, angioplasty, and bypass surgery procedures performed in Ontario rose considerably (increases of 2.2-fold, 3.6-fold, and 1.5-fold, respectively).

Exhibits 3.2a–c and 3.3a–c: Rates by LHIN

These exhibits show marked regional variations in age- and sex-adjusted procedure rates across LHINs. Between 2001/02 and 2003/04, rates increased for coronary angiography by 4% and for angioplasty by 18%, and fell by 8% for bypass surgery. The increased use of angioplasty relative to bypass surgery over this time is likely attributable to several factors. First, the development of stents has reduced the occurrence of re-narrowing of the artery (restenosis), an early and common complication of angioplasty. Second, the price of stents has declined significantly over the past few years. Third, the clinical indications for angioplasty have increased over this same period.[2-10] Finally, clinical studies have documented similar outcomes for patients with multi-vessel coronary disease treated with angioplasty and stenting, and patients managed with bypass surgery.

Coronary angiography rates were lowest in LHINs South West and Waterloo Wellington, and highest in North West and North East (Exhibit 3.2a). Rates of angioplasty exceeded rates of bypass surgery in all LHINs, and were lowest in Erie St. Clair and highest in South East (Exhibit 3.2b). Rates for bypass surgery were lowest in Toronto Central and have been steadily dropping for the past 3 years. Conversely, in LHIN North West, bypass surgery rates have been increasing and are now the highest in the province (Exhibit 3.2c).

The degree of regional variation was significant. In 2003/04, the ratio of procedure rates in the highest rate LHIN to the lowest rate LHIN (extremal quotient) for coronary angiography was 2.1, for angioplasty it was 2.4, and for bypass surgery it was 1.9.

Exhibits 3.4a–c: Age- and sex-specific rates by LHIN

These exhibits provide a breakdown of cardiac procedures stratified by age and sex across LHINs. Utilization rates of all 3 procedures were highest among patients aged 65–74 years, corresponding with the average age of patients hospitalized with angina and heart attack. Rates were considerably lower in women than in men (2-fold, 3-fold, and 4-fold less, for coronary angiography, angioplasty, and bypass surgery, respectively). However, part of the difference may be attributable to factors such differences in age, severity of disease, concurrent illnesses, or procedural appropriateness, each of which has been shown to contribute to differences in procedure rates between men and women.[15-19]

Exhibit 3.5: Rates by neighourhood income quintile

This exhibit illustrates that overall procedure rates among those living in poorer neighbourhoods were similar to, or higher than, those living in affluent neighborhoods. This is considered appropriate because the burden of cardiac disease is highest in poor neighbourhoods in Ontario.

Exhibit 3.6: Number of procedures by hospital

In this exhibit, cardiac procedure volumes 2003/04 are shown for the 17 hospitals providing these services in Ontario. Of the 17 hospitals, 11 provide all 3 cardiac services (coronary angiography, angioplasty, and bypass surgery), while 5 hospitals provide coronary angiography only. One hospital (Rouge Valley Health System, Toronto) performs 2 of the 3 services: angioplasty and coronary angiography. As indicated, University Health Network, Toronto provides the highest volume of coronary angiography and bypass surgery, while the University of Ottawa Heart Institute provides the highest volume of angioplasty in the province.

Procedure rates in other jurisdictions

The rates of cardiac procedures have risen in Canada and elsewhere over the past decade.[20,21] In Ontario, despite steady increases in procedure rates, the rates of coronary angiography and angioplasty have risen more slowly than those in other Canadian jurisdictions.[22,23] Currently, Ontario's rates of coronary angiography and angioplasty are lower than those of Alberta and British Columbia, but higher than those of Eastern Canada.[14,24,25]

Wait times

Urgency rating scores

Ontario patients awaiting cardiac procedures are tracked in the CCN registry. Based on presenting symptoms, each cardiac patient is assigned an urgency rating score that corresponds to 1 of 3 categories (urgent, semi-urgent, elective). Each urgency level has a corresponding RMWT. The urgency scoring system was developed through a panel process involving Ontario physicians. The patient's urgency score considers clinical factors (e.g., frequency of chest pain, recent heart attack) along with relevant test results (e.g., stress testing, and/or the extent of artery blockage). Urgency rating scores (and RMWT) have been developed for coronary angiography and bypass surgery (see Exhibits 3.8a and 3.8c) but have yet to be developed for angioplasty in Ontario.[12,26] The urgency rating scores have

been validated and appropriately reflect physician judgment and the risk of adverse events for patients waiting in the queue.[27-29]

Exhibits 3.7a–c: Proportion of procedures performed within wait time ranges

The proportion of cases completed within an individual's RMWT according to wait times for coronary angiography and bypass surgery are provided in Exhibits 3.7a and 3.7c; Exhibit 3.7b illustrates the distribution of patients awaiting angioplasty according to wait time categories. Overall, only 56% of referred patients received coronary angiography within their RMWT, whereas 72% of patients received bypass surgery within their RMWT. Fortunately, significant delays (as defined by the proportion of patients who received their procedure beyond their RMWT) generally occurred much less frequently among urgent patients (whose median wait times were also the shortest) than among elective patients (whose median wait times were longest).

Exhibits 3.8a–c: Median wait times by LHIN

For coronary angiography, the median wait time in Ontario in 2003/04 was 6 days. From 2001/02 to 2003/04, the median wait time declined by 1 day—from 7 days (50% of patients receiving coronary angiography within their RMWT) to 6 days (56% of patients receiving coronary angiography within their RMWT). While coronary angiography wait times appropriately decreased according to urgency levels, wait times (and % performed within RMWT) varied considerably across LHINs, and within urgency groups (Exhibit 3.8a). Hamilton Niagara Haldimand Brant had lengthy delays across all urgency levels with wait times exceeding RMWTs among 54% of urgent patients, 69% of semi-urgent patients, and 62% of elective patients in 2003/04. Coronary angiography wait times were similarly long among semi-urgent patients in Champlain and North East, and among elective patients in Champlain and North West. Conversely, coronary angiography wait times were shortest in Toronto Central, regardless of urgency.

Median wait times for angioplasty procedures have fallen from 5 days (over fiscal years 2001/02 to 2003/04) to 3 days (2003/04). Not surprisingly, patients that were referred from home (outpatients) waited considerably longer for angioplasty than did patients referred from hospital (inpatients). North West had the longest median angioplasty wait times (with in-hospital wait times and out-of-hospital wait times being 2.5-fold greater and nearly 2-fold greater, respectively, than those of the provincial average). Conversely, median angioplasty wait times were shortest in South East, South West, Mississauga Oakville, and Toronto Central (Exhibit 3.8b).

The median wait time for bypass surgery in 2003/04 was 12 days, but wait times varied according to urgency level. While median wait times have generally remained stable over time for urgent and semi-urgent bypass surgery patients, median wait times for elective patients have risen from 34 days to 40 days over the past 3 years (Exhibit 3.8c). Median wait times in the North West were generally longer than in any other LHIN (with 35% of urgents, 31% of semi-urgents, and 40% of elective patients waiting longer than their RMWTs); conversely, bypass surgery wait times were shortest in Toronto Central and Mississauga Oakville for urgent and semi-urgent patients, and in South East for elective cases.

The relationship between waits and rates

Several studies have demonstrated that regional variation in utilization rates and wait times for revascularization procedures is largely explained by variations in access to coronary angiography.[30-32] To provide an indirect assessment of variations in access to coronary angiography, regional differences in the utilization rates of coronary angiography were compared with regional differences in the wait times for coronary angiography. The ranking of coronary angiography rates was found to bear little or no relationship to the ranking of coronary angiography waits across regions. In short, no jurisdiction was characterized as being both low for rates and long for waits (this combination is considered to be a surrogate measure of poor access). To the contrary, northern regions of Ontario have high rates and long median wait times for coronary angiography, suggesting either a higher burden of cardiac disease, a lower clinical threshold for intervention, or both.

Appropriateness

Two-fold variation in utilization rates of coronary angiography, angioplasty, and bypass surgery was identified across LHINs in Ontario, even after adjusting for regional age and sex differences. This raises questions such as whether regions with different rates of cardiac procedures are performing too many interventions, too few interventions, or the ideal number of interventions. The rate of appropriate procedures could not be determined from this study, as it would have required the collection of data on coronary anatomy and long-term patient outcomes.

Several studies have explored the appropriateness of cardiac procedure rates in Ontario, and elsewhere.[33-35] For example, a study in the early 1990s compared appropriateness of coronary angiography and bypass surgery between the United States (New York State—high-rate region) and Canada (Ontario and BC—low-rate regions). In both countries, similar percentages of patients had coronary angiography or bypass surgery for necessary, appropriate, uncertain, or inappropriate indications, providing evidence to support the possibility of unmet need

for cardiac procedures in Ontario at that time. In light of the marked rise in cardiac procedures in Ontario over the past decade, it may be time to re-examine the issue of appropriateness of cardiac procedures. Studies from the US (which showed higher rates than Ontario) have suggested that there is a considerable amount of potentially inappropriate elective angioplasties being performed on patients with minimal or no symptoms.[36] In contrast, a study from England (which has lower utilization rates of cardiac procedures than does Ontario), suggests that there are many patients there who could benefit from procedures but do not receive them.[37]

Unmet need

The CCN's 2004 Target Setting Committee is working on a needs-based planning model that takes into account the prevalence of, and regional variations in, the incidence of indications for cardiac procedures in Ontario.[22] However, the model's success depends on available data, and there is still a need to better quantify the frequency of indications for cardiac procedures, and the outcome benefits. Quantification of unmet need is complex, because need may be driven by patient preferences, expectations, or culture, and is not always objectively defined by standard measures of disease severity. This contributes to the difficulties policy makers, system managers, clinicians, and researchers face in identifying optimal rates for cardiac procedures in Ontario.

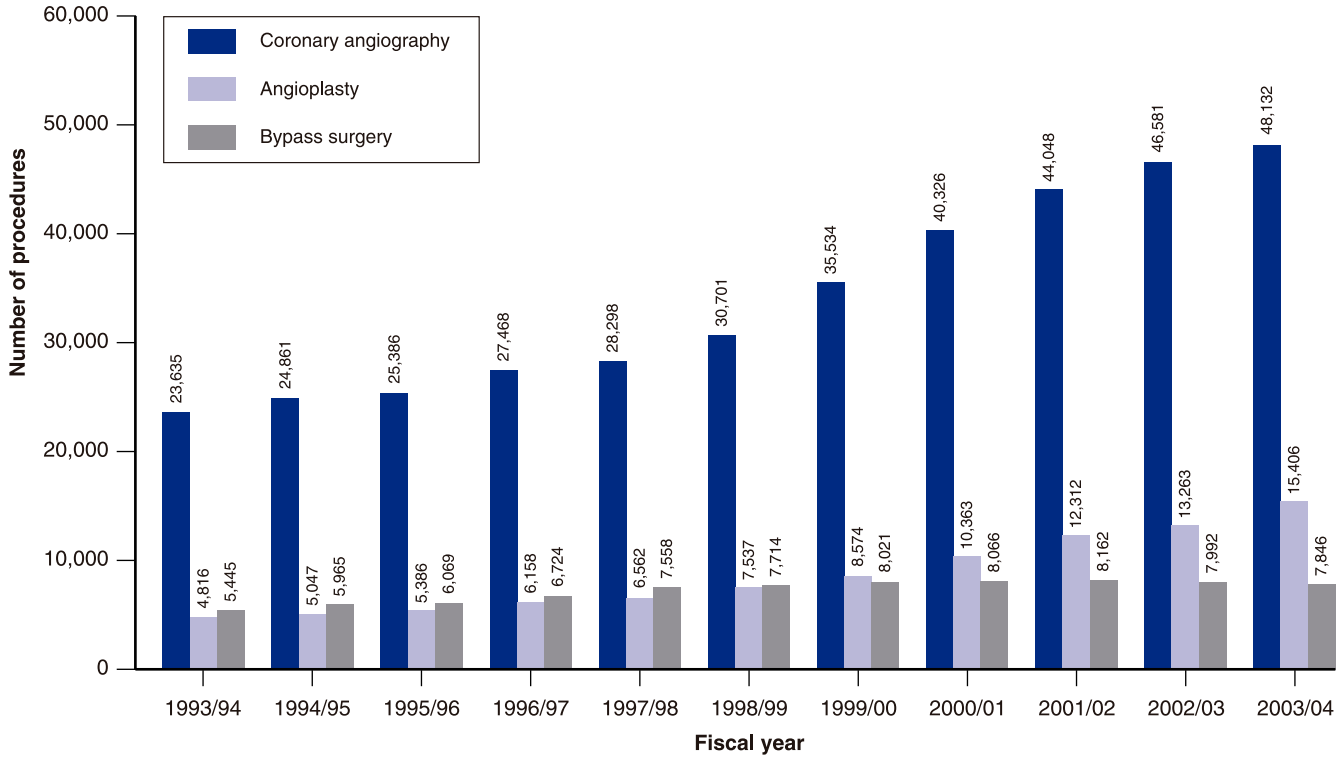
The issue of unmet need extends beyond evaluation and prioritization of coronary angiography, angioplasty, and bypass surgery.[38] While waiting lists for such procedures have received substantial public attention in Ontario, mortality rates in the queue remain less than 5 per 1,000 patients.[39] By comparison, relatively little public and policy attention has been given to cardiac prevention initiatives, such as cardiac rehabilitation—a program shown to reduce post-heart attack mortality rates by 20%, and when applied to more stable angina patients, may have superior quality of life benefits compared to angioplasty and stents.[40,41] Similarly, access to cardiac specialists, implantable defibrillators, and heart failure clinics warrant greater attention than that received to date.

Patient outcomes

Previous studies have shown that short-term (in-hospital) mortality and complication rates after angioplasty and bypass surgery are low. For example, in Ontario, approximately 1% and 2% of patients die in-hospital following angioplasty and bypass surgery, respectively.[42,43] Procedural mortality rates have remained stable over time. Angioplasty mortality and complication rates in Ontario are among the lowest in Canada, despite increasing patient severity over time.[42] Although Ontario data are readily available for death rates following cardiac procedures, they are scarce for patient quality of life following procedures. Collecting data on quality of life from questionnaires such as the Seattle Angina Questionnaire, before and after these procedures, would help quantify the outcome benefits of increased rates of intervention in Ontario.

Chapter 3—List of Exhibits

3.1 Annual number of coronary angiograms, angioplasties, and bypass surgeries, in Ontario, 1993/94–2003/04



*In this exhibit angiography and angioplasty data include Ontario and non-Ontario residents of all ages from 1993/94–2000/01 but only Ontario residents aged 20 years and older for 2001/02 to 2003/04. Bypass surgery data includes Ontario residents only aged 20 years and older for all fiscal years.

Data source: Cardiac Care Network of Ontario

3.2a Number and age- and sex-adjusted rate of coronary angiography per 100,000 population aged 20 years and older, by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

Local Health Integration Network	2001/02		2002/03		2003/04	
	Number of Coronary Angiographies	Rate per 100,000 Population	Number of Coronary Angiographies	Rate per 100,000 Population	Number of Coronary Angiographies	Rate per 100,000 Population
1. Erie St. Clair	1,766	401	1,958	437	2,157	472
2. South West	2,530	369	2,751	395	2,815	395
3. Waterloo Wellington	1,698	400	1,871	427	1,813	404
4. Hamilton Niagara Haldimand Brant	5,464	545	5,706	557	6,090	584
5. Central West	2,218	516	2,449	547	2,724	593
6. Mississauga Oakville	3,231	557	3,444	565	3,476	547
7. Toronto Central	3,525	463	3,779	492	3,759	487
8. Central	4,413	520	4,599	522	4,645	509
9. Central East	6,221	558	6,649	580	6,859	583
10. South East	2,478	743	2,437	716	2,384	684
11. Champlain	3,674	436	3,950	457	4,071	460
12. North Simcoe Muskoka	1,526	500	1,738	549	1,723	526
13. North East	3,181	723	3,228	727	3,450	768
14. North West	1,086	629	1,205	689	1,426	810
All Ontario	**44,048**	**525**	**46,581**	**541**	**48,132**	**546**

Extremal Quotients: 2.02 for 2001/02; 1.84 for 2002/03; 2.05 for 2003/04
*Missing values: 2001/02 (1,037); 2002/03 (817); 2003/04 (740)

Summary statistics (2003/04)	Value	P-value
Extremal Quotient	2.1	
Ratio of Third Quartile over First Quartile	1.3	
Coefficient of Variation (%)	17.6	
Systematic Component of Variation	49.3	
Adjusted Chi-square (likelihood ratio)	1494.6	<0.0001

Data sources: Cardiac Care Network of Ontario; Ministry of Health and Long-Term Care–Registered Persons Database

3.2b Number and age- and sex-adjusted rate of angioplasty per 100,000 population aged 20 years and older, by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

Local Health Integration Network	2001/02		2002/03		2003/04	
	Number of Angioplasties	Rate per 100,000 Population	Number of Angioplasties	Rate per 100,000 Population	Number of Angioplasties	Rate per 100,000 Population
1. Erie St. Clair	403	92	399	89	535	117
2. South West	681	99	739	106	844	119
3. Waterloo Wellington	437	102	521	118	592	131
4. Hamilton Niagara Haldimand Brant	1,514	151	1,576	155	1,878	180
5. Central West	574	135	660	147	799	172
6. Mississauga Oakville	849	146	920	150	1,115	175
7. Toronto Central	964	127	1,060	138	1,097	142
8. Central	1,167	138	1,262	143	1,467	161
9. Central East	1,497	135	1,687	147	2,005	170
10. South East	884	266	908	266	960	275
11. Champlain	1,578	187	1,677	193	1,855	209
12. North Simcoe Muskoka	393	129	499	157	572	174
13. North East	847	192	879	198	1,080	240
14. North West	201	115	227	129	318	179
All Ontario	**12,312**	**147**	**13,263**	**154**	**15,406**	**174**

Extremal Quotients: 2.91 for 2001/02; 3.01 for 2002/03; 2.37 for 2003/04
*Missing values: 2001/02 (323); 2002/03 (249); 2003/04 (289)

Summary statistics (2003/04)	Value	P-value
Extremal Quotient	2.4	
Ratio of Third Quartile over First Quartile	1.3	
Coefficient of Variation (%)	21.3	
Systematic Component of Variation	61.6	
Adjusted Chi-square (likelihood ratio)	702.0	<0.0001

Data sources: Cardiac Care Network of Ontario; Ministry of Health and Long-Term Care–Registered Persons Database

3.2c Number and age- and sex-adjusted rate of bypass surgery per 100,000 population aged 20 years and older, by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

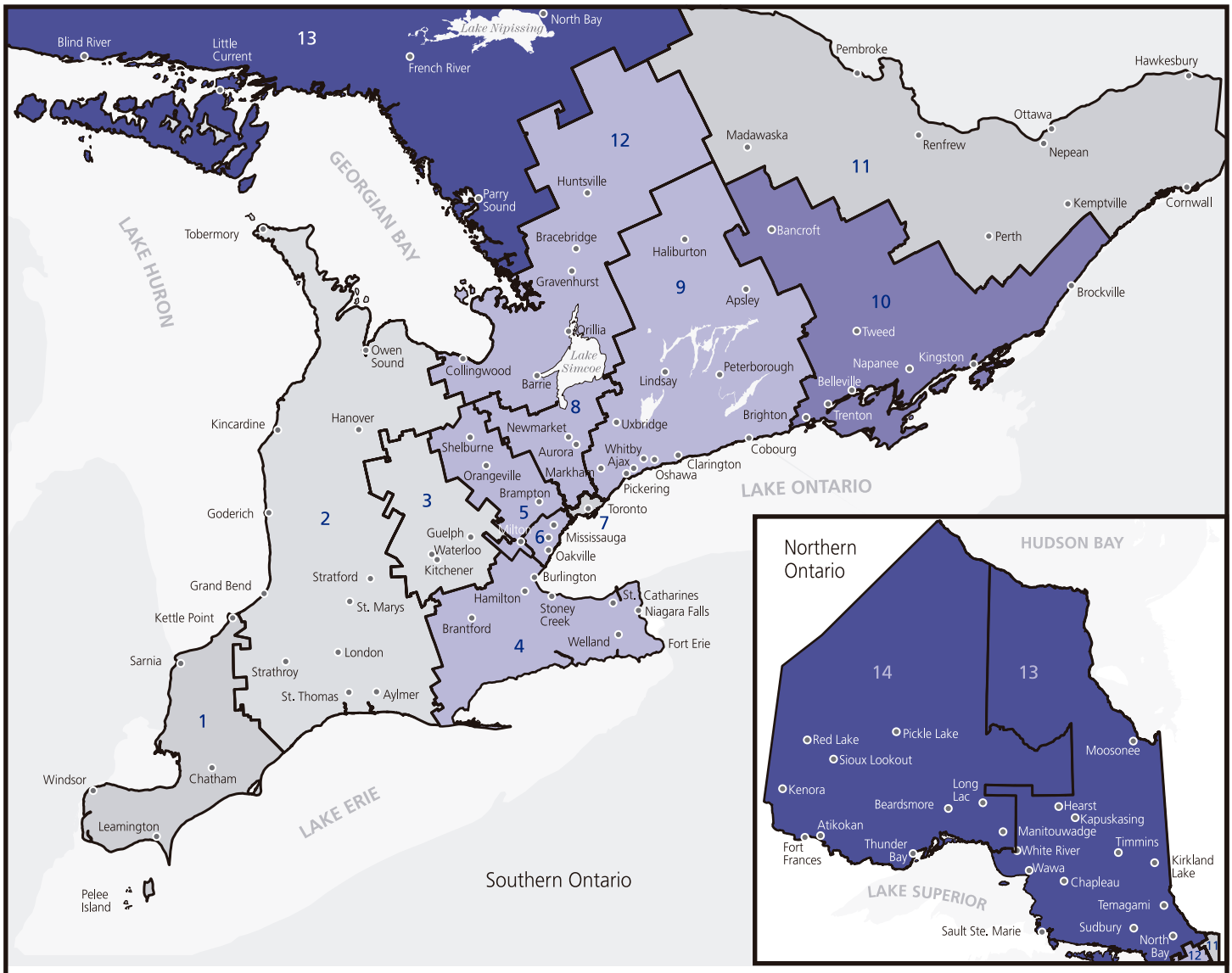
Local Health Integration Network	2001/02		2002/03		2003/04	
	Number of Bypass Surgeries	Rate per 100,000 Population	Number of Bypass Surgeries	Rate per 100,000 Population	Number of Bypass Surgeries	Rate per 100,000 Population
1. Erie St. Clair	400	91	438	98	439	96
2. South West	576	84	558	80	625	87
3. Waterloo Wellington	421	100	399	92	360	81
4. Hamilton Niagara Haldimand Brant	1,033	102	1,108	107	1,066	101
5. Central West	451	108	436	99	499	111
6. Mississauga Oakville	546	96	634	106	596	95
7. Toronto Central	532	71	496	66	487	64
8. Central	779	92	709	81	705	77
9. Central East	1,160	104	1,060	93	1,071	91
10. South East	406	120	364	105	338	96
11. Champlain	708	85	693	81	643	73
12. North Simcoe Muskoka	304	98	343	107	285	85
13. North East	544	122	468	104	426	94
14. North West	162	92	166	94	217	122
All Ontario	**8,162**	**97**	**7,992**	**93**	**7,846**	**89**

Extremal Quotients: 1.72 for 2001/02; 1.60 for 2002/03; 1.88 for 2003/04
*Missing values: 2001/02 (140); 2002/03 (120); 2003/04 (89)

Summary statistics (2003/04)	Value	P-value
Extremal Quotient	1.9	
Ratio of Third Quartile over First Quartile	1.2	
Coefficient of Variation (%)	15.1	
Systematic Component of Variation	23.9	
Adjusted Chi-square (likelihood ratio)	167.3	<0.0001

Data sources: Cardiac Care Network of Ontario; Ministry of Health and Long-Term Care–Registered Persons Database

3.3a Age- and sex-adjusted rate of coronary angiography per 100,000 population aged 20 years and older, by Local Health Integration Network, in Ontario, 2003/04



Local Health Integration Networks (LHINs)

1. Erie St. Clair
2. South West
3. Waterloo Wellington
4. Hamilton Niagara Haldimand Brant
5. Central West
6. Mississauga Oakville
7. Toronto Central
8. Central
9. Central East
10. South East
11. Champlain
12. North Simcoe Muskoka
13. North East
14. North West

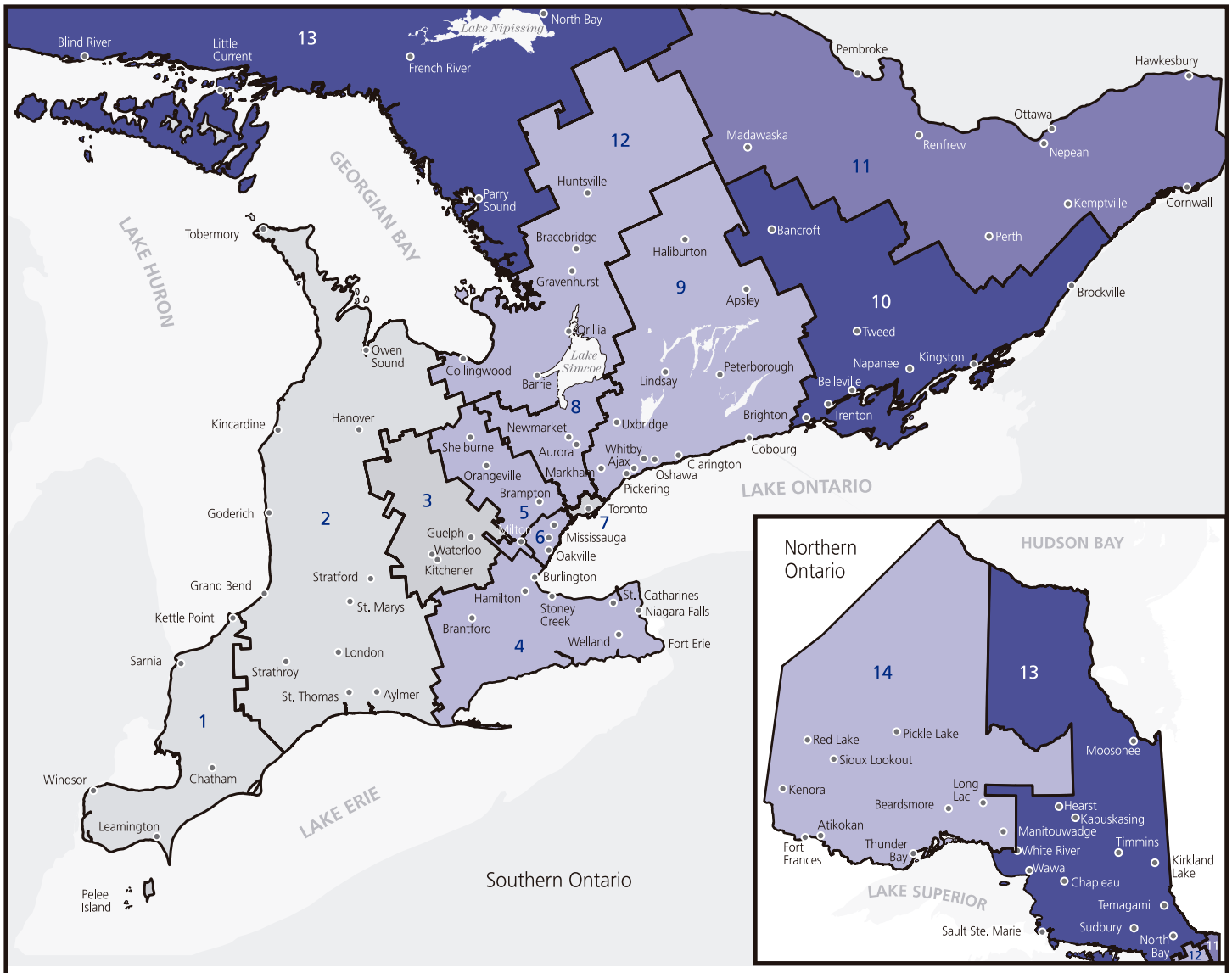
Age- and sex-adjusted rates for coronary angiography per 100,000 population, by Local Health Integration Network, in Ontario, 2003/04

Rate per 100,000 population	Comparative rate ratio	Number of LHINs in each category
≥ 709.6	≥ 1.3	(2)
600.5 to 709.6	1.1 to 1.3	(1)
491.3 to 600.5	0.9 to 1.1	(6)
409.4 to 491.3	0.75 to 0.9	(3)
< 409.4	< 0.75	(2)

Ontario rate = 545.9/100,000 persons

Data source: Cardiac Care Network of Ontario

3.3b Age- and sex-adjusted rate of angioplasty per 100,000 population aged 20 years and older, by Local Health Integration Network, in Ontario, 2003/04



Local Health Integration Networks (LHINs)

1. Erie St. Clair
2. South West
3. Waterloo Wellington
4. Hamilton Niagara Haldimand Brant
5. Central West
6. Mississauga Oakville
7. Toronto Central
8. Central
9. Central East
10. South East
11. Champlain
12. North Simcoe Muskoka
13. North East
14. North West

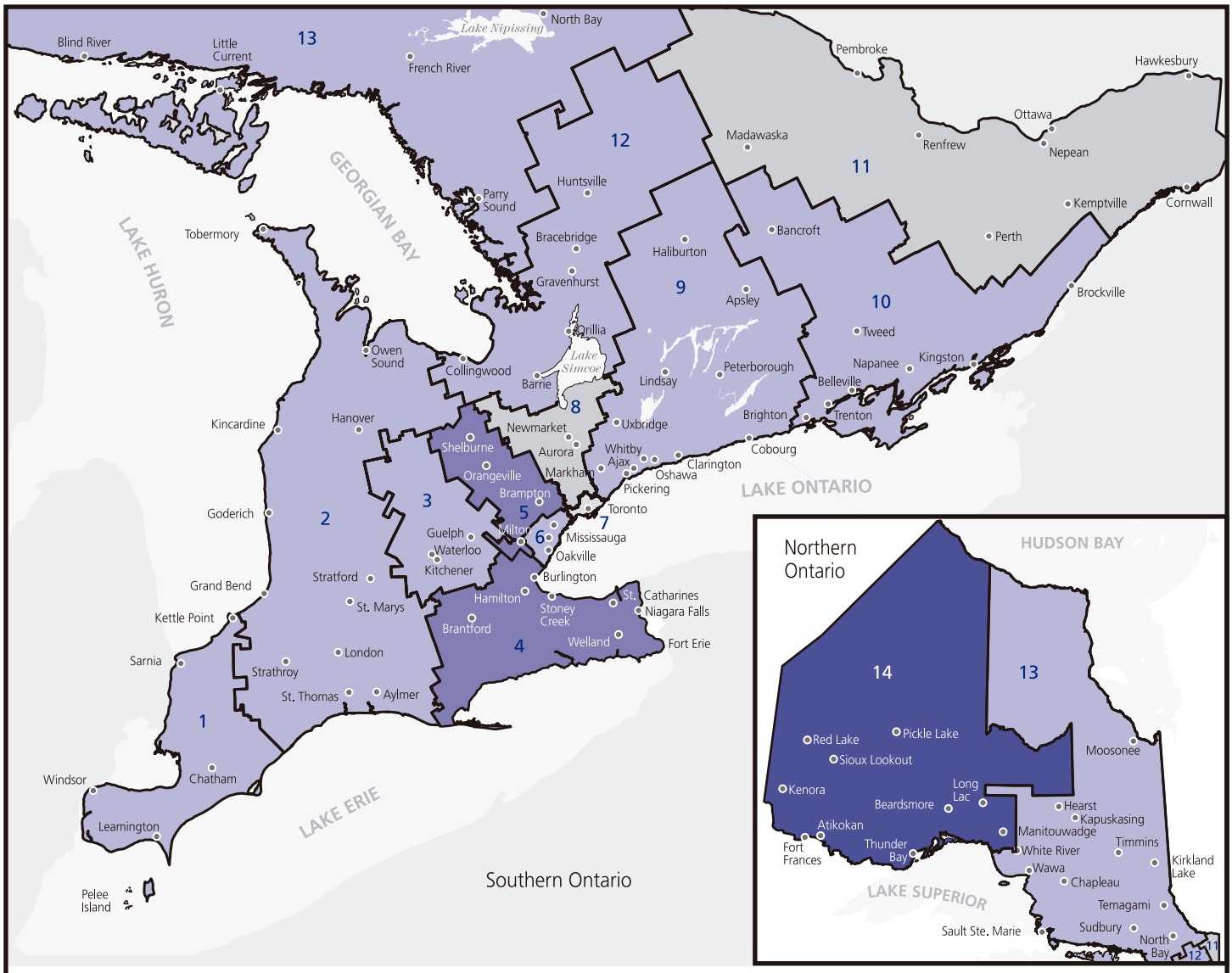
Age- and sex-adjusted rates for angioplasty per 100,000 population, by Local Health Integration Network, in Ontario, 2003/04

Rate per 100,000 population	Comparative rate ratio	Number of LHINs in each category
≥ 226.8	≥ 1.3	(2)
191.9 to 226.8	1.1 to 1.3	(1)
157.0 to 191.9	0.9 to 1.1	(7)
130.9 to 157.0	0.75 to 0.9	(2)
< 130.9	< 0.75	(2)

Ontario rate = 174.5/100,000 persons

Data source: Cardiac Care Network of Ontario

3.3c Age- and sex-adjusted rate of bypass surgery per 100,000 population aged 20 years and older, by Local Health Integration Network, in Ontario, 2003/04



Local Health Integration Networks (LHINs)

1. Erie St. Clair
2. South West
3. Waterloo Wellington
4. Hamilton Niagara Haldimand Brant
5. Central West
6. Mississauga Oakville
7. Toronto Central
8. Central
9. Central East
10. South East
11. Champlain
12. North Simcoe Muskoka
13. North East
14. North West

Age- and sex-adjusted rates for bypass surgery per 100,000 population, by Local Health Integration Network, in Ontario, 2003/04

Rate per 100,000 population	Comparative rate ratio	Number of LHINs in each category
≥115.8	≥ 1.3	(1)
98.0 to 115.8	1.1 to 1.3	(2)
80.2 to 98.0	0.9 to 1.1	(8)
66.8 to 80.2	0.75 to 0.9	(2)
< 66.8	< 0.75	(1)

Ontario rate = 89.1/100,000 persons

Data source: Cardiac Care Network of Ontario

3.4a Overall and age- and sex-specific number and rate of coronary angiography per 100,000 population aged 20 years and older, by Local Health Integration Network, and for the province of Ontario, 2003/04

Local Health Integration Network	Women & Men Overall		Women by Age Group Rate of Coronary Angiography				Women Overall		Men by Age Group Rate of Coronary Angiography				Men Overall	
	Number of Coronary Angiographies	Rate per 100,000 Population	Age 20–39	Age 40–64	Age 65–74	Age 75+	Number of Coronary Angiographies	Rate per 100,000 Population	Age 20–39	Age 40–64	Age 65–74	Age 75+	Number of Coronary Angiographies	Rate per 100,000 Population
1. Erie St. Clair	2,157	491	20	331	885	687	717	315	63	852	1,823	1,303	1,440	678
2. South West	2,815	427	26	246	691	570	882	257	54	667	1,787	1,262	1,933	611
3. Waterloo Wellington	1,813	389	15	238	737	549	536	224	39	719	1,848	1,298	1,277	565
4. Hamilton Niagara Haldimand Brant	6,090	633	24	431	1,126	859	2,106	420	76	937	2,420	1,971	3,984	866
5. Central West	2,724	524	21	369	1,265	961	855	322	69	983	2,475	1,984	1,869	736
6. Mississauga Oakville	3,476	517	23	337	1,109	855	1,102	316	53	923	2,361	1,823	2,374	736
7. Toronto Central	3,759	439	23	318	1,140	741	1,341	299	42	747	2,210	1,651	2,418	592
8. Central	4,645	499	20	264	1,020	835	1,416	290	57	873	2,173	1,901	3,228	730
9. Central East	6,859	594	25	381	1,166	809	2,213	366	61	1,000	2,585	1,710	4,643	844
10. South East	2,384	771	30	510	1,349	1,145	848	529	81	1,122	2,671	2,125	1,536	1,031
11. Champlain	4,071	465	14	278	835	703	1,251	275	47	790	2,016	1,656	2,820	670
12. North Simcoe Muskoka	1,723	579	18	401	930	684	555	363	73	953	1,833	1,702	1,168	807
13. North East	3,450	868	27	633	1,383	940	1,165	565	120	1,391	2,749	2,007	2,285	1,196
14. North West	1,426	867	66	689	1,967	991	535	637	87	1,301	3,190	1,830	891	1,107
All Ontario	**48,132**	**553**	**23**	**363**	**1,079**	**798**	**15,753**	**348**	**61**	**926**	**2,299**	**1,750**	**32,375**	**775**

Data source: Cardiac Care Network of Ontario

3.4b Overall and age- and sex-specific number and rate of angioplasty per 100,000 population aged 20 years and older, by Local Health Integration Network, and for the province of Ontario, 2003/04

Local Health Integration Network	Women & Men Overall		Women by Age Group Rate of Angioplasty				Women Overall		Men by Age Group Rate of Angioplasty				Men Overall	
	Number of Angioplasties	Rate per 100,000 Population	Age 20-39	Age 40-64	Age 65-74	Age 75+	Number of Angioplasties	Rate per 100,000 Population	Age 20-39	Age 40-64	Age 65-74	Age 75+	Number of Angioplasties	Rate per 100,000 Population
1. Erie St. Clair	535	122	-	66	206	155	151	66	13	240	484	283	384	181
2. South West	844	128	3	66	145	184	229	67	21	215	587	340	615	194
3. Waterloo Wellington	592	127	1	71	208	192	160	67	13	270	532	370	432	191
4. Hamilton Niagara Haldimand Brant	1,878	195	1	102	278	270	536	107	20	347	745	598	1,342	292
5. Central West	799	154	3	87	356	223	211	79	25	331	633	612	588	231
6. Mississauga Oakville	1,115	166	2	65	322	286	272	78	16	350	774	555	843	261
7. Toronto Central	1,097	128	1	72	270	198	313	70	9	264	613	554	784	192
8. Central	1,467	158	-	58	264	236	343	70	16	327	683	637	1,124	254
9. Central East	2,005	174	4	85	252	253	524	87	19	347	746	458	1,481	269
10. South East	960	310	8	168	546	450	311	194	22	496	1,115	838	649	436
11. Champlain	1,855	212	4	94	279	288	442	97	21	426	933	723	1,413	336
12. North Simcoe Muskoka	572	192	4	106	306	245	167	109	20	352	563	590	405	280
13. North East	1,080	272	2	160	402	302	317	154	27	496	850	622	763	399
14. North West	318	193	7	97	391	137	84	100	4	396	696	391	234	291
All Ontario	**15,406**	**177**	**2**	**88**	**289**	**250**	**4,131**	**91**	**18**	**347**	**731**	**557**	**11,275**	**270**

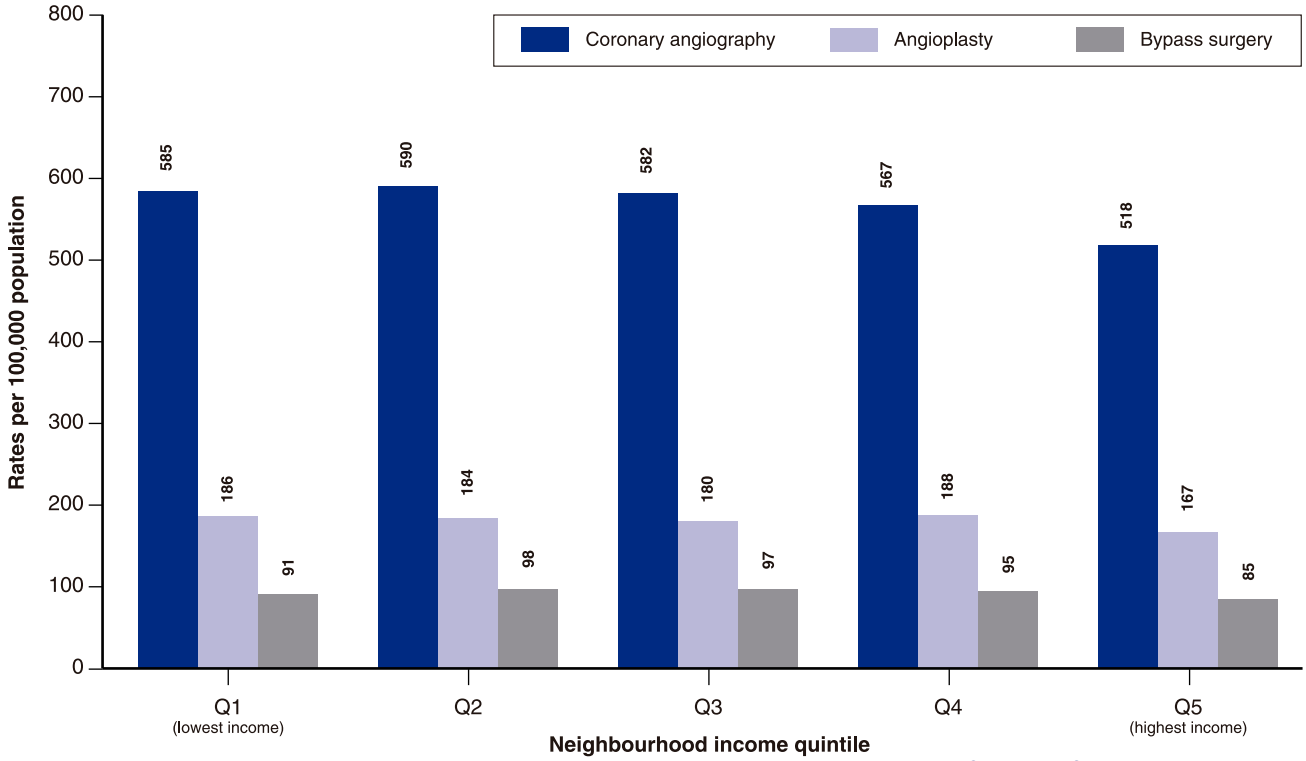
Data source: Cardiac Care Network of Ontario

3.4c Overall and age- and sex-specific number and rate of bypass surgery per 100,000 population aged 20 years and older, by Local Health Integration Network, and for the province of Ontario, 2003/04

Local Health Integration Network	Women & Men Overall		Women by Age Group Rate of Bypass Surgery				Women Overall		Men by Age Group Rate of Bypass Surgery				Men Overall	
	Number of Bypass Surgeries	Rate per 100,000 Population	Age 20-39	Age 40-64	Age 65-74	Age 75+	Number of Bypass Surgeries	Rate per 100,000 Population	Age 20-39	Age 40-64	Age 65-74	Age 75+	Number of Bypass Surgeries	Rate per 100,000 Population
1. Erie St. Clair	439	100	-	36	125	106	91	40	5	185	552	354	348	164
2. South West	625	95	-	37	120	100	139	40	4	162	553	257	486	154
3. Waterloo Wellington	360	77	4	24	118	82	72	30	1	144	537	317	288	127
4. Hamilton Niagara Haldimand Brant	1,066	111	-	32	164	111	225	45	3	181	644	397	841	183
5. Central West	499	96	-	35	247	197	121	46	4	189	601	434	378	149
6. Mississauga Oakville	596	89	1	27	130	83	103	29	3	172	613	433	493	153
7. Toronto Central	487	57	-	18	97	62	95	21	2	109	438	289	392	96
8. Central	705	76	1	24	133	62	140	29	3	143	463	331	565	128
9. Central East	1,071	93	0	30	132	80	203	34	1	172	578	352	868	158
10. South East	338	109	-	44	182	119	88	55	2	178	458	389	250	168
11. Champlain	643	73	1	23	125	80	135	30	3	123	448	359	508	121
12. North Simcoe Muskoka	285	96	-	26	173	58	57	37	4	172	472	295	228	157
13. North East	426	107	2	41	166	109	104	50	10	184	476	247	322	168
14. North West	217	132	3	31	190	137	41	49	4	224	797	427	176	219
All Ontario	**7,846**	**90**	**1**	**30**	**145**	**93**	**1,637**	**36**	**3**	**162**	**543**	**348**	**6,209**	**149**

Data source: Cardiac Care Network of Ontario

3.5 Age- and sex-adjusted rate of coronary angiography, angioplasty, and bypass surgery per 100,000 population aged 20 years and older, by neighbourhood income quintile, in Ontario, 2003/04



Data sources: Cardiac Care Network of Ontario; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–Postal Code Conversion File

3.6 Number of coronary angiographies, angioplasties, and bypass surgeries, by hospital corporation, in Ontario, 2003/04

Hospital Corporation	City	Number of Coronary Angiographies	Number of Angioplasties	Number of Bypass Surgeries
Academic				
Hamilton Health Sciences Corporation–General Campus	Hamilton	4,724	1,764	1,002
Kingston General Hospital	Kingston	2,424	1,186	453
London Health Sciences Centre–University Campus; Victoria Campus	London	3,435	1,393	1,150
St. Michael's Hospital	Toronto	2,493	1,324	804
Sunnybrook and Women's College Health Sciences Centre	Toronto	2,842	1,645	829
University Health Network–Toronto General and Toronto Western Hospitals	Toronto	6,156	1,891	1,142
University of Ottawa Heart Institute	Ottawa	4,210	2,027	736
Community				
Hotel-Dieu Grace Hospital	Windsor	1,288	N/A	N/A
Peterborough Regional Health Centre	Peterborough	1,719	N/A	N/A
Rouge Valley Health System–Centenary	Toronto	2,531	407	N/A
St. Mary's General Hospital	Kitchener	2,349	590	289
Sault Area Hospitals	Sault Ste. Marie	829	NA	NA
Southlake Regional Health Centre	Newmarket	3,307	434	104
Sudbury Memorial Hospital	Sudbury	2,529	1,076	435
Thunder Bay Regional Health Sciences Centre	Thunder Bay	1,322	NA	NA
Toronto East General Hospital	Toronto	1,767	N/A	N/A
Trillium Health Centre–Mississauga site	Mississauga	4,207	1,669	902

N/A = not applicable as service is not provided

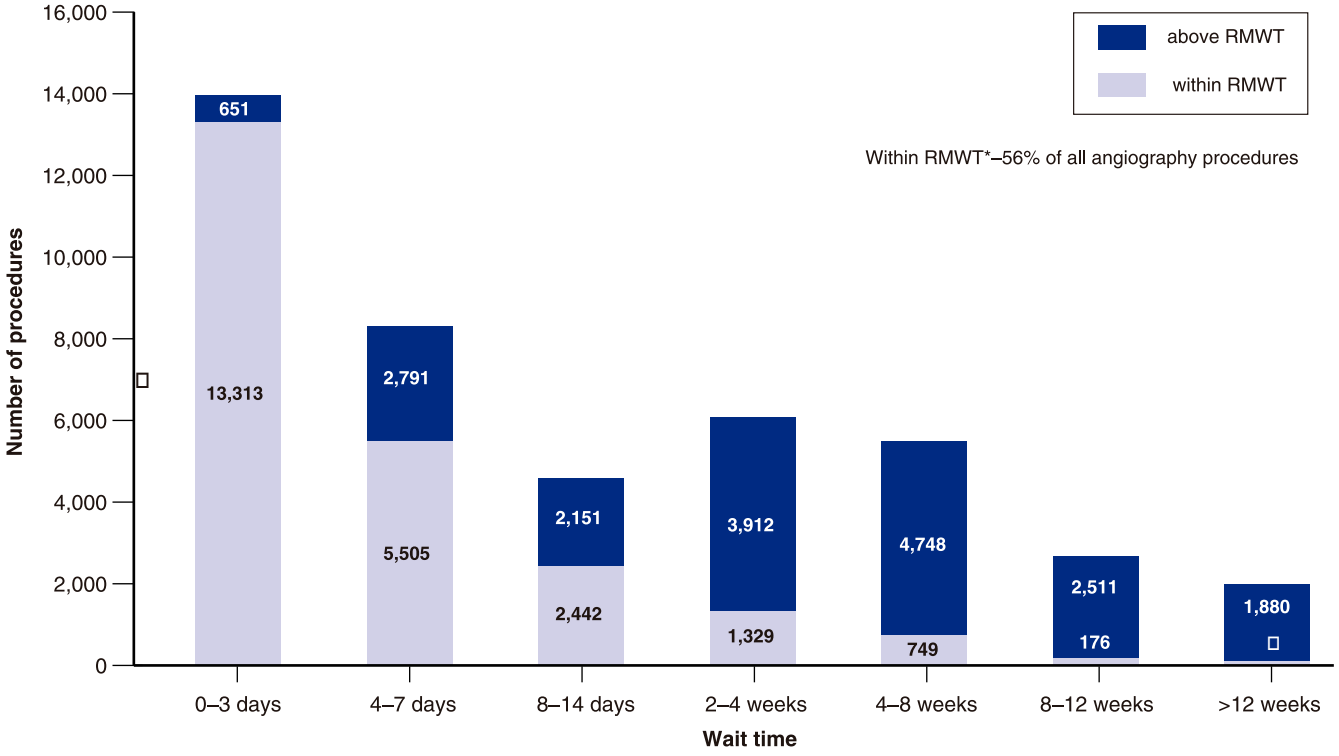
Data source: Cardiac Care Network of Ontario

Small hospitals: Facilities that generally provide less than 3,500 weighted cases, have a referral population of less than 20,000 people, and are the only hospital in their community, as defined by the Joint Policy and Planning Committee (JPPC)

Academic hospitals: University-affiliated facilities; members of the Council of Academic Hospitals of Ontario (CAHO)

Community hospitals: All other hospitals

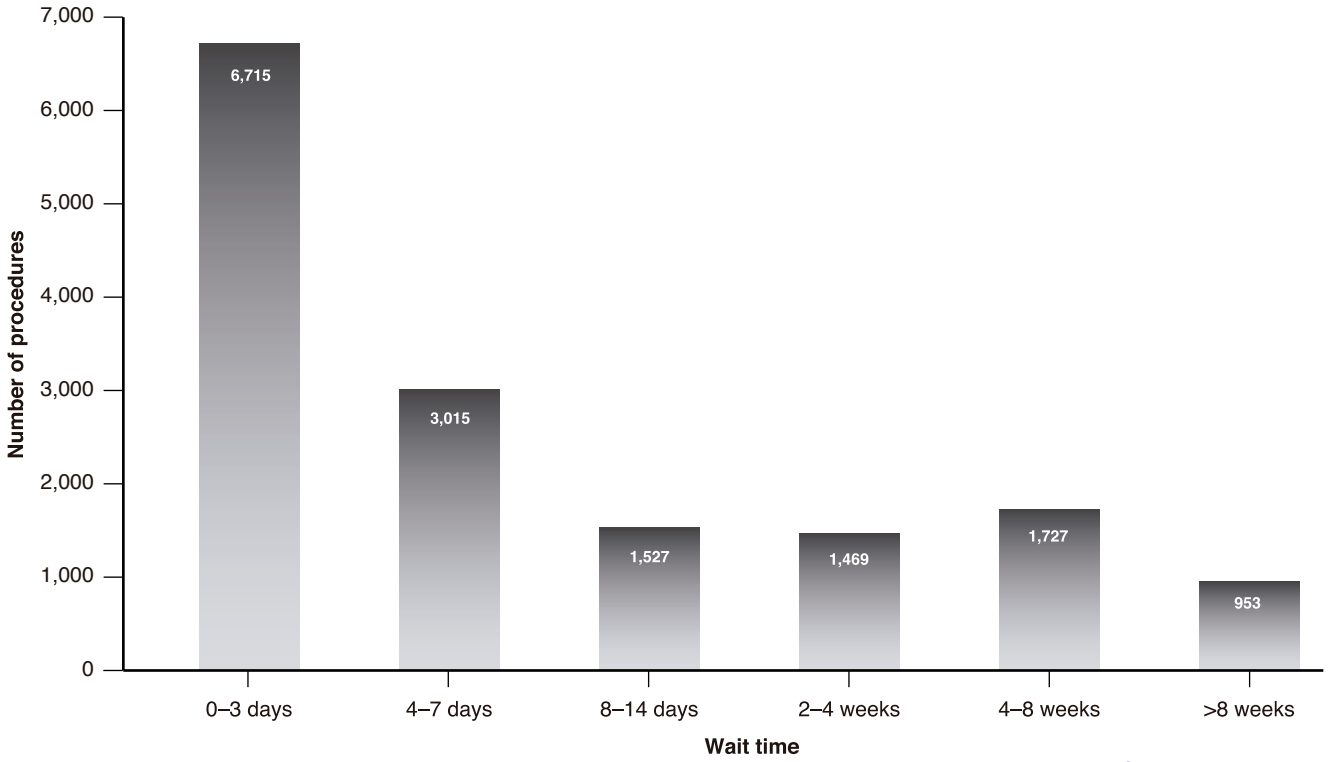
3.7a Number of coronary angiographies performed within recommended maximum wait times, in Ontario, 2003/04



*RMWT = Recommended Maximum Wait Time

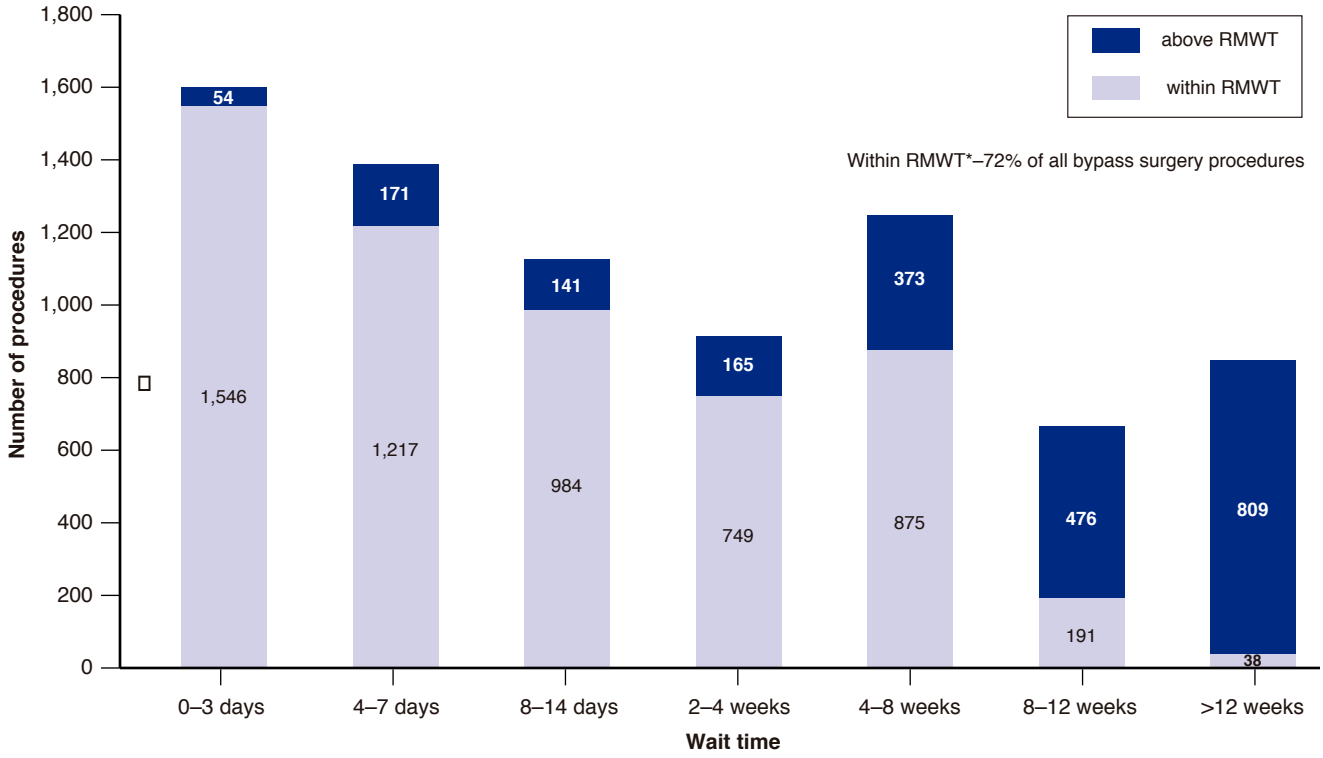
Data source: Cardiac Care Network of Ontario

3.7b Number of angioplasties performed within specified wait times, in Ontario, 2003/04



Data source: Cardiac Care Network of Ontario

3.7c Number of bypass surgeries performed within recommended maximum wait times, in Ontario, 2003/04



*RMWT = Recommended Maximum Wait Time

Data source: Cardiac Care Network of Ontario

3.8a Median wait times and proportion of coronary angiographies performed within recommended maximum wait times, by urgency category, Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

Local Health Integration Network	Urgent (RMWT* 0–7days)						Semi-urgent (RMWT 8–28 days)						Elective (RMWT 29 days or greater)					
	2001/02		2002/03		2003/04		2001/02		2002/03		2003/04		2001/02		2002/03		2003/04	
	Median Wait Time (Days)	Percent of Coronary Angiographies Performed within RMWT	Median Wait Time (Days)	Percent of Coronary Angiographies Performed within RMWT	Median Wait Time (Days)	Percent of Coronary Angiographies Performed within RMWT	Median Wait Time (Days)	Percent of Coronary Angiographies Performed within RMWT	Median Wait Time (Days)	Percent of Coronary Angiographies Performed within RMWT	Median Wait Time (Days)	Percent of Coronary Angiographies Performed within RMWT	Median Wait Time (Days)	Percent of Coronary Angiographies Performed within RMWT	Median Wait Time (Days)	Percent of Coronary Angiographies Performed within RMWT	Median Wait Time (Days)	Percent of Coronary Angiographies Performed within RMWT
1. Erie St. Clair	3	56	3	58	3	58	7	56	14	43	11	47	16	64	20	67	21	67
2. South West	3	45	3	49	2	61	11	47	14	45	14	45	25	58	26	62	23	67
3. Waterloo Wellington	2	59	2	63	1	76	11	46	14	45	12	46	14	81	27	66	28	64
4. Hamilton Niagara Haldimand Brant	4	35	4	37	3	46	36	20	33	26	29	31	51	37	42	41	48	38
5. Central West	3	60	2	67	2	68	16	41	17	38	16	40	29	62	24	72	26	62
6. Mississauga Oakville	3	57	3	60	2	65	20	40	19	40	17	41	34	58	34	61	41	50
7. Toronto Central	1	74	1	77	1	83	14	44	8	57	5	65	21	71	13	82	11	82
8. Central	2	72	1	73	1	76	10	49	10	51	9	52	17	78	15	81	15	78
9. Central East	2	60	2	63	2	70	14	42	11	47	9	54	20	77	18	74	15	85
10. South East	3	56	3	62	1	76	17	40	7	57	7	54	29	52	27	64	43	41
11. Champlain	3	46	2	59	3	59	41	27	30	32	29	35	76	17	57	30	55	31
12. North Simcoe Muskoka	2	63	3	64	3	58	8	53	9	52	10	50	12	84	14	82	17	74
13. North East	2	63	2	66	2	70	25	32	23	34	22	33	29	49	29	54	33	50
14. North West	3	54	4	58	3	67	20	36	18	41	12	46	39	57	53	40	50	42
All Ontario	**3**	**56**	**2**	**60**	**2**	**65**	**16**	**39**	**14**	**43**	**13**	**46**	**26**	**62**	**24**	**65**	**24**	**63**

Urgency level is calculated from an urgency rating score.
Each urgency rating score corresponds to a RMWT as illustrated in the following:

Calculated Urgency Rating Score	RMWT
1	< 1 day
2	1-3 days
3	4-7 days
4	8-14 days
5	15-42 days
6	43-90 days
7	91+ days

*RMWT = Recommended Maximum Wait Time.

RMWTs vary according to patient urgency level.

Patient urgency rating score and category (urgent, semi-urgent, elective) are based on clinical characteristics at the time of referral.

Data source: Cardiac Care Network of Ontario

3.8b Median wait times for angioplasty by patient location at time of referral, Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

Local Health Integration Network	Median Wait Time for Angioplasty (Days)								
	Referred from Home			Referred from In-Hospital			Overall		
	2001/02	2002/03	2003/04	2001/02	2002/03	2003/04	2001/02	2002/03	2003/04
1. Erie St. Clair	29	23	20	2	4	2	7	8	6
2. South West	28	28	19	1	2	1	3	4	2
3. Waterloo Wellington	26	31	19	3	4	1	6	7	3
4. Hamilton Niagara Haldimand Brant	27	35	31	2	2	2	6	6	4
5. Central West	29	33	21	3	3	2	7	6	5
6. Mississauga Oakville	29	29	19	2	2	1	4	4	2
7. Toronto Central	28	28	20	1	1	1	3	3	2
8. Central	29	31	21	2	2	2	6	6	4
9. Central East	26	28	19	2	2	2	7	6	4
10. South East	25	27	39	1	1	1	3	3	2
11. Champlain	50	34	35	3	2	2	5	4	4
12. North Simcoe Muskoka	29	32	23	3	2	2	7	6	5
13. North East	31	32	35	2	1	1	6	3	3
14. North West	36	38	44	5	4	5	12	10	9
All Ontario	**29**	**30**	**24**	**2**	**2**	**2**	**5**	**5**	**3**

In contrast to coronary angiography and bypass surgery, urgency scores and recommended maximum wait times have not been developed for angioplasty.

Data source: Cardiac Care Network of Ontario

3.8c Median wait times and proportion of bypass surgery performed within recommended maximum wait times, by urgency category, Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

Local Health Integration Network	Urgent (RMWT* within 14 days)						Semi-urgent (RMWT 14–42 days)						Elective (RMWT 43–180 days)					
	2001/02		2002/03		2003/04		2001/02		2002/03		2003/04		2001/02		2002/03		2003/04	
	Median Wait Time (Days)	Percent of Bypass Surgeries Performed within RMWT	Median Wait Time (Days)	Percent of Bypass Surgeries Performed within RMWT	Median Wait Time (Days)	Percent of Bypass Surgeries Performed within RMWT	Median Wait Time (Days)	Percent of Bypass Surgeries Performed within RMWT	Median Wait Time (Days)	Percent of Bypass Surgeries Performed within RMWT	Median Wait Time (Days)	Percent of Bypass Surgeries Performed within RMWT	Median Wait Time (Days)	Percent of Bypass Surgeries Performed within RMWT	Median Wait Time (Days)	Percent of Bypass Surgeries Performed within RMWT	Median Wait Time (Days)	Percent of Bypass Surgeries Performed within RMWT
1. Erie St. Clair	5	53	4	74	4	59	8	75	11	66	10	75	27	81	40	65	28	71
2. South West	4	62	3	69	3	62	8	79	10	71	7	78	24	81	39	69	30	71
3. Waterloo Wellington	4	64	5	63	3	73	8	73	13	69	7	79	41	68	48	63	35	67
4. Hamilton Niagara Haldimand Brant	2	63	4	57	3	68	10	73	8	77	10	70	43	70	54	58	55	56
5. Central West	3	72	3	66	3	74	9	72	10	77	8	78	36	82	40	77	41	68
6. Mississauga Oakville	3	62	2	64	2	78	9	70	13	68	6	82	45	71	44	65	40	68
7. Toronto Central	3	78	2	78	2	72	7	70	11	71	6	71	35	76	39	74	48	66
8. Central	3	77	3	76	3	74	8	72	12	69	7	75	32	76	43	74	43	69
9. Central East	3	74	4	64	3	68	7	79	13	70	9	71	41	75	43	70	42	70
10. South East	5	58	7	52	5	65	11	74	8	84	7	82	42	70	19	95	13	90
11. Champlain	3	69	2	74	3	74	7	85	10	76	12	80	29	89	42	88	41	89
12. North Simcoe Muskoka	4	60	5	63	4	65	7	69	13	69	13	72	41	81	48	72	45	69
13. North East	3	69	2	72	2	73	7	79	6	79	8	71	13	96	14	93	19	84
14. North West	5	66	6	67	6	65	12	74	13	69	14	69	38	76	29	68	50	60
All Ontario	**3**	**67**	**3**	**67**	**3**	**69**	**8**	**75**	**10**	**73**	**8**	**75**	**34**	**78**	**39**	**74**	**40**	**71**

Urgency level is calculated from an urgency rating score.
Each urgency rating score corresponds to a RMWT as illustrated in the following:

Calculated Urgency Rating Score	RMWT
1	Immediate
2	< 1 day
3	1-3 days
4	3-14 days
5	2-6 weeks
6	6 weeks to 3 months
7	3-6 months

*RMWT = Recommended Maximum Wait Times. RMWTs vary according to patient urgency level.

Patient urgency rating score and category (urgent, semi-urgent, elective) are based on clinical characteristics at the time of referral.

The RMWT by which a patient should get the procedure is shown in the column headings for each urgency category.

Data sources: Cardiac Care Network of Ontario; Statistics Canada–Postal Code Conversion File

Conclusions and Next Steps

Significant regional variations in cardiac procedure rates and wait times were identified in Ontario. Most, but not all, patients received procedures within their RMWTs as specified by urgency levels. Better coordination and management of waiting lists across LHINs could increase the proportions of patients receiving procedures within their RMWT. These regional inequities should be addressed as part of the Ontario Wait Time Strategy.

Overall median wait times in Ontario are short (6 days for coronary angiography, 3 days for angioplasty, 12 days for bypass surgery in 2003/04), and continue to fall for coronary angiography and angioplasty. However, a significant number of patients still experienced significant delays and waited longer than their benchmark RMWT (e.g., only 56% of patients received coronary angiography within RMWTs). Studies conducted in Ontario and other jurisdictions have consistently demonstrated that wait time delays are more common among patients originally admitted to hospitals that do not perform cardiac procedures as compared to patients admitted directly to hospitals that do.[30,44] Greater attention should be given to this issue in Ontario, and regional cardiac referral centres that perform cardiac procedures should be accountable for ensuring that patients from community hospitals have the same wait times for cardiac procedures as those patients admitted directly to regional cardiac referral centres.

An urgency rating score in Ontario needs to be developed for angioplasty services and current coronary angiography and bypass surgery scores need to be updated. Management of cardiac patients has evolved considerably since these scores were developed more than a decade ago, and the RMWTs in these models may no longer reflect current scientific data.

The appropriateness of cardiac procedures should be evaluated prospectively (i.e., concurrent with patient presentation for heart disease or as patients are referred for cardiac procedures). This could be done by incorporating more data on coronary anatomy in the CCN database, as well as collecting data on patient symptoms before and after cardiac procedures.

Other aspects of access to cardiac care in Ontario also require study, including cardiac rehabilitation, devices such as implantable defibrillators, and health human resources. Heart disease is a highly preventable condition and greater attention to primary prevention initiatives (e.g., smoking cessation and reducing childhood obesity) could decrease demand for cardiac procedures in the future.

Finally, policy makers and researchers should continue to find better ways to match resources with population need for cardiac services, despite the inherent complexities. Such planning should consider financial and geographical barriers, which impede a patient's ability to travel long distances, the consequences of which may necessitate hospital stays of days or even weeks before transfer to regional cardiac centres.

Despite the need for continued improvement, the CCN waiting list system for coronary angiography, angioplasty, and bypass surgery serves as a model for the benefits of a waiting list registry to provide Ontarians with timely and equitable access to advanced cardiac services.

Appendix 3.A

How the Research was Done

Data sources and analyses

Rates

People aged 20 years and older that had coronary angiography, angioplasty, and isolated bypass surgery between April 1, 1993 and March 31, 2004, were identified using data collected from the CCN registry. Network staff validated these data with the CCN coordinating centre and host hospital records at each site. The same definitions used by the CCN were employed: patients who underwent valve surgery at the same time as bypass surgery were excluded, given the absence of urgency rating scores for concomitant valve surgery. Non-Ontario residents were excluded from the analyses (with the exception of Exhibit 3.1, in which all-comers are shown). Information for Ontario residents only was not available for coronary angiography and angioplasty before 2001. Hospital corporation data were verified with information from the CCN and the MOHLTC.

Waits

Wait times were calculated by the CCN for individuals; these were aggregated for population-based reporting purposes. RMWTs were drawn from CCN calculations based on standardized definitions of clinical urgency. The RMWT reflected the patient's urgency upon removal from the waiting list. If a patient experiences more severe symptoms while waiting for procedures, the CCN database updates patient status, creating a new RMWT (i.e., often shorter and reflective of more urgent status). However, unlike the CCN reports which "restart the clock" upon symptom status changes, this analysis took into account the total duration of time patients had already been waiting in the queue. Consequently, the percentage of patients receiving service within RMWTs displayed in these analyses may be lower than those previously reported on the CCN website.

Limitations

This analysis has several limitations. First, historical referral patterns for cardiac procedures in Ontario were not based on the new LHIN boundaries and thus, some of the regional variation in access may be expected. However, previous studies have documented significant regional rate and wait time variations for cardiac procedures irrespective of geopolitical boundaries. Therefore, it is unlikely that all regional variations would have resolved had LHIN boundaries incorporated existing referral patterns. Second, the CCN urgency rating scores and RMWTs, developed more than a decade ago, were designed primarily for patients with stable angina, whereas, in the past few years, the focus has shifted to patients with unstable angina and heart attacks. Thus, the proportion of cases referred for coronary angiography within an acceptable wait time may be different now than when the CCN urgency scores were created. Third, access to cardiac procedures by hospital was not analyzed, but there are likely large differences among Ontario hospitals that may reflect capacity to perform these procedures. Finally, for methodological consistency with other chapters, non-Ontarians were excluded from the analyses, yet individuals from other provinces (most notably Quebec) do have cardiac procedures in Ontario and have some influence on access and wait times.

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INSIDE

4

Chapter

Cataract Surgery

Chaim M. Bell, MD, PhD, FRCPC, Wendy V. Hatch, OD, MSc, Geta Cernat, MD, Pamela M. Slaughter, MA, MSc, Shaun Singer, MD, FRCSC and, Jack V. Tu, MD, PhD, FRCPC

Executive Summary

Issue

Cataract surgery markedly improves the vision of patients with cataracts. There is concern that Ontario residents may be experiencing prolonged waits for cataract surgery.

Study

Data from the Ministry of Health and Long-Term Care Ontario Health Insurance Plan (MOHLTC-OHIP) physician claims database and the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD) were used to determine the rates and geographical distribution of cataract surgery throughout Ontario. As well, estimated wait times for cataract surgery were calculated based on visits with ophthalmologists before surgery.

Key findings

The number of annual cataract surgery procedures in Ontario more than doubled from 49,489 in 1993/94 to 102,182 in 2003/04. Overall adjusted rates for the 3-year period (2001/02–2003/04) in Ontario increased from 1,103 procedures per 100,000 population aged 20 years and older in 2001/02 to 1,166 surgeries per 100,000 population in 2003/04. The median estimated wait time for cataract surgery in Ontario in 2003/04 was 15 weeks. Approximately half (48%) of persons having cataract surgery in Ontario waited longer than a suggested recommended maximum wait time (RMWT) benchmark of 16 weeks. Wait times by Local Health Integration Network (LHIN) varied across the province; the shortest median wait was 8 weeks while the longest median wait was 2.8 times longer at 22 weeks.

Implications

Despite large increases in cataract surgery procedures over the past decade, many Ontario residents waited longer than optimal for their procedure. There is a need to improve the timeliness with which patients receive cataract surgery in Ontario. As more surgeries are performed, it will also be important to document measures of visual acuity and visual function before and after surgery in a provincial cataract surgery registry.

Introduction

Cataracts are a common cause of vision loss and are usually completely treatable with surgical excision and lens implantation. Risk factors for developing cataracts include increasing age, female sex, low income, sunlight exposure, myopia, brown eyes, alcohol consumption and smoking.[1,2] The rate of cataract progression and vision deterioration varies depending on the type of cataract.

Cataract surgery rates have been increasing over the past two decades[3-7] with advances in surgical technique and changing indications for surgery.[8] The introduction in the 1980s of intraocular lenses (IOLs), surgically implanted plastic lenses that replace the eye's natural lens, eliminated the need for high magnification glasses after surgery. The technique of phacoemulsification (high frequency vibrations that break the cataract into minute fragments) in the 1990s and newer foldable IOLs led to smaller incisions, "one-stitch" or "no-stitch" surgery, and surgery earlier in the course of the condition.[9] In the past, cataract surgery involved general anaesthetic and a week-long hospital stay. Today, cataract surgery is usually performed as an outpatient procedure using local anaesthesia and sedation, with post-operative care provided in an ambulatory care setting. These factors, coupled with an aging population, have led to a greater demand for cataract surgery, which, coupled with hospital budget restraints, have led to longer wait times.

In this chapter, rates, wait times, and early post-operative complications for cataract surgery across Ontario were studied using linked administrative databases. Data from the MOHLTC-OHIP database and the CIHI-DAD were used for this analysis. Lacking definitive data for how long individuals wait for cataract surgery, wait times for this procedure were estimated using a detailed algorithm based on previously validated methodology[10,11] for measuring cataract surgery wait times using administrative data (See Appendix 4.A).

Findings and Discussion

Rates of service provision

Exhibit 4.1: Annual number of procedures by year

The annual number of cataract surgery procedures in Ontario more than doubled from 49,489 in 1993/94 to 102,182 in 2003/04. Large increases in surgery volumes that occurred in the mid-1990s, were subsequently followed by small yearly increases.

Exhibit 4.2: Annual ophthalmologist case-load for cataract surgery

In 2003/04, of the 439 ophthalmologists in Ontario, 274 performed cataract surgery. Ophthalmologists' surgical activity broke down as follows:

- 240 performed more than 50 surgeries in a year;

Of the 240 that performed more than 50 surgeries in a year:

- 61 performed 51–250 (1 to 5 cases per week);
- 111 performed 251–500 (5 to 10 cases per week);
- 61 performed 501–1,000 (10 to 20 cases per week); and
- 7 performed more than 1,000 surgeries (over 20 cases per week).

Just under half of the ophthalmologists were "high volume" cataract surgeons, described as performing more than 400[12] to 500[10] procedures per year.

Exhibits 4.3 and 4.4: Rates by LHIN

Over the 2001/02–2003/04 period, overall rates of cataract surgery increased from 1,103 procedures to 1,166 procedures per 100,000 population aged 20 and older. In comparison, the rate of cataract surgery in Sweden increased from 447 per 100,000 population in 1992, to 726 per 100,000 population in 2000.[4] Rates of cataract surgery were also analyzed by LHIN. For 2003/04, Champlain's cataract surgery rate was 1.7 times greater than that of Toronto Central, with the adjusted rates varying from 862 surgeries per 100,000 population to 1,442 procedures per 100,000 population.

Exhibit 4.5: Age- and sex-specific rates by LHIN

The analyses demonstrate that older people and women had higher crude rates of cataract surgery (Exhibit 4.5). In 2003/04, women had a average crude rate of 1,351 procedures per 100,000 population compared to a rate of 982 per 100,000 population for men. This pattern is similar to those found in other countries, including Sweden,[13] the UK,[14] and the United States.[7] However, in the oldest age group (age 85+) in these analyses, men had a higher rate of cataract surgery than women.

Exhibit 4.6: Rates by neighbourhood income quintile

Age- and sex-adjusted cataract surgery rates increased with neighbourhood income for the first 4 quintiles. The poorest neighbourhoods (Q1) in Ontario had a cataract surgery rate of 1,167 surgeries per 100,000 population, compared to the fourth quintile, which had a rate of 1,279 surgeries per 100,000 population. This amounts to almost a 10% relative increase in cataract surgery rate. The third and fifth quintiles showed similar cataract surgery rates, but were below that of the fourth quintile, though reasons for this are not clear. A study of a single health authority in the UK found a significant variation in cataract presentation between 3 units, which correlated well with social deprivation indices and poor use of optometric services.[15] In contrast, an Australian study of more than 5,000 patients looked at demographic factors including rural residence, employment status, occupation and ethnicity, and found that none of these factors were related to the presence of unoperated cataract.[16]

Procedures by hospital

Hospital-specific cataract surgery procedure volumes are not presented in this chapter. While there was very good agreement on the overall volumes of surgeries performed provincially and at the LHIN level, there were significant discrepancies as to which institution some surgeries could be attributed to in the MOHLTC-OHIP vs. the CIHI National Ambulatory Care Registry System (NACRS) databases. These findings highlight the need for improved data sources.

Wait times

Exhibit 4.7: Proportion of procedures performed within wait time ranges

Wait times are usually defined as the difference between the date of decision for surgery and the date of surgery. Administrative data provided the date of surgery; however, the date of decision for surgery was estimated by incorporating 2 techniques modified from previous research performed in Manitoba and Ontario.[10,11] The combined method was validated with primary data collected on cataract surgery wait times from St. Joseph's Health Centre in London, Ontario (see Appendix 4.B).

Based on this methodology, the median wait for cataract surgery in 2003/04 was 15 weeks (Exhibit 4.7). In comparison, a 2003 survey of ophthalmologists in a Toronto hospital identified a median wait of 36 weeks for cataract surgery[17] and a 2004 survey of ophthalmologists in Ontario identified a median wait of 23 weeks.[18]

Exhibit 4.8: Wait times in other provinces

This exhibit shows recent provincial waits from other parts of Canada. For example, in July 2004, the median wait time for cataract surgery in British Columbia was 10 weeks (BC Ministry of Health Services website). In comparison, wait times in other countries were 32 weeks in the UK (1997),[14] 11 weeks for a hospital in Australia (1999),[19] 39 weeks in a Swedish city (1997),[20] and 78 weeks in a New Zealand hospital (1997).[21]

Exhibit 4.9: Median wait times and proportion of procedures performed within RMWT of 16 weeks by LHIN

Formal RMWTs for cataract surgery have not been developed in Ontario. For this report, 16 weeks is the suggested wait time benchmark based on a number of sources. A 2004 Fraser Institute survey of Canadian ophthalmologists estimated a reasonable median wait for cataract surgery in Ontario of 8 weeks, with a range of 8–12 weeks across Canada.[18] In a study that involved Manitoba residents, patients' perspective of acceptability suggested restricting waits to less than 6 months and preferably less than 3 months.[22] The Western Canada Waiting List (WCWL) Project found that patients satisfied with surgery waited an average 3 to 4 months compared with 7 months for dissatisfied patients.[23] International standards include a 3-month guarantee from 1992–1996 in Sweden[4] and a target wait of 4 months in the UK (with the surgery for the second eye within 2 to 3 months).[24] This initiative to reduce wait times in the UK involved the creation of mobile cataract surgery units.[25] This has been so successful, they have now reduced their target wait to 3 months.[26]

Exhibit 4.9 shows that cataract surgery wait times varied across the province by LHIN. In 2003/04, the shortest wait was in Erie St. Clair (8 weeks); the longest wait was in South West (22 weeks). The wait in South West was 2.8 times greater than that of Erie St. Clair. It is possible that variations in regional resource allocation for cataract surgery explain some of these findings. However, the rapidly changing indications for this procedure might also create different thresholds for surgery between ophthalmologists.

The median wait time for cataract surgery in Ontario was 15 weeks for all 3 fiscal years studied: 2001/02–2003/04. In 2003/04, almost 50% of individuals had waits for cataract surgery beyond 16 weeks. In 8 LHINs, the majority of cataract surgery waits were under 16 weeks. Erie St. Clair and North West had the highest proportion of cataract surgeries completed within 16 weeks (65%), while the South West had the lowest proportion of cataract surgeries completed within 16 weeks (37%).

Appropriateness

No formal tools have been developed in Ontario to measure the appropriateness of cataract surgery. The RAND-UCLA method (see Chapter 1) to assess the appropriateness of cataract surgery[27] has been validated, but the chapter authors are not aware of implementation in any setting. A few Canadian studies have questioned the appropriateness of cataract surgery in some patients. One study found that for roughly 1 in 10 people, the pre-operative visual acuity was above the threshold for surgery and no functional indication justifying surgery was noted in the hospital chart.[28] Similarly, Wright et al[29] found that one-third of pre-operative patients scored higher than 90% on a visual function assessment, suggesting that the clinical threshold for performing cataract surgery may have been inappropriately low. Critics of these studies maintain that not enough clinical information was considered.[30,31] In light of these studies, it is suggested that Ontario ophthalmologists propose criteria by which the appropriateness of cataract surgery can be independently assessed.

Urgency

There are no formal Ontario-wide prioritization methods in place to measure cataract surgery urgency. Surgeons sometimes give discretionary priority to patients who are unable to work or perform activities of daily living. The outcome of surgery is not usually adversely affected by the length of wait; however, the surgical technique of phacoemulsification is simpler when performed on less mature cataracts.[9] The main impact of long waits is the detrimental effect of visual impairment on a patient's daily function. Studies indicate that those with cataracts are more likely to have a history of at-fault motor vehicle collisions and falls.[32,33] A randomized controlled trial of expedited (approximately 4 weeks) or routine (12-month wait) surgery found that the rate of falling was reduced by 34% in the expedited surgery group. The expedited surgery group also had fewer fractures (3% vs. 8%).[34]

Prioritization tools

Various prioritization models are in place in other jurisdictions. Although visual acuity is an important consideration when prioritizing patients, it has the potential for poor accuracy in patients with cataracts. Priority tools take into consideration other important factors such as the degree of visual function impairment that affects a patient's quality of life. The Visual Function14 (VF-14)[35] is one example of a validated visual function questionnaire. Most prioritization models use a scoring system to assess visual acuity, visual function and various other factors including other existing medical

conditions, independent living, time waiting, work impairment, impaired ability to drive to work, difficulty with glare, and surgeon's urgency rating through questionnaires and clinical data.

In Canada, scoring systems have been developed[36,37] to help determine a patient's priority for cataract surgery. National guidelines in New Zealand have been introduced and refined to standardize prioritization across the country.[21] In Ontario, the Joint Policy and Planning Committee (JPPC) created the Ontario Wait List (OWL) project, completed in August 2002. The expert panel modified the WCWL cataract surgery questionnaire and evaluated the reliability and validity of the instrument. The panel concluded that the majority of the criteria are appropriate for ascertaining urgency within the cataract surgery setting, and that development of severity scores for each criterion and expanded pilot testing should be the next logical step in moving the tool towards possible implementation.[38] The panel recommended that the JPPC should: further study the priority instrument's utility and redesign the criteria that address glare and activities of daily living; address implementation issues, as well as other considerations outlined in the document; quantify wait times by tracking the number of patients waiting (with wait time defined as the time from "date on" to "date off" the wait list); and develop maximum acceptable wait times along with a minimum dataset to monitor cataract wait lists.[38]

Unmet need

In a random sample of people aged 65 years and older in north London, England, the prevalence of cataract causing any degree of visual impairment was 30%. Of these participants, 88% were not in touch with eye health services.[39] In order to estimate the population need for cataract surgery in Ontario, it would be necessary to conduct a random survey of the population to determine the proportion with cataracts that meet the criteria for surgery, and would want it if offered the choice. The authors of this chapter are not aware of any such studies in Ontario.

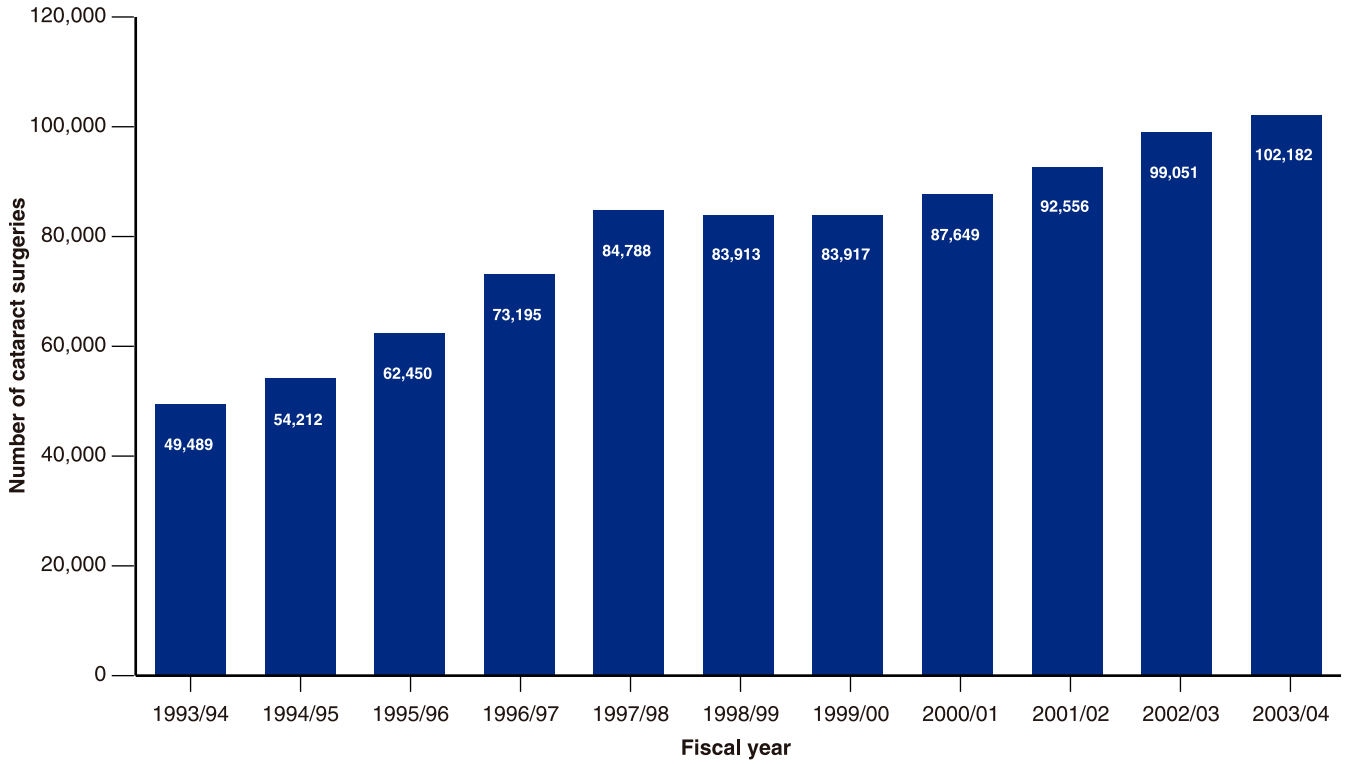
Patient outcomes

Ontario's current administrative data do not include important cataract surgical outcomes such as post-operative complications, visual acuity, visual function, return to driving, and quality of life. However, 2 early post-operative complications were identified together: vitrectomy and vitreous injections or aspirations within 2 weeks of cataract surgery. These procedures are performed for suspected endophthalmitis (infection) and lost lens or lens fragments. For the fiscal years 2001/02, the rate of these 2 complications combined was 0.48% (447/92,556); for 2002/03 it was 0.39% (390/99,051); and for 2003/04 it was 0.38% (392/102,182). These data will overestimate actual endophthalmitis and lost lens/lens fragment rates because this method only captures potential cases. Reported rates for endophthalmitis include 0.5% to 1.06% in Sweden, (1998–2000),[4] 0.08% in Singapore (1996–2001),[40] 0.2% in New Zealand,[41] 0% in the United States, Canada, Denmark, and Spain,[42] and 0.03% in the UK.[43] Lost lens/lens fragment rates of 0.3% (and 0.16% for lost IOL into vitreous) were reported in the UK[43] and 0.3% (and 0.1% for lost IOL into vitreous) in an international study.[42]

The routine collection of data on visual function before and after cataract surgery through an instrument such as the VF-14 and a simple visual acuity measure would also provide invaluable information about the outcomes achieved from cataract surgery in Ontario. The VF-14 takes only a few minutes to administer and can be conducted by telephone.

Chapter 4—List of Exhibits

4.1 Annual number of cataract surgeries for the population aged 20 years and older, in Ontario, 1993/94–2003/04



Data source: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan

4.2 Number of ophthalmologists and volume of cataract surgery, in Ontario, 2001/02–2003/04

Ophthalmologists	2001/02	2002/03	2003/04
Number of ophthalmologists	429	433	439
Number of ophthalmologists performing cataract surgery	271	272	274
Number of ophthalmologists performing > 50 surgeries/year	238	231	240
Median number of procedures by surgeons performing > 50 surgeries/year	360	392	398
Number of ophthalmologists performing 51–250 surgeries/year	83	60	61
Number of ophthalmologists performing 251–500 surgeries/year	97	106	111
Number of ophthalmologists performing 501–1,000 surgeries/year	53	59	61
Number of ophthalmologists performing > 1,000 surgeries/year	–	6	7

Data source: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan

4.3 Number and age- and sex-adjusted rate of cataract surgery per 100,000 population aged 20 years and older, by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

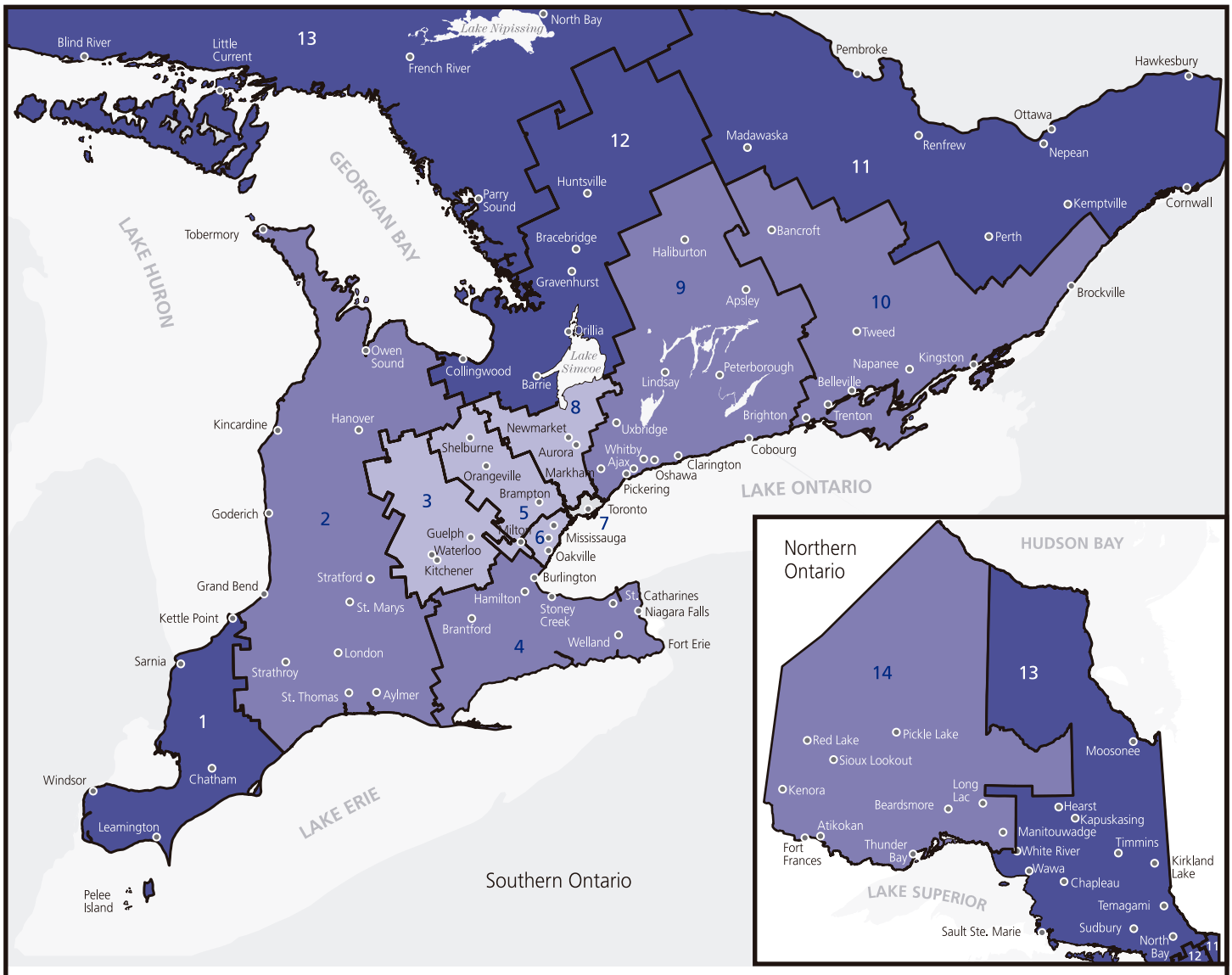
Local Health Integration Network	2001/02		2002/03		2003/04	
	Number of Cataract Surgeries	Rate per 100,000 Population	Number of Cataract Surgeries	Rate per 100,000 Population	Number of Cataract Surgeries	Rate per 100,000 Population
1. Erie St. Clair	5,967	1,307	6,155	1,331	6,348	1,357
2. South West	7,923	1,090	8,463	1,147	9,250	1,238
3. Waterloo Wellington	3,399	807	4,099	948	4,537	1,026
4. Hamilton Niagara Haldimand Brant	12,151	1,133	12,901	1,186	13,099	1,187
5. Central West	3,448	938	3,928	1,028	3,998	1,007
6. Mississauga Oakville	5,170	993	5,486	1,002	5,864	1,025
7. Toronto Central	6,661	828	7,020	867	7,034	862
8. Central	7,832	931	8,796	1,008	8,830	977
9. Central East	12,261	1,142	13,133	1,190	13,449	1,191
10. South East	3,806	1,077	4,270	1,195	4,479	1,234
11. Champlain	11,703	1,401	11,891	1,399	12,468	1,442
12. North Simcoe Muskoka	3,644	1,175	4,366	1,364	4,428	1,342
13. North East	6,122	1,423	5,919	1,355	6,017	1,361
14. North West	2,102	1,217	2,188	1,256	2,023	1,155
All Ontario	**92,556**	**1,103**	**99,051**	**1,154**	**102,182**	**1,166**

Missing values: 2001/02 (367); 2002/03 (436); 2003/04 (358)

Summary statistics (2003/04)	Value	P-value
Extremal Quotient	1.7	
Coefficient of Variation (%)	15.0	
Systematic Component of Variation	20.0	
Adjusted Chi-square (likelihood ratio)	2306.3	< 0.0001

Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Ontario Health Insurance Plan; Statistics Canada–Postal Code Conversion File

4.4 Age- and sex-adjusted rate of cataract surgery per 100,000 population aged 20 years and older, by Local Health Integration Network, in Ontario, 2003/04



Local Health Integration Networks (LHINs)

1. Erie St. Clair
2. South West
3. Waterloo Wellington
4. Hamilton Niagara Haldimand Brant
5. Central West
6. Mississauga Oakville
7. Toronto Central
8. Central
9. Central East
10. South East
11. Champlain
12. North Simcoe Muskoka
13. North East
14. North West

Age- and sex-adjusted rate of cataract surgery per 100,000 population aged 20 years and older, by Local Health Integration Network, in Ontario, 2003/04

Rate per 100,000 population	Comparative rate ratio	Number of LHINs in each category
1,282.7 to 1,515.9	1.1 to 1.3	(4)
1,049.5 to 1,282.7	0.9 to 1.1	(5)
874.6 to 1,049.5	0.75 to 0.9	(4)
< 874.6	< 0.75	(1)

Ontario rate = 1,166.1/100,000 persons

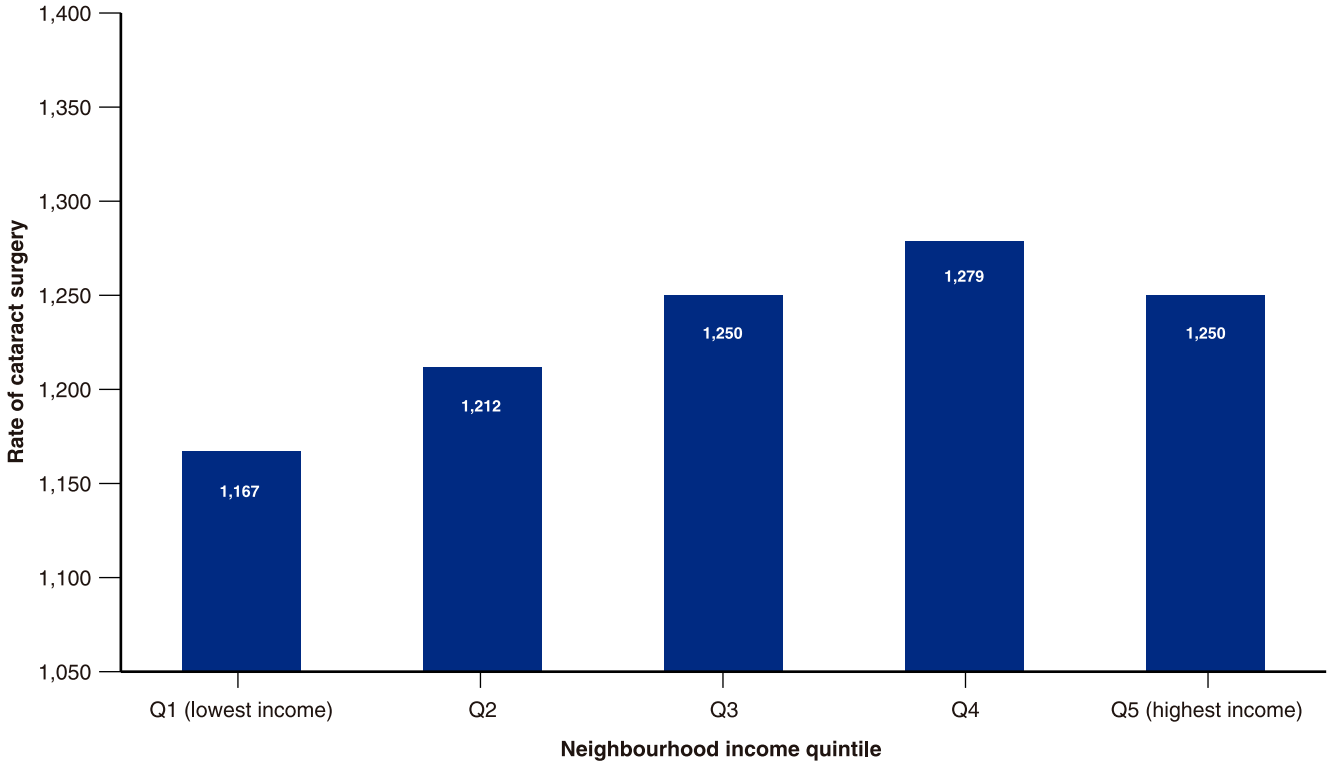
Data source: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan

4.5 Overall and age- and sex-specific number and crude rate of cataract surgery per 100,000 population aged 20 years and older, by Local Health Integration Network, and for the province of Ontario, 2003/04

Local Health Integration Network	Women & Men Overall		Women by Age Group Rate of Cataract Surgery				Women Overall		Men by Age Group Rate of Cataract Surgery				Men Overall	
	Number of Cataract Surgeries	Rate per 100,000 Population	Age 20-64	Age 65-74	Age 75-84	Age 85+	Number of Cataract Surgeries	Rate per 100,000 Women	Age 20-64	Age 65-74	Age 75-84	Age 85+	Number of Cataract Surgeries	Rate per 100,000 Men
1. Erie St. Clair	6,348	1,444	303	5,351	9,086	4,887	3,750	1,649	311	4,570	8,157	6,469	2,598	1,224
2. South West	9,250	1,401	263	4,653	9,540	5,293	5,685	1,655	289	3,158	7,410	7,224	3,565	1,126
3. Waterloo Wellington	4,537	975	206	3,505	7,760	5,468	2,716	1,134	219	2,938	6,443	6,197	1,821	806
4. Hamilton Niagara Haldimand Brant	13,099	1,363	288	4,247	8,232	5,171	7,766	1,549	298	3,449	7,234	6,375	5,333	1,160
5. Central West	3,998	769	237	4,002	6,678	4,186	2,307	868	212	3,187	6,153	5,309	1,691	666
6. Mississauga Oakville	5,864	873	207	3,809	7,361	5,072	3,443	986	212	3,162	6,290	5,946	2,421	750
7. Toronto Central	7,034	822	185	3,316	6,040	3,889	4,264	952	189	2,789	4,909	4,770	2,770	678
8. Central	8,830	949	218	3,694	6,885	4,391	5,202	1,065	224	2,819	6,037	5,243	3,628	820
9. Central East	13,449	1,165	285	4,721	8,144	4,927	8,036	1,331	264	3,570	7,042	6,217	5,413	984
10. South East	4,479	1,449	287	4,839	9,321	5,691	2,801	1,748	255	3,598	6,818	4,745	1,678	1,127
11. Champlain	12,468	1,424	342	6,147	9,660	5,347	7,581	1,669	307	4,306	8,727	6,730	4,887	1,160
12. North Simcoe Muskoka	4,428	1,488	295	5,209	9,787	5,274	2,599	1,700	294	3,479	9,057	6,619	1,829	1,263
13. North East	6,017	1,514	372	4,978	9,055	5,746	3,547	1,720	347	3,714	8,161	8,135	2,470	1,292
14. North West	2,023	1,230	269	4,526	8,581	4,525	1,223	1,456	218	3,215	7,482	5,171	800	994
All Ontario	**102,182**	**1,174**	**265**	**4,497**	**8,223**	**4,978**	**61,125**	**1,351**	**259**	**3,438**	**7,072**	**6,120**	**41,057**	**982**

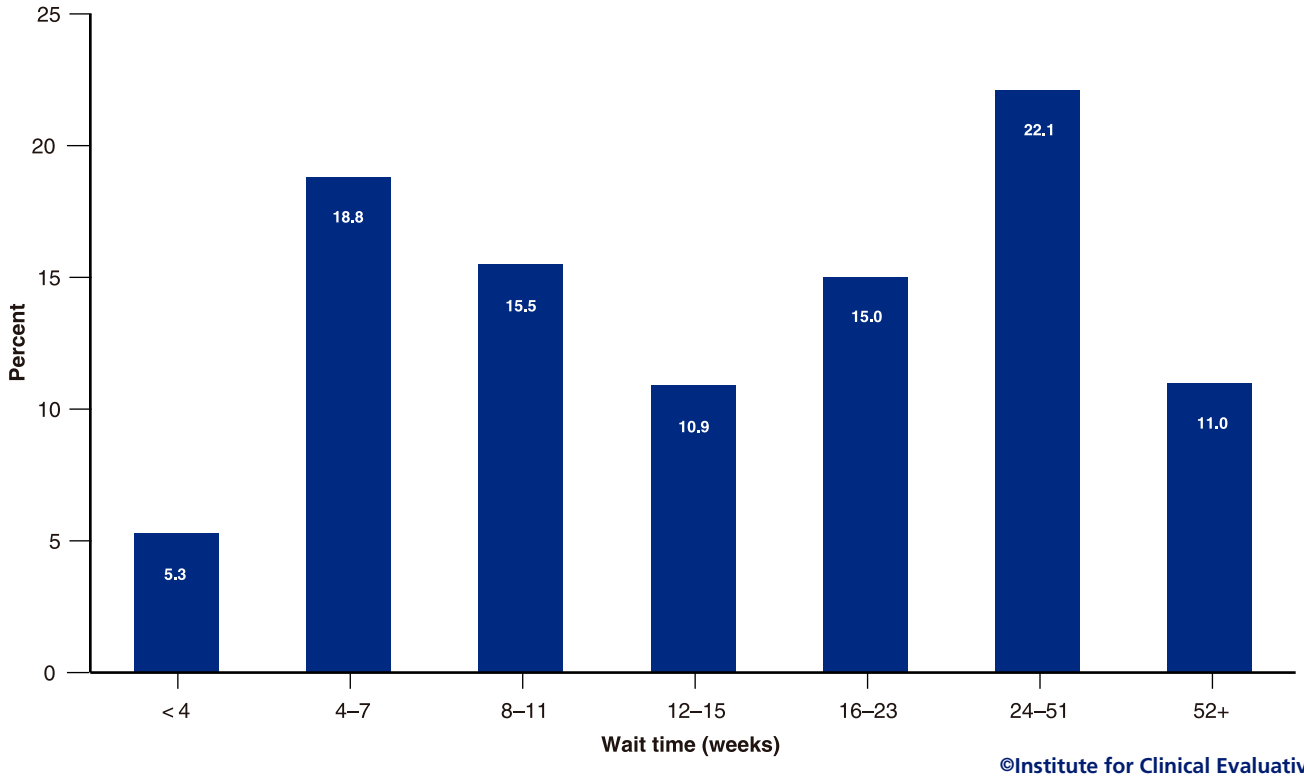
Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Ontario Health Insurance Plan; Statistics Canada–Postal Code Conversion File

4.6 Age- and sex-adjusted rate of cataract surgery per 100,000 population aged 20 years and older, by neighbourhood income quintile, in Ontario, 2003/04



Data sources: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan; Canadian Institute for Health Information–Discharge Abstract Database; Statistics Canada–Postal Code Conversion File

4.7 Proportion of cataract surgeries performed within specified wait time ranges, in Ontario, 2003/04



Data sources: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan; Canadian Institute for Health Information–Discharge Abstract Database; Statistics Canada–Postal Code Conversion File

4.8 Wait times for cataract surgery in 6 other Canadian provinces

Province	Date	Wait Time for Cataract Surgery
1. British Columbia	Jul–2004	Median 10.3 weeks
2. Alberta	Nov–2004	Most patients received service within 12–72 weeks depending on hospital
3. Saskatchewan	Sep–2004	Lists percentage of patients waiting less than 3 weeks, 6 weeks, and 3, 6, 12, 18 months by region
4. Manitoba	Nov–1999	Mean 28.9 weeks
5. Quebec	2004	Lists number of patients waiting 6 months or more at each hospital
6. Nova Scotia	1995/96	Mean 120 days (17.1 weeks)

Sources:

1. British Columbia: Surgical Wait Times
http://www.swl.hlth.gov.bc.ca/swl/db/swl.WaitlistPkg.GetHospitalListBySurgSpec?IEvent=27
2. Alberta: Wait List Registry
http://www.health.gov.ab.ca/waitlist/WaitListPublicHome.jsp
3. Saskatchewan: Surgical Wait List Management
www.sasksurgery.ca
4. Bellan L, Mathen M. The Manitoba Cataract Waiting List Program. *CMAJ* 2001; 164(8):1177–80
5. Quebec: Surgery and Treatment Waiting Lists
http://www.msss.gouv.qc.ca/sujets/listesdattente/index.html
6. Nova Scotia: Reporting Health Performance
http://www.gov.ns.ca/health/downloads/surgery.pdf

4.9 Median wait time for cataract surgery and proportion of surgeries performed within recommended maximum wait time (16 weeks), by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

	Wait Times for Cataract Surgery					
	2001/02		2002/03		2003/04	
Local Health Integration Network	Median Wait Time (Weeks)	Percent of Cataract Surgeries Performed Within RMWT* (16 Weeks)	Median Wait Time (Weeks)	Percent of Cataract Surgeries Performed Within RMWT (16 Weeks)	Median Wait Time (Weeks)	Percent of Cataract Surgeries Performed Within RMWT (16 Weeks)
1. Erie St. Clair	9	64	9	64	8	65
2. South West	19	43	21	36	22	37
3. Waterloo Wellington	15	55	16	49	19	43
4. Hamilton Niagara Haldimand Brant	18	44	17	47	15	52
5. Central West	13	58	13	55	16	50
6. Mississauga Oakville	15	52	16	50	15	52
7. Toronto Central	15	51	17	47	18	43
8. Central	16	49	15	52	17	47
9. Central East	14	54	13	57	15	53
10. South East	11	59	13	55	12	61
11. Champlain	16	50	18	46	16	49
12. North Simcoe Muskoka	19	42	15	52	13	59
13. North East	15	53	13	59	14	56
14. North West	14	55	10	67	12	65
All Ontario	**15**	**52**	**15**	**52**	**15**	**51**

*RMWT = Recommended Maximum Wait Time
Note: Rounding performed

Data source: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan

Conclusions and Next Steps

The annual number of cataract surgeries in Ontario more than doubled over a 10-year period, but recent yearly increases were relatively small. Approximately half (48%) of the people having cataract surgery in Ontario wait longer than 16 weeks for surgery. There is large variation in the rates and waits for cataract surgery across the province that needs to be addressed.

Online publication of wait times (Exhibit 4.8) by hospital or region (Alberta, Quebec, and Saskatchewan websites) and by surgeon (British Columbia website) could be adopted in Ontario so that patients, optometrists, and physicians are aware of the wait times and all possible treatment options within the province. If patients are willing to travel, this could help to decrease waiting lists and wait times at some institutions. A central provincial cataract surgery registry that includes the actual date of decision for surgery would need to be established. The registry should ideally include date of referral to the surgeon, best corrected visual acuity, degree of visual functional impairment, patient's clinical urgency, and the date of surgery. Implementation of a prioritization tool for cataract surgery in Ontario will help ensure equitable access to cataract surgery.

Appendix 4.A

How the Research was Done

Data sources

Patients aged 20 years and older that had cataract surgery were identified using the MOHLTC-OHIP database (fee code E140) between April 1, 1993 and March 31, 2004. The physician-specialty code for ophthalmologists (specialty code 23) was obtained from MOHLTC-OHIP and CIHI-DAD. Regional and residential information for cataract surgery were obtained from the CIHI-DAD for the same dates for all patients. The MOHLTC Registered Persons Database (RPDB) was used to determine a patient's postal code when a record was unavailable from CIHI-DAD. The number of surgeries was tabulated according to the newly defined LHINs.

Wait times for cataract surgery were estimated using an algorithm (Figure 4.1). The date of surgery was identified with billing code E140. Using the J108 code, it was also determined whether biometry (a series of eye measurements used to determine the magnification of the IOL to be implanted) was billed within the 2 years preceding surgery. The decision date for surgery was estimated from the contact date with the surgeon (using OHIP codes A233, A234, A235, A236, or A935) within the 2 years before the date of surgery. This method was modified from previous research from Manitoba[10] and accounted for over two-thirds of the cohort. If biometry (J108) was not billed, then the estimate of the decision date for surgery was the date of the last contact with the surgeon (using OHIP codes A233, A234, A235, A236, or A935) within 2 years preceding surgery. This method was based on previous research from Ontario[11] and accounted for just under one-third of the cohort. The wait time was defined as the difference between the date of surgery and the estimate of the date of decision for surgery. Visits within 1 month of surgery were disregarded because discussions with ophthalmologists indicated that interim visits are common, particularly when the wait for surgery is long, and that using a visit that close to surgery as an estimate of the date of decision would likely be an underestimation.

Detailed data measuring waits from decision for surgery used in the London, Ontario validation exercise supported this decision (Appendix 4.B). Finally, if individuals were found to have had surgery on both eyes over the study period, only the first surgery was included in the analysis of wait time. However, all cataract surgeries were included in the analyses of surgery rates. In this way, more than 78% (80,074/102,182) of eligible cataract surgeries were included in the determination of wait times. The median wait times for patients who had biometry codes compared to patients who did not were similar (16 vs. 15 weeks). The proportions of patients with wait times shorter than 12 weeks were also similar; 39% for those who had biometry codes compared to 41% for those without.

Two post-operative complications from cataract surgery (suspected endophthalmitis and lost lens/lens fragment) can be specifically identified with administrative data. Patients requiring a vitreal injection or aspiration (OHIP code E149) and vitrectomy (OHIP code E148) for suspected endophthalmitis (infection) or as a result of a lost lens or lens fragment (an intraoperative complication) within 2 weeks of surgery were identified and included in the analysis.

Analyses

Statistics Canada Postal Code Conversion Files and 2001 Census information were used for the calculation of rates, and individual-level postal codes from MOHLTC-OHIP, CIHI-DAD and MOHLTC-RPDB to link with neighbourhood-level income for analyses related to income and LHIN-specific data, and hospital-specific data.

Limitations

The estimate of wait time for surgery is likely an underestimate of the true wait for some cases and may be an overestimate for others. A study from Manitoba[10] indicates that a similar algorithm was valid for patients whose estimated waits were more than 10 weeks, but tended to underestimate those with waits less than 10 weeks. For approximately one-third of the sample, the estimated date of decision was the last visit with a surgeon before surgery. This was found to be a valid estimate in Ontario,[11] but may be an underestimate, particularly for those with very long waits (more than 6 months) or other existing ocular conditions (glaucoma, macular degeneration) which can require interim visits to an ophthalmologist.

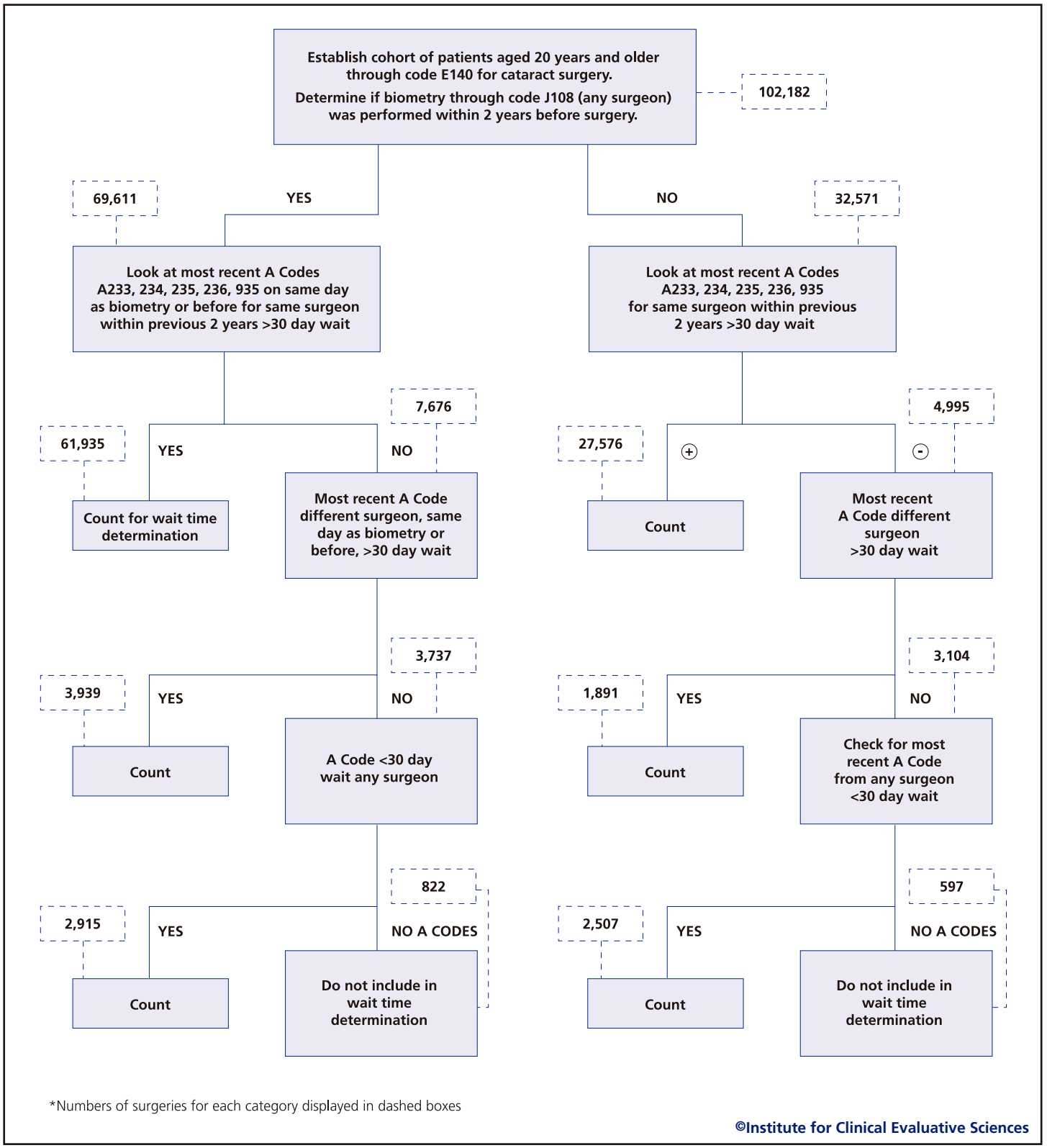
To overcome these issues and provide a closer estimate of these waits, if the estimated date of decision was less than 1 month after the last visit to the surgeon, the prior visit was used. For this small group in the sample, urgent cases that had an actual wait of less than 1 month may be overestimated. In addition, if both eyes were done in 2003/04, waits were only measured for the first eye. If one eye was done prior to 2003/04, it is possible that for patients with a biometry code,

the second eye surgery could be linked with the biometry code for the first eye. This could lead to an overestimate of the wait time in this portion of the sample. Encouragingly, in the validation study (Appendix 4.B), the proportion of patients waiting less than 24 weeks was similar between the clinical database and the administrative data. It is likely that individual surgeons' practice patterns will vary more with longer waits, which may account for some of the discrepancy. Future efforts aimed at shortening wait times should account for these differences. Therefore, when using administrative data to estimate waits, the proportion of people having surgery before a RMWT should be considered a better indicator of effectiveness than the proportion with extreme waits.

Estimates of early post-operative complications in this report may be an overestimate because potential cases of endophthalmitis and lost lens/lens fragments, rather than actual cases, were captured. It was not possible to independently separate the 2 complication rates.

The calculation of cataract surgery rates and wait times in LHIN South East may be inaccurate. Cataract surgery rates could be underestimated in this area because some ophthalmologists are part of an alternate funding plan at Queen's University and do not bill MOHLTC-OHIP directly. This may also have affected estimates of wait times but it cannot be ascertained if it is an under- or overestimate.

Figure 4.1 Algorithm for cataract wait time*



*Numbers of surgeries for each category displayed in dashed boxes

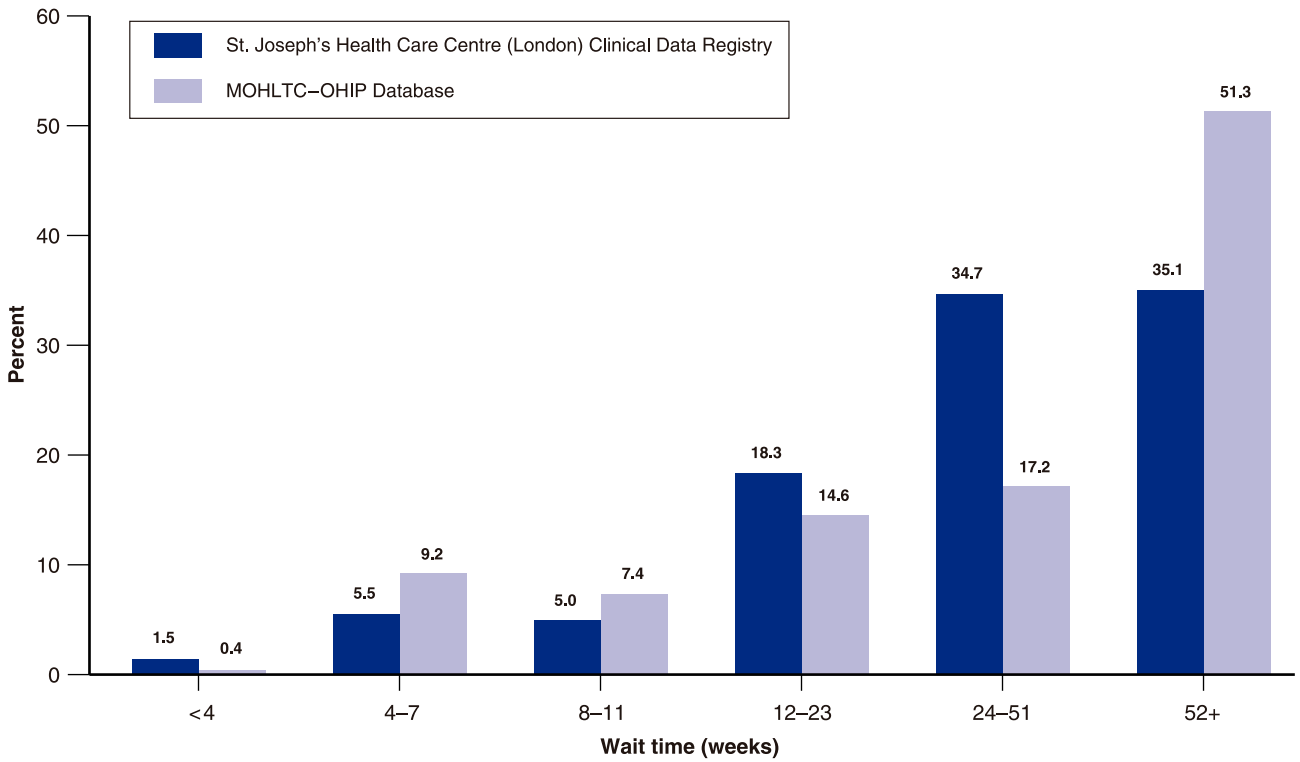
Appendix 4.B

Detailed Analytical Methods

Administrative database wait time validation study

Administrative data analysis was compared with a clinical data registry of patients at St. Joseph's Health Care Centre in London, Ontario collected from November 2003–March 2004. The clinical registry contained the actual date of decision for surgery, whereas in this study, the decision date was estimated using administrative databases. The numbers of surgeries were found to be similar, with 759 in the clinical database and 694 in the administrative database. Other surgeries (58) were identified for which a J108 code was billed but no visit with the surgeon was found. The estimates of surgery wait times were similar for both methods for groups waiting less than 12 weeks (12% vs. 17%) and those waiting less than 24 weeks (30% vs. 32%) (Figure 4.2). The median estimates of surgery wait times were not similar (37 vs. 54 weeks), likely a result of long waits at this site and a greater disagreement between the 2 methods for wait times longer than 24 weeks. Hence, the method used here is most reliable for the determination of the proportion of patients waiting less than 24 weeks for surgery.

Figure 4.2 Cataract surgery wait times validation, December 2003–March 2004



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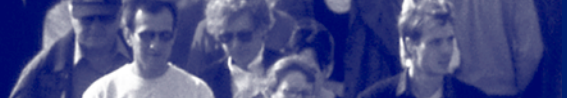


INSIDE

5

Chapter

Total Hip and Knee Replacement

Robert B. Bourne, MD, FRCSC, Donald DeBoer, MMath, Gillian Hawker, MD, MSc, FRCPC, Hans Kreder, MD, MPH, FRCSC, Nizar Mahomed, MD, ScD, FRCSC, J. Michael Paterson, MSc, Susan Warner, MEd, and Jack Williams, PhD

Executive Summary

Issue

Total hip replacement (THR) and total knee replacement (TKR) are highly effective and cost-effective treatments for the pain and functional impairment associated with end-stage arthritis. Despite increases in the number of total joint replacements (TJR), Ontarians are concerned about poor access to, and increasing wait times for, TJRs.

Study

For the Ontario population aged 20 years and older, data from the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD), the Ministry of Health and Long-Term Care Ontario Health Insurance Plan (MOHLTC-OHIP) database, and the Ontario Joint Replacement Registry (OJRR) were used to describe:

- The number of THRs and TKRs performed during the last decade;
- Variation in TJR rates according to age, sex, socioeconomic status, and place of patient residence; and,
- The length of time patients are waiting to receive operations.

Key findings

Between 1993/94 and 2003/04, the annual number of THRs and TKRs grew by more than 50% and 100%, respectively. The rates for the procedures, adjusted for age and sex, increased by 6% and 10% respectively over the last 3 years. Despite this growth, regional variations in procedure rates persist; and during the last year, fewer than 50% of patients received their scheduled TJRs within 6 months.

Implications

Too many Ontarians have excessive waits for TJRs. Additional resources are needed to help reduce wait times and eliminate unmet need for TJR. If the mandate of the OJRR is expanded to include waiting list management, it must involve all surgeons and hospitals performing TJRs. Further research is needed to determine if it is possible to develop a reliable and valid acuity scoring system that can be used to decide which patients on the waiting list should receive priority for surgery.

Introduction

In Ontario, THRs and TKRs are among the most commonly performed surgical procedures.[1-5] Most TJRs are for the management of osteoarthritis (OA), a major cause of long-term disability that is characterized by degenerative changes in the articular cartilage and underlying bones of the hip and knee. When non-surgical interventions have failed to adequately control symptoms, TJRs are highly beneficial and cost-effective procedures to relieve pain and restore function.[6-11] TJRs are also performed to manage damage from trauma, fractures, and cancers, and to replace previous TJRs that have failed. Ninety percent of TJRs last at least 10 years, after which an increasing number of patients require a new TJR (known as a revision).

This chapter of *Access to Health Services in Ontario:*

- Provides an update on trends in TJR;
- Describes variation in TJR rates according to age, sex, socio-economic status, and place of patient residence;
- Presents surgical wait time estimates by Local Health Integration Network (LHIN);
- Briefly reviews methods of assessing appropriateness, urgency, unmet need, and outcomes of TJR; and,
- Offers suggestions for future policy and research.

Findings and Discussion

Rates of service provision

Exhibits 5.1a–b: Annual number of procedures by year

THR procedures were well established by 1980, while TKR procedures became established around 1985. In Ontario, THRs outnumbered TKRs until 1995/96, when TKRs became more common. Currently, approximately 3,000 more TKRs than THRs are performed annually.

TJRs are classified as planned (also known as elective) primary, revision, and unplanned primary procedures. A planned primary TJR is a scheduled procedure for managing the pain and functional limitations of disease, primarily OA. Primary procedures accounted for about 75% of THRs and about 90% of TKRs performed in 2003/04.

A primary procedure may fail, requiring a revision procedure. Failure can be due to infection, loosening of the implant, loss of bone integrity, or failure of the prosthesis itself. Normally, primary TJRs last for 10 or more years. In 2003/04, 12% of THRs and 8% of TKRs in Ontario were revisions. These proportions are roughly similar to those observed in other Canadian provinces[12] and other countries that maintain TJR registries, such as Norway, Australia, and New Zealand.[12] Over the last 10 years, the proportion of TJRs as revisions has remained relatively stable in Ontario.

Unplanned procedures are largely for the management of trauma, fractures, dislocation, infection, or cancer. These procedures are typically performed as part of an urgent hospital admission, and are more common for hips than knees. As explained in Appendix 5.A, apparent changes in the proportions of revision and unplanned THR over the last 2 years may reflect changes in procedure and diagnosis coding accompanying the introduction of International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada/Canadian Classification of Health Interventions (ICD-10-CA/CCI) classification in Ontario hospitals, rather than an actual increase in unplanned procedures.

Exhibits 5.2a–b and 5.3a–b: Rates by LHIN

For 2003/04, LHIN Central West had the lowest rate per 100,000 population (89) and LHIN South East had the highest rate (139) for THRs. The low and high rates for TKRs were in LHIN Toronto Central (93) and LHIN North West (200), respectively. Variation in rates among LHINs was 2-fold for TKRs and 1.5-fold for THRs. The magnitude of the regional variation in TJR has not changed appreciably over the last decade, even with the increases in the numbers of procedures performed.[1,5,13] Over the last 3 years, the regional ordering of rates has remained relatively stable for THR and TKR.

Exhibits 5.4a–b: Age- and sex-specific rates by LHIN

To understand utilization patterns and trends, procedure rates must be considered by age and sex. For THRs and TKRs, the rates were low for individuals aged 64 years and younger, peaked for those aged 65 to 84 years, and decreased for persons aged 85 years and older. The age-specific rates for THR were lower than for TKR at all ages, except for those in the 85+ years age group, where THR rates were higher than TKR rates. The age-specific rates were higher for women than for men for hip and knee replacements at all ages, with one exception. Men aged 85 years and older had a higher rate of TKR than women of the same age. These patterns were relatively consistent across LHINs.

Exhibits 5.5a–b: Rates by neighbourhood income quintile

Variation in level of service provision was assessed to determine whether there was an association with the socioeconomic status of place of residence. The rate of THR was found to be lowest in the poorest neighbourhoods and highest in the wealthiest neighbourhoods. The pattern was similar for TKR, but the gradient was not as great. The rates in the wealthiest neighbourhoods were 1.5 and 1.2 times greater than the rates in the poorest neighbourhoods for THRs and TKRs, respectively. These gradients are the opposite of what would be expected based on the burden of disease, which is greatest in the poorest neighbourhoods.

Exhibits 5.6a–b: Number of procedures by hospital

The numbers of planned primary, revision, and unplanned primary TJRs in Ontario hospitals in 2003/04 are displayed in Exhibit 5.6a for THRs and Exhibit 5.6b for TKRs. Cell sizes with fewer than 6 procedures were suppressed to ensure confidentiality. Fifty-six hospitals performed THRs and 56 hospitals performed TKRs. Of these, 1 hospital performed THRs only and 1 performed TKRs only. Academic hospitals performed about one-third of the planned primary TJRs, but did more than half of the more complex procedures (revisions and unplanned primaries).

Wait times

Exhibits 5.7a–b: Proportion of planned primary TJRs performed within wait time ranges

Surgical wait times have 3 components:

- The time between a family doctor's referral to a surgeon and the date of the first consult with the surgeon;
- The time from date of the patient's first surgical consult to the date the surgeon and patient decide to proceed with a TJR; and,

- The time between the decision date for surgery and the actual date of surgery.[14,15]

Using available health administrative data, the third component was estimated by matching surgeons' OHIP billing records for the last surgical consultation to corresponding OHIP billing records for the operation and corresponding hospital discharge records in the CIHI-DAD (see Appendix 5.A for details). Orthopaedic surgeons who are members of the Southeastern Ontario Academic Medical Organization (SEAMO) at Queen's University do not bill OHIP, thus, information about their patients' wait times are not available to the Institute for Clinical Evaluative Sciences (ICES). However, several SEAMO surgeons participate in the OJRR, and through a written research agreement, wait time information was obtained for the TJRs performed by these surgeons in 2003/04.

Ontario researchers have shown that about 20% of patients decide to proceed with TJR some time after their initial consultation with an orthopaedic surgeon.[14] Thus, for about 1 in 5 individuals, the wait times reported in this chapter overstate the duration of time from decision to surgery. The extent and nature of the difference is the subject of ongoing OJRR-ICES research. However, Shortt and colleagues found that the average wait times derived from administrative data in Ontario are similar to those derived from chart review.[16]

Waits for planned TJRs are described as the proportion of patients waiting for specified periods, and as median wait times. About 50% of THR patients and 40% of TKR patients waited less than 26 weeks for surgery, and about 20% and 30%, respectively, waited more than 1 year.

Exhibits 5.8a–b: Median wait times and percent of procedures completed within the RMWT of 26 weeks

In 2003/04, median wait times for TJR in Ontario were 24 weeks for THRs and 33 weeks for TKRs. These figures are similar to the 24-week estimate that 165 Ontario orthopaedic surgeons reported to The Fraser Institute in early 2004.[17] For hip patients, the median wait times varied from 16 weeks in LHIN Erie St. Clair to 36 weeks in LHIN Champlain. The low and high median wait times for TKR were 26 weeks in LHIN Erie St. Clair and 45 weeks in LHIN North East. In general, LHINs that had long waits for THR also had long waits for TKRs. However, there was no obvious relationship between median wait times and the rates of TJRs among LHINs (i.e., LHINs with long waits did not consistently have low rates of TJRs).

In Ontario, there is general consensus among physician experts that patients with sufficient pain and/or functional impairment to warrant a planned, primary TJR should wait no more than 26 weeks (the RMWT), although this has not been established formally. The RMWT of 26 weeks is consistent with physician opinion in other countries, such as Spain,[18] New Zealand,[19] and the United Kingdom.[20] About 50% of THR patients and 60% of TKR patients in Ontario have waits in excess of 26 weeks. By comparison, in 1993/94, about 25% of THR patients and 39% of TKR patients waited 6 months or more for their procedures in Ontario.[13]

Ten years ago, Ontario researchers found that patients appeared to be operated on in the order in which they entered surgeons' waiting lists.[21] More recently, however, data from the OJRR and a population-based survey suggest that patients with greater acuity are given priority when scheduling surgery.[14,22]

Comparing rates of procedures with other jurisdictions

The considerable increase in rates of Ontario's TJRs raises questions about the rates elsewhere. In 2001/02, the age-standardized rates (per 100,000 population) for THRs ranged from 39 in Quebec to 72 in Alberta (Ontario's rate was 64).[23] The low and high rate provinces for TKRs were Quebec (39) and Manitoba (96) respectively, with Ontario reporting 91. With the exception of Quebec, all provinces had significantly higher rates for TKRs than for THRs. Factors that contribute to geographical variation in procedure rates include disease burden, access to orthopaedic surgeons and family doctors, surgeons' access to hospital beds and operating room time, physician enthusiasm, and patient preference.

In 2000, the crude rates (per 100,000 population) of THR for Norway (124) and New Zealand (119) were nearly twice Canada's rate in 2001/02 (64).[23] Corresponding crude rates for TKR are 35 (Norway), 75 (New Zealand), and 80 (Canada). Not only are there wide variations in the rates but, unlike Canada, some countries have higher rates of THR than TKR.[23] Some caution is required when comparing crude rates, as they are not adjusted for differences in the age and sex composition of the population. Differences in how data are captured may also contribute to the variation. For example, while Norwegian TKR data are supplied by a joint replacement registry and exclude partial knee replacements, Canadian TKR figures are based on CIHI hospital discharge abstracts and, due to limitations of the ICD-9/CCP (Canadian Classification of Diagnostic, Therapeutic, and Surgical Procedures) classification system, combine total and partial knee replacements (see Appendix 5.A for details). In 1997, the crude THR rate in Sweden was 100 per 100,000 population.[24] Researchers recommended an increase to 130 THR per 100,000 population in order to satisfy unmet need and reduce queues. This rate had been achieved in several Swedish regions and was considered a reasonable target for the country as a whole.[24]

Appropriateness

In the context of wait times, appropriateness is an important issue in the provision of planned primary TJRs. Appropriateness is defined as the proportion of patients for whom the benefits of the procedure are likely to outweigh the harms.

There is general consensus that TJRs are appropriate if a patient has persistent pain or disability that interferes with daily activities and is not relieved by medical treatment, and for which there is radiological evidence of joint damage.[10,11,25] However, there is little consensus about how to precisely quantify appropriateness.

In Ontario, the RAND Delphi method, a well recognized method for determining appropriateness (see Chapter 1), has been used by clinicians to identify the most important factors affecting the appropriateness of TJR.[26,27] The chosen factors were:

- Presence and severity of pain;
- Severity of functional impairment;
- Problems with performing a caregiving role; and,
- Perceived likelihood of improvement in function with surgery.

Although this methodology has been used to retrospectively assess the appropriateness of TJR, it has not been used as a tool to determine the appropriateness of surgery in regular practice.

A Spanish group used similar methodology to establish appropriateness criteria.[28-31] For THR, 3 domains were considered important: previous non-surgical procedures (i.e., standard medical therapies had been tried); pain level; and functional limitation. For TKR, the domains were somewhat different, and included previous surgical management, symptoms, the severity of joint damage on X-ray, localization within the knee, patient age, and mobility and stability. The test-retest and inter-rater reliability have been assessed and found to be adequate. However, as with the Ontario appropriateness criteria, the Spanish criteria have not been evaluated as a tool to prioritize patients for TJR.

The Western Ontario and McMaster University Osteoarthritis Index (WOMAC) is among the most reliable and valid measures of pain, stiffness, and functional impairment in persons with OA of the hip or knee, and is widely used in studies of surgical and medical management of OA.[8,32,33] An Ontario expert panel felt that the WOMAC would be a reasonable tool to determine appropriateness, and recommended that it should be completed at the time of surgical consultation and forwarded to a central registry at the time the surgeon and patient agree to proceed with TJR.[34] In the absence of WOMAC benchmarks for defining appropriateness, the Ontario panel recommended a preliminary benchmark: that patients with severe symptoms (which they defined as 50/100 or higher) be scheduled for surgery and receive the procedure within 3 months.[34]

In summary, there is general consensus about the most important factors to consider when determining the appropriateness of TJR. However, there is no commonly accepted method of definitively separating appropriate and inappropriate TJRs because of the subjective nature of the symptoms and the different values held by individuals assessing appropriateness. However, using appropriateness criteria developed to date, Canadian studies of the appropriateness of TJR have concluded that the vast majority are appropriate.[35,36]

Urgency

Planned and primary TJR

Urgency refers to the rapidity with which a procedure should be done, and is influenced by the impact of delay on outcomes, symptoms, and anxiety. For TJRs, the major adverse effect of prolonged wait times is the pain and functional disability experienced by patients, which can be considerable. If the planned procedures are appropriate and there are long wait times, the question arises as to whether who waits the longest should be based on the acuity (or severity) of joint damage, pain and disability.

Groups in New Zealand (NZ) and Western Canada have attempted to develop urgency rating scores (URS) for TJR, using the opinions of approximately 30 clinicians. The NZ priority criteria for hip and knee replacement surgery identified several key factors impacting urgency: pain severity and duration; functional problems; joint damage; and additional factors, including other affected joints and threat to role or independence.[37] When used in 137 patients on a waiting list for TJR, patient rankings based on the NZ acuity scores were weakly correlated with severity of disease (using the Lesquesne Indices of Hip/Knee Severity) and 2 measures of general health status (EQ-5D and SF-12) prior to surgery. Moreover, NZ rankings were poor predictors of the benefits of surgery, as assessed by changes in the Lesquesne indices and the general health status measures. Given that the NZ rankings were developed to predict the magnitude of improvement from TJRs, the results were felt not to provide strong support for the NZ priority criteria. The authors suggested that alternative ways of determining patient priorities in the timing of TJRs should be explored.[38]

The Western Canada Waiting List (WCWL) Project[39-41] followed a process similar to that used in NZ, and identified 7 key criteria affecting urgency: pain (on motion, at rest, with walking); other functional limitations; abnormal findings on examination;

potential for progression of disease based on X-ray findings; and threat to role and/or independence. Ratings are weighted and summed to produce a "priority score", which experts have endorsed. However, the criteria have not been tested prospectively. The WCWL panel has recommended: additional research, including comparison of criteria scores with scores from other tools, such as the WOMAC; testing of the forms with general practitioners; and, development of a set of operational definitions and instruments to accompany the criteria. Saskatchewan recently introduced the WCWL priority scoring system to the Saskatchewan Surgical Care Network website.[42] It is the first province in Canada to prioritize patients for elective procedures and target maximum wait times. However, the impact of the system on wait times has yet to be determined.

The OJRR could assist in the management of hospital waiting lists and wait times in Ontario.[14,43] OJRR researchers are currently developing a tool to help surgeons prioritize patients in the queue according to recommended wait time thresholds and disease/symptom severity.

Unplanned and revision procedures

TJRs for cancer, fractures, and trauma are unplanned and considered urgent, and wait times for such procedures are generally not an issue. Revision surgery is necessary when a primary TJR fails. The timing of a revision procedure is determined largely by the cause of the failure. Some revision procedures are done on an emergency or urgent basis. In other cases, such as when there is evidence of implant loosening, a revision may be more elective. Even then, undue delay and progressive loosening may seriously compromise a revision. Thus, while exceptions exist, revision procedures are generally managed in a timely manner.

Unmet need

It is important to consider patients who would benefit from TJR but are not being referred for surgical consultation—the unmet need. Levels of unmet need for TJR have been estimated in 3 population-based surveys.

Frankel et al.[44] and Jüni et al.[45] conducted the Somerset and Avon survey of health to estimate the prevalence of hip and knee disease severe enough to warrant TJR. The study included a stratified random sample of 28,080 individuals aged 35 years and older from more than 40 general practices in 2 regions of the UK. It entailed an initial screening survey to identify individuals with hip or knee pain; additional questionnaires about symptoms and disability, socio-demographics, previous health services, preferences for care, and quality of life; a clinical examination for hip or knee disease; and a radiographic examination. The NZ priority scoring system was used to define need for TJR. Estimates of need were then adjusted to exclude those unfit for surgery; those who had not had adequate medical therapy; and those unwilling to undergo surgery if it were offered. After translating the prevalence rates into incidence rates, Frankel[44] estimated that by increasing the number of THRs in the UK from 43,500 procedures per year to 46,600 per year, the demand of eligible and willing candidates could be met.

Much higher estimates of unmet need for TKRs were found by Jüni et al.,[45] who ascertained that the annual number of procedures in the UK would have to increase from 29,300 to 55,800 TKRs. However, patients and general practitioners perceived TKRs more negatively than THRs. Persons with unmet need for TKR were less willing to consider surgery than those with unmeet need for THR, and this reduced the estimated demand to less than the actual rate of TKR.

In Ontario, Hawker et al.[46-48] examined unmet need for TJR in 2 areas of the province—1 with relatively high population-based procedure rates and 1 with low procedure rates. An initial screening survey of the entire population aged 55 years and older identified individuals with severe hip or knee symptoms. In these individuals, arthritis severity was assessed using the WOMAC. Trained physiotherapists established the presence of arthritis through clinical and radiological assessment, and evaluated willingness to undergo TJR, if it were offered. The need for TJR (hip or knee) was defined as a WOMAC summary score greater than 38/100, no self-reported contraindications to surgery, and willingness to undergo TJR if it were offered. Interestingly, unmet need for TJRs was greater in the higher-rate area: 540 per 100,000 persons aged 55 years and older compared with 240 per 100,000 in the lower-rate area. Despite higher rates of TJR in women, unmet need among women (530/100,000) was more than 3-fold greater than among men (160/100,000).[47] Further, after adjusting for age, sex, region, and body mass index, both lower education levels and lower income levels were independently associated with a greater likelihood of having a potential need for TJR.[48]

Unmet need for TJRs, as well as wide gaps between assessed need and acceptance of surgery, is documented in UK- and Ontario-based studies.[45,49] Health policy decision makers must consider surgical indications for TJR, in addition to individuals' preferences, when estimating population need for surgery. On their own, regional variations in TJR rates reveal little about underlying patterns of disease burden, unmet need, or patient preferences.

Patient outcomes

Primary TJRs appear to result in greater health improvement than revision procedures. Overwhelming evidence shows that planned primary TJRs lead to considerable improvements in pain and physical functioning in appropriately selected patients, with post-operative quality of life scores close to those

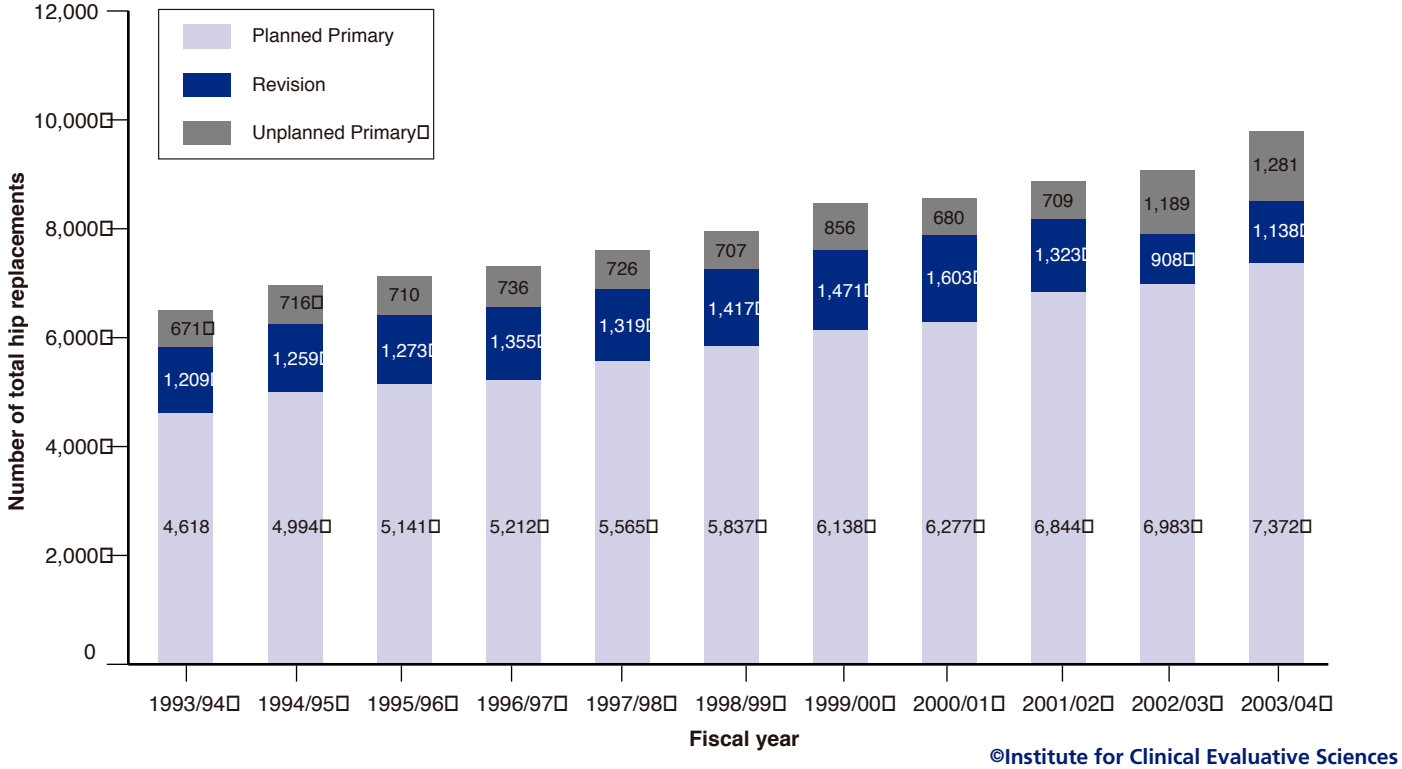
of the normal population.[8,50] Generally, patients with systemic inflammatory conditions, such as rheumatoid arthritis, do less well than patients with local disease, such as OA. The overall benefits of TJRs are also adversely affected by coexistent serious chronic health problems. Nevertheless, there is general consensus that, compared with other surgical and medical interventions, TJRs are highly cost-effective procedures.[8,51,52]

Given the benefits of TJR, avoidable pain and disability can be minimized by reducing the time to surgery. Further, proponents of URS systems suggest that certain patients are at high-risk of disease progression and will have poorer post-operative outcomes if their surgery is not completed in a timely manner. However, evidence for improved outcomes with quicker access is circumspect[38] and inconclusive.

Improved waiting list management may increase the likelihood of scheduling procedures in accordance with patient preferences. A coherent management plan will include clear objectives, and an information system that will allow managers to assess whether the objectives are being met.

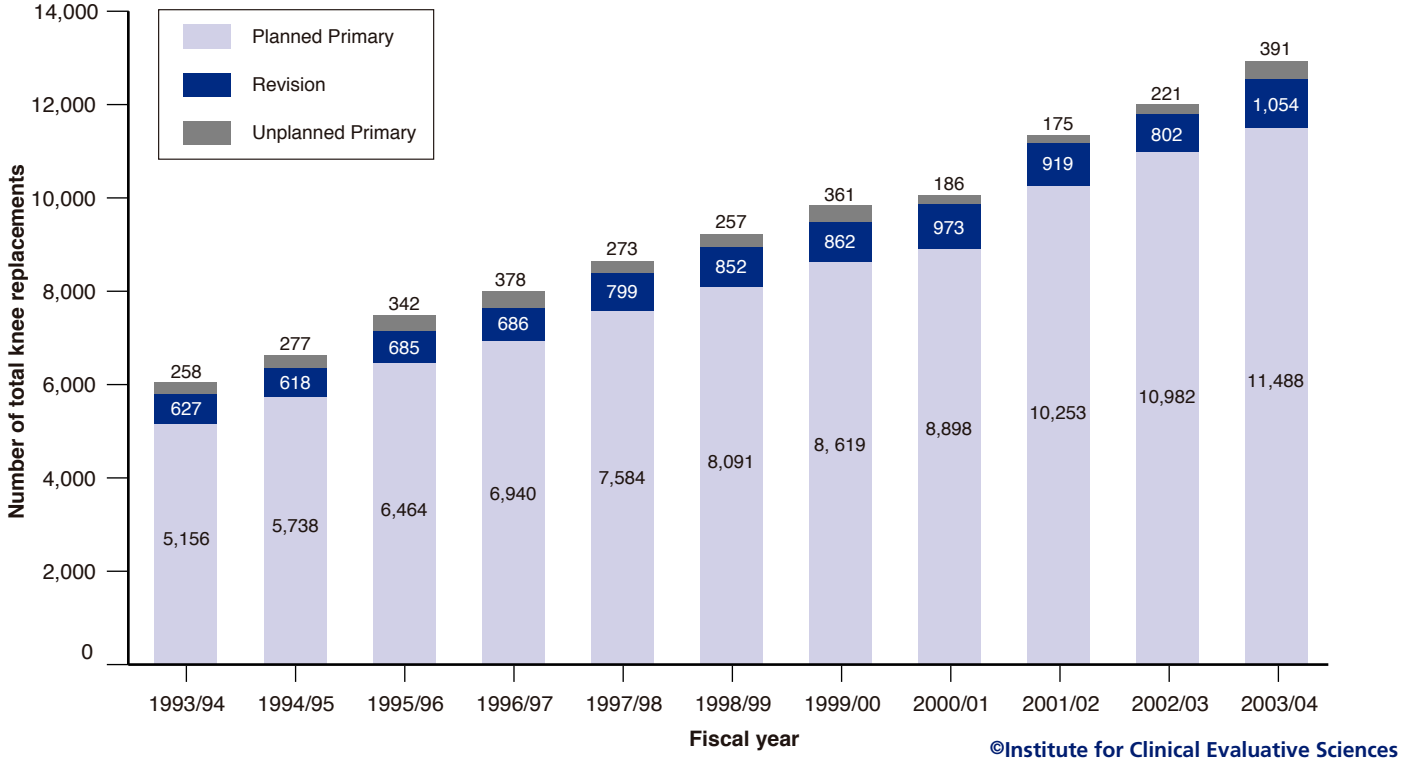
Chapter 5—List of Exhibits

5.1a Annual number of total hip replacements for the population aged 20 years and older, by type, in Ontario, 1993/94–2003/04



Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Registered Persons Database

5.1b Annual number of total knee replacements for the population aged 20 years and older, by type, in Ontario, 1993/94–2003/04



Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Registered Persons Database

5.2a Number and age- and sex-adjusted rate of total hip replacement per 100,000 population aged 20 years and older, by Local Health Integration Network, in Ontario, 2001/02–2003/04

Local Health Integration Network	2001/02		2002/03		2003/04	
	Number of Total Hip Replacements	Rate per 100,000 Population	Number of Total Hip Replacements	Rate per 100,000 Population	Number of Total Hip Replacements	Rate per 100,000 Population
1. Erie St. Clair	572	127	549	121	532	116
2. South West	885	127	827	117	980	137
3. Waterloo Wellington	475	112	448	103	522	117
4. Hamilton Niagara Haldimand Brant	1,239	119	1,244	118	1,387	131
5. Central West	354	89	336	82	375	89
6. Mississauga Oakville	527	97	558	98	633	107
7. Toronto Central	707	88	719	89	744	91
8. Central	714	84	870	99	813	90
9. Central East	1,107	102	1,134	102	1,256	111
10. South East	421	125	440	127	481	139
11. Champlain	889	106	891	104	925	107
12. North Simcoe Muskoka	370	122	364	117	367	114
13. North East	406	95	429	99	502	116
14. North West	186	110	236	138	236	138
All Ontario	**8,876**	**106**	**9,080**	**106**	**9,791**	**112**

Summary statistics (2003/04)	Value	P-value
Extremal Quotient	1.6	
Coefficient of Variation (%)	14.4	
Systematic Component of Variation	20.1	
Adjust Chi-Square (likelihood ratio)	201.7	<0.0001

Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census

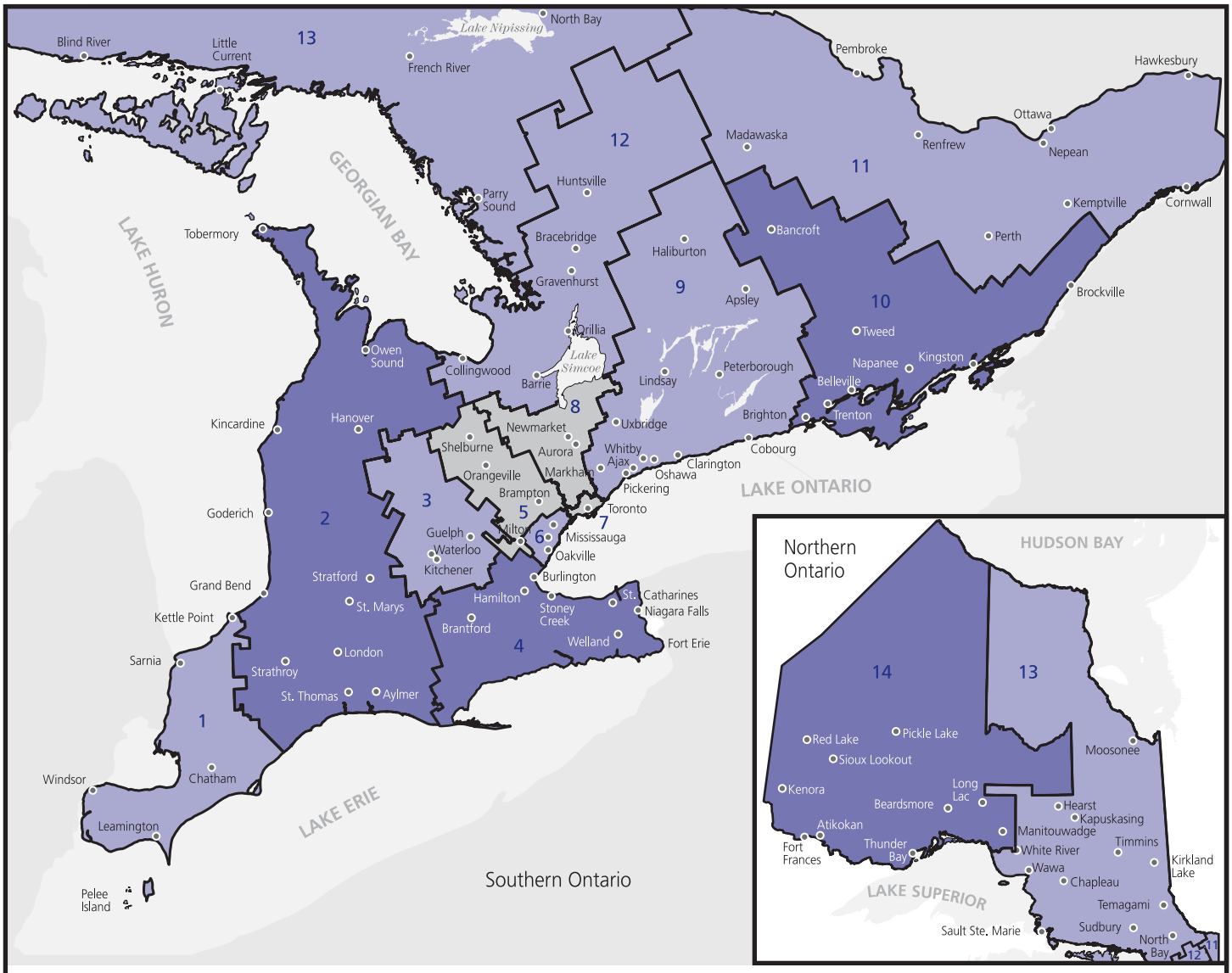
5.2b Number and age- and sex-adjusted rate of total knee replacement per 100,000 population aged 20 years and older, by Local Health Integration Network, in Ontario, 2001/02–2003/04

Local Health Integration Network	2001/02		2002/03		2003/04	
	Number of Total Knee Replacements	Rate per 100,000 Population	Number of Total Knee Replacements	Rate per 100,000 Population	Number of Total Knee Replacements	Rate per 100,000 Population
1. Erie St. Clair	633	141	686	152	705	155
2. South West	1,014	145	1,139	162	1,283	179
3. Waterloo Wellington	526	124	548	127	659	150
4. Hamilton Niagara Haldimand Brant	1,613	155	1,637	156	1,751	166
5. Central West	508	130	572	138	671	156
6. Mississauga Oakville	643	118	730	129	774	129
7. Toronto Central	716	90	722	90	743	93
8. Central	921	108	1,043	119	1,063	117
9. Central East	1,556	142	1,652	148	1,644	144
10. South East	532	156	579	169	689	198
11. Champlain	1,165	140	1,127	133	1,281	149
12. North Simcoe Muskoka	473	153	514	163	554	172
13. North East	639	149	649	151	729	168
14. North West	374	222	365	216	339	200
All Ontario	**11,347**	**135**	**12,005**	**140**	**12,933**	**149**

Summary statistics (2003/04)	Value	P-value
Extremal Quotient	2.2	
Coefficient of Variation (%)	18.3	
Systematic Component of Variation	36.4	
Adjust Chi-Square (likelihood ratio)	442.8	<0.0001

Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census

5.3a Age- and sex-adjusted rate of total hip replacement per 100,000 population aged 20 years and older, by Local Health Integration Network, in Ontario, 2003/04



Local Health Integration Networks (LHINs)

1. Erie St. Clair
2. South West
3. Waterloo Wellington
4. Hamilton Niagara Haldimand Brant
5. Central West
6. Mississauga Oakville
7. Toronto Central
8. Central
9. Central East
10. South East
11. Champlain
12. North Simcoe Muskoka
13. North East
14. North West

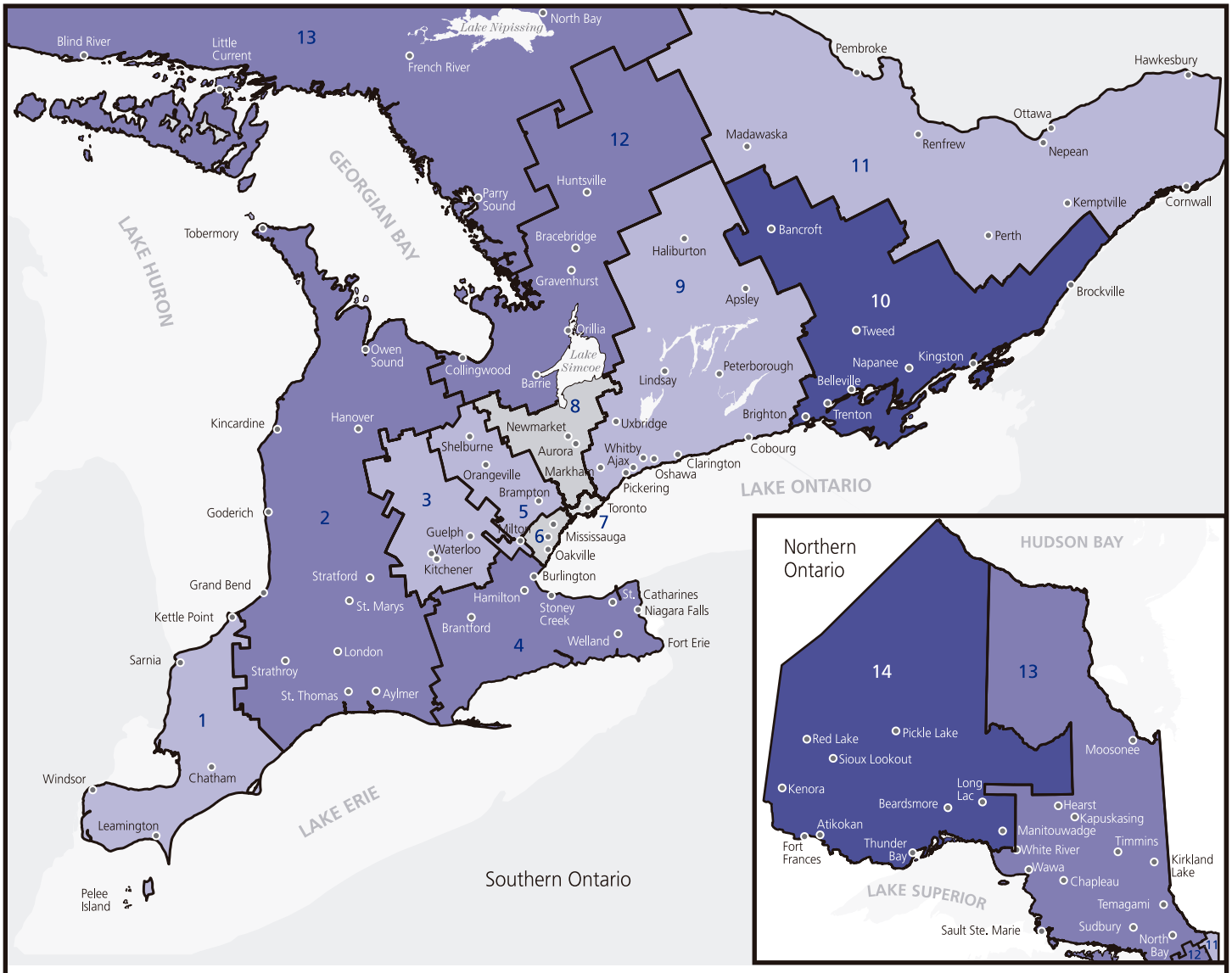
Age- and sex-adjusted rates for total hip replacement per 100,000 population aged 20 years and older, by Local Health Integration Network, in Ontario, 2003/04

Rate per 100,000 population	Comparative rate ratio	Number of LHINs in each category
123.5 to 145.9	1.1 to 1.3	(4)
101.0 to 123.5	0.9 to 1.1	(7)
84.2 to 101.0	0.75 to 0.9	(3)

Ontario rate = 112.2/100,000 persons

Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census

5.3b Age- and sex-adjusted rate of total knee replacement per 100,000 population aged 20 years and older, by Local Health Integration Network, in Ontario, 2003/04



Local Health Integration Networks (LHINs)

1. Erie St. Clair
2. South West
3. Waterloo Wellington
4. Hamilton Niagara Haldimand Brant
5. Central West
6. Mississauga Oakville
7. Toronto Central
8. Central
9. Central East
10. South East
11. Champlain
12. North Simcoe Muskoka
13. North East
14. North West

Age- and sex-adjusted rates for total knee replacement per 100,000 population aged 20 years and older, by Local Health Integration Network, in Ontario, 2003/04

Rate per 100,000 population	Comparative rate ratio	Number of LHINs in each category
≥ 193.2	≥ 1.3	(2)
163.5 to 193.2	1.1 to 1.3	(4)
133.8 to 163.5	0.9 to 1.1	(5)
111.5 to 133.8	0.75 to 0.9	(2)
< 111.5	< 0.75	(1)

Ontario rate = 148.6/100,000 persons

Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census

5.4a Overall and age- and sex-specific number and rate of total hip replacement per 100,000 population aged 20 years and older, by Local Health Integration Network, and for the province of Ontario, 2003/04

Local Health Integration Network	Women & Men Overall		Women by Age Group Rate of Total Hip Replacement				Women Overall		Men by Age Group Rate of Total Hip Replacement				Men Overall	
	Number of Total Hip Replacements	Rate per 100,000 Population	Age 20-64	Age 65-74	Age 75-84	Age 85+	Number of Total Hip Replacements	Rate per 100,000 Population	Age 20-64	Age 65-74	Age 75-84	Age 85+	Number of Total Hip Replacements	Rate per 100,000 Population
1. Erie St. Clair	532	121	60	443	570	370	338	149	49	254	376	453	194	91
2. South West	980	149	49	587	634	429	572	167	66	359	524	340	408	129
3. Waterloo Wellington	522	112	54	402	599	292	305	127	44	381	501	284	217	96
4. Hamilton Niagara Haldimand Brant	1,387	144	60	422	718	445	839	167	54	409	436	342	548	119
5. Central West	375	72	31	366	514	260	215	81	32	280	392	175	160	63
6. Mississauga Oakville	633	94	37	404	682	396	381	109	39	275	470	360	252	78
7. Toronto Central	744	87	28	348	553	408	452	101	32	310	314	383	292	72
8. Central	813	87	31	380	512	397	501	103	27	260	374	373	312	71
9. Central East	1,256	109	41	418	637	405	750	124	44	314	409	389	506	92
10. South East	481	156	56	444	727	478	274	171	75	352	543	224	207	139
11. Champlain	925	106	44	362	528	458	538	118	42	375	438	81	387	92
12. North Simcoe Muskoka	367	123	51	416	575	392	215	141	49	363	345	219	152	105
13. North East	502	126	53	340	568	233	270	131	59	392	385	411	232	121
14. North West	236	144	70	332	707	395	130	155	69	380	615	110	106	132
All Ontario	**9,791**	**113**	**44**	**411**	**609**	**404**	**5,802**	**128**	**45**	**335**	**427**	**322**	**3,989**	**96**

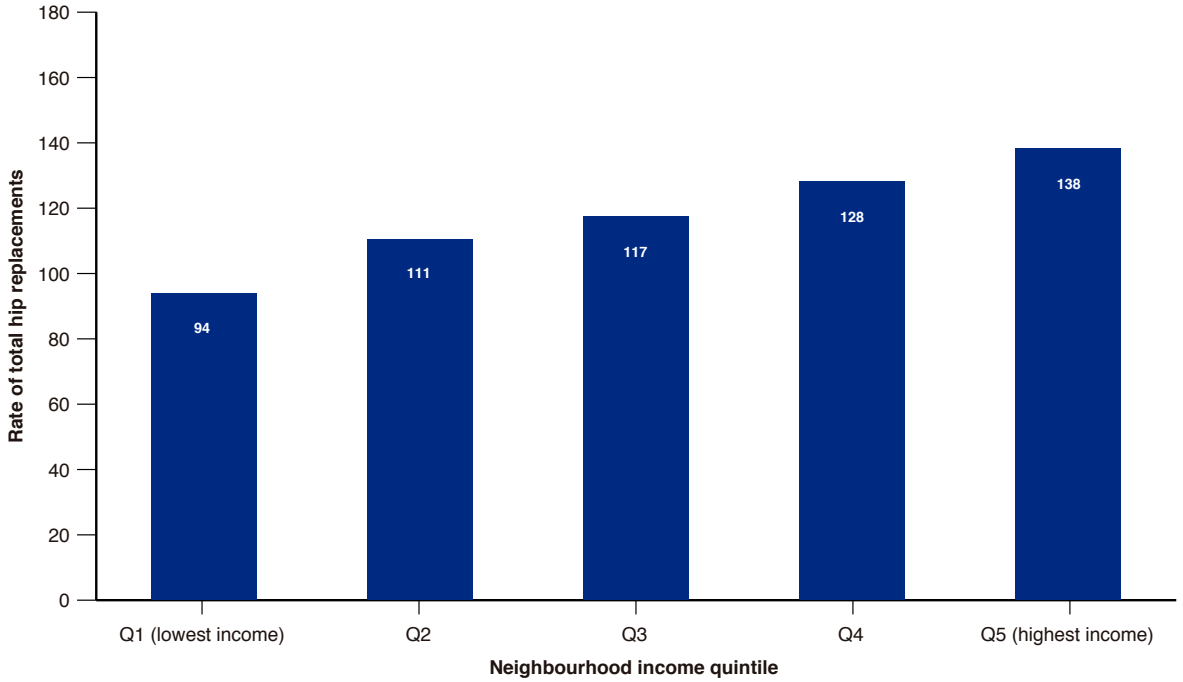
Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census

5.4b Overall and age- and sex-specific number and rate of total knee replacement per 100,000 population aged 20 years and older, by Local Health Integration Network, and for the province of Ontario, 2003/04

Local Health Integration Network	Women & Men Overall		Women by Age Group Rate of Total Knee Replacement				Women Overall		Men by Age Group Rate of Total Knee Replacement				Men Overall	
	Number of Total Knee Replacements	Rate per 100,000 Population	Age 20-64	Age 65-74	Age 75-84	Age 85+	Number of Total Knee Replacements	Rate per 100,000 Population	Age 20-64	Age 65-74	Age 75-84	Age 85+	Number of Total Knee Replacements	Rate per 100,000 Population
1. Erie St. Clair	705	160	77	696	587	322	428	188	55	523	556	330	277	131
2. South West	1,283	194	82	724	814	149	731	213	61	702	752	362	552	174
3. Waterloo Wellington	659	142	65	614	721	255	390	163	37	591	742	324	269	119
4. Hamilton Niagara Haldimand Brant	1,751	182	86	713	729	216	1,071	214	54	615	583	187	680	148
5. Central West	671	129	71	751	776	130	411	155	50	517	546	175	260	102
6. Mississauga Oakville	774	115	66	613	574	189	496	142	31	468	499	108	278	86
7. Toronto Central	743	87	44	524	494	192	533	119	17	268	299	96	210	51
8. Central	1,063	114	46	624	656	179	696	143	23	361	576	112	367	83
9. Central East	1,644	142	68	638	654	172	994	165	45	539	538	220	650	118
10. South East	689	223	87	739	859	291	376	235	80	698	961	269	313	210
11. Champlain	1,281	146	71	584	710	280	770	170	41	558	655	324	511	121
12. North Simcoe Muskoka	554	186	102	560	703	183	308	202	56	660	794	109	246	170
13. North East	729	184	92	712	581	97	418	203	72	608	529	137	311	163
14. North West	339	206	112	841	784	308	204	243	78	557	742	440	135	168
All Ontario	**12,933**	**147**	**71**	**656**	**679**	**208**	**7,855**	**174**	**44**	**538**	**601**	**215**	**5,078**	**122**

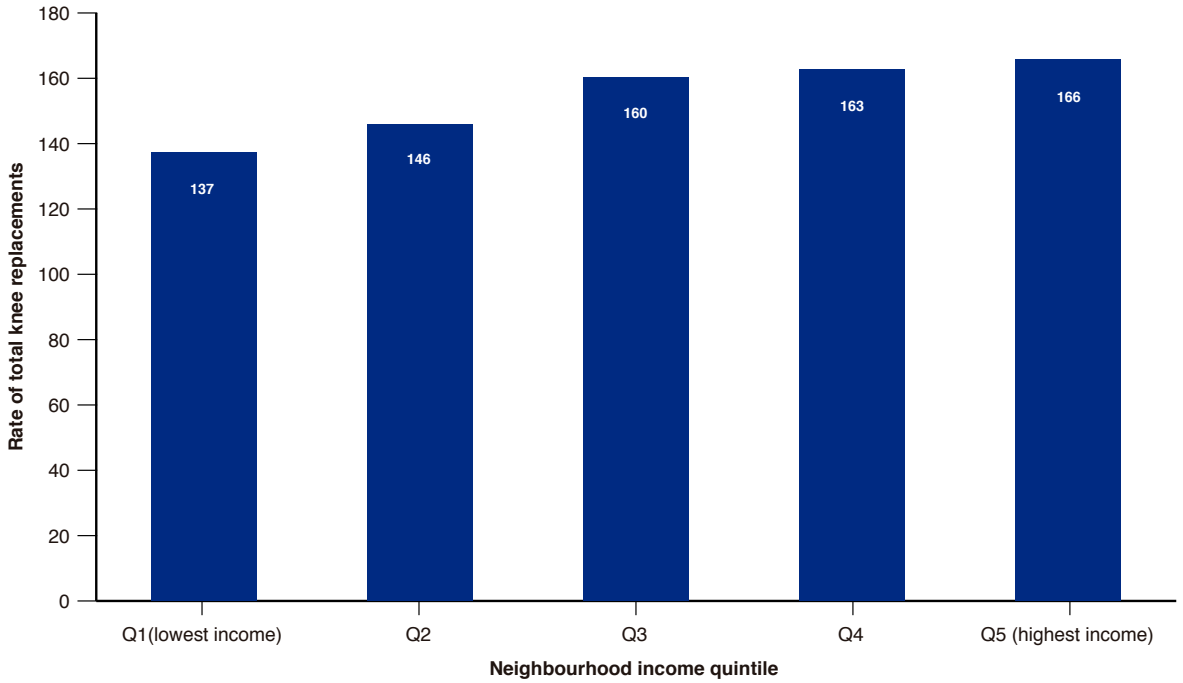
Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census

5.5a Age- and sex-adjusted rate of total hip replacements per 100,000 population aged 20 years and older, by neighbourhood income quintile, in Ontario, 2003/04



Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census

5.5b Age- and sex-adjusted rate of total knee replacements per 100,000 population aged 20 years and older, by neighbourhood income quintile, in Ontario, 2003/04



Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census

5.6a Number of total hip replacements, by hospital corporation, and type of surgery, in Ontario, 2003/04

Hospital Corporation	City	Number of Planned Primary Total Hip Replacements†	Number of Revision Total Hip Replacements‡	Number of Unplanned Primary Total Hip Replacements§
Academic				
Hamilton Health Sciences Corporation	Hamilton	394	76	31
Kingston General Hospital	Kingston	203	39	43
London Health Sciences Centre	London	326	73	28
Mount Sinai Hospital	Toronto	99	53	41
St. Joseph's Health Care, London	London	66	24	6
St. Joseph's Healthcare, Hamilton	Hamilton	104	28	13
St. Michael's Hospital	Toronto	176	49	16
Sunnybrook and Women's College Health Sciences Centre	Toronto	535	104	37
The Ottawa Hospital	Ottawa	323	75	89
University Health Network	Toronto	211	81	36
Community				
Bluewater Health	Sarnia	122	12	8
Brant Community Healthcare System	Brantford	82	6	32
Brockville General Hospital	Brockville	41	6	*
Cambridge Memorial Hospital	Cambridge	78	*	13
Chatham-Kent Health Alliance	Chatham	85	6	18
Cornwall Community Hospital	Cornwall	6	*	*
Credit Valley Hospital, The	Mississauga	91	*	19
Grand River Hospital Corporation	Kitchener	189	11	6
Grey Bruce Health Services	Owen Sound	181	*	*
Guelph General Hospital	Guelph	98	7	8
Halton Healthcare Services Corporation	Oakville	141	21	36
Hotel Dieu Grace Hospital, Windsor	Windsor	169	25	17
Hotel Dieu Health Sciences Hospital, Niagara	St. Catharines	156	28	9
Humber River Regional Hospital	Toronto	158	21	16
Huron Perth Healthcare Alliance, Stratford	Stratford	27	*	*
Hôpital Régional de Sudbury Regional Hospital Corporation	Sudbury	137	13	23
Joseph Brant Memorial Hospital	Burlington	151	16	25
Lakeridge Health Corporation	Oshawa	129	17	18
Markham Stouffville Hospital	Markham	92	11	51
Montfort Hospital	Ottawa	109	11	26
Niagara Health System	Niagara Falls	137	12	22
North Bay General Hospital	North Bay	34	*	*
North York General Hospital	Toronto	175	14	40
Orillia Soldiers' Memorial Hospital	Orillia	12	*	*
Perth & Smiths Falls District Hospital	Smiths Falls	56	*	7
Peterborough Regional Health Centre	Peterborough	169	14	25
Queensway-Carleton Hospital	Ottawa	166	7	12
Quinte Healthcare Corporation	Belleville	139	11	*
Religious Hospitallers of St. Joseph Health Centre, Cornwall	Cornwall	30	*	*
Ross Memorial Hospital	Lindsay	36	*	15
Rouge Valley Health System	Toronto	157	23	13
Royal Victoria Hospital of Barrie, The	Barrie	193	18	6
Sault Area Hospital	Sault Ste. Marie	93	*	*
Southlake Regional Health Centre	Newmarket	122	15	10
St. Joseph's Health Centre, Toronto	Toronto	109	14	21
St. Mary's General Hospital	Kitchener	72	18	27
St. Thomas-Elgin General Hospital	St. Thomas	72	*	15
The Scarborough Hospital	Toronto	205	23	28
Thunder Bay Regional Health Sciences Centre	Thunder Bay	175	38	16
Timmins & District Hospital	Timmins	47	*	*
Toronto East General Hospital	Toronto	124	18	29
Trillium Health Centre	Mississauga	175	29	23
William Osler Health Centre	Brampton	210	16	22
Windsor Regional Hospital	Windsor	50	*	17
Woodstock General Hospital	Woodstock	59	*	*
York Central Hospital	Richmond Hill	104	14	9

Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Registered Persons Database

† Planned primary: scheduled initial total hip replacement procedures ‡ Revision: total hip replacement procedures performed on joints which have been previously replaced
§ Unplanned primary: total hip replacement procedures performed due to trauma, fracture, or cancer * Cell sizes with fewer than 6 procedures were suppressed to ensure confidentiality

Academic hospitals: University-affiliated facilities; members of the Council of Academic Hospitals of Ontario (CAHO)

Community hospitals: All other hospitals

Small hospitals: Facilities that generally provide less than 3,500 weighted cases, have a referral population of less than 20,000 people, and are the only hospital in their community, as defined by the Joint Policy and Planning Committee (JPPC)

5.6b Number of total knee replacements, by hospital corporation, and type of surgery, in Ontario, 2003/04

Hospital Corporation	City	Number of Planned Primary Total Knee Replacements†	Number of Revision Total Knee Replacements‡	Number of Unplanned Primary Total Knee Replacements§
Academic				
Hamilton Health Sciences Corporation	Hamilton	594	74	11
Kingston General Hospital	Kingston	257	52	8
London Health Sciences Centre	London	375	127	*
Mount Sinai Hospital	Toronto	108	36	10
St. Joseph's Health Care London	London	105	17	*
St. Joseph's Healthcare Hamilton	Hamilton	122	6	*
St. Michael's Hospital	Toronto	164	21	9
Sunnybrook and Women's College Health Sciences Centre	Toronto	624	91	*
The Ottawa Hospital	Ottawa	487	54	6
University Health Network	Toronto	243	36	*
Community				
Bluewater Health	Sarnia	176	7	*
Brant Community Healthcare System	Brantford	113	6	*
Brockville General Hospital	Brockville	80	*	*
Cambridge Memorial Hospital	Cambridge	102	*	*
Chatham-Kent Health Alliance	Chatham	137	8	*
Cornwall Community Hospital	Cornwall	98	*	*
Credit Valley Hospital, The	Mississauga	238	12	*
Grand River Hospital Corporation	Kitchener	237	19	*
Grey Bruce Health Services	Owen Sound	270	9	*
Guelph General Hospital	Guelph	166	10	*
Halton Healthcare Services Corporation	Oakville	177	7	*
Hotel Dieu Grace Hospital, Windsor	Windsor	188	18	*
Hotel Dieu Health Sciences Hospital, Niagara	St. Catharines	201	15	*
Humber River Regional Hospital	Toronto	299	12	*
Huron Perth Healthcare Alliance	Stratford	74	*	*
Hôpital Régional de Sudbury Regional Hospital Corporation	Sudbury	239	35	*
Joseph Brant Memorial Hospital	Burlington	201	13	*
Lakeridge Health Corporation	Oshawa	152	7	*
Markham Stouffville Hospital	Markham	133	*	*
Montfort Hospital	Ottawa	263	9	*
Niagara Health System	Niagara Falls	247	22	9
North Bay General Hospital	North Bay	124	*	*
North York General Hospital	Toronto	287	15	*
Orillia Soldiers' Memorial Hospital	Orillia	29	*	*
Perth & Smiths Falls District Hospital	Smiths Falls	111	*	*
Peterborough Regional Health Centre	Peterborough	227	18	*
Queensway-Carleton Hospital	Ottawa	211	9	*
Quinte Healthcare Corporation	Belleville	257	15	*
Ross Memorial Hospital	Lindsay	41	7	*
Rouge Valley Health System	Toronto	250	22	*
Royal Victoria Hospital of Barrie, The	Barrie	316	21	*
Sault Area Hospitals	Sault Ste. Marie	122	*	*
Southlake Regional Health Centre	Newmarket	180	10	*
St. Joseph's Health Centre, Toronto	Toronto	137	9	*
St. Mary's General Hospital	Kitchener	140	11	*
St. Thomas-Elgin General Hospital	St. Thomas	68	7	*
The Scarborough Hospital	Toronto	627	47	*
Thunder Bay Regional Health Sciences Centre	Thunder Bay	255	21	*
Timmins & District Hospital	Timmins	50	*	*
Toronto East General Hospital	Toronto	197	17	*
Trillium Health Centre	Mississauga	376	22	*
William Osler Health Centre	Brampton	445	12	*
Windsor Regional Hospital	Windsor	163	14	*
Woodstock General Hospital	Woodstock	85	10	*
York Central Hospital	Richmond Hill	116	9	*
Small				
Dryden Regional Health Centre	Dryden	56	*	*

Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Registered Persons Database; Statistics Canada–2001 Census

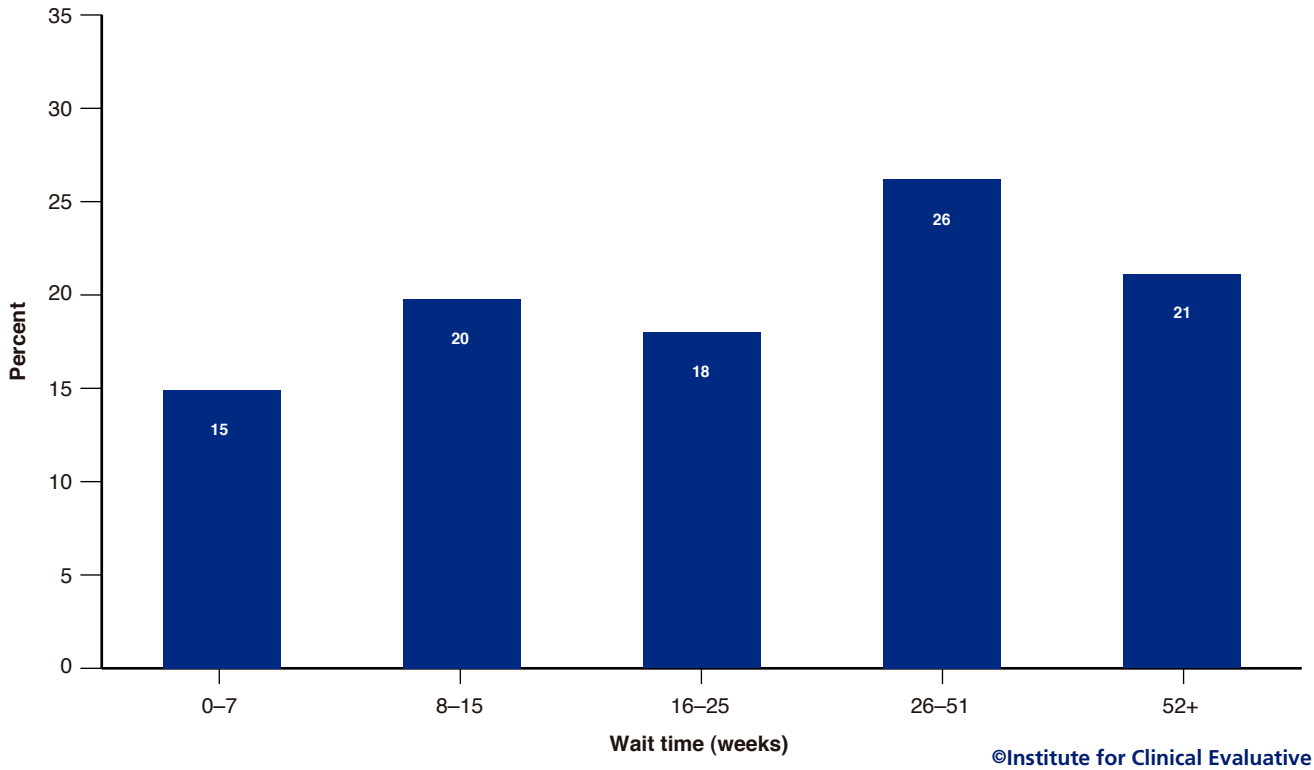
† Planned primary: scheduled initial total knee replacement procedures ‡ Revision: total knee replacement procedures performed on joints which have been previously replaced
§ Unplanned primary: total knee replacement procedures performed due to trauma, fracture, or cancer
*Cell sizes with fewer than 6 procedures performed were suppressed to ensure confidentiality

Academic hospitals: University-affiliated facilities; members of the Council of Academic Hospitals of Ontario (CAHO)

Community hospitals: All other hospitals

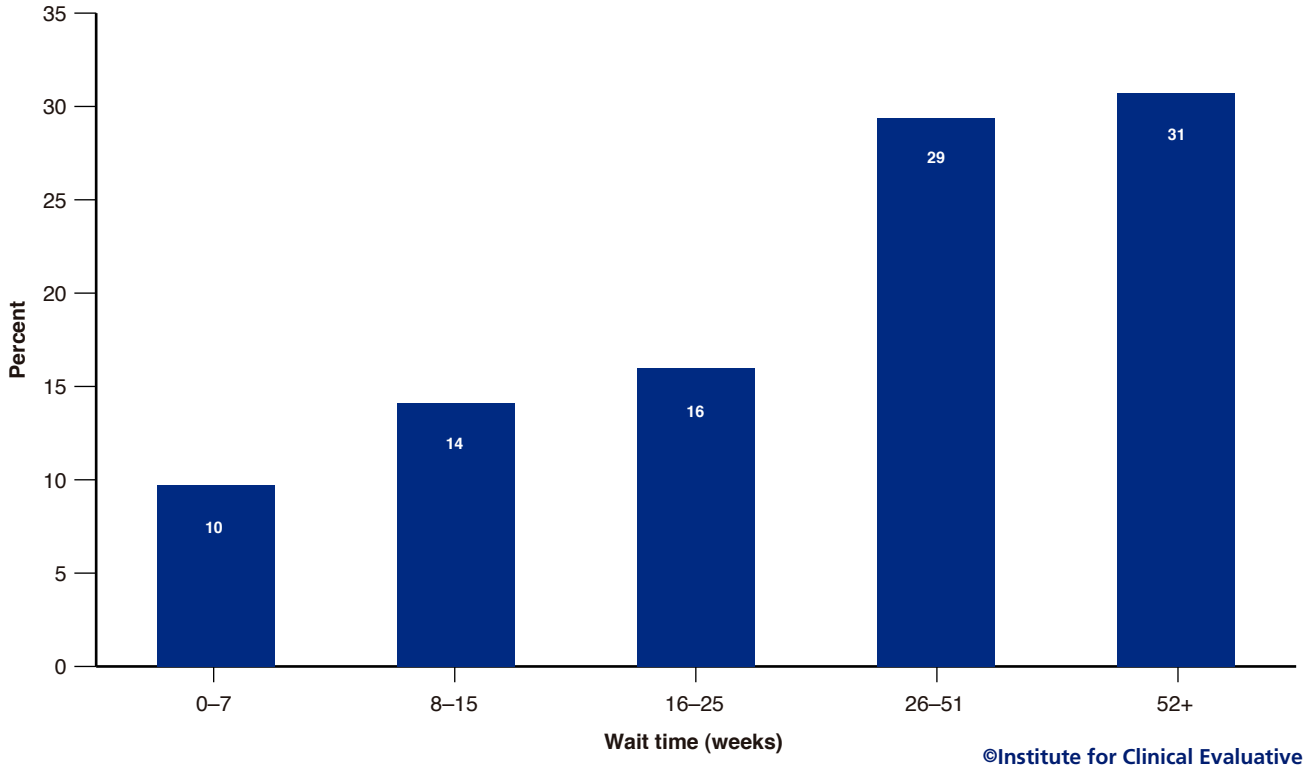
Small hospitals: Facilities that generally provide less than 3,500 weighted cases, have a referral population of less than 20,000 people, and are the only hospital in their community, as defined by the Joint Policy and Planning Committee (JPPC)

5.7a Proportion of planned primary total hip replacements performed within specified wait time ranges, in Ontario, 2003/04



Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Ontario Joint Replacement Registry

5.7b Proportion of planned primary total knee replacements performed within specified wait time ranges, in Ontario, 2003/04



Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Ontario Joint Replacement Registry

5.8a Median wait time for planned primary total hip replacement and proportion performed within the recommended maximum wait time (26 weeks), by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

Local Health Integration Network	Wait Times for Total Hip Replacement					
	2001/02		2002/03		2003/04	
	Median Wait Time (Weeks)	Percent of Planned Primary Total Hip Replacements Performed Within RMWT* (26 Weeks)	Median Wait Time (Weeks)	Percent of Planned Primary Total Hip Replacements Performed Within RMWT (26 Weeks)	Median Wait Time (Weeks)	Percent of Planned Primary Total Hip Replacements Performed Within RMWT (26 Weeks)
1. Erie St. Clair	14	69	15	68	16	71
2. South West	21	58	28	48	30	44
3. Waterloo Wellington	17	65	20	59	21	57
4. Hamilton Niagara Haldimand Brant	19	63	22	59	25	52
5. Central West	20	65	22	56	24	53
6. Mississauga Oakville	17	66	20	61	23	57
7. Toronto Central	20	61	21	57	20	60
8. Central	18	62	20	62	24	55
9. Central East	19	60	20	58	20	58
10. South East	21	58	31	45	27	47
11. Champlain	30	42	33	41	36	34
12. North Simcoe Muskoka	16	70	19	64	21	59
13. North East	24	53	27	47	32	39
14. North West	12	78	13	71	20	66
All Ontario	**20**	**61**	**22**	**56**	**24**	**53**

*RMWT= Recommended Maximum Wait Time

Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Ontario Joint Replacement Registry

5.8b Median wait time for planned primary total knee replacement and proportion performed within the recommended maximum wait time (26 weeks), by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

	Wait Times for Total Knee Replacement					
	2001/02		2002/03		2003/04	
Local Health Integration Network	Median Wait Time (Weeks)	Percent of Planned Primary Total Knee Replacement Performed Within RMWT* (26 Weeks)	Median Wait Time (Weeks)	Percent of Planned Primary Total Knee Replacement Performed Within RMWT (26 Weeks)	Median Wait Time (Weeks)	Percent of Planned Primary Total Knee Replacement Performed Within RMWT (26 Weeks)
1. Erie St. Clair	19	58	20	59	26	50
2. South West	27	47	37	38	43	31
3. Waterloo Wellington	23	54	27	48	28	45
4. Hamilton Niagara Haldimand Brant	26	50	31	42	32	41
5.Central West	27	49	28	45	31	41
6. Mississauga Oakville	27	49	24	52	30	43
7. Toronto Central	22	56	26	49	32	43
8. Central	23	55	25	51	29	45
9. Central East	23	53	25	52	27	48
10. South East	34	36	34	41	35	35
11. Champlain	40	33	44	27	44	24
12. North Simcoe Muskoka	22	58	25	51	30	47
13. North East	33	40	35	34	45	31
14. North West	37	37	36	40	35	35
All Ontario	**27**	**49**	**29**	**45**	**33**	**40**

*RMWT= Recommended Maximum Wait Time

Data sources: Canadian Institute for Health Information–Discharge Abstract Database; Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Ontario Joint Replacement Registry

Conclusions and Next Steps

In 2003/04, 56 Ontario hospitals and 247 orthopaedic surgeons performed 22,724 TJRs. Although the number of TJRs has nearly doubled since 1993/94, there has been a more than 4-fold increase in the number of people waiting beyond the RMWT of 26 weeks for TJRs (about 2,400 in 1993/94 to about 10,400 in 2003/04). Without a considerable increase in procedures, the number of patients with excessive wait times will continue to rise.

The OJRR captures information about wait times, the surgical procedure itself, and outcomes related to TJRs in Ontario. If its mandate is expanded to include waiting list management, it must involve all surgeons and hospitals performing TJRs, and all individuals seeking the procedure. For most patients, surgical wait times begin at the time of referral to an orthopaedic surgeon. This information is not accurately captured using health administrative data and this gap should be addressed.

Ontario must also build on the work of the OJRR and others described in this chapter, and establish criteria that could be used to assess the appropriateness of TJRs in the province.

It must be determined whether a quantitative URS is superior to using clinician judgment in waiting list management and whether it enhances clinical decision making.

Public access to regional information about surgical wait times will allow patients to choose faster access to surgery at an institution other than the one to which they are referred.

It will be important to measure the outcomes of TJR with a simple, standardized scale such as the WOMAC, as is being done by the OJRR.

Finally, despite the increase in number of TJRs, it is essential to develop and implement methods to assess unmet need in the province, which might be considerable.

Appendix 5.A

How the Research was Done

Data sources

Data on TJRs were obtained from the CIHI-DAD and from MOHLTC-OHIP for fiscal years 1993/94 to 2003/04. THRs and TKRs were identified from CIHI-DAD records by discharge date and specific ICD-10-CA/CCI and ICD-9/CCP procedure and diagnosis codes. ICD-10-CA/CCI classification was implemented in Ontario hospitals in 2002/03. Non-Ontario residents and persons under 20 years of age were excluded, as were procedures that were coded as "cancelled", "previous", "out-of-hospital", or "abandoned after onset". Bilateral procedures were counted only once.

For THR procedures coded in the CCI classification, the rubric code of 1.VA.53, *implantation of internal device, hip joint* was used. This rubric is broken down into more detailed subcategories: cement spacer, single component and dual component, and for each, whether the procedure was cemented or uncemented. Only the dual component prosthetic device codes were included in this report, as these capture total (as opposed to partial) hip replacements: 1.VA.53.LA-PN (open approach) and 1.VA.53.PN-PN (robotics-assisted approach). Revision procedures were identified using a supplementary code called a Status Attribute, in which Status Attribute = R identifies the procedure as a revision. The coding of this attribute, however, was optional until 2003/04. Thus, the number of procedures coded as revisions in 2002/03 and 2003/04 may be underestimated.

For THR procedures coded in the CCP classification, the codes of interest were 93.51, *total hip replacement with methyl methacrylate*, and 93.59, *other total hip replacement*. Before 2000/01, these codes also included revisions. However, as of April 1, 2000, revisions of a THR *cemented with methyl methacrylate* were assigned the CCP code 93.52, and revisions of a THR *uncemented* were coded 93.53. All 4 codes were used in this study.

For TKR procedures coded in CCI, the rubric 1.VG.53, which refers to *implantation of internal device*, knee joint, was used. This rubric code permits the separation of true TKRs (dual and tri-component prosthetic device codes) from partial knee replacements (single component prosthetic devices and cement spacers) using subcodes. However, to maintain comparability with older classification systems used elsewhere in this report, all codes in rubric 1.VG.53 were used to define TKR procedures.

As with THR procedures, revisions were identified using the supplementary code Status Attribute = R.

For TKR coded in CCP, the relevant codes are 93.41, *geomedic and polycentric total knee replacement* (until April 2000, this code captured primary and revision procedures) and 93.40 (in April 2000, this code was added to capture revision of a TKR, cemented or uncemented).

Primary TJRs for cancer, fractures, or trauma were considered "unplanned". Procedures were deemed unplanned if a record identified a hospital admission as "Urgent", "Emergent", or "Entry from Emergency" or it was accompanied by a diagnosis code listed in Table 5.1. All remaining procedures were considered planned. In some hospitals, some planned primary procedures may have been coded as unplanned. During our verification process with hospitals, two hospitals confirmed the error and supplied revised procedure counts. These revised counts appear in Exhibits 5.6a and 5.6b.

For each TJR the patient's age, sex, and postal code were obtained from the CIHI-DAD. When a valid postal code was not found, it was obtained from the MOHLTC Registered Persons Database (RPDB). The RPDB contains contact and administrative data for all OHIP beneficiaries. Postal codes were converted into Dissemination Areas (DAs) using Statistics Canada conversion files, and DAs were converted into LHINs.

Surgical wait times (time from a patient's last surgical consult to date of operation) for planned primary TJRs were calculated for procedures performed in fiscal 2001/02, 2002/03, and 2003/04. OHIP claims were matched with CIHI records on the patients' unique identifying numbers encrypted by ICES. OHIP claims with the suffix of "A" and fee codes for primary THR (R440 or R553), revision THR (R241), primary TKR (R441 or R248), and revision TKR (R244) were abstracted. Matching CIHI and OHIP records required the same unique identifying number, with the OHIP service date falling within admission and discharge dates on the CIHI discharge abstract. The starting point for the wait time was the date on the OHIP billing record for the patient's last surgical consultation (billing codes A065 or C065) before surgery. Because about 20% of patients make the decision to proceed with TJR some time after the surgical consultation, this protocol systematically overestimates the duration of time from decision to surgery. The extent and nature of the difference is the subject of ongoing research.

Orthopaedic surgeons who are members of SEAMO at Queen's University do not bill OHIP, thus, information about their patients' wait times would not be available to ICES. However, several SEAMO surgeons participate in the OJRR, and through a written research agreement, wait time information was obtained for TJRs performed by these surgeons in 2003/04.

Analyses

Age- and sex-specific population counts for the LHINs for 2001 were derived from Statistics Canada 2001 Census counts. Population counts for the LHINs for 2002 and 2003 were interpolated from the 2001 figures weighted by the changes in the Statistics Canada post-censal population estimates for census divisions over the same period. Age- and sex-standardized rates for TJRs were calculated using these population estimates and are expressed as rates per 100,000 persons aged 20 years and older. Regional variation in the utilization of TJR was assessed by tabulating and mapping procedure rates by LHIN, procedure number and type, and by hospital corporation. In hospital-level analyses, cell sizes with fewer than 6 procedures were suppressed to ensure confidentiality.

Wait times were calculated for planned primary TJR from 2001/02 by year and by LHIN. Wait times were not standardized by age or sex. For 2003/04, the distribution of wait times and proportions above and below the RMWT of 26 weeks were shown by dividing the TJRs into 5 categories: completion within 7 weeks; 8–15 weeks; 16–25 weeks; 26–51 weeks; and 52 weeks or more. Median wait times and proportions of procedures completed within the RMWT were calculated by year and by LHIN to assess change over time and geographic variation in waits.

Table 5.1 Diagnosis codes used to define primary total joint replacements as "unplanned"*

Condition	ICD-9	ICD-10-CA
Cancer		
Malignant neoplasm of bone, lower limb	170.7, 170.8, 170.9	C40.2, C40.3, C40.8, C40.9
Secondary malignant neoplasm, bone	198.5	C79.5
Injury		
Fracture of acetabulum	808.0, 808.1	S32.4
Fracture of femur, patella, tibia, fibula	820, 821, 822, 823, 827, 828	S72.x, S82.0, S82.1, S82.2, S82.4, S82.7, S82.9
External Cause of Injury		
Transport accident	E800 – E848	V01.x – V99.x
Accidental falls	E880 – E888	W00.x – W19.x

* If not in the presence of hospital admission category "Urgent", "Emergent", or "Entry from Emergency"

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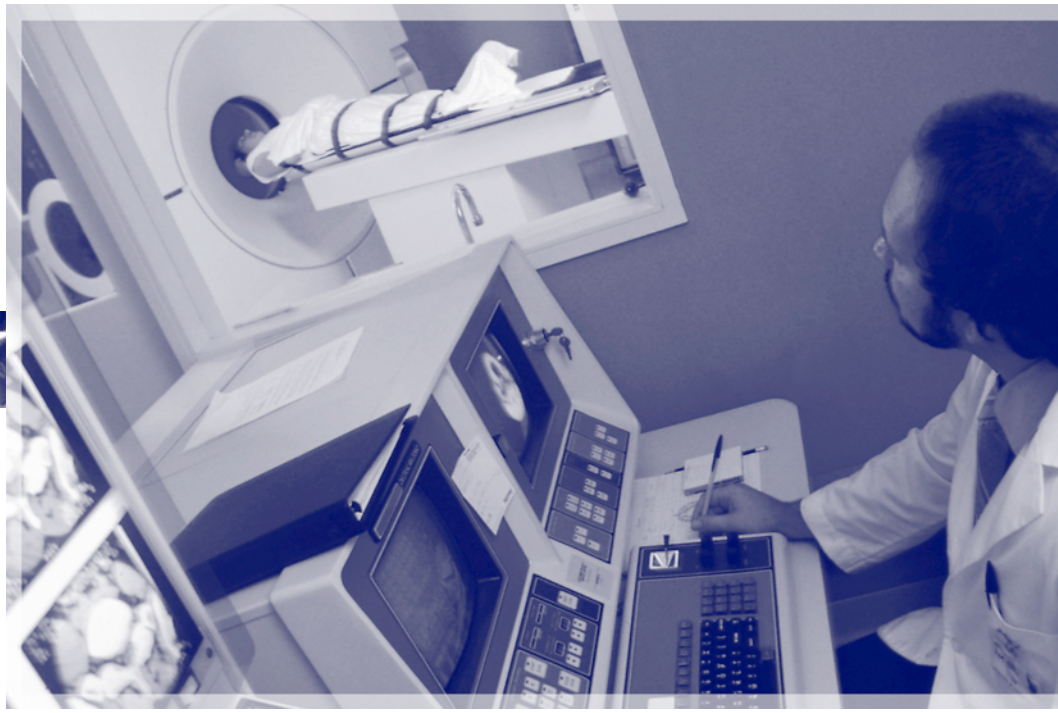
INSIDE

6

Chapter

CT and MRI Scanning

Andreas Laupacis, MD, MSc, FRCPC, M. Anne Keller, MD, FRCPC and Raymond Przybysz, MSc



Executive Summary

Issue

There is considerable concern that Ontarians do not have sufficient access to computerized tomography (CT) and magnetic resonance imaging (MRI) scanning in Ontario.

Study

Data from the Ontario Health Insurance Plan (OHIP) were used to describe the number of CT and MRI scans done in Ontario during the last decade, the rate of scanning, and variation in scanning rates according to age, sex, socioeconomic status and geographical location.

Key findings

Between 1993/94 and 2003/04, the number of CT scans increased 3-fold, while the number of MRI scans increased 6-fold. Between 2001/02 and 2003/04, the rate of CT scanning increased by 15% and the rate of MRI scanning increased by 30%. The Local Health Integration Network (LHIN) region with the highest rate of CT scanning had a rate 1.6 times higher than the LHIN with the lowest rate, while for MRI the LHIN with the highest rate of scanning was 1.9 times higher than the LHIN with the lowest rate. Individuals living in the wealthiest neighbourhoods were 21% more likely to receive an MRI scan than those living in the poorest neighbourhoods. No province-wide Ontario data are available to describe the length of time patients are waiting to receive a CT or MRI scan.

Implications

The marked increase in the rate of CT and MRI scanning during the last few years is greater than the increase in the rate of the surgical interventions evaluated in other chapters in this atlas. There is an urgent need to:

- Determine the appropriateness of the requests causing the increase in scanning;
- Routinely measure the length of time that Ontarians are waiting for CT and MRI scans; and,
- Ensure Ontarians receive CT or MRI scans in a timely manner.

Introduction

Used to investigate a variety of symptoms, CT and MRI are non-invasive imaging techniques. Canada has fewer CT and MRI scanners than most developed countries,[1] and there is public and clinician concern about access to these technologies.[2,3]

Major technical developments in CT and MRI imaging evolved during the last decade. In 1998, advances in CT scanners from single-slice acquisition (1 image is obtained with each rotation of the X-ray tube) to 4-slice acquisition (4 images are obtained with each rotation) resulted in improvements in imaging of the chest and abdomen. In 2001, availability of 16-slice acquisition facilitated extremely fast scanning times, and the indications for CT expanded to include vascular investigations. MRI technology has also progressed, with improved coil design for optimal image quality, and faster pulse sequences, which opened the door for abdominal and breast imaging to become standard examinations.

Improved image quality and expanded indications for CT and MRI scanning have naturally led to an increasing number of scans. CT and MRI scanning have become the first line test for many clinical indications, no longer relegated to being ordered after other imaging tests have proven inconclusive (e.g., CT scanning for a suspected pulmonary embolus). This should reduce the need for general radiography, nuclear medicine, myelography, and other tests.

The purpose of this chapter is to describe the rate of CT and MRI scanning in Ontario during the last decade, and variation according to age, sex, socioeconomic status, and geographical location. Because of the way MRI scans are reimbursed in Ontario, the information is available for outpatient scans only, while the information for CT includes inpatient and outpatient scans. No Ontario data are available to accurately describe wait times, appropriateness, urgency, or unmet need for CT and MRI scanning.

Findings and Discussion

Rates of service provision

Exhibits 6.1a –b and 6.2: Annual number of procedures by year

During the last decade, the number of CT scans performed in Ontario increased 3-fold, while the number of MRI scans increased 6-fold. During the same period, the number of CT and MRI scanners operating in Ontario also increased by approximately 3- and 5-fold, respectively.

In 2003/04, scanning of the abdomen/pelvis was the most frequently performed type of CT scan (45%). CT scans of the abdomen/pelvis and thorax increased the most during the last decade, by 466% and 403%, respectively.

In 2003/04, scanning of the brain was the most frequently performed type of MRI scan (35%). MRI scans of the extremities and spine increased the most during the last decade, by 1,057% and 666%, respectively.

Exhibits 6.3a –b and 6.4a –b: Rates by LHIN

In 2003/04, the rate of CT scans was 5 times higher than the rate of MRI scans. The rates were calculated on the basis of where patients live, not on the basis of where the scan was done.

In 2003/04, LHIN North Simcoe Muskoka had the highest CT scanning rate, which was 1.6 times higher than the LHIN with the lowest rate (North West).

In 2003/04, LHIN North West had the highest MRI scanning rate, which was 1.9 times higher than the LHIN with the lowest rate (Waterloo Wellington).

In the 2 years between 2001/02 and 2003/04, the rate of CT scanning increased by 15% and the rate of MRI scanning increased by 30%. The analysis incorporated changes in population size, and was adjusted for age and sex. Thus, this large increase means that CT and MRI scanning are being used more intensively, although the reason is not clear. It is likely a combination of:

- New indications;
- Increased use of scanning to monitor response to therapy (e.g., the response of a lymphoma to chemotherapy);
- Physician concern about litigation;
- Greater patient and physician demand; and,
- More scanners.

Exhibits 6.5a –b: Age- and sex-specific rates by LHIN

In 2003/04, the highest rate of CT scans was observed in the 75 years+ age group (women and men), while the highest rate of MRI scans was observed in men aged 65–74 years, and women aged 40–64 years.

In 2003/04, men and women under 65 years of age had a virtually identical rate of CT scanning, while men aged 65 years and older had a slightly higher rate of scanning than women in the same age group.

In 2003/04, women under 65 years of age had a slightly higher rate of MRI scanning than men in the same age group, while men aged 75+ years had a slightly higher rate of scanning than women in the same age group.

Exhibits 6.6a –b: Rates by neighbourhood income quintile

Individuals living in the poorest neighbourhoods were 10% more likely to receive a CT scan and 21% less likely to receive a MRI scan than individuals living in the wealthiest neighbourhoods. On average, individuals living in poor neighbourhoods have worse health than those living in wealthy neighbourhoods. Thus, the greater use of CT scans for individuals living in poor neighbourhoods may reflect a greater burden of disease. On the other hand, the greater use of MRI scans for individuals living in wealthy neighbourhoods likely indicates greater access to the technology. Whether this represents under-utilization of MRI scans for poorer individuals, over-utilization for wealthier individuals, or a combination of both, is not known.

Note: The OHIP database contains a field that indicates where the CT or MRI scan was done. Following analysis of this field and subsequent discussion with Ontario hospitals, it was recognized that there were important inaccuracies in the data. Therefore, no hospital-specific information is provided in this report.

Wait times

Because information about the time CT and MRI scans were requested is not routinely collected in Ontario, it was not possible to determine the average length of time from request to completion. In a 2004 survey of clinicians by The Fraser Institute, the median wait time in Ontario was reported at 5 weeks for a CT scan and 12 weeks for an MRI scan.[4] Using information from surveys of the general public, Statistics Canada reported a median wait time of 3 weeks for non-emergency CT scans, MRI scans, or angiograms.[5] However, interpreting these results with certainty is difficult. For example, both studies relied upon self-reporting, which can be inaccurate. In addition, The Fraser Institute study had a poor response rate of 31%, and the Statistics Canada study combined 3 different diagnostic modalities. Some centres in Canada report the length of time patients wait for CT and MRI scans,[6,7,8] but this is not routinely done in Ontario.

To obtain accurate information on the actual wait time for CT and MRI scans in Ontario, data on the date the test was ordered, date of completion, and indication should be routinely collected from imaging centres. This should be recorded as part of an electronic booking system in a standardized manner, and would create a province-wide registry that allows analyses of wait times and linkage to other administrative data for further analyses.

Appropriateness

Because CT and MRI scanning are generally believed to be relatively non-invasive, it seems that they are increasingly being used to investigate non-specific symptoms due to several factors:

- Growing patient demand;
- Clinicians' concerns about missing a treatable illness no matter how unlikely;
- Concerns about litigation if an important abnormality is not diagnosed; and,
- The increased supply of scanners in Ontario.

It is possible that these issues account for the increase in the rate of CT and MRI scanning observed in this chapter, however, accurate data are not available. It is important to recognize that use of diagnostic imaging in low-risk individuals can lead to false positive results, which create unwarranted anxiety and expose patients to the unnecessary risk and expense of further investigations.

In theory it should be possible to develop guidelines to help clinicians and patients determine when a CT or MRI scan is indicated. However, in practice this is not easy. The types of symptoms and physical findings that might justify a CT or MRI scan are almost infinite and cannot be easily captured in clinical practice guidelines. As well, in addition to making a diagnosis, there are other reasons for ordering a diagnostic test, such as to provide reassurance, establish a prognosis, determine the extent of disease, and follow response to therapy.

However, progress is being made. The American College of Radiology has used methodologies similar to those developed by the RAND Corporation to establish appropriateness criteria for imaging,[9] but Canadian clinicians rarely use them (they are extensive and most clinicians are likely not aware of them). The Canadian Association of Radiologists is developing evidence-based guidelines for all diagnostic imaging procedures, which should be available in 2005.

Cancer Care Ontario (CCO) is leading an initiative to develop specific guidelines for the use of cross-sectional imaging to stage cancer, monitor response to therapy, and follow patients for recurrence. There is an urgent need for high-quality studies on the impact of diagnostic imaging on patient management and outcome to inform guidelines like those being developed by CCO.

Another approach to assessing the appropriateness of CT and MRI scanning, other than guidelines, is to determine the proportion of scans that are entirely normal. If this varies markedly between regions, it would raise questions about whether scans are being ordered too frequently in the regions with the highest frequency of normal scans, or not frequently enough in the region with the lowest frequency. Of course, many scans would be expected to be normal, and considerable research needs to be done about how to determine the appropriate frequency of normal scans. At the very least, this approach would lead clinicians to reflect upon their use of scans.

Urgency

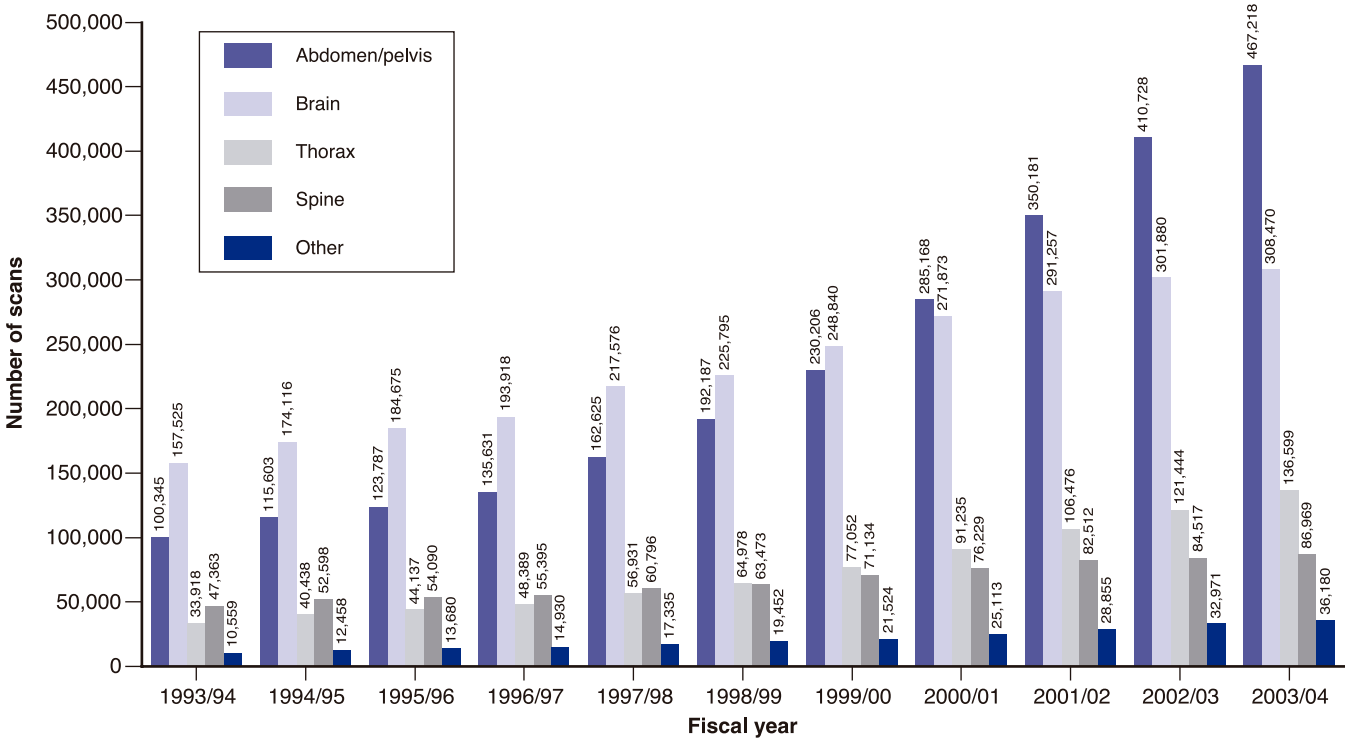
A recent survey of Ontario radiologists by the CT-MRI Expert Working Group, (established to support the Ministry of Health and Long-Term Care's (MOHLTC) Access to Care initiative), suggests that most radiologists review every request for CT and MRI scans in order to prioritize patients on the waiting list and make recommendations for another test if it is considered more appropriate. However, the authors are not aware of any reliable and easy-to-use priority-setting tools for CT and MRI scanning. The Western Canada Waiting List Project has taken the lead in attempts to develop a priority-setting scoring system for MRI scans. To date, these efforts have not been successful due to poor agreement among clinicians on how to use the complex scoring system.[10–12] The Provincial Wait Time Monitoring Project Steering Committee in Nova Scotia has recommended a priority rating index that divides patients waiting for CT and MRI scans into 3 levels of urgency with target wait times of <3 days, 4 to 14 days, and 15 to 28 days.[13] These times reflect the opinions of working group members.

Patient outcomes

In general, it is difficult to expect to demonstrate an association between the performance of a diagnostic test and patient outcomes, except in a relatively small number of specific clinical indications. However, on a population basis, it is possible to assess the correlation between the intensity of resource use and outcome. A recent study in the United States found that regions with the highest expenditures on health care had no better outcomes, and indeed there was a trend towards poorer outcomes and less use of evidence-based therapy.[14,15] Intriguingly, one of the greatest differences between the highest and lowest expenditure regions was in the use of a variety of diagnostic tests. A similar study in Ontario would provide useful information.

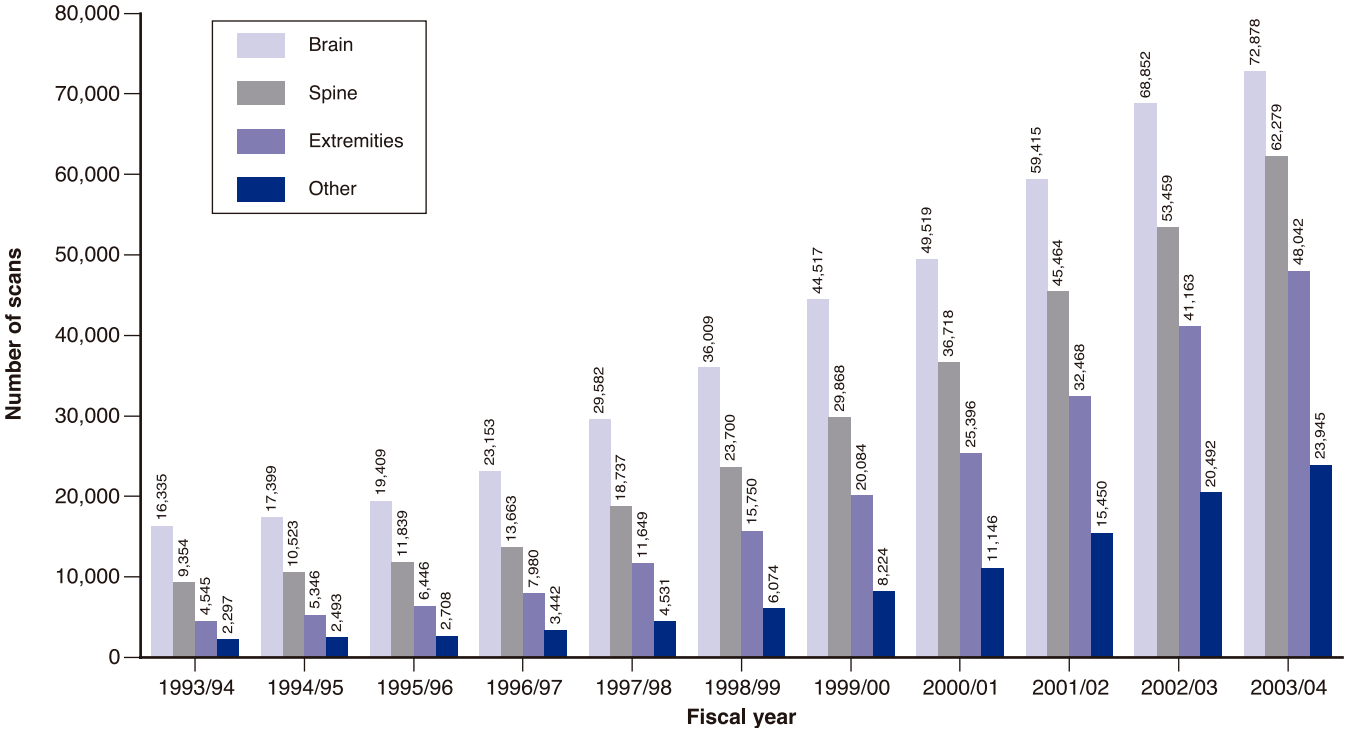
Chapter 6—List of Exhibits

6.1a Annual number of inpatient/outpatient CT scans, by type, in Ontario, 1993/94–2003/04



Data source: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan

6.1b Annual number of outpatient MRI scans, by type, in Ontario, 1993/94–2003/04



Data source: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan

6.2 Change in number of CT and MRI scanners in Ontario, calendar years 1993–2004

Calendar Year	Number of CT scanners			Number of MRI scanners		
	Total at Beginning of Year	Number Added	Total at End of Year	Total at Beginning of Year	Number Added	Total at End of Year
1993	26	5	31	10	0	10
1994	31	7	38	10	1	11
1995	38	6	44	11	1	12
1996	44	9	53	12	0	12
1997	53	7	60	12	10	22
1998	60	6	66	22	3	25
1999	66	10	76	25	5	30
2000	76	0	76	30	3	33
2001	76	4	80	33	6	39
2002	80	7	87	39	4	43
2003	87	8	95	43	2	45
2004	95	5	100*	45	4	49
*		6	106			

*Year of purchase unknown for 6 CT scanners

Data source: Ministry of Health and Long-Term Care

6.3a Number and age- and sex-adjusted rate of inpatient/outpatient CT scans per 100,000 population, by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

Local Health Integration Network	2001/02		2002/03		2003/04	
	Number of CT Scans	Rate per 100,000 Population	Number of CT Scans	Rate per 100,000 Population	Number of CT Scans	Rate per 100,000 Population
1. Erie St. Clair	40,886	6,847	48,401	7,989	53,687	8,739
2. South West	65,547	7,112	70,581	7,544	76,380	8,049
3. Waterloo Wellington	37,554	6,353	41,027	6,781	45,743	7,403
4. Hamilton Niagara Haldimand Brant	89,411	6,667	97,432	7,150	102,850	7,436
5. Central West	44,957	7,451	48,870	7,800	54,440	8,418
6. Mississauga Oakville	57,037	7,122	65,084	7,777	71,218	8,210
7. Toronto Central	87,610	8,327	97,139	9,129	98,708	9,232
8. Central	97,008	8,342	107,634	8,917	108,823	8,727
9. Central East	111,643	7,401	125,104	8,082	138,495	8,750
10. South East	32,929	7,536	35,840	8,050	40,510	8,945
11. Champlain	89,220	7,779	96,746	8,266	115,067	9,666
12. North Simcoe Muskoka	37,690	9,328	42,933	10,281	46,613	10,842
13. North East	40,852	7,154	45,097	7,845	50,563	8,741
14. North West	12,832	5,537	14,561	6,255	15,541	6,637
Invalid/missing postal code	*14,105*	-	*15,091*	-	*16,798*	-
All Ontario	**859,281**	**7,544**	**951,540**	**8,165**	**1,035,436**	**8,708**

Summary statistics (2003/04)	Value	P-value
Extremal Quotient	1.6	
Coefficient of Variation (%)	9.6	
Systematic Component of Variation	13.5	
Adjusted Chi-square (likelihood ratio)	11528.7	<0.0001

Data sources: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

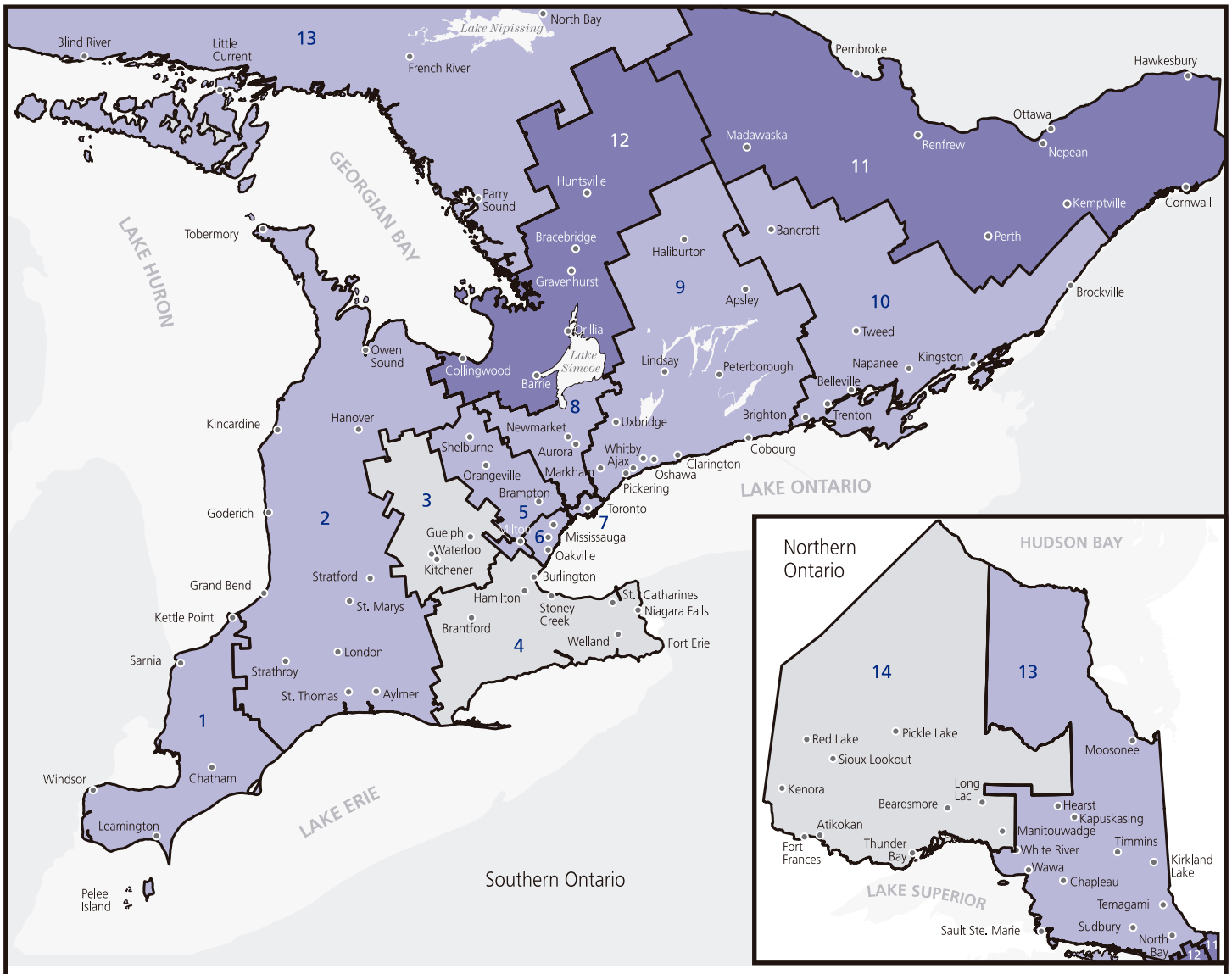
6.3b Number and age- and sex-adjusted rate of outpatient MRI scans per 100,000 population, by Local Health Integration Network, and for the province of Ontario, 2001/02–2003/04

Local Health Integration Network	2001/02 Number of MRI Scans	2001/02 Rate per 100,000 Population	2002/03 Number of MRI Scans	2002/03 Rate per 100,000 Population	2003/04 Number of MRI Scans	2003/04 Rate per 100,000 Population
1. Erie St. Clair	5,749	979	7,784	1,306	8,732	1,450
2. South West	9,377	1,056	11,464	1,273	13,289	1,460
3. Waterloo Wellington	4,240	694	5,904	948	8,222	1,301
4. Hamilton Niagara Haldimand Brant	15,081	1,183	22,039	1,700	28,457	2,159
5. Central West	8,229	1,245	9,516	1,389	10,826	1,536
6. Mississauga Oakville	11,687	1,374	14,616	1,651	16,704	1,821
7. Toronto Central	17,521	1,670	20,743	1,957	21,724	2,045
8. Central	17,227	1,462	20,549	1,683	21,997	1,748
9. Central East	19,930	1,302	24,554	1,567	25,894	1,621
10. South East	3,893	945	4,833	1,159	5,833	1,380
11. Champlain	16,465	1,428	15,273	1,302	17,616	1,477
12. North Simcoe Muskoka	5,048	1,289	6,101	1,512	6,151	1,482
13. North East	11,148	2,018	12,527	2,257	12,813	2,311
14. North West	4,978	2,170	5,410	2,346	5,744	2,484
Invalid/missing postal code	*2,224*	-	*2,653*	-	*3,142*	-
All Ontario	**152,797**	**1,342**	**183,966**	**1,581**	**207,144**	**1,749**

Summary statistics (2003/04)	Value	P-value
Extremal Quotient	1.9	
Coefficient of Variation (%)	17.6	
Systematic Component of Variation	44.2	
Adjusted Chi-square (likelihood ratio)	6333.5	<0.0001

Data sources: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

6.4a Age- and sex-adjusted rate of inpatient/outpatient CT scans per 100,000 population, by Local Health Integration Network, and for the province of Ontario, 2003/04



Local Health Integration Networks (LHINs)

1. Erie St. Clair
2. South West
3. Waterloo Wellington
4. Hamilton Niagara Haldimand Brant
5. Central West
6. Mississauga Oakville
7. Toronto Central
8. Central
9. Central East
10. South East
11. Champlain
12. North Simcoe Muskoka
13. North East
14. North West

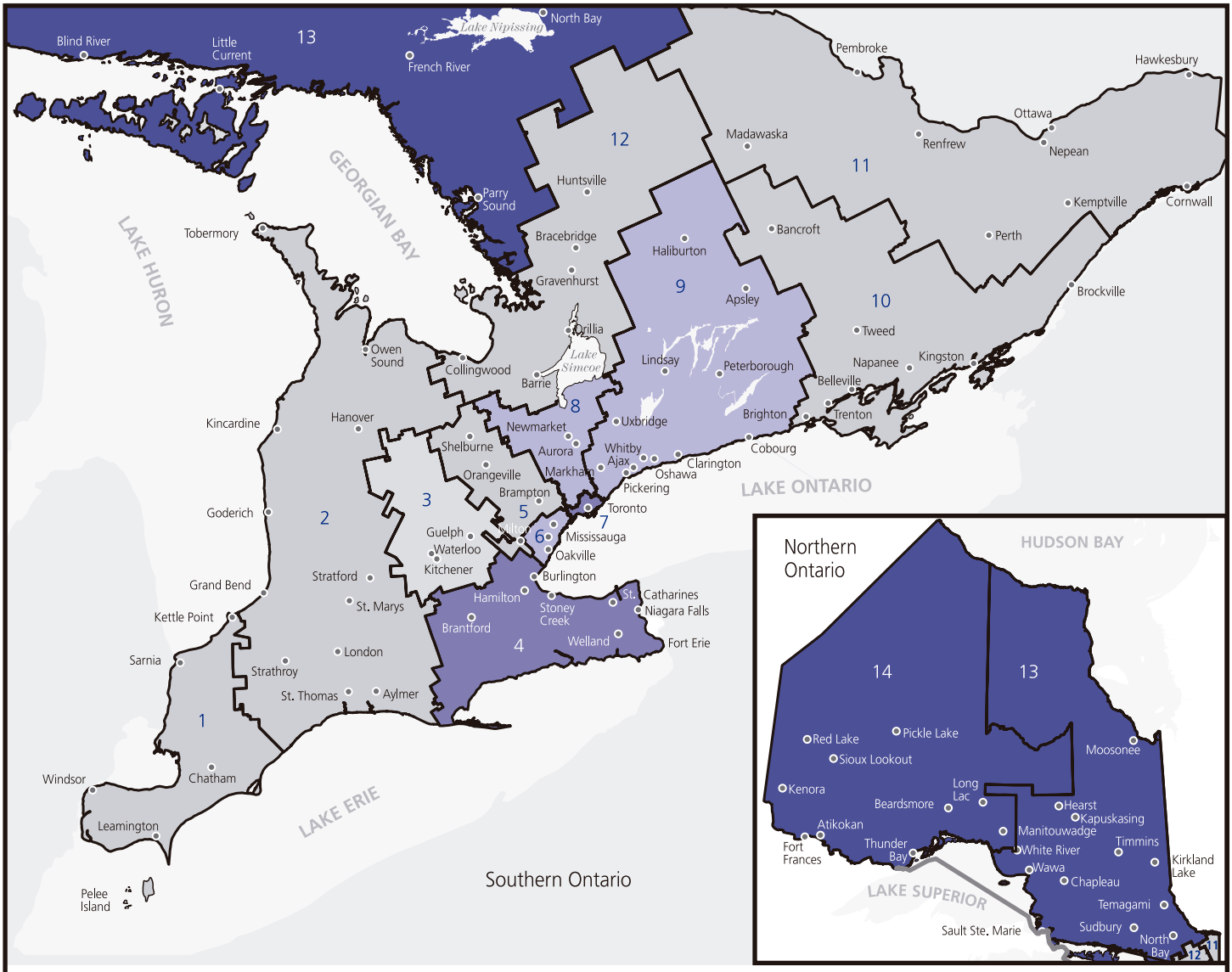
Age- and sex-adjusted rates for CT scans, per 100,000 population, by Local Health Integration Network, in Ontario, 2003/04

Rate per 100,000 population	Comparative rate ratio	Number of LHINs in each category
9,578.8 to 11,320.4	>1.1	(2)
7,837.2 to 9,578.8	0.9 to 1.1	(9)
6,531.0 to 7,837.2	0.75 to 0.9	(3)

Ontario rate = 8,708/100,000 persons

Data sources: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

6.4b Age- and sex-adjusted rate of outpatient MRI scans per 100,000 population, by Local Health Integration Network, and for the province of Ontario, 2003/04



Local Health Integration Networks (LHINs)

1. Erie St. Clair
2. South West
3. Waterloo Wellington
4. Hamilton Niagara Haldimand Brant
5. Central West
6. Mississauga Oakville
7. Toronto Central
8. Central
9. Central East
10. South East
11. Champlain
12. North Simcoe Muskoka
13. North East
14. North West

Age- and sex-adjusted rates for outpatient MRI scans, per 100,000 population, by Local Health Integration Network, in Ontario, 2003/04

Rate per 100,000 population	Comparative rate ratio	Number of LHINs in each category
≥ 2,273.7	≥ 1.3	(2)
1,923.9 to 2,273.7	1.1 to 1.3	(2)
1,574.1 to 1,923.9	0.9 to 1.1	(3)
1,311.8 to 1,574.1	0.75 to 0.9	(6)
< 1,311.8	< 0.75	(1)

Ontario rate = 1,749/100,000 persons

Data sources: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

6.5a Overall and age- and sex-specific number and rate of inpatient/outpatient CT scans per 100,000 population, by Local Health Integration Network, and for the province of Ontario, 2003/04

Local Health Integration Network	Women & Men Overall		Women by Age Group Number of CT Scans				Women Overall		Men by Age Group Number of CT Scans				Men Overall	
	Number of CT Scans	Rate per 100,000 Population	Age 0–39	Age 40–64	Age 65–74	Age 75+	Number of CT Scans	Rate per 100,000 Population	Age 0–39	Age 40–64	Age 65–74	Age 75+	Number of CT Scans	Rate per 100,000 Population
1. Erie St. Clair	53,687	8,991	3,634	10,809	19,186	24,222	26,802	8,813	3,811	10,701	26,227	34,886	26,879	9,174
2. South West	76,380	8,541	3,290	9,773	18,920	22,773	38,286	8,371	3,560	10,074	23,049	30,767	38,090	8,719
3. Waterloo Wellington	45,743	7,164	2,717	9,007	18,486	22,546	22,966	7,091	2,770	9,098	23,641	31,367	22,776	7,238
4. Hamilton Niagara Haldimand Brant	102,850	8,009	2,982	9,137	17,548	21,213	51,749	7,854	3,099	9,135	22,576	29,623	51,099	8,172
5. Central West	54,440	7,419	3,140	10,445	20,136	25,342	26,941	7,286	3,247	10,230	26,513	35,719	27,494	7,554
6. Mississauga Oakville	71,218	7,729	2,940	9,860	20,769	28,048	36,278	7,714	3,002	9,804	24,627	36,655	34,930	7,744
7. Toronto Central	98,708	9,180	2,797	11,042	23,134	30,822	49,563	8,932	3,206	11,952	29,914	41,506	49,135	9,442
8. Central	108,823	8,639	3,009	10,513	21,364	30,059	55,195	8,518	3,054	10,686	26,689	40,040	53,598	8,762
9. Central East	138,495	8,784	3,311	10,787	21,699	27,278	70,722	8,736	3,202	10,932	25,988	36,625	67,759	8,833
10. South East	40,510	9,945	3,481	11,363	21,440	24,852	20,254	9,737	3,460	11,575	26,247	35,238	20,247	10,158
11. Champlain	115,067	9,847	3,585	12,675	25,060	31,069	61,108	10,223	3,134	11,403	29,905	40,390	53,946	9,450
12. North Simcoe Muskoka	46,613	11,546	4,784	13,707	27,421	30,901	23,959	11,709	4,130	13,267	30,687	40,363	22,652	11,376
13. North East	50,563	9,569	3,677	10,866	20,591	23,644	25,215	9,343	3,714	10,593	25,760	35,226	25,347	9,804
14. North West	15,541	6,922	2,552	8,573	16,256	19,626	7,846	6,926	2,649	8,189	19,962	23,974	7,695	6,918
Missing*	*16,798*	-	-	-	-	-	*8,797*	-	-	-	-	-	*7,945*	-
All Ontario	**1,035,436**	**8,840**	**3,258**	**10,784**	**21,442**	**26,782**	**525,681**	**8,776**	**3,290**	**10,745**	**26,514**	**36,054**	**509,592**	**8,904**

* Invalid: includes out-of-province, and missing age, sex, or postal code information

Data sources: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

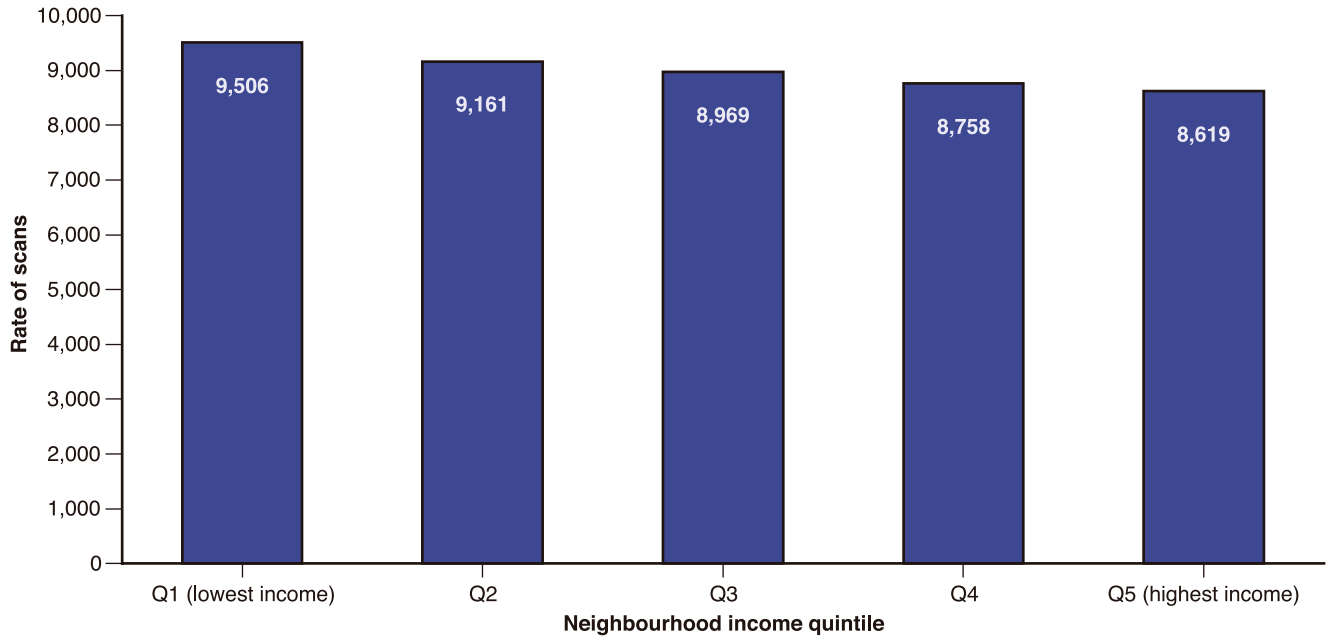
6.5b Overall and age- and sex-specific number and rate of outpatient MRI scans per 100,000 population, by Local Health Integration Network, and for the province of Ontario, 2003/04

Local Health Integration Network	Women & Men Overall		Women by Age Group Number of MRI Scans				Women Overall		Men by Age Group Number of MRI Scans				Men Overall	
	Number of MRI Scans	Rate per 100,000 Population	Age 0–39	Age 40–64	Age 65–74	Age 75+	Number of MRI Scans	Rate per 100,000 Population	Age 0–39	Age 40–64	Age 65–74	Age 75+	Number of MRI Scans	Rate per 100,000 Population
1. Erie St. Clair	8,732	1,462	1,073	2,288	2,244	1,325	4,799	1,578	860	1,962	2,097	1,437	3,933	1,342
2. South West	13,289	1,486	1,100	2,384	2,092	1,181	7,385	1,615	873	1,927	2,036	1,523	5,903	1,351
3. Waterloo Wellington	8,222	1,288	935	2,222	1,842	956	4,553	1,406	748	1,809	1,773	1,162	3,669	1,166
4. Hamilton Niagara Haldimand Brant	28,457	2,216	1,468	3,669	3,226	1,930	15,759	2,392	1,240	2,948	3,146	2,360	12,697	2,031
5. Central West	10,826	1,475	958	2,536	2,440	1,433	5,733	1,550	873	2,130	2,770	2,043	5,091	1,399
6. Mississauga Oakville	16,704	1,813	1,117	3,106	2,796	1,797	9,056	1,926	1,026	2,509	3,170	2,311	7,645	1,695
7. Toronto Central	21,724	2,020	1,178	3,546	3,573	2,109	11,944	2,152	1,085	2,906	3,431	2,636	9,775	1,878
8. Central	21,997	1,746	1,027	2,858	3,013	1,998	11,864	1,831	940	2,478	3,263	2,446	10,129	1,656
9. Central East	25,894	1,642	1,091	2,579	2,447	1,460	13,910	1,718	955	2,291	2,608	1,923	11,981	1,562
10. South East	5,833	1,432	1,097	2,329	1,879	998	3,304	1,588	772	1,819	1,796	1,422	2,527	1,268
11. Champlain	17,616	1,507	933	2,855	2,561	1,471	10,424	1,744	678	1,906	2,260	1,843	7,189	1,259
12. North Simcoe Muskoka	6,151	1,524	1,022	2,368	2,270	1,298	3,286	1,606	934	2,021	2,124	1,569	2,864	1,438
13. North East	12,813	2,425	1,635	3,812	3,259	1,909	6,977	2,585	1,420	3,211	3,040	2,142	5,836	2,257
14. North West	5,744	2,559	1,509	4,114	4,040	2,517	3,006	2,654	1,228	3,863	4,000	3,252	2,736	2,460
Missing*	*3,142*	-	-	-	-	-	*1,696*	-	-	-	-	-	*1,441*	-
All Ontario	**207,144**	**1,768**	**1,141**	**2,956**	**2,758**	**1,640**	**113,696**	**1,898**	**976**	**2,427**	**2,746**	**2,044**	**93,416**	**1,632**

* Invalid: includes out-of-province, and missing age, sex, or postal code information

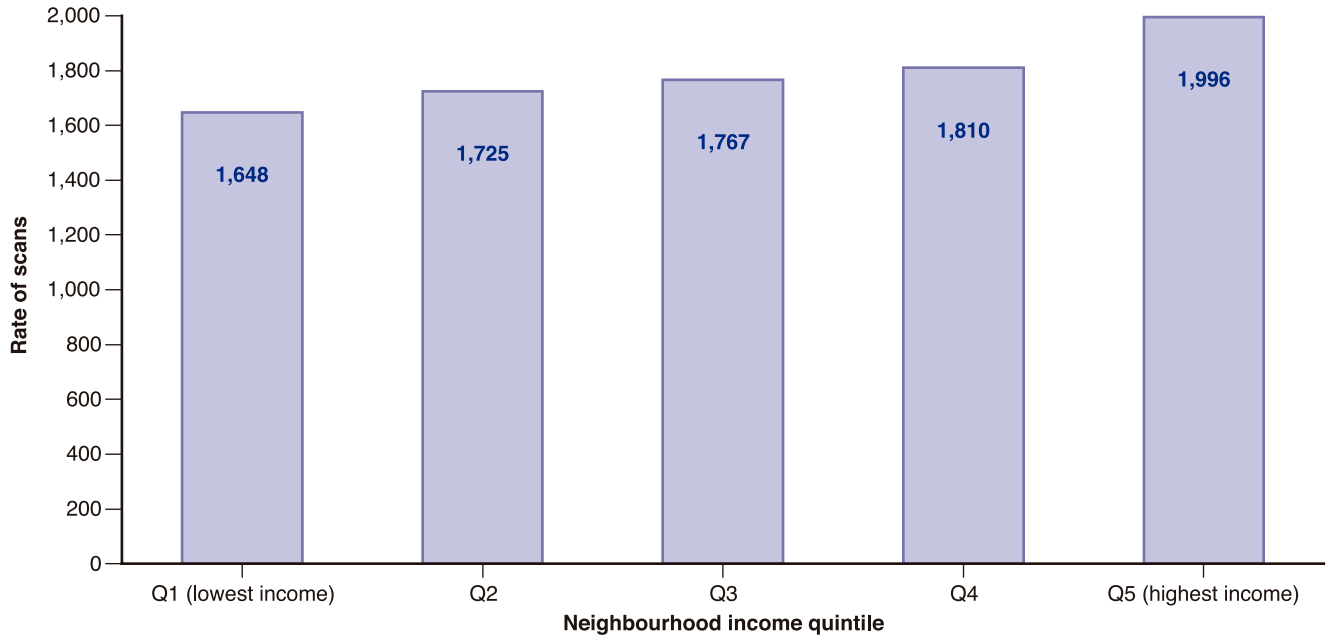
Data sources: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

6.6a Age- and sex-adjusted rate of inpatient/outpatient CT scans per 100,000 population, by neighbourhood income quintile, in Ontario, 2003/04



Data sources: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

6.6b Age- and sex-adjusted rate of outpatient MRI scans per 100,000 population, by neighbourhood income quintile, in Ontario, 2003/04



Data sources: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan and Registered Persons Database; Statistics Canada–2001 Census and Postal Code Conversion File

Conclusions and Next Steps

Over the last decade, the numbers and rates of CT and MRI scanning increased markedly in Ontario, and show no sign of abating. There was moderate variation in the rate of scanning among LHINs in Ontario. Individuals living in wealthier neighbourhoods were somewhat more likely to receive an MRI scan than those living in poorer neighbourhoods, suggesting an impact of socioeconomic status upon access to MRI scans.

Despite the increase in the number of scans, Ontario still has relatively few scanners per population compared to many other developed countries, though the "correct" ratio of scanners per population and the correct rate of scans are not known. Continued technological advances in CT and MRI scanning likely mean that the indications for these tests will continue to expand. There is a need to determine the factors that have driven the increase in CT and MRI scanning in Ontario, and to determine the appropriateness of the use of scanning. At the same time, guidelines for the appropriate use of new CT and MRI scanning techniques must be developed, and older, less accurate diagnostic imaging techniques should be abandoned.

Appendix 6.A

How the Research was Done

Data from MOHLTC–OHIP were used to describe trends in CT and MRI use. Only services that were deemed valid and reimbursed by OHIP were included. The professional component of all OHIP claims for CT and MRI scans from April 1, 1993 to March 31, 2004 was identified. Because inpatient MRI scans are covered by hospital global budgets and not billed to OHIP, inpatient MRI scans were excluded.

For CT scans, all professionally billed OHIP codes were grouped into body part-specific scans (regardless if they were done with or without I.V. contrast) (Table 6.1). Only 1 body part-specific CT scan per patient per day was counted regardless of the number of physicians, institutions and fee codes that appeared in the OHIP files for that patient on that day.

For professionally billed outpatient MRI scans, a base code for a multi-slice sequence is available as well as an additional code for repeat sequences (another plane or different pulse sequence) (Table 6.2). MRI utilization was defined by counting the base multi-sequence codes, with or without repeats or additional related procedures. Similar to the approach to CT scans, only 1 body part-specific MRI scan was counted per patient per day.

The patient's sex, age, and postal code at the time of the scan was obtained by linking with the MOHLTC Registered Persons Database (RPDB), which contains contact and administrative data for all OHIP beneficiaries. Postal codes were converted into Dissemination Areas (DA) using Statistics Canada conversion files, and then DAs were converted into LHINs.

Table 6.1 Professional inpatient/outpatient CT scan OHIP billing codes

Body Part	OHIP Code	Description
Abdomen	X126 CTT	Abdomen - with/out I.V. contrast
	X409 CTT	Abdomen - without I.V. contrast
	X410 CTT	Abdomen - with I.V. contrast
Extremities	X127 CTT	Extremities (one or more) - with/out I.V. contrast
	X412 CTT	Extremities (one or more) - without I.V. contrast
	X413 CTT	Extremities (one or more) - with I.V. contrast
Head	X188 CTT	Head - with/out I.V. contrast
	X400 CTT	Head - without I.V. contrast
	X401 CTT	Head - with I.V. contrast
	X402 CTT	Complex head - without I.V. contrast
	X405 CTT	Complex head - with I.V. contrast
	X408 CTT	Complex head - with/out I.V. contrast
Neck	X124 CTT	Neck - with/out I.V. contrast
	X403 CTT	Neck - without I.V. contrast
	X404 CTT	Neck - with I.V. contrast
Pelvis	X231 CTT	Pelvis without I.V. contrast
	X232 CTT	Pelvis with I.V. contrast
	X233 CTT	Pelvis with and without I.V. contrast
Spine	X128 CTT	Spine - with/out I.V. contrast
	X415 CTT	Spine - without I.V. contrast
	X416 CTT	Spine - with I.V. contrast
Thorax	X125 CTT	Thorax - with/out I.V. contrast
	X406 CTT	Thorax - without I.V. contrast
	X407 CTT	Thorax - with I.V. contrast

Data source: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan

Table 6.2 Professional outpatient MRI scan OHIP billing codes

Body Part	OHIP Code	Description
Abdomen	X451 Mag. Res. Im.	Abdomen - multislice S.E. (1 or 2 echos)
Extremities	X471 Mag. Res. Im.	Extremities - multislice S.E. (1 or 2 echos)
	X488 MRI	Multiple extremities multislice sequence
Head	X421 Mag. Res. Im.	Head - multislice S.E. (1 or 2 echos)
Neck	X431 Mag. Res. Im.	Neck - multislice S.E. (1 or 2 echos)
Pelvis	X461 Mag. Res. Im.	Pelvis - multislice S.E. (1 or 2 echos)
Spine	X490 Mag. Res. Im.	Limited spine (1 segment) - multislice SE (1 or 2 echoes)
	X493 Mag. Res. Im.	Intermediate spine (2 adj.segs.) - multislice S.E.
	X496 Mag. Res. Im.	Complex spine (2 or more non-adj. segs.) - multislice S.E.
Thorax	X441 Mag. Res. Im.	Thorax - multislice S.E. (1 or 2 echos)

Data source: Ministry of Health and Long-Term Care–Ontario Health Insurance Plan

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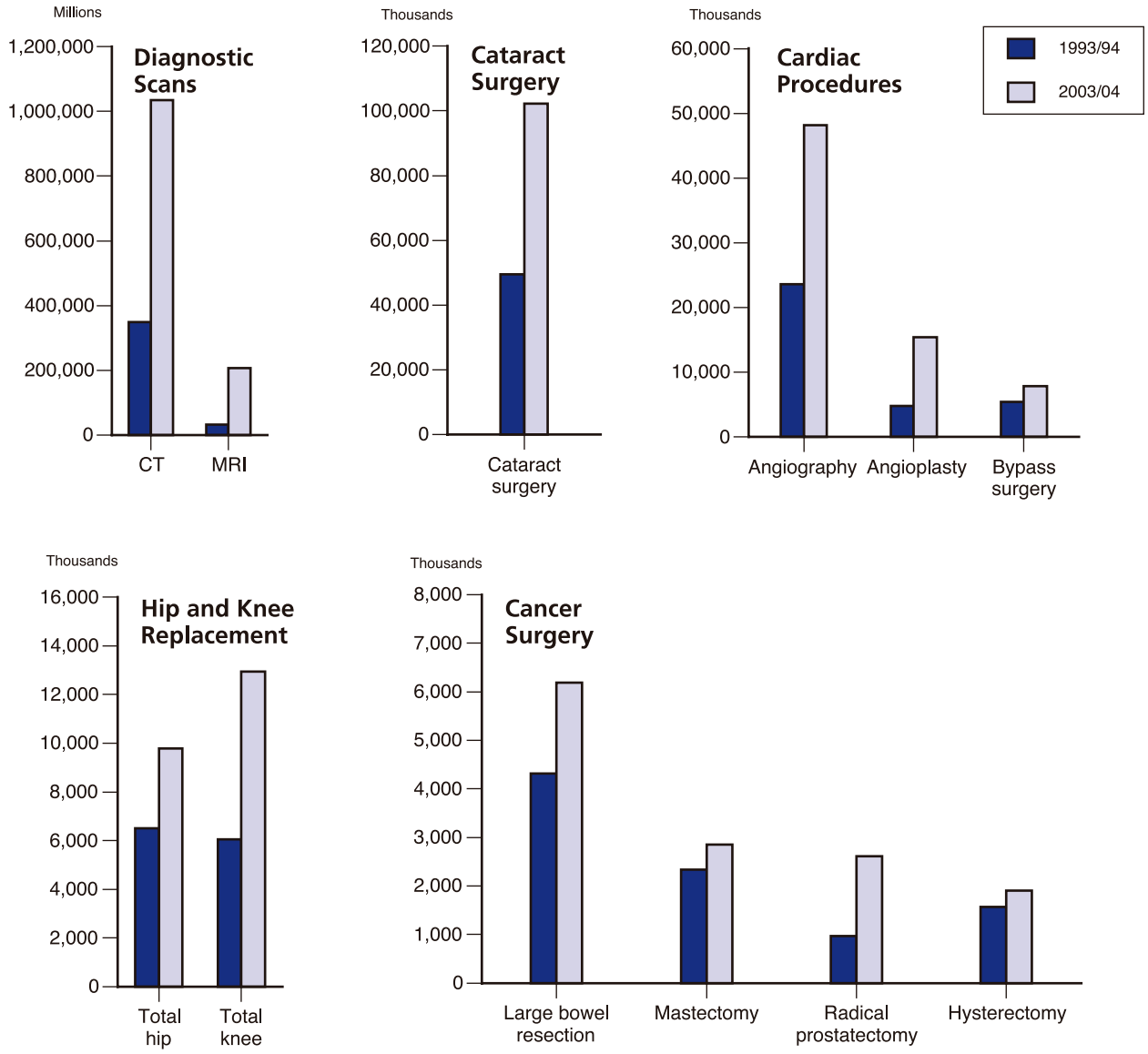
7

Chapter

Summary of Findings

7.1 Comparison of the annual number of procedures, in Ontario, 1993/94 vs. 2003/04



Exhibits 7.1 and 7.2:

Between 1993/94 and 2003/04, there was an increase in all of the procedures and diagnostic tests examined in this atlas.

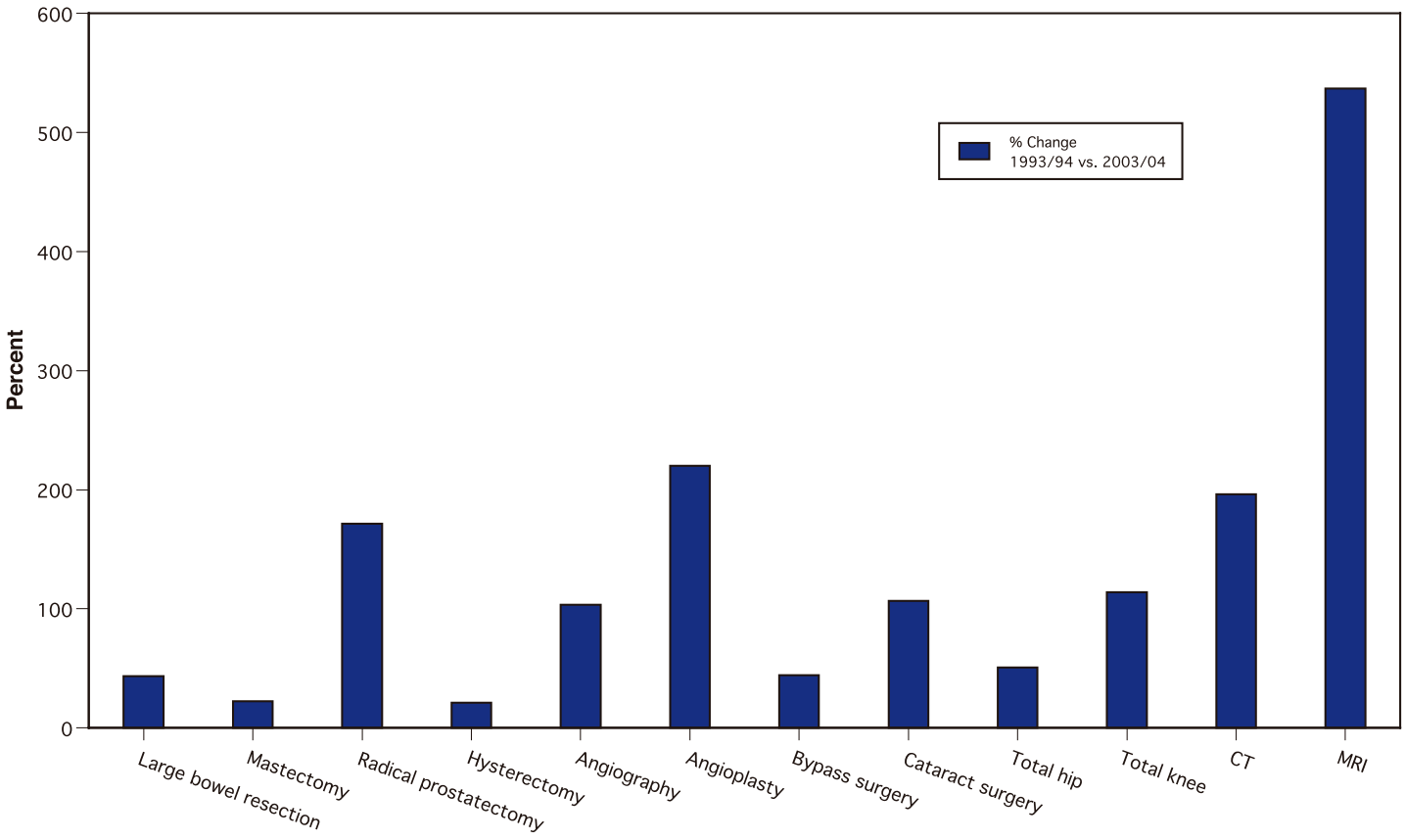
The greatest increases occurred in the number of MRI scans (an increase of 537%), angioplasties (220%), CT scans (196%) and radical prostatectomies for prostate cancer (171%).

The smallest increases occurred in mastectomy for breast cancer (an increase of 22%), hysterectomy for uterine cancer (21%), bypass surgery (44%), and large bowel resection for colon cancer (43%).

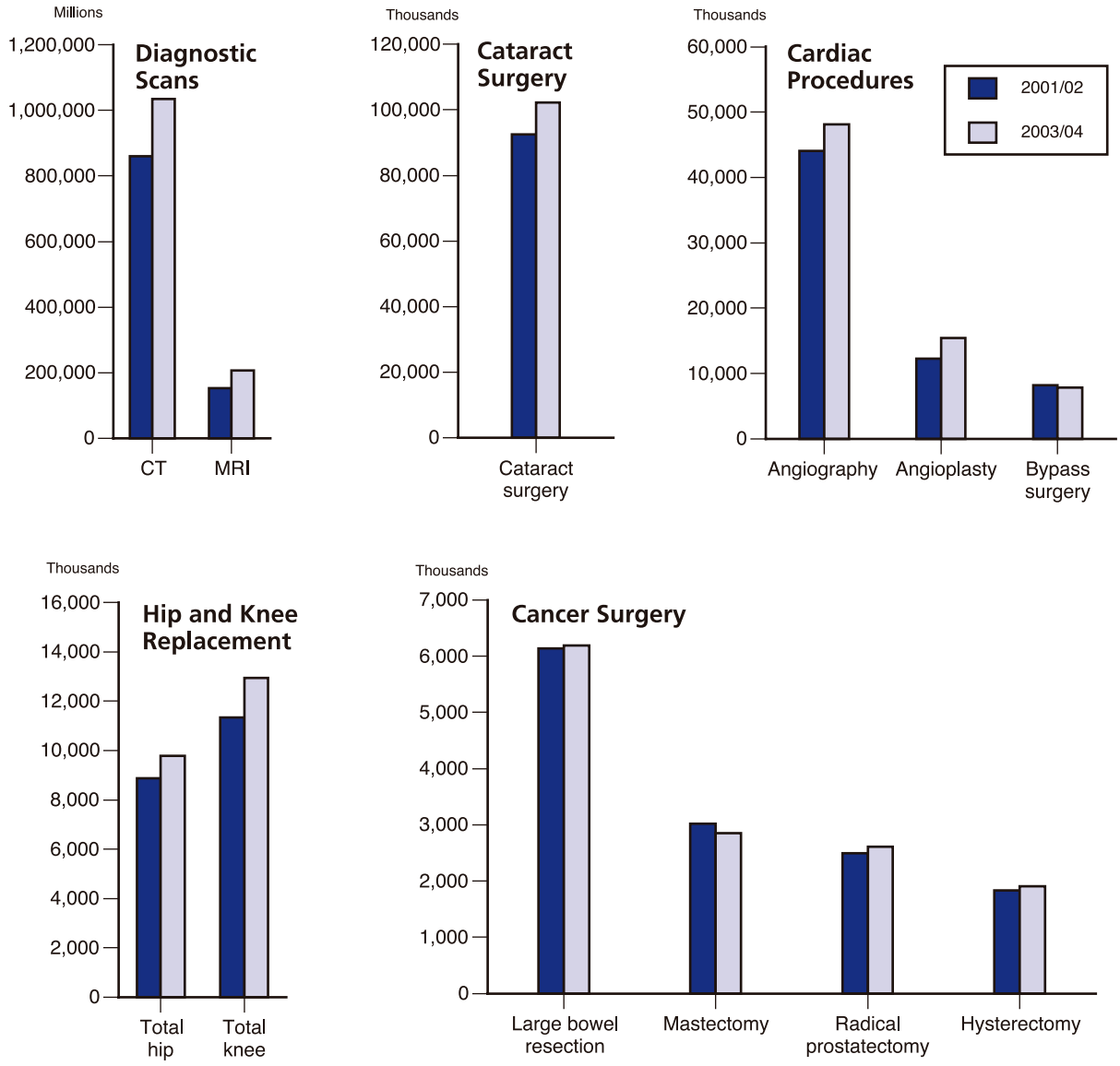
The relatively small increases seen for mastectomy, hysterectomy and large bowel resection likely reflect small increases in the number of patients with breast, uterine and colon cancer in the Ontario population over the past decade, and relatively stable indications for these types of procedures.

The large increase in the number of radical prostatectomies may reflect an increase in the use of PSA screening, as well as a trend towards more aggressive treatment of prostate cancer. The relatively large increase in angioplasty and the relatively small increase in bypass surgery are similar to what has been seen in other jurisdictions, reflecting an expansion in the reasons for using angioplasty.

7.2 Percent change in the annual number of procedures, in Ontario, 1993/94 vs. 2003/04



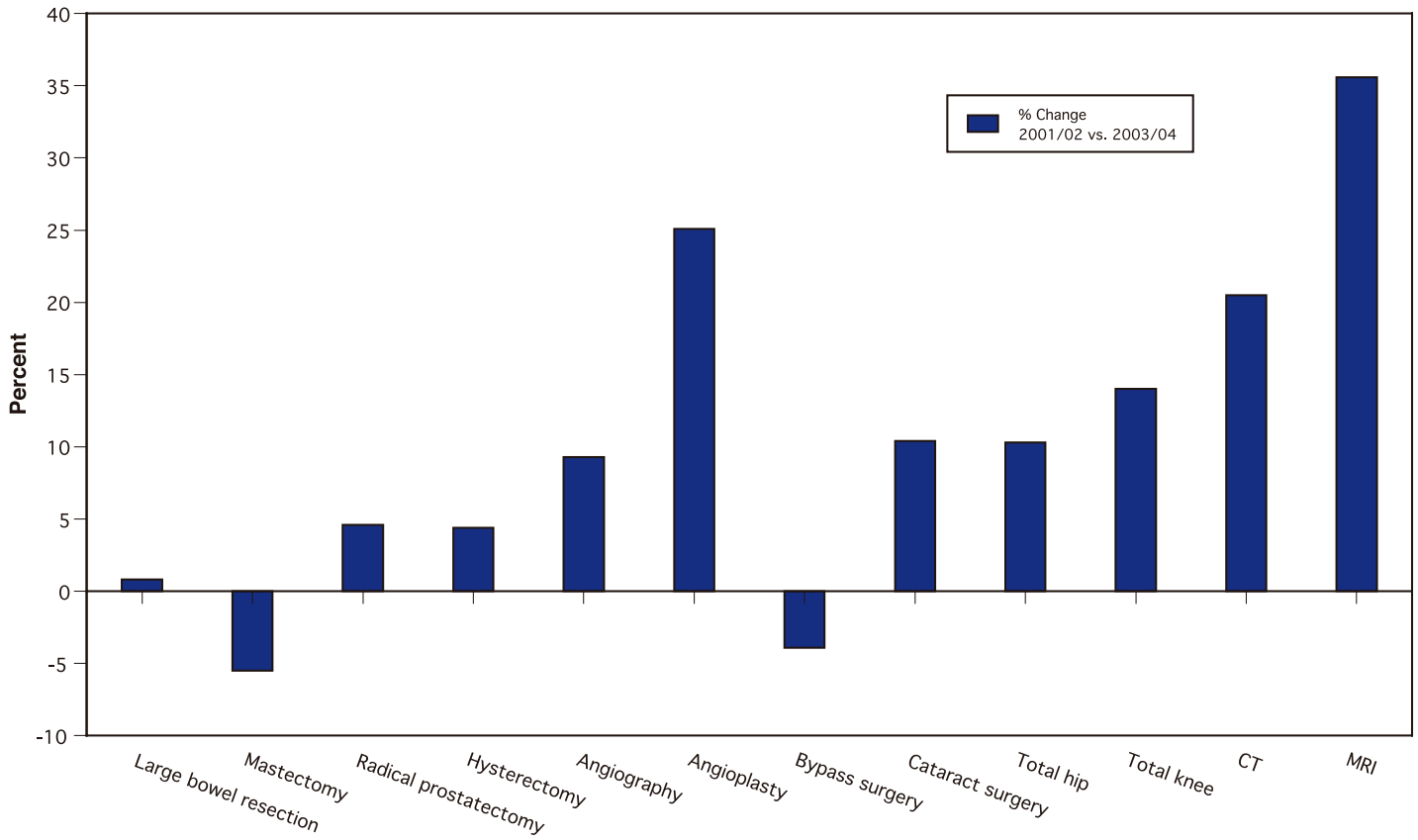
7.3 Comparison of the annual number of procedures, in Ontario, 2001/02 vs. 2003/04



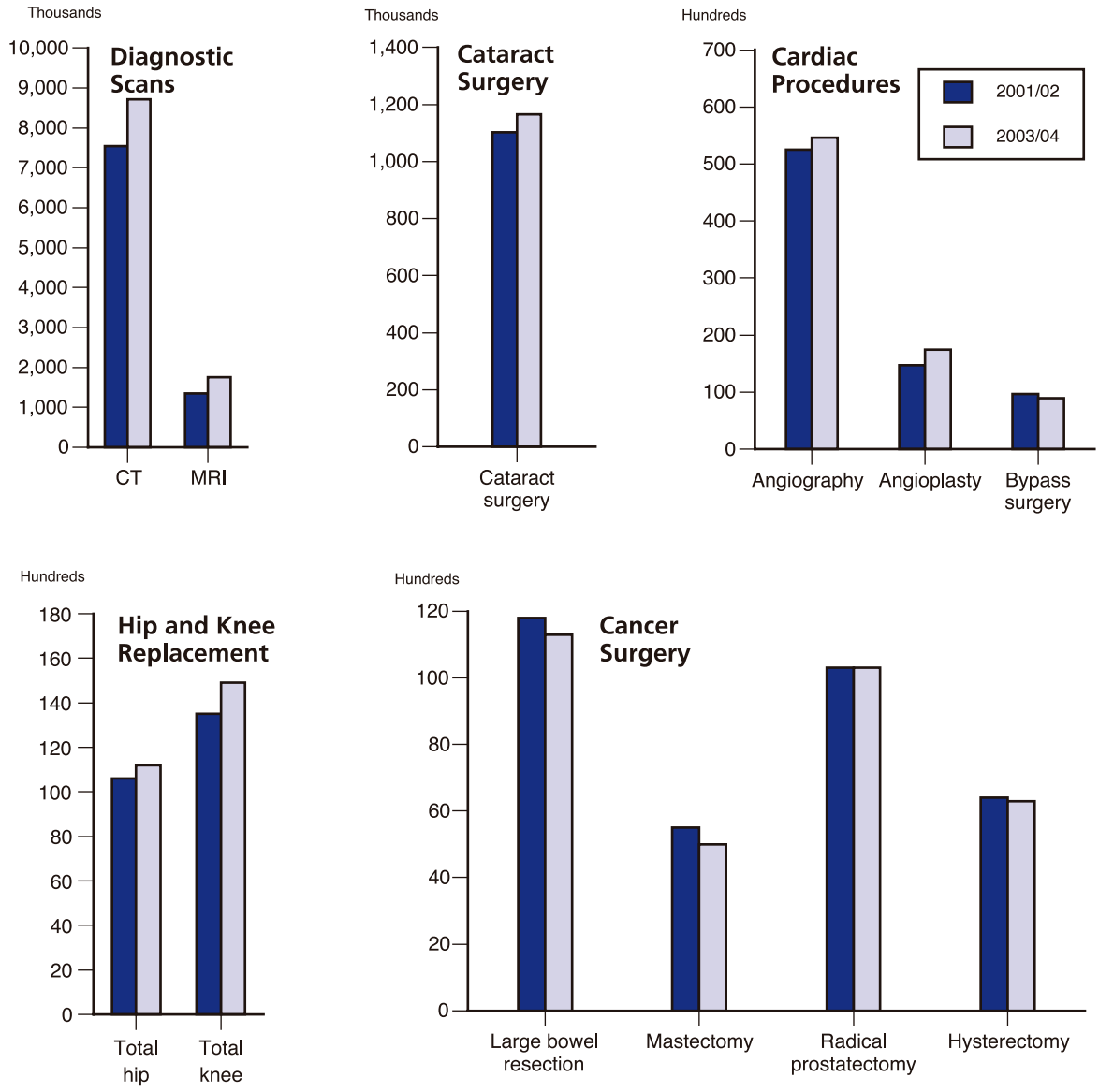
Exhibits 7.3 and 7.4:

The changes in the number of procedures seen during the last two years are similar to those seen during the last decade. However, during the last two years the number of bypass surgeries has actually decreased, while the number of angioplasties has increased by 25%. The decrease in the number of mastectomies likely suggests that relatively more women with breast cancer are undergoing lumpectomy rather than mastectomy, and is likely not due to a decrease in the frequency of breast cancer.

7.4 Percent change in the annual number of procedures, in Ontario, 2001/02 vs. 2003/04



7.5 Comparison of the rate of procedures per 100,000 population, in Ontario, 2001/02 vs. 2003/04

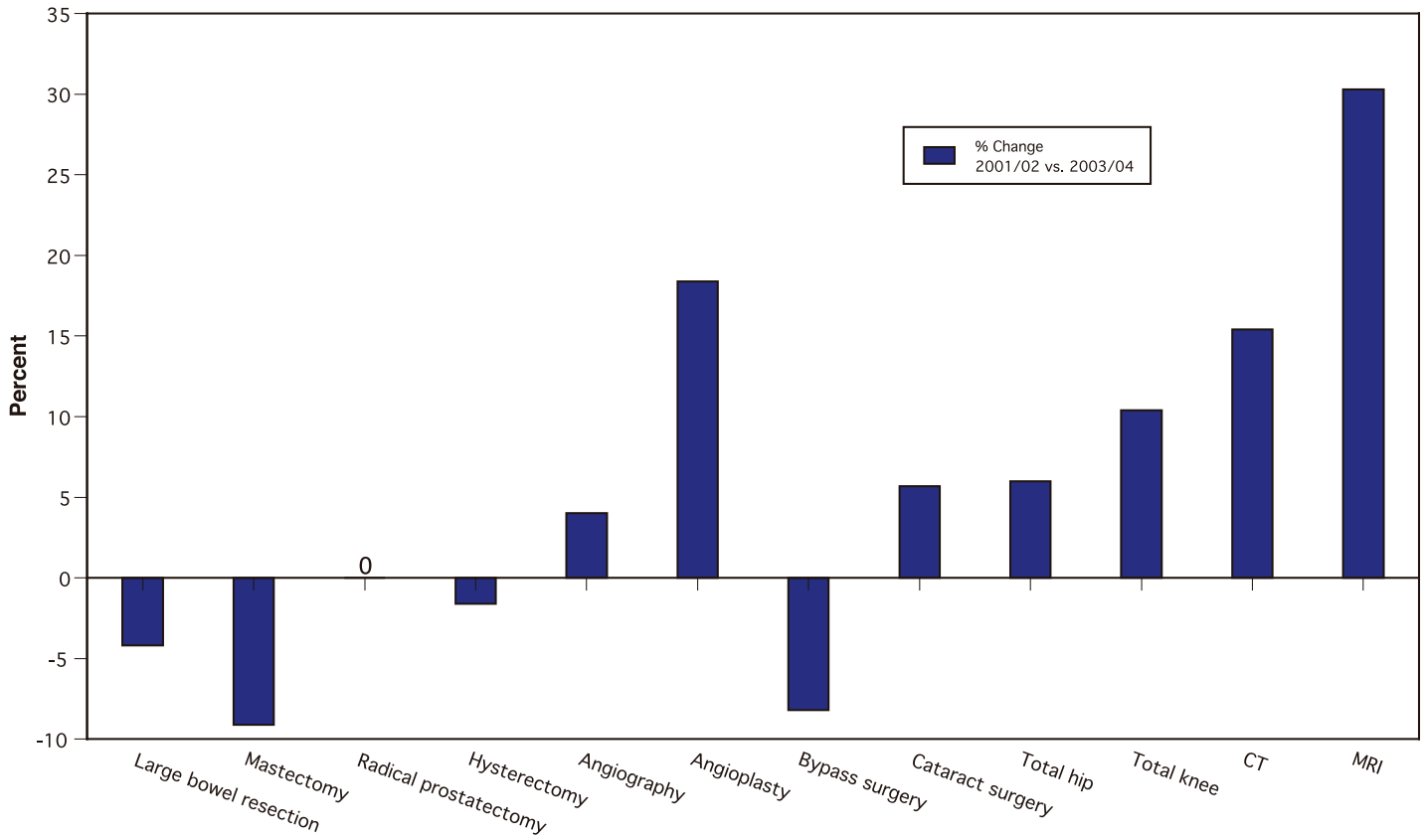


Exhibits 7.5 and 7.6:

The rate of procedures reflects the average number of procedures per 100,000 population. This number is "adjusted" for changes in the age and sex of the population from year to year. Thus, an increase in the rate of a procedure over time means that it is being used more intensively than before, while a decrease in the rate means that it is being used less intensively.

Since 2001/02, the largest increase in rates occurred for MRI scanning (an increase of 30%), angioplasty (18%), and CT scanning (15%). During the same period, there was a decrease in the rate of mastectomy (a decrease of 9%), bypass surgery (8%), and large bowel resection (4%). The decrease in mastectomies likely occurred because more women with breast cancer are having lumpectomies. The decrease in large bowel resections may reflect a small decrease in the frequency of colon cancer due to screening for the disease, or may simply be due to chance.

7.6 Percent change in the rate of procedures per 100,000 population, in Ontario, 2001/02 vs. 2003/04



7.7 Variation in procedures across Local Health Integration Networks, in Ontario, 2003/04

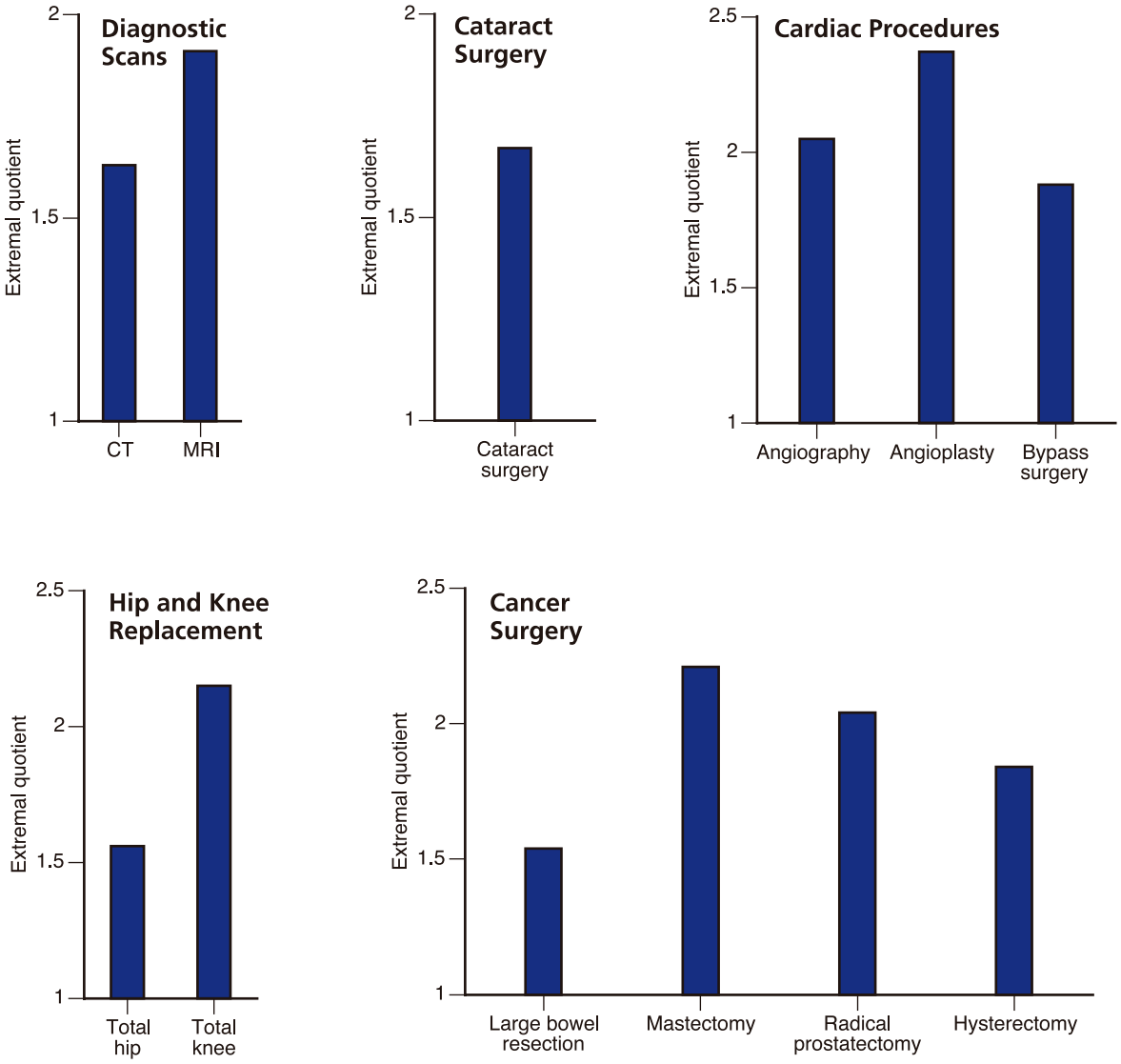


Exhibit 7.7:

The rate of all procedures varied across regions, even when the analysis adjusted for differences in the age and sex of the population. The largest variations occurred for angioplasty; individuals living in the region with the highest rate were 2.4 times more likely to receive the procedure than individuals living in the region with the lowest rate. This ratio is called the extremal quotient (EQ). The EQ for mastectomy and knee joint replacement was 2.2, and the EQ for radical prostatectomy was 2.1.

The relatively large extremal quotient for mastectomy (2.2) may reflect variations across LHINs in the performance of mastectomy vs. lumpectomy. The variation in the frequency of radical prostatectomy (2.0) may be due to different approaches to the management of prostate cancer in terms of aggressive surgery vs. watchful waiting.

These analyses of regional variation have not taken into account differences in the frequency of disease (other than those associated with age and sex), and cannot determine the impact of patient preference or clinician practice style on the rate of procedures.

7.8 Percent difference in rate of procedures between lowest and highest income quintiles, in Ontario, 2003/04

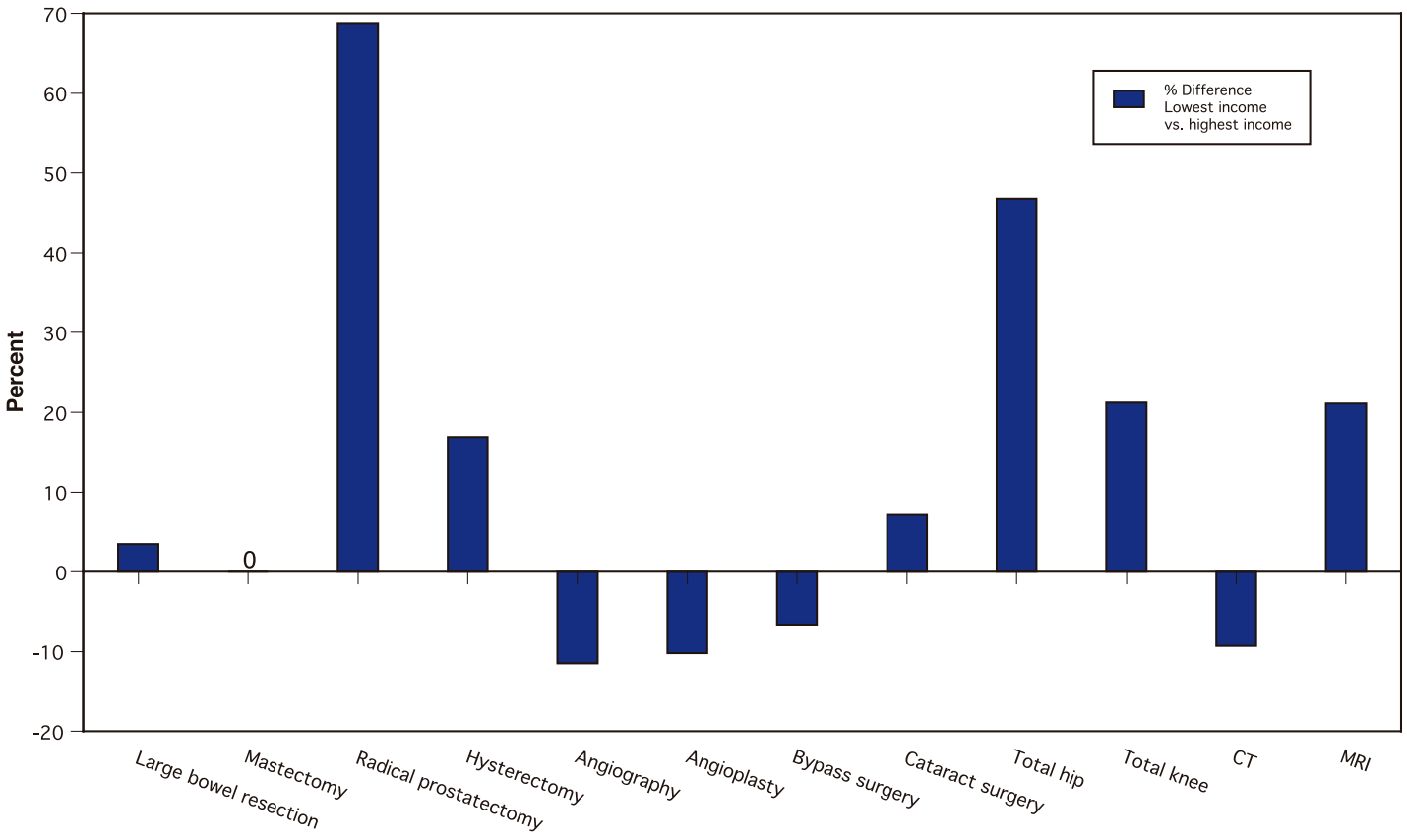


Exhibit 7.8:

Positive values indicate that individuals in the highest income quintile are more likely to receive the procedure, while negative values indicate that individuals in the lowest income quintile are more likely to receive the procedure.

In general, individuals living in low income neighbourhoods have poorer health than those living in wealthier neighbourhoods. Thus, one would expect the rate of procedures and diagnostic tests to be at least as great or greater in low income neighbourhoods compared to high income neighbourhoods. This was the case for the cardiac procedures studied, mastectomy, and CT scanning. However, individuals living in wealthier neighbourhoods in Ontario were more likely to receive MRI scans, radical prostatectomies, and hip and knee replacements, than those living in poorer neighbourhoods.

7.9 Comparison of median wait time for selected procedures, in Ontario, 2001/02 vs. 2003/04

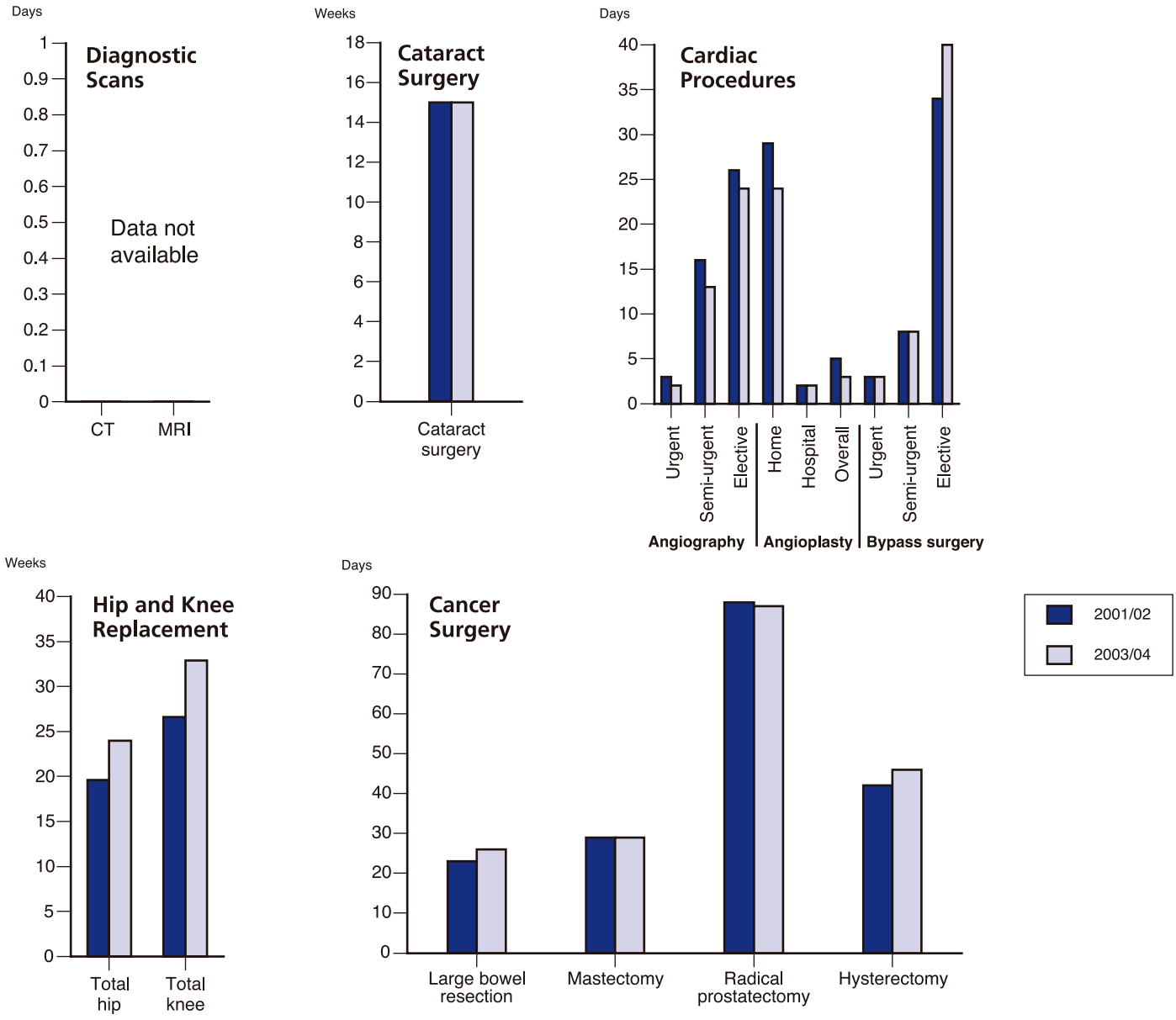


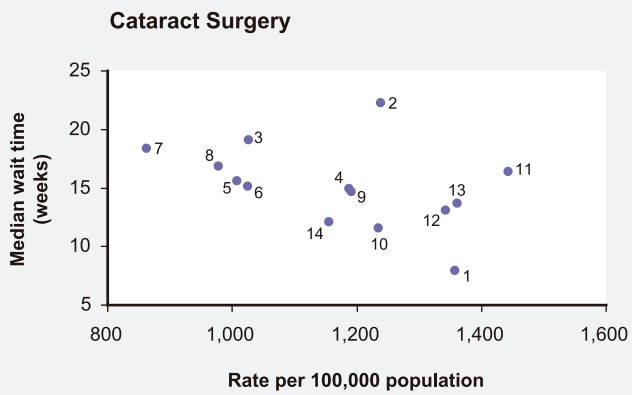
Exhibit 7.9:

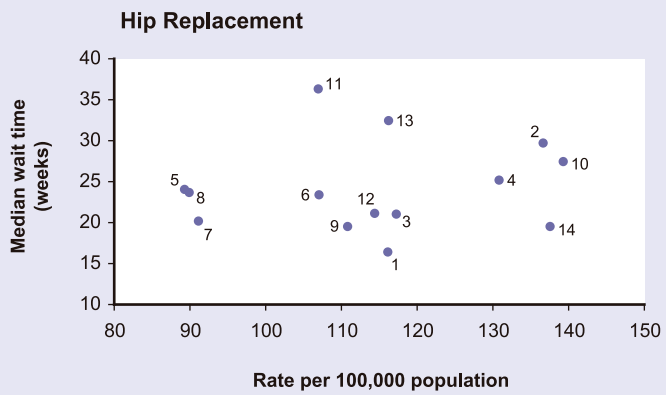
The median wait times varied considerably depending upon the procedure. From 2001/02 to 2003/04, the median wait time for hip and knee replacements increased by 4 and 6 weeks, respectively.

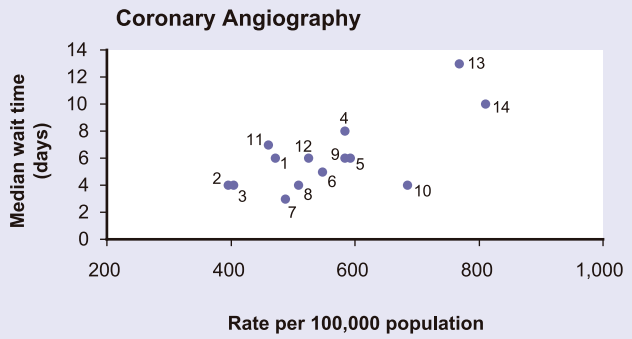
There was no increase in the median wait time for cataract surgery, mastectomy, or radical prostatectomy.

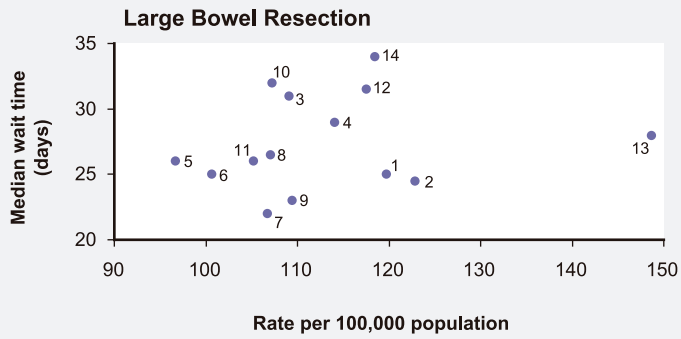
For cancer surgeries the wait time between surgical consultation and surgery was the greatest for radical prostatectomy. This is likely due to several factors including the wait for biopsy, consideration for radiotherapy, and watchful waiting in some patients, and, therefore, probably represents an over-estimate of the true wait time for the surgery.

7.10 Relationship between median wait time and age- and sex-adjusted rates of procedures, by Local Health Integration Network, in Ontario, 2003/04









Local Health Integration Networks (LHINs)

1. Erie St. Clair
2. South West
3. Waterloo Wellington
4. Hamilton Niagara Haldimand Brant
5. Central West
6. Mississauga Oakville
7. Toronto Central
8. Central
9. Central East
10. South East
11. Champlain
12. North Simcoe Muskoka
13. North East
14. North West

Exhibit 7.10:

This exhibit plots the median wait time in each LHIN versus the procedure rate in that LHIN for 4 procedures: cataract surgery, hip joint replacement surgery, coronary angiography, and large bowel resection for colon cancer (similar exhibits for the other procedures included in this atlas are available on the ICES website at www. ices.on.ca).

If the frequency of underlying disease is similar in the LHINs, and if patients and physicians in the LHINs have similar thresholds for performing the procedures, regions with high procedure rates would be expected to have low median wait times, and vice versa. However, with the possible exception of cataract surgery, this pattern is not seen, which could suggest: that the frequency of underlying disease varies markedly across LHINs; that there is considerable variation in the threshold for performing procedures; that access to care varies markedly across LHINs; or a combination of the above. For example, LHIN North West has the highest angiography rate and the second highest median wait time; this might be caused by a high frequency of underlying coronary artery disease in northwestern Ontario. Regions with low procedure rates and high median wait times likely reflect poor access, such as with cataract surgery in LHIN Toronto Central.

It is important to recognize that the magnitude of the difference in procedure rates and median wait times among LHINs varies markedly depending upon the procedure. For example, the difference in the rate of cataract surgery between the highest and lowest LHIN is 580 procedures per 100,000 population; the equivalent difference in rates for large bowel resection for colon cancer is 52 procedures per 100,000. The difference in median wait times between the highest and lowest LHIN is 100 days (14 weeks) for cataract surgery and 12 days for large bowel resection for colon cancer.

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Chapter 8

Reflections and Recommendations

Jack V. Tu, MD, PhD, FRCPC, Samuel Shortt, MPA, MD, PhD, Paula McColgan, MHA, CHE, S. Patricia Pinfold, MSc, and Andreas Laupacis, MD, MSc, FRCPC

Introduction

The preceding chapters provide an analysis of the current state of knowledge in Ontario regarding access to five key health care services: selected cancer surgeries, selected cardiac procedures, cataract surgery, hip and knee replacements, and computed tomography (CT) and magnetic resonance imaging (MRI) scans. This final chapter offers reflections on some of the key findings and provides recommendations about how to improve access to these services in Ontario. Potential funding options and the measures required to improve the management of waiting lists in Ontario are presented.

Addressing waiting list issues will pose significant challenges for policy makers in Ontario and across Canada. The findings in this report demonstrate that, from 2001/02 to 2003/04, many Ontario patients experienced prolonged waits for four of the five key services. For the fifth service, CT and MRI scans, provincial wait time data were not available and therefore the length of time that patients are waiting for these diagnostic tests could not be determined. For many patients, the waits for service exceeded recommended maximum wait times (RMWT) used in other jurisdictions that we feel are reasonable for use in Ontario. As well, there was significant variation in the rates of most procedures between Local Health Integration Networks (LHINs), with some LHINs having procedure rates that were more than double those of other LHINs. Wait times for procedures also varied widely across LHINs.

Waiting Lists: Challenges and Opportunities

The findings of this report show that over the past decade there have been substantial increases in the number of procedures for each of the five services studied, yet many patients continue to experience prolonged wait times. This means that demand for these services has risen as fast and in some instances faster than the increase in supply. This increased demand is fuelled by multiple factors, including:

- An aging population—with greater need for medical and surgical services;
- Increasing rates of obesity leading to chronic diseases such as heart disease and cancer;
- Increasing scientific evidence that certain procedures lead to improved outcomes (e.g., angioplasty);
- Advances in surgery, allowing surgeons to safely operate on higher risk patients than was possible in the past (e.g., cardiac surgery, joint replacement procedures, cataract surgery);
- Increased patient and provider demand for high-tech services such as MRI scans;
- Increased concern about litigation leading to "defensive" medicine with more diagnostic testing; and,
- Supply-induced demand (increased availability of imaging techniques such as CT and MRI scans likely stimulates greater demand).

Some degree of waiting exists in most health care systems, and reasonable wait times should not be equated with poor quality of care or an inefficient system. A reasonable period of waiting prior to a major life-altering elective surgery, such as cardiac surgery or hip replacement, provides patients with an opportunity to prepare for surgery, and to reconsider whether they truly wish to proceed with the surgery and its associated risk of complications. Some wait time also allows a health care system to run efficiently by minimizing idle time on the part of providers, which would occur if there were no waiting lists. However, when wait times for health care are excessively prolonged for many patients, as suggested by the data in this report, there is a problem. There are no medical benefits associated with excessive wait times and some patients suffer considerable pain, stress, and anxiety while waiting.[1,2] The risk of an adverse event (e.g., falls while waiting for cataract surgery, or heart attacks while waiting for bypass surgery) also increases when patients wait for unreasonable lengths of time.

An important opportunity exists to enhance public confidence in Ontario's health care system by effectively addressing the wait time issue. However, like the problem itself, the solutions are complex and will likely require a combination of additional funding coupled with better management of waiting lists.[3] Provision of one without the other will not resolve the problem and will likely lead to ongoing waiting list issues, system instability, and a diversion of resources from other required health care services.

Funding Recommendations

In support of the Ontario Wait List Strategy, the Ontario government has committed funding to improve access to the five key services that they have identified. As the strategy evolves, further funding to support a higher volume of services will likely be forthcoming. To assist the Ministry of Health and Long-Term Care (MOHLTC) in its future deliberations regarding funding to address access issues in Ontario, it is recommended that the following four principles be considered:

- Funding should be allocated to provide all Ontarians with equitable access to the five key services, regardless of geographical location.
- Targeted "one-time" queue-clearing funding infusions are needed to shorten prolonged and/or rapidly expanding waiting lists.

- Methods of allocating long-term funding, once waiting lists are stabilized, should be developed using population-based regional target procedure rates.
- Funding is required for public education regarding waiting lists.

Discussion of funding recommendations

1. Funding should be allocated to provide all Ontarians with equitable access to the five key services, regardless of geographical location.

In light of resource constraints facing the Ontario health care system, priority funding should be given to those procedures and/or regions where access issues are most significant, as indicated by the findings in this report. Prolonged waits across the province suggest a need for all LHINs to receive additional resources. However, geographical regions of Ontario where rates of service are comparatively low and waits are comparatively long should receive priority for funding to reduce these regional inequities, either by direct service provision or by arranging service elsewhere for residents through collaborative agreements with other LHINs. While Northern Ontario is commonly perceived to be the area of the province with the least access to health care services, the data in this report suggests that this is not always the case—for example, Northern Ontario residents have relatively high rates of cardiac procedures and MRI scans. It is important to recognize that some regional variation (but likely not two-fold) may be due to underlying differences in the burden of disease. One would therefore expect some regions to have higher rates of procedures than others. Equitable access means that individuals with a similar clinical need for a procedure are equally likely to receive it in a timely manner regardless of where they live in Ontario.

2. Targeted "one-time" queue-clearing funding infusions are needed to shorten prolonged and/or rapidly expanding waiting lists.

Rapidly growing waiting lists suggest a marked imbalance between the demand for procedures and the supply. To stabilize waiting lists by clearing a backlog of cases and achieve shorter average wait times, a queue-clearing infusion of resources is required. Decisions regarding funding allocation should be made on a region-, hospital- and procedure-specific basis, and adequate human and hospital resources must be available to support the increased caseloads. This could involve strategies such as expanding the capacity of hospitals to perform procedures on weekends.[4] In some situations, it may be necessary to transfer patients to surgeons, hospitals, or LHINs where there is greater procedural capacity. Maintaining waiting lists of similar size across health care providers is an effective strategy for increasing the proportion of patients who can obtain service within RMWTs as shown in Figure 8.1. Patients with projected wait times that exceed RMWTs should be given priority for transfer to a provider with a shorter wait time. Development of such strategies will require timely information on waiting lists, extra capacity at some hospitals, and cooperation between providers in different hospitals and LHINs in Ontario. Some patients may still choose to have their surgery with a given surgeon at a local hospital in spite of a longer wait, and these preferences should be respected.

Although the transfer of patients to providers some distance away may be necessary to decrease wait times in the short-term, this is not an attractive long-term strategy. In the long-term, resources should be made available locally to meet legitimate local needs.

Queue-clearing infusions have served to decrease waiting lists in other jurisdictions, although these efforts have not always been successful in the short- or long-term. In some cases, short-term decreases in wait times have been followed by gradual increases in waits in the longer term, as the threshold for clinical intervention changes. In other cases, the infusion of resources was of insufficient magnitude to significantly clear the backlog of cases, let alone meet the baseline demand.[2,5]

While additional funding is required to shorten long waiting lists, more efficient use of existing resources would also improve the current situation. For example, some hospitals in Ontario may make more efficient use of their operating room time than others and may be able perform a greater volume of surgeries for the same level of funding. The volume of diagnostic tests that can be completed with a given CT or MRI scanner varies across the province. Although there is very little data available regarding the cost-efficiency of health care delivery between health care institutions in Ontario, studies from the United States have shown dramatic differences in the cost of surgeries between institutions, with the clinical outcomes being comparable.[6]

3. Methods of allocating long-term funding, once waiting lists are stabilized, should be developed using population-based regional target procedure rates.

Once waiting lists have been stabilized with a shorter overall wait, it is recommended that population-based target procedure rates for each of the five key services, within each LHIN, be established with the objective of reducing the two-fold regional variation that currently exists for most of these services, while also recognizing that there may be true differences in the need among regions because of the characteristics of the population. These target rates would help keep wait times within acceptable ranges so that prolonged waits do not emerge in the future.

This could be done with input from service-specific expert panels that would review the epidemiological data on population need. For example, the MOHLTC may wish to establish an overall target rate per 100,000 population for each service, and fund hospitals serving patients in under-serviced LHINs accordingly to achieve the defined target volumes. This funding should be: provided to hospitals outside global budgets; sufficient to cover the true costs of the procedures; protected for delivery of specific service volumes, with accountability for services being provided within established timelines; and, conditional upon submission of complete data on services provided to a provincial wait list registry.

Long-term funding allocations should primarily be based on target procedure rates that can achieve a range of acceptable wait times, rather than on target wait times themselves, due to the complex nature of the relationship between service volumes and wait times. Long-term funding based primarily on wait times may exacerbate regional disparities because some LHINs with the highest procedure rates also have the longest wait times. It is essential that long-term funding be allocated in a way that does not create inappropriate incentives in the system, whereby clinical thresholds for intervention are lowered to create longer waiting lists, thereby ensuring additional funding.

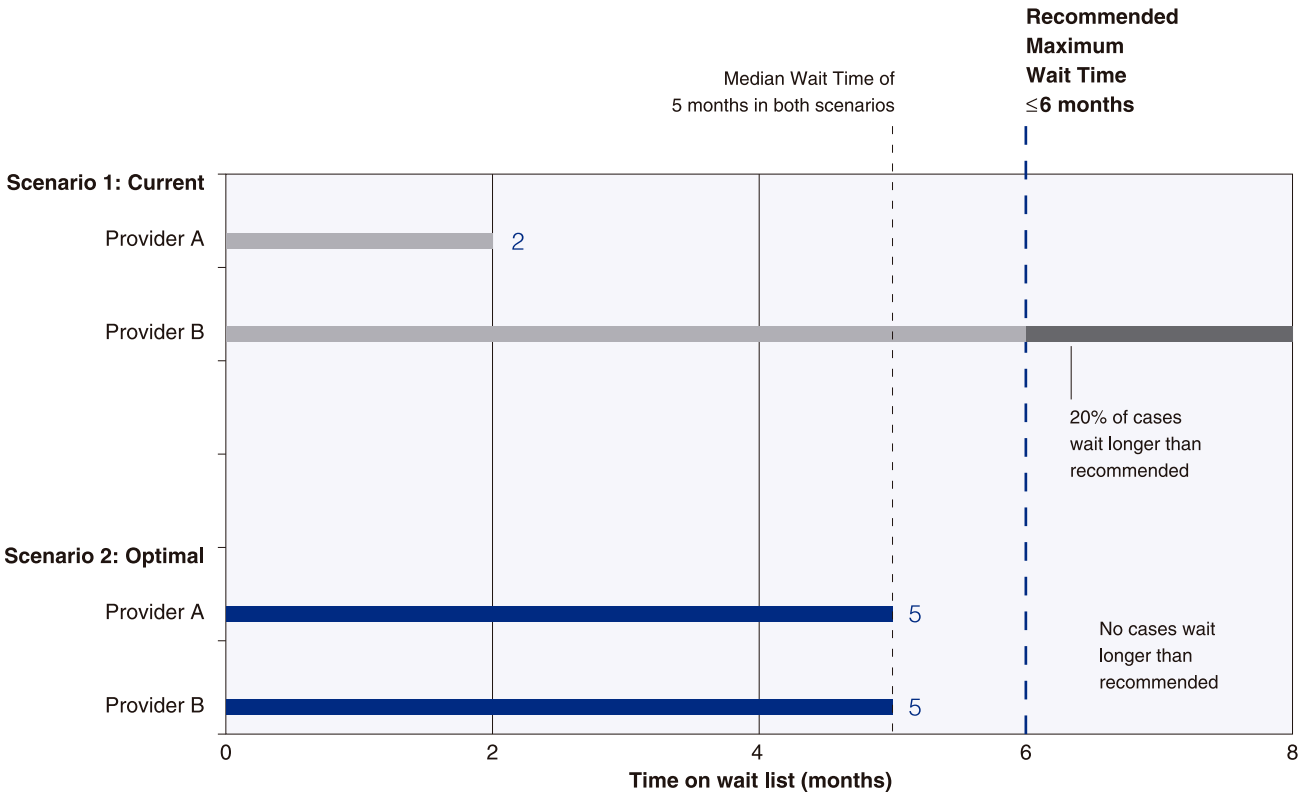
Consideration should be given to modifying regional targets on the basis of clinical need (e.g., the burden of certain diseases such as heart disease, osteoarthritis, and cancer may be higher in certain regions of Ontario than in others). In these circumstances, it may be possible to establish "markers of need" for services based on the incidence of indications for these procedures and thus, adjust regional target procedure rates accordingly. For example, the rate of hospital admissions for heart attack is a good indicator of the relative need for cardiac procedures in a region since heart attack is a common reason for performing cardiac procedures.[7] Studies conducted in Ontario have estimated the population-based unmet need for total joint replacements in different counties, and this information would be helpful in setting target rates for these procedures.[8,9] As well, it should be possible to establish target rates for cancer surgeries based upon the projected incidence of new cancers in different regions of Ontario, taking into account changing population demographics.

4. Funding is required for public education regarding waiting lists.

A key component in the Ontario Wait Time Strategy should be public education about waiting lists and wait times. The majority of the public does not use the health care system regularly and as such, public perceptions of access to care is primarily driven by the media, which tends to focus on negative anecdotal patient stories about excessively long waiting lists and/or patient deaths.[10] Currently, there is very limited system-wide information available to the public about the length of waiting lists and as a result, media coverage often diminishes public confidence in the health care system, leading to large infusions of resources that may not always represent the best use of limited health care dollars. It is also unlikely that the public is aware of the large increase in the number of most procedures performed in Ontario during the past decade or the potential negative impact that dealing with wait times for certain procedures may have upon the resources available for other interventions.

Educating the public with reliable information on wait times is critical to enhancing public confidence in Ontario's health care system. At the time of referral to a waiting list, all patients should be given information about the expected wait time and instructions about who to contact should their condition deteriorate while on the waiting list. Accurate and balanced information regarding the risks of waiting should also be provided to patients so they are fully informed. Timely information about the length of waiting lists among different hospitals and surgeons in Ontario should be available to referring physicians and patients via the internet, so that they have the option of choosing providers with shorter wait times. Studies have shown that patients are willing to wait for non-urgent health care services, provided that they are adequately informed about the length of the wait and that the wait is of a reasonable duration.[2]

Figure 8.1 Advantages of having waiting lists of similar size between providers (hospitals and surgeons)*



*This figure shows two hypothetical waiting list scenarios. In Scenario 1, Provider A has a median wait time of 2 months and Provider B has a median wait time of 8 months. This results in a median wait time of 5 months for all patients but 20% of cases wait longer than the recommended maximum wait time (RMWT) of 6 months or less. In Scenario 2, both provider A and provider B have a median wait time of 5 months. As a result, no patients wait longer than the RMWT of 6 months or less. Scenario 2 can be achieved by prospectively monitoring waiting lists and transferring patients to achieve similar-sized waiting lists across providers.

Access Monitoring and Measurement Recommendations

This report, focusing on five key health services, describes a framework for evaluating access to health care services in Ontario. Although it provides an important baseline foundation for future efforts to improve patient access, a number of additional steps are necessary to successfully address the waiting list problem. Waiting lists have been a major issue affecting the Canadian health care system for many years and yet there is a surprising lack of high-quality information on actual patient wait times, the effects of waits on patient outcomes, and the outcomes of patients who have received services. The recommendations in Table 8.1, each of which will be discussed in turn, should be considered to improve management of access to health care in Ontario. Adoption of these recommendations will allow for better management of waiting lists in the future.

Table 8.1 Recommendations for improving management of access to health care in Ontario

1. Publish annual provincial reports on access to health care in Ontario, initially for the five key services, but expand the reports over time to include other priority areas.
2. Develop an electronic provincial wait list clinical registry.
3. Implement, with Ontario-specific modifications if necessary, existing patient urgency prioritization systems for selected services where feasible and appropriate.
4. Develop and implement Ontario-specific wait time benchmarks, using work completed in other jurisdictions.
5. Develop evidence-based guidelines for appropriate clinical indications for selected services.
6. Develop a system to measure patient outcomes before and after procedures.
7. Develop computer simulation models to estimate future need for services.
8. Develop methods to measure other important key wait time intervals.
9. Measure access to other important aspects of the health system to ensure that these areas are not adversely affected.
10. Investigate the causes of socioeconomic disparities in access to certain services.

1. Publish annual provincial reports on access to health care in Ontario, initially for the five key services, but expand the reports over time to include other priority areas.

The Ontario Wait Time Strategy, launched in 2004, is expected to decrease wait times by 2007.[11] To evaluate the effectiveness of this strategy, it is recommended that annual data-based reports on procedure rates and wait times for the five priority services be published to demonstrate to Ontarians, using objective information, how their health care system has responded to the investments that have been made. Over time, this report should be expanded to cover other priority areas where access issues are problematic, as well as other dimensions of the access framework used in this report. A critical component of the Ontario Wait Time Strategy will be improving the quantity and the quality of information available about wait times through new information systems and research on access to care issues. As noted earlier in this report, there is a significant information gap regarding CT and MRI scans, with no provincial information available on wait times for these diagnostic services. Acquiring this information should be a key priority for the Ontario Wait Time Strategy, and could be achieved by mandating the reporting and collection of this information in a standardized manner in Ontario.

2. Develop an electronic provincial wait list clinical registry.

While the Ontario Health Insurance Plan (OHIP) physician billing database served as an effective tool for measuring wait times for this report, its effectiveness will diminish in the future as more physicians are remunerated through alternative payment plans, rather than fee-for-service billing. Given the continued erosion of the OHIP database, it is recommended that an electronic provincial waiting list clinical registry be established, beginning with the five key health care services, to provide the information needed to assess wait times on an on-going basis.

Administrative databases such as the Canadian Institute for Health Information (CIHI) and OHIP databases are important sources of information regarding the overall health care system. However, for wait time analyses, complex algorithms need to be developed to estimate wait times, and assumptions need to be made that may not always be accurate for individual patients. For example, the date of decision to proceed with surgery may not always be the date of the last surgical consultation before surgery. Furthermore, even volumes of cases measured using these two data sources may not be accurate because of coding or billing errors, or differences in interpretation of coding guidelines. For this report, procedure volumes for each service were sent to

participating hospitals for verification. In the vast majority of cases, there was agreement between the volumes identified through the datasets and hospitals' internal data sources. However, in some cases, significant discrepancies were identified. For this reason, volumes of cataract surgeries and diagnostic imaging procedures, by institution, were not included in this report. Separate analyses did confirm that these institution-specific discrepancies did not affect the results by LHINs in an important way. Accurate information is critical to assess the impact of efforts to reduce wait times in Ontario and to make evidence-based policy decisions.

Effective use of an electronic clinical registry will improve system responsiveness and allow health system managers and providers to better manage patient waiting lists. A provincial registry will allow real-time reporting of wait times by region, institution and provider, and will benefit both patients and referring clinicians, who will have the option of choosing providers with shorter wait times. A waiting list clinical registry could also provide other benefits, such as facilitating the booking of operating room time. Other countries (e.g., England) and provinces (e.g., Saskatchewan, British Columbia) have made significant strides in developing these types of information systems. In Ontario, successful electronic waiting list registries have been developed for patient referrals for cardiac procedures at the Ottawa Heart Institute and for surgical waiting list management at Queen's University in Kingston. Provincial information about wait times for radiation therapy are available to the public on the Cancer Care Ontario (CCO) website (www.cancercare.on.ca) and for cardiac procedures on the Cardiac Care Network of Ontario (CCN) website (www.ccn.on.ca).

A suggested minimum dataset for the provincial waiting list clinical registry is provided in Table 8.2. While the feasibility of gathering the suggested data remains to be pilot-tested, a small amount of clinical data is included as it will be important to understand why patients are being referred and how urgently the service is needed. It should be noted that the initial phase of the registry might include fewer data elements than those suggested here, and that the data collected will evolve over time.

Table 8.2 Suggested minimal dataset for provincial waiting list registry

Patient demographics including name, address, telephone number, and health card number.
Accepting surgeon, hospital, and date of acceptance onto the waiting list (decision).
Clinical rationale for procedure and type of procedure requested (+/- supplementary narrative).
Pre-operative patient urgency or severity marker (e.g., visual function for cataract surgery, CCN urgency rating score data elements) and date recorded.
Patient urgency categorization by referring or accepting physician (e.g., elective, urgent, emergent).
Change in pre-operative patient urgency status and date, if applicable.
Date and reason patient was removed from the waiting list, if applicable.
Operating surgeon, hospital, and date of operation/service, if performed.
Post-operative outcome (to be developed at a later date).

The successful deployment of a centralized provincial waiting list registry has the potential to improve the delivery of health care in Ontario. Factors that will be crucial to the success of such a registry are defined in Table 8.3, and include:

- The ability to obtain clinician and administrative buy-in. Support from clinicians can be garnered by minimizing the volume of data collected, making the registry electronic and a seamless part of booking a procedure, and by providing timely data from the registry so that clinicians and their patients benefit from the data collection effort.
- Mandatory participation of providers and hospitals will be necessary to ensure the success of the registry. Participation in the registry should be tied to hospital funding and/or physician reimbursement to ensure complete data capture of all patients. The most cost-effective strategy for capturing data will need to be determined and some dedicated data gathering personnel may be required.
- Independent, periodic data quality audits should be undertaken to increase confidence in the accuracy of the data and to help improve the quality of the data collected.

- Adherence to strict privacy and confidentiality standards through compliance with the Ontario *Personal Health Information Protection Act, 2004* will be fundamental to the success of this initiative. Patients should be fully informed about the existence of the registry, why their information is gathered and how it is used, and what safeguards are in place to ensure data security.

Table 8.3 Critical success factors for the provincial wait list registry

Only essential data elements collected.
Timely access of clinicians, managers, and administrators to the data.
Mandatory participation (tied to hospital and/or physician funding).
Strong privacy and confidentiality safeguards.
Clinical input into data elements collected, data element definitions.
Periodic data quality audits.

3. Implement, with Ontario-specific modifications if necessary, existing patient urgency prioritization systems for selected services where feasible and appropriate.

Patient urgency prioritization systems have been recommended as a means of ensuring equitable access, where patients with the greatest need are given priority access to service, and those whose clinical condition is least severe wait the longest. Such systems have been developed for cardiac patients in Ontario and have been successfully implemented in the CCN cardiac procedure registry.[12,13] Patient urgency prioritization systems have also been developed for a number of procedures including total joint replacements and cataract surgery as part of the Western Canada Waiting List Project, although these have not yet been implemented on a wide-scale.[14]

An Ontario patient urgency prioritization system should build upon work done elsewhere in this area with Ontario-specific modifications, if necessary. While there are potential benefits from such systems, a precautionary note is also warranted. These systems are intended to be used as a guide for scheduling patients, but should not interfere with individual patient/physician decision making whereby other factors may also influence the optimal timing of surgery. Successful development and implementation of urgency rating systems may be difficult where the primary variable used to determine urgency is subjective, such as the degree of patient pain in the case of joint replacement, rather than more objective variables, such as coronary anatomy or left ventricular function for cardiac surgery. Furthermore, these systems may have limited utility for procedures such as cancer surgery where the diagnosis is certain, and most patients need surgery in a timely manner.

An alternative approach would involve the use of a pre-defined threshold score on a quality of life measure such as the Western Ontario and McMaster Osteoarthritis Index (WOMAC) scale.[15] The threshold on this scale would serve as an indication (in this case for joint replacement) that the procedure is appropriate and elective patients would be scheduled primarily on a first-come, first-served basis. This approach would minimize concerns about queue jumping in patient urgency prioritization systems. Studies from Canada and England have suggested that clinicians will schedule patients appropriately for coronary angiography based on their clinical need (i.e., patients with the greatest need had the shortest waits), without a formal patient urgency prioritization system.[16,17] Expert panels of clinicians have been formed to provide advice on the Ontario Wait Time Strategy for each of the five services. Arriving at a provincial consensus about the value of and best method for patient prioritization will be an important task for these panels.

4. Develop and implement Ontario-specific wait time benchmarks, using work already completed in other jurisdictions.

An important component of the Ontario Wait Time Strategy will involve the establishment of clear wait time benchmarks for various services. Wait time benchmarks for medical tests and procedures, based on clinical need, are an important component of any patient prioritization system. Target timeframes help guide administrators and clinicians as they work to improve the timeliness of health care delivery, and allow patients, the public and payers to see how the health care system is performing. However, it is critical that patients and the public understand the legitimate reasons why some patients will wait beyond a benchmark wait time. For example, some patients may prefer an extended wait time for personal or family reasons, while some may require more time to determine their physical fitness for surgery. Further, it is important that it be understood that benchmarks are not care guarantees, and 100% compliance should not be expected.

An important challenge in establishing wait time benchmarks is setting targets in the face of limited scientific data and finite health care resources. Randomized clinical trials of different wait times are difficult to conduct and observational studies of waiting lists will have limitations due to selection biases in determining which patients undergo surgery first. Development of benchmarks for the five key services will have to rely primarily on consensus opinions of expert clinicians and

patients, guided by the limited available scientific literature on this topic.[14] Given that the clinical course of patients on waiting lists will never be predictable with a high degree of certainty, it may be perfectly reasonable that different provinces in Canada choose different benchmarks that reflect local values and resources. Ontario benchmarks for the key services should build upon work already conducted on this topic by groups such as the Western Canada Waiting List Project, the Canadian Medical Association, and benchmarks used in other Organization for Economic Cooperation and Development (OECD) countries.[2,18] Countries such as England, Sweden, New Zealand, and Spain have developed national wait time benchmarks and have found these to be effective in stimulating and improving their respective health care systems.[2]

It is important to note the different terminology used by various groups in Canada to describe benchmark wait times. For example, CCN uses Recommended Maximum Wait Time (RMWT), the Western Canada Waiting List (WCWL) Project uses Maximum Acceptable Wait Time, and the Saskatchewan Surgical Care Network uses Target Wait Time. In this report, RMWT was selected as the preferred term. The term "recommended" recognizes that not only is considerable judgment used to establish benchmarks, but as with all recommendations, these may change over time. The term "maximum" indicates that the health care system should strive to provide most surgery or diagnostic imaging sooner than the RMWT.

In Ontario, RMWTs for coronary artery bypass surgery and coronary angiography were established through a rigorous expert consensus panel approach. This is not the case for cancer surgery, cataract extraction or joint replacement. For the latter two, the authors of this report based RMWTs on: a review of other jurisdictions' recommendations; a review of literature about the consequences of waiting for these procedures; and their best judgment as clinicians and researchers. There is recognition that further work on this topic needs to be conducted in Ontario, including defining wait time benchmarks for different patient urgency levels, conditional upon an appropriate indication for a procedure or service. For cancer surgery, no RMWTs are provided, as the literature was unclear about such determinations, and the benchmarks will likely vary by type of cancer.

5. Develop evidence-based guidelines for appropriate clinical indications for certain services.

Significant variation in the rates of many procedures observed across LHINs suggests that there may be clinical uncertainty or debate among physicians over the appropriate reasons for performing some of the services studied in this report. The rates of most of the procedures in this report were approximately two times higher in some LHINs as compared to others. This suggests that there are regional differences in the burden of disease, the clinical threshold for performing the service, patient preferences, the availability of resources needed to perform the procedures, or all of the above. To help understand the relative importance of these possible explanations, it will be important to capture data on the clinical rationale for performing the five health care services in the provincial waiting list registry.

In addition to data collection, it is recommended that evidence-based provincial guidelines be established for services, such as diagnostic imaging (e.g., CT and MRI scans), where there has been a very rapid expansion in service rates over the past decade. In theory, it should be possible to develop guidelines to help clinicians and patients determine when a CT or MRI scan is indicated. However, in practice this is not easy. The types of symptoms and physical findings that might justify a CT or MRI scan are almost infinite and cannot be easily captured in a clinical practice guideline. As well as making a diagnosis, there are other reasons for ordering diagnostic tests, such as providing reassurance, establishing a prognosis, determining the extent of disease, and in follow-up to therapy.

However, progress is being made on this front. The Canadian Association of Radiologists (CAR) is developing evidence-based guidelines for all diagnostic imaging procedures, which should be available this year. Cancer Care Ontario (CCO) is leading an initiative to develop specific guidelines for the use of diagnostic imaging to identify stages of cancer, monitor response to therapy, and follow patients for recurrence. There is an urgent need for high-quality studies on the impact of diagnostic imaging on patient management and outcomes to inform guidelines like those being developed by the CAR and CCO.

6. Develop a system to measure patient outcomes before and after procedures.

Although improving access to care and reducing wait times is a major priority for policy makers in Canada, it is also important to examine outcomes associated with these health care services to see whether or not patients are receiving measurable benefits. For example, what proportions of patients that undergo cardiac angioplasty and bypass surgery in Ontario have less angina six months after surgery than before? Has the visual function of the vast majority of patients that received cataract surgery in Ontario improved?

It is recommended that patient outcomes be measured before and after selected elective procedures such as cardiac procedures, hip and knee replacements and cataract surgery,

where the benefits are primarily related to quality of life. A centralized registry would make this process more efficient as designated staff could contact patients by telephone or mail, regardless of the centre in which the procedure was completed. The feasibility of gathering pre- and post-procedure data has been established in previous studies, and well-tested disease-specific quality of life measures are available, including the Seattle Angina Questionnaire (SAQ), WOMAC, and the Visual Function-14 scale.[15,19,20]

If it is demonstrated that the vast majority of patients currently receiving services in Ontario are obtaining significant quality of life benefits, particularly in regions with high procedure rates, this provides indirect evidence that further expansion of service rates may be appropriate and justified. In contrast, if a significant proportion of patients appear to have minimal or no symptoms indicating the need for the procedure, or have poor outcomes in spite of surgery, as has been shown in some studies,[21,22] the case for increased capacity is not convincing and health care resources might be better used to address other priorities.

Evaluation of the long-term outcomes of patients undergoing cancer surgery should also be completed. For example, how do the long-term survival rates of patients undergoing different types of cancer surgery in Ontario compare to those of patients in other provinces and countries? These studies would be complex as it would be necessary to account for differences in the stage at which cancer is diagnosed in various jurisdictions, and to take into consideration the use of other adjuvant treatments such as radiotherapy and/or chemotherapy. Nevertheless, outcome studies for all key services are important, since a major goal of providing more timely access to care is to improve patient outcomes.

7. Develop computer simulation models to estimate future needs for services.

To adequately plan for the financial and human resources required to meet the health care needs of the Ontario population, consideration should be given to building computer simulation forecasting models. Such models, widely used in other fields such as economics and engineering, would integrate data from a number of different sources including projected population demographic data from Statistics Canada, clinical data from clinical registries, administrative data, and costing information from the Ontario Case-Costing Project. With advanced mathematical modeling techniques it should be possible to estimate future needs and costs for most of these services, taking into account multiple assumptions such as the aging population, changes in disease risk factors and disease incidence, as well as changing clinical rationales for conducting various procedures. From these models, projected volumes of services required to achieve certain procedure rates and wait time targets could be estimated along with the resource requirements.

There is a need for innovative studies that incorporate lessons learned from research on waiting lists in other sectors of society. Operations research is a branch of industrial engineering where well-developed mathematical methods and computer simulation techniques have been developed to study queuing theory. Incorporating operations research methods more widely into health care in Canada could help with the formulation of strategies to maximize patient throughput and minimize patient wait times.

8. Develop methods to measure other important key wait time intervals.

This report has focused primarily on the wait time interval between the last surgeon consultation and the date of surgery. In reality, the wait period begins much earlier, as a patient waits to see a primary care physician and then waits for an appointment to see a surgeon, at which time a decision to proceed with surgery is made. Currently, measuring these earlier wait time intervals is challenging due to a lack of available data. Collecting this type of data for all patients in Ontario is impossible at the present time with our fragmented health information system. However, it may be possible to estimate these wait time intervals using several alternative approaches. One method would involve establishing a wait time surveillance system whereby a random sample of family physicians in Ontario, from different regions, are asked to facilitate the collection of real-time wait time data on a sample of consecutive patients each year who require access to various services.[2] It may also be possible to measure the family physician to specialist wait interval by requiring specialists in Ontario who are performing the five key services to submit data on the date at which an initial referral was received to the provincial wait time registry. Alternatively, including this type of data in the information systems that are being implemented through primary care reform initiatives in Ontario would also provide a means of acquiring this information.

9. Measure access to other important aspects of the health system to ensure that these areas are not adversely affected.

It may be argued that Ontarians have suboptimal access to many health care services in addition to the five key services that are the focus of the Ontario Wait Time Strategy. For example, it has been estimated that approximately 900,000 Ontarians do not have access to a family doctor.[23] There is

suboptimal access to screening for large bowel cancer,[24] and it is likely that increasing such screening would have a much greater effect upon morbidity and mortality than a small decrease in the wait time for large bowel resection. The recent Severe Acute Respiratory Syndrome (SARS) outbreak highlighted deficiencies in our public health system and critical care capacity.[25] Chronic disease management, palliative care and home care services are other aspects of health care in Ontario that some feel are underfunded.

Concerns have also been expressed that patients waiting for other types of surgery may have to wait longer to accommodate those having surgery for the services identified as key priorities. Whether the Ontario Wait Time Strategy will have an adverse effect on access to other services will depend in part upon the extent to which the Strategy will involve new resources, as opposed to the redeployment of existing resources. It could also be argued that it is not possible to try and improve all aspects of the health care system simultaneously, and that initial priorities have to be clearly identified and access improved before other challenges are tackled. The availability of sufficient health human resources will be of critical importance to the success of the Strategy. To address these complex issues, it will be important to measure and monitor access to other types of health services as the implementation of the Ontario Wait Time Strategy progresses. This could be done using methods similar to those used in this report.

10. Investigate the causes of observed socioeconomic disparities in access to certain services.

One final topic suggested for future study involves a detailed review of the causes of observed socioeconomic disparities in access to several of the services examined in this report. Study findings indicate that those living in wealthier parts of Ontario had higher rates of total joint replacements, MRI scans, cataract surgery, and radical prostatectomy. The explanations for this disparity are multifactorial, but could include geographical differences in the availability of services; differences in patient knowledge, preferences and/or demands; willingness to pay for tests that are not covered by OHIP, such as the Prostate Specific Antigen (PSA) test; access to primary care physicians or specialists; referral biases; and, differences in the burden of disease. The frequency of most diseases is more common among the poor, and thus, the burden of disease is probably not the primary explanation for most of these disparities. Sorting out which of these potential explanations are important factors could be determined through future research studies. The Canadian health care system prides itself on providing universal access to health care for all Canadians, and as such, efforts to understand and reduce socioeconomic disparities in access to care should be a priority.

Final Reflections

Although the data presented in this report show that significant waiting list issues exist in the Ontario health care system, several points should be kept in mind. First, the main adverse effect of prolonged waiting for most health services, with the exception of some potentially life-saving cardiac procedures and cancer surgery, is patient pre-operative quality of life, rather than premature death. This reality may help to explain why, in spite of public concern about excessive wait times in Canada, relatively small numbers of Canadians die on a waiting list, and Canadians still continue to enjoy one of the highest life expectancies of any industrialized nation.[26] Second, while media coverage about long waiting lists and other health system problems have contributed to a decline in public confidence in the system, many Canadians who have used the health care system have received reasonably timely care and have generally been satisfied with their encounters.[23] Third, while the recent commitment to reducing wait times will be very important for those patients and families who have suffered pain, stress, and anxiety from prolonged and excessive waits for any of the five key health services, it is important to consider the bigger picture. Preventing the development of diseases, such as heart disease, by decreasing rates of smoking and obesity through appropriate health promotion programs, or cancer through the use of screening programs that allow for early detection, will ultimately have a greater impact on improving the health of Ontarians than reducing wait times for services to treat chronic diseases. Finally, it is important to appreciate that the absence of any type of wait for service suggests excess capacity and typically involves some idle time for providers, neither of which is cost-effective. Excess capacity can also result in unnecessary procedures as there is no need to vet or screen cases due to resource constraints, as has been observed in the United States.[27]

Timely access to some types of health care continues to be a major challenge facing the Ontario and Canadian health care systems, as demonstrated by the findings presented in this report. It will be important for all stakeholders in the system to work collaboratively on this most challenging problem. It is sobering to note that in spite of the provision of markedly increased volumes of all of the five key health services over the past decade, wait times continue to be significant, and public confidence and satisfaction with the system has declined.[5] This problem is unlikely to be solved with more money alone, but rather requires targeted funding in combination with improved management. Successfully addressing the waiting list issue will require a long-term investment in health human resources, hospital services, clinical information systems, and health services research. We hope that the information and recommendations contained in this report will be acted upon by government, health system managers, and clinicians, and will ultimately lead to constructive improvements in access to care across the Ontario health care system.

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Phone (416) 480-4055
Fax (416) 480-6048
Website: www.ices.on.ca
G1 06, 2075 Bayview Avenue
Toronto, Ontario M4N 3M5
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ISBN 0-9730491-9-7
Printed in Canada