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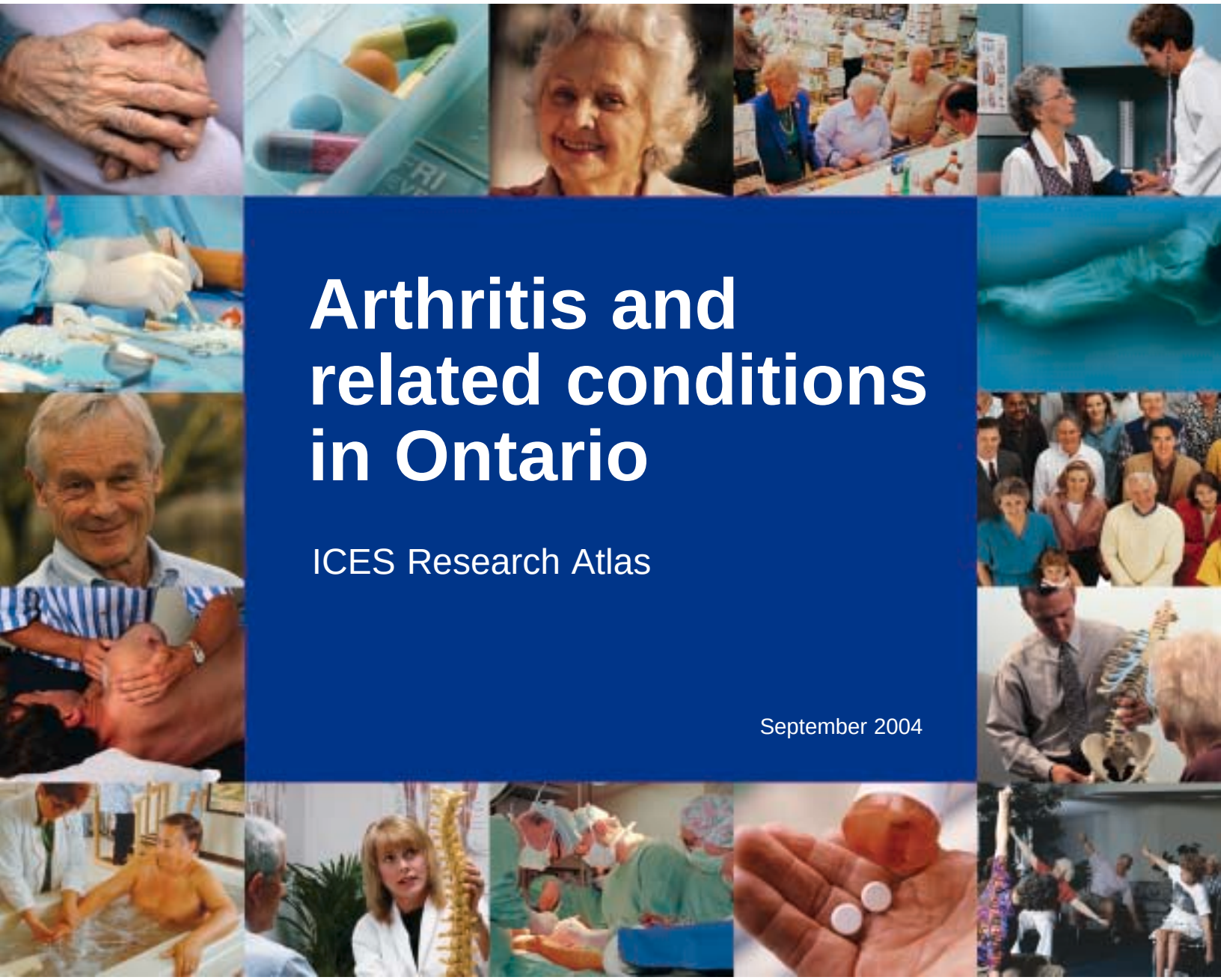


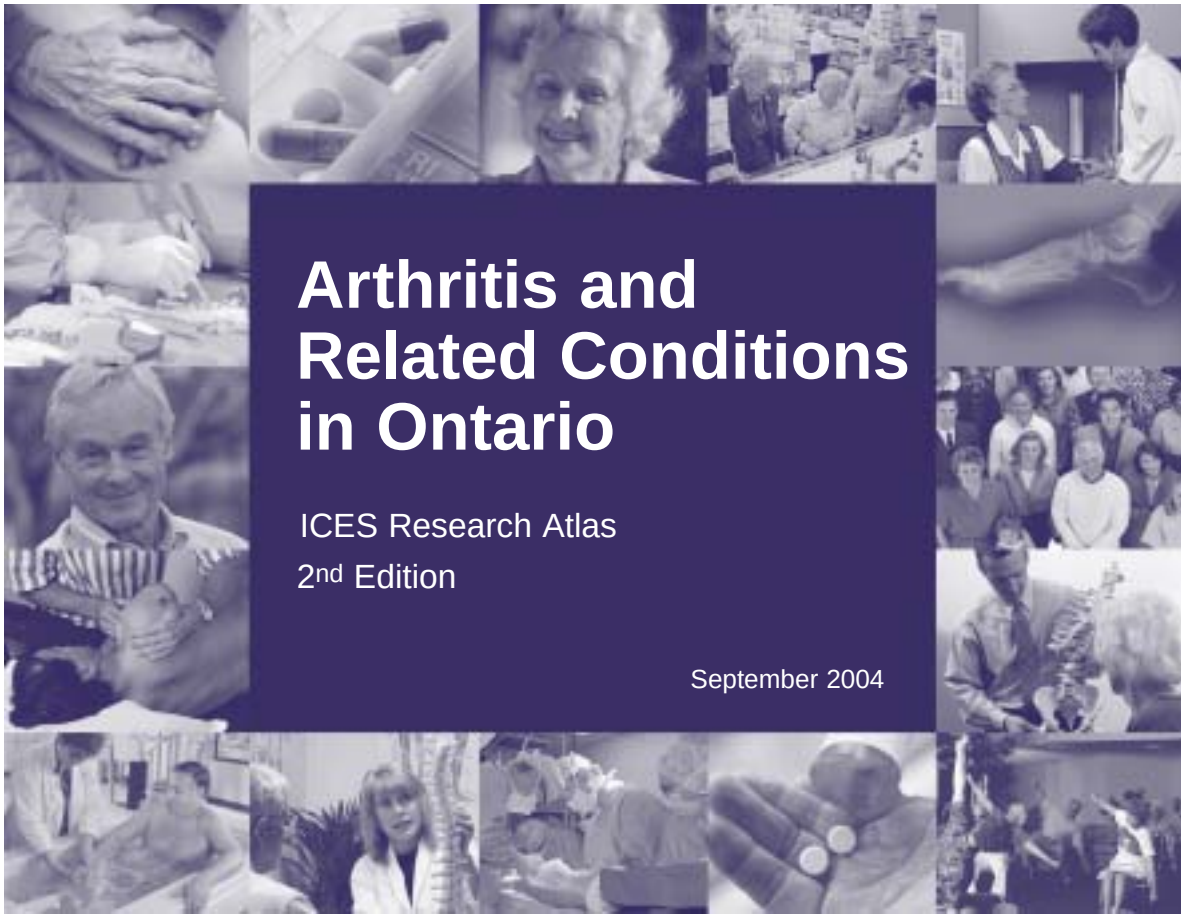
Arthritis and related conditions in Ontario

ICES Research Atlas

September 2004

The Arthritis Society

ACREU
Arthritis Community Research & Evaluation Unit



Arthritis and Related Conditions in Ontario

ICES Research Atlas

2nd Edition

September 2004

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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.

Arthritis Community Research and Evaluation Unit (ACREU)

The Arthritis Community Research and Evaluation Unit (ACREU) was founded in 1991 as an interdisciplinary research unit. Our mission is to explore the impact of arthritis on individuals, their families, communities, and on the population at large, in order to further the development of targeted policies and effective interventions. ACREU is the primary source for reliable data on arthritis in Canada. Research includes arthritis and employment, primary care management, access to specialists, joint replacement surgery and rehabilitation service delivery.

ACREU investigators were major contributors to the first-ever, federally funded national study, Arthritis in Canada (2003) as well as the first edition of the ICES research atlas, *Patterns of Health Care in Ontario: Arthritis and Related Conditions* (1998).

Rehabilitation was one of the original research themes at ACREU and it continues to be an important research focus. Among the recent achievements in ACREU-associated rehabilitation research are the *Hospital Report 2003: Rehabilitation,* and the development of the Client Centred Rehabilitation Questionnaire (CCRQ), which is being used throughout Ontario for clients discharged from Inpatient Rehabilitation Services.

The Arthritis Society

The mission of The Arthritis Society is to search for the underlying causes and subsequent cures for arthritis, and to promote the best possible care and treatment for people with arthritis. The Arthritis Society is Canada's not-for-profit organization devoted solely to funding and promoting arthritis research, programs and patient care. It has a national administrative office in Toronto, division offices in each province and nearly 1,000 community branches throughout Canada.

The Arthritis Society provides hope through education, community support and research-based solutions to the over 4 million Canadians living with arthritis, for a better life—today and tomorrow. The Society is able to provide this due to the widespread support it receives from the tens of thousands of volunteers and donors across the country.

An 21-member national board is responsible for managing and controlling the activities of The Society. The voluntary board includes representatives from each division, as well as other members recruited from across Canada. National staff provide administrative support for the board and facilitate cross-country initiatives such as research and corporate partnerships. Each division operates within this structure, navigating with local operating procedures established by their respective board of directors. Divisions are responsible primarily for fundraising, promoting and/or providing patient or client care, delivering education programs and providing advocacy at the local level.

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Population geography and mapping boundaries

Multiple levels of geography are used within Ontario to describe populations. The three main inter-related geographic coding systems are Statistics Canada's Standard Geographical Classification (SGC), the Residence Coding System from the Ontario Ministry of Health and Long-Term Care (MOHLTC), and Canada Post's mail delivery system using postal codes.

Standard Geographical Classification

The Standard Geographical Classification (SGC) is a system of names and codes representing areas of Canada. It consists of a three-tiered hierarchy—province or territory, census division, and census subdivision. Lower levels of census geography such as Census Tracts (CTs), the former Enumeration Areas (EAs), and the latest grouping Dissemination Areas (DAs), are less commonly used for collection of health data but can be used for analysis based on recoding from the postal codes (see later discussion of postal code system). CTs, EAs and DAs are available for Census data and can be useful for regrouping into some level of geography lower than the CSD level for "community level" analysis. Most data produced by Statistics Canada uses this system including Census data, population estimates and projections.

MOHLTC Residence Coding System

The Ontario MOHLTC bases all geography on its Residence Coding System. The lowest level (4 digits) represents municipalities, townships, named settlements, First Nations reserves, and unorganized areas. These geographic units are the basis of the Public Health Unit geography. Most data coming from Statistics Canada, including population estimates and projections and vital statistics must be regrouped into Residence Codes based on Census Sub Division (CSD). Because some CSDs map to more than one Residence Code, decisions regarding the assignment of CSDs to unique Residence Codes are made by the MOHLTC. Residence Codes reflect changes in the municipal boundaries that occur between Census years whereas Statistics Canada's data are based on CSDs from the most recent Census.

The next highest level of geography for MOHLTC is the county/district. Counties are created by grouping 4-digit Residence Codes together and therefore differ somewhat from Statistics Canada's Census Divisions (based on groupings of CSDs). In many cases these geographies match; most differences are related to where First Nations reserves are placed. Statistics Canada splits reserves across CDs whereas MOHLTC selects one county to place the entire reserve.

Residence codes are also the basis of the public health unit geography in Ontario. Many health units coincide with counties, however, in some cases, marked with an asterisk in the table below, a county will fall into more than one health unit area. For this reason, when aggregating data which is based on census geography it is preferable to group CSDs rather than CDs into health units.

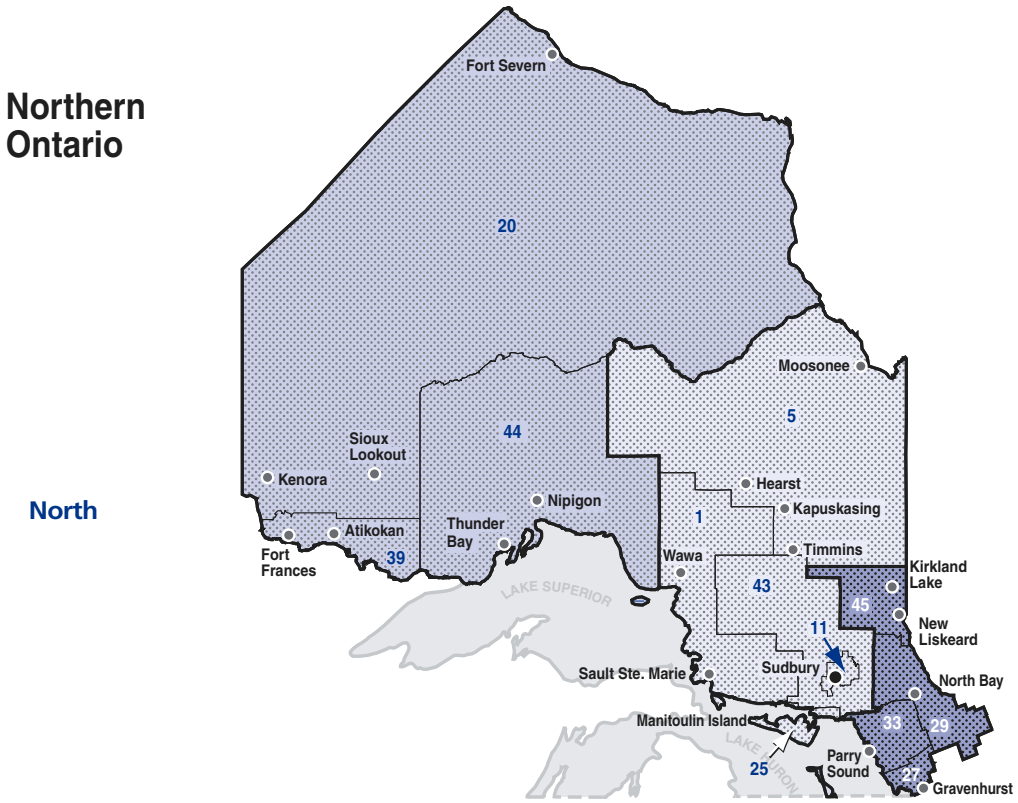
The highest level of geography in the MOHLTC's system is the Health Planning Region, whose boundaries differ from those of other Ontario Ministries such as the Ministry of the Environment and the Ministry of Community, Family and Children's Services. The MOHLTC's seven current Health Planning Regions, which replaced the five regions depicted in the 1998 atlas, are outlined in the map (next page), in addition to District Health Councils (16) and Counties (49). These geographical boundaries are used for map exhibits in this atlas.

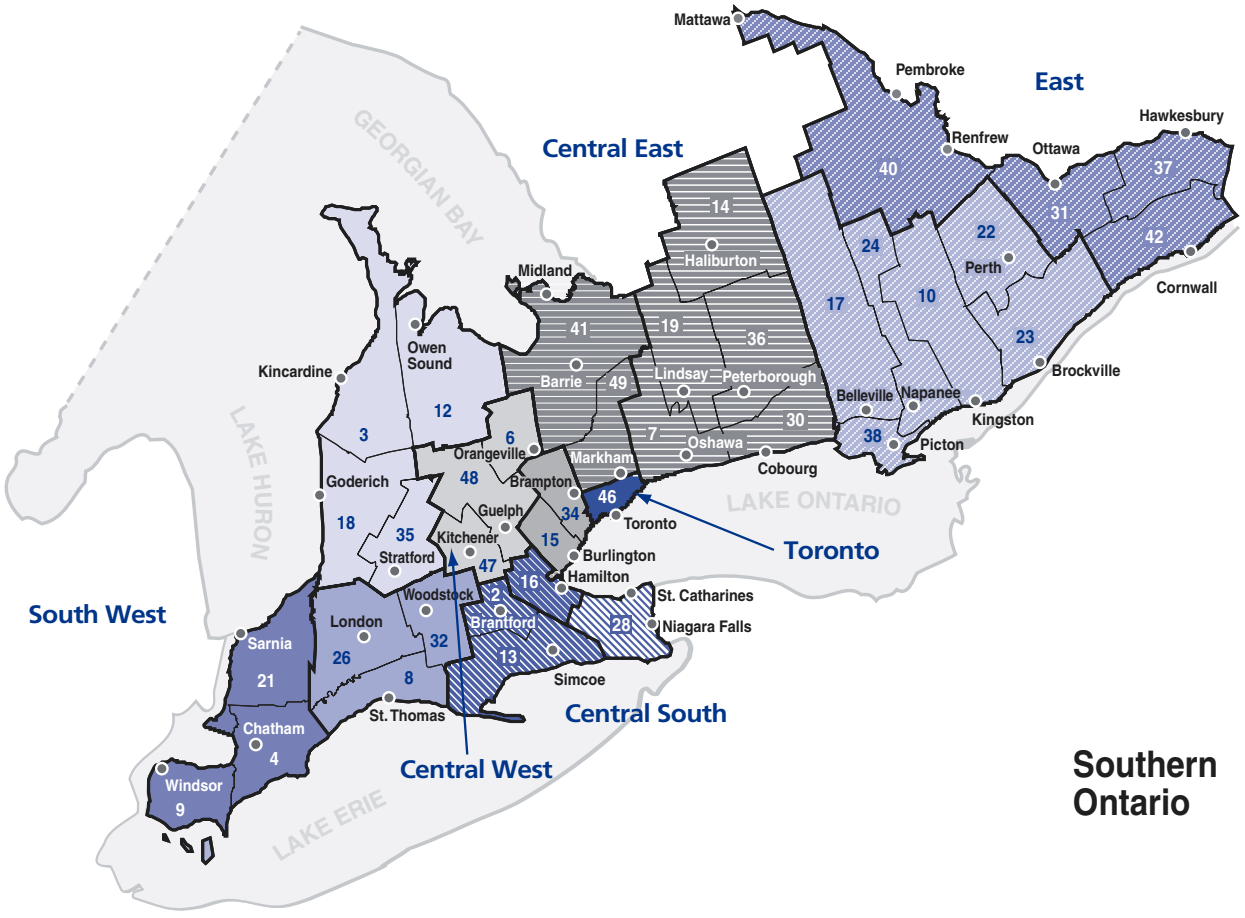
Map guide

Ontario Health Planning Regions, District Health Councils and Counties

How to Read ICES Maps

Ministry of Health and Long-Term Care (MOHLTC) Regions	District Health Councils (DHCs)	Regions, Counties and Districts (49)
North	Algoma-Cochrane-Manitoulin-Sudbury	Algoma (1), Cochrane (5), Greater Sudbury (11), Manitoulin (25), Sudbury (43)
	Northern Shores	Muskoka (27), Nipissing (29), Parry Sound (33), Timiskaming (45)
	Northwestern Ontario	Kenora (20), Rainy River (39), Thunder Bay (44)
South West	Essex-Kent-Lambton	Chatham-Kent (4), Essex (9), Lambton (21)
solid colour	Grey-Bruce-Huron-Perth	Bruce (3), Grey (12), Huron (18), Perth (35)
	Thames Valley	Elgin (8), Middlesex (26), Oxford (32)
Central West	Halton–Peel	Halton (15), Peel (34)
solid colour	Waterloo Region–Wellington–Dufferin	Dufferin (6), Waterloo (47), Wellington (48)
Central South	Grand River	Brant (2), Haldimand-Norfolk (13)
	Hamilton	Hamilton (16)
	Niagara	Niagara (28)
Toronto	Toronto	Toronto (46)
solid colour		
Central East	Durham-Haliburton-Kawartha-Pine Ridge	Durham (7), Haliburton (14), Northumberland (30), Peterborough (36), Kawartha Lakes (19)
	Simcoe-York	Simcoe (41), York (49)
East	Champlain	Ottawa (31), Prescott-Russell (37), Renfrew (40), Stormont-Dundas-Glengarry (42)
	Southeastern Ontario	Frontenac (10), Hastings (17), Lanark (22), Leeds-Grenville (23), Lennox-Addington (24), Prince Edward (38)


Northern Ontario
North
Fort Severn
20
Moosonee
5
44
Sioux Lookout
Kenora
Nipigon
Hearst
Kapuskasing
1
Atikokan
Thunder Bay
Timmins
Fort Frances
39
Wawa
Kirkland Lake
43
45
LAKE SUPERIOR
11
New Liskeard
Sudbury
Sault Ste. Marie
North Bay
Manitoulin Island
33
29
LAKE HURON
Parry Sound
25
27
Gravenhurst


Mattawa
Pembroke
East
Hawkesbury
Renfrew
Ottawa
40
37
31
Central East
GEORGIAN BAY
14
42
22
24
Haliburton
Perth
Midland
17
10
Cornwall
41
19
36
23
Owen Sound
Kincardine
Barrie
49
Lindsay
Peterborough
Brockville
Belleville
Napanee
12
3
30
Kingston
6
7
Oshawa
38
Picton
Orangeville
Markham
Cobourg
48
Brampton
Goderich
46
LAKE ONTARIO
LAKE HURON
34
Guelph
18
35
Toronto
Kitchener
15
Toronto
Stratford
47
Burlington
16
Hamilton
Woodstock
2
St. Catharines
South West
London
Brantford
28
Niagara Falls
Sarnia
32
26
13
Simcoe
21
8
Central South
St. Thomas
Chatham
4
Central West
Windsor
9
LAKE ERIE
Southern Ontario

Overview

Arthritis (inflammation of the joints), a **leading cause of pain, physical disability and health care utilization in Ontario,** is part of a larger family of musculoskeletal disorders that create a notable **burden on population health.** In addition to causing considerable morbidity and disability, arthritis and related conditions (A&R) stimulate a host of related costs ranging from reduced quality of life to significant expenditures in health care resources such as physician visits, specialist care, expensive prescription medication, surgery and rehabilitation. **With more than four million Canadians** living with arthritis and other musculoskeletal disease, the **annual cost** is a staggering **$17.8 billion.**

While **osteoarthritis** is one of the **most common** forms of arthritis, **more than 100 different chronic conditions** exist, ranging from relatively mild forms of tendinitis (as in tennis elbow) and bursitis to illness in systemic forms, such as rheumatoid arthritis. Pain syndromes such as fibromyalgia, arthritis-related disorders such as systemic lupus erythematosus, which affects the entire body, and gout, are also included in the disease's many forms. There is **no known cure,** but therapies to manage arthritis are most effective when **started early** in the disease process.

Though **prevalence** of arthritic conditions increases with age, it is not confined solely to the elderly population and many are affected in the prime of their lives. About 9.8 million baby boomers (33 per cent of the population) are approaching the age of 50. It is estimated that between 1991 and 2031, the number of 45 to 54 year-olds diagnosed with arthritis *will double* from **418,000** to **738,000** and the number of 55 to 64 year-olds diagnosed *will more than double* to **1.4 million,** from **645,000.**

The first ICES research atlas *Patterns of Health Care in Ontario: Arthritis and Related Conditions* was published in 1998. The second edition, *Arthritis and Related Conditions in Ontario,* provides an overview of the current situation for policymakers, decision-makers, health care professionals and the public, particularly individuals with arthritis. Bringing together data from provincial population health surveys, the Ontario Health Insurance Plan database, the Ontario Drug Benefits database, home care data, and databases on hospital admissions and day surgery procedures, this research atlas paints a **comprehensive picture** of the **impact of arthritis and related conditions** across the province and proposes strategies to better manage the challenge of meeting growing demand for arthritis care and treatment.

Produced in partnership with the **Arthritis Community Research and Evaluation Unit (ACREU)** and **The Arthritis Society, Ontario division,** the objectives of this report are to:

- **Provide an overview of the impact of arthritis** and related conditions among Ontarians including health and social outcomes and the use of health care services;
- **Identify strategies** that may reduce the adverse consequences associated with arthritis, and
- **Provide a basis for initiatives** to enhance access to care and services.

Arthritis and Related Conditions in Ontario covers the following topics:

- Emerging Issues
- Burden of Disease
- Availability of Services
- Primary and Specialist Care
- Use of Medication
- Surgical Services
- Rehabilitation for Total Joint Replacement

Key findings & policy options

Prevalence

Findings

In **2000/01**, arthritis and rheumatism affected **over 1.6 million** Ontarians aged 15 and older. By **2026**, it is estimated that **2.8 million Ontarians** aged 15 years and older **will have arthritis or rheumatism**.

In **2000/01**, **two-thirds** of people with arthritis **were women** and nearly **3 out of every 5 people** with arthritis **were younger than 65 years** of age. **The prevalence of arthritis** was **higher in northern Ontario**, though there were also areas of **high prevalence in southern Ontario**. Arthritis was more frequently reported in people with a lower level of education and in the Aboriginal population.

Policy options

Target an **intensive public education program** to specific populations about prevention and management of osteoarthritis by **decreasing risk factors** such as obesity and injury.

Develop, implement and evaluate a **chronic disease model of care** that includes disease prevention, health promotion, self-management, and is grounded in best practices. The model should incorporate a **collaborative network of health professionals**, the **key principles of client-centredness**, and **timely and relevant interventions** in a variety of settings.

Access to care

Findings

Access to arthritis-related services, specialist care, surgical services and use of post-acute rehabilitation **varied across the province.**

The level of health professional services for people with arthritis and related conditions remained relatively static since 1997. As the **number of people with arthritis rises,** this will translate into **declining levels of service per individual.**

Policy options

Step up **recruitment and training in specialist care** to address the shortage of orthopaedic surgeons, rheumatologists, and other health care providers and ensure access and equity in care throughout the province.

Provide **targeted training and education to allied health professionals** (physiotherapists, occupational therapists, and chiropractors) to **facilitate specialization** and **increase their role** in treatment of arthritis.

Primary care

Findings

The majority of **2.8 million physician visits** for arthritis and related conditions in 2000/01 were to **primary care physicians,** highlighting their key role in the management of these disorders.

Policy options

Improve the **education and training** of primary care physicians with respect to musculoskeletal conditions to **increase appropriate referrals** and **encourage effective relationships with rheumatologists.**

Key findings & recommendations

Total joint replacement

Findings

The rate of **total hip replacements (THR)** and **total knee replacements (TKR)** **increased** during the 1990s.

There is **unmet need** for total joint replacement (TJR), and with the aging of the population and associated increase of arthritis, **demand for surgery will grow**.

Wait times for THR and TKR **increased** between 1993/94 and 2001/02 with a **median wait of 29 weeks** for primary TKR and **20 weeks** for primary THR, in 2001.

Ontario orthopaedic surgeons spent only 35% of their time **dedicated to surgery**, while in the US, the recommended dedication of time is **62%.**

Arthroscopy comprises **almost half of orthopaedic surgery** for arthritis and related conditions, though its efficacy in the management of arthritis remains unclear.

Policy options

In the short-term, **strategies to reduce wait times for surgery,** including methods to **prioritize patients waiting** for TJRs, **are key.** In the long-term, the **shortage of orthopaedic surgeons should be addressed** through more recruitment and training of specialists.

More research into the **efficacy of arthroscopic surgery** in the management of osteoarthritis is **key to determine appropriate indications for this surgery.**

More research into the **outcomes of different rehabilitation processes** for TJR is necessary to determine the best approach, and to ascertain its contribution to improving capacity for TJR surgery.

The percentage of **patients discharged to inpatient rehabilitation** following primary and revision THR and TKR **increased from approximately 30% to 40%** between 1995/96 and 2001/02. Patients discharged to inpatient rehabilitation had a **shorter acute care length of stay** compared to patients discharged directly home.

Use of medication

Findings

The total cost of **arthritis-related prescriptions increased by 224%** between 1998 and 2001 due mainly to the **increased use and higher cost of COX-2 inhibitors,** a type of non-steroidal anti-inflammatory drug (NSAID), released in 1999.

Treatment with disease-modifying antirheumatic drugs (DMARDs) is **recommended as soon as rheumatoid arthritis is diagnosed.** In contrast, the proportion of **people receiving DMARDs is much less than the estimated number of people with rheumatoid arthritis** in Ontario.

Policy options

Ensure that people with arthritis have **access to necessary drugs** on the **Ontario Drug Benefit Formulary and that drugs are prescribed appropriately.**

Ensure people with inflammatory arthritis **have access to drugs** such as **DMARDs and biologics,** (proven to help prevent joint damage) through specialist care, particularly rheumatologists and internal medicine physicians.

Data collection

Findings

Lack of data for some populations and services creates an **incomplete picture of the impact of arthritis and related conditions** on the population of Ontario. For example, there is little information for rehabilitation services (publicly and privately funded), use of community services, and children with arthritis.

Policy options

Continue **rigorous surveillance of arthritis and related conditions** to **monitor trends** in disease prevalence, health status, health care utilization, and wait times for care.

Collect reliable data for **rehabilitation services** (publicly and privately funded), **use of community services,** and **children with arthritis,** to accurately describe the **impact of arthritis** in Ontario.

INSIDE

1

Chapter

Emerging Issues

EM Badley, DPhil

Introduction

Arthritis is a leading cause of pain, physical disability and health care utilization in Ontario. Chapter 1 of *Arthritis and Related Conditions in Ontario* highlights some of the emerging issues facing the province in the management of these widespread diseases, and provides an overview of the major themes addressed in subsequent chapters to help facilitate intervention in the improvement of care for Ontarians living with arthritis. Key topics include: Emerging Issues, Burden of Disease, Availability of Services, Primary and Specialist Care, Use of Medication, Surgical Services, and Rehabilitation for Total Joint Replacement. Although this report provides a comprehensive examination of arthritis in Ontario, some relevant matters, such as children and certain rehabilitation services, could not be included due to the lack of data.

Background

Arthritis and related disorders make up a large group of disorders affecting the joints, ligaments, tendons, bones and other components of the musculoskeletal system. Arthritis is one of the most common chronic conditions in Ontario.[1,2] It is a leading cause of pain, physical disability and use of health care services. Arthritis-related pain and disability affect wider aspects of life including travel, leisure and social activities, and labour force participation.[3–6] These challenges have a significant impact on affected individuals and their families, and also have consequences for society as a whole.[7,8]

The effects of arthritis are frequently underestimated. Because it is usually not life-threatening, physicians, the general public, and even those who have the condition, often dismiss it as "just aches and pains" and an inevitable part of aging.[2,9] As a result, individuals with arthritis may fail to seek or receive appropriate and adequate help. Services with proven efficacy in reducing pain and improving disability are not seen as a priority.

All forms of arthritis share symptoms such as pain, swelling or stiffness in or around the joints. If left untreated, arthritis can affect the structure and functioning of the joints, leading to increased pain, disability and difficulty performing everyday activities.[10–15] Although there is no known cure for arthritis, appropriate treatment has been shown to prevent disability, maintain function and reduce pain.[13,15–19] While the exact nature of medical treatment varies according to the type and severity of arthritis, general management and rehabilitation strategies are similar for all types. Typically, arthritis lasts for the rest of the affected person's life and has a course that fluctuates between exacerbations and remissions. Care must be available over the full course of the disease, and different types of care are likely to be needed at different points in time. Management of the disease is focused on controlling symptoms, secondary prevention of pain and disability, and improving quality of life where possible. Proposed reforms for primary care, improved access to specialist and hospital services, and expansion of publicly-funded drug coverage, are crucial to successfully managing arthritis and rheumatism.

Acquiring information to document the impact of arthritis in Ontario presents a number of challenges. First, the term "arthritis" covers a range of conditions and the best known of these are described in Appendix 1.A[1,20] which outlines the key features, prevalence, possible risk factors and disease management. While every effort has been made to maintain a consistent definition throughout this report, the use of a variety of data sources necessitates some variation in the range of arthritis conditions included. Where considered relevant, these variations are noted.

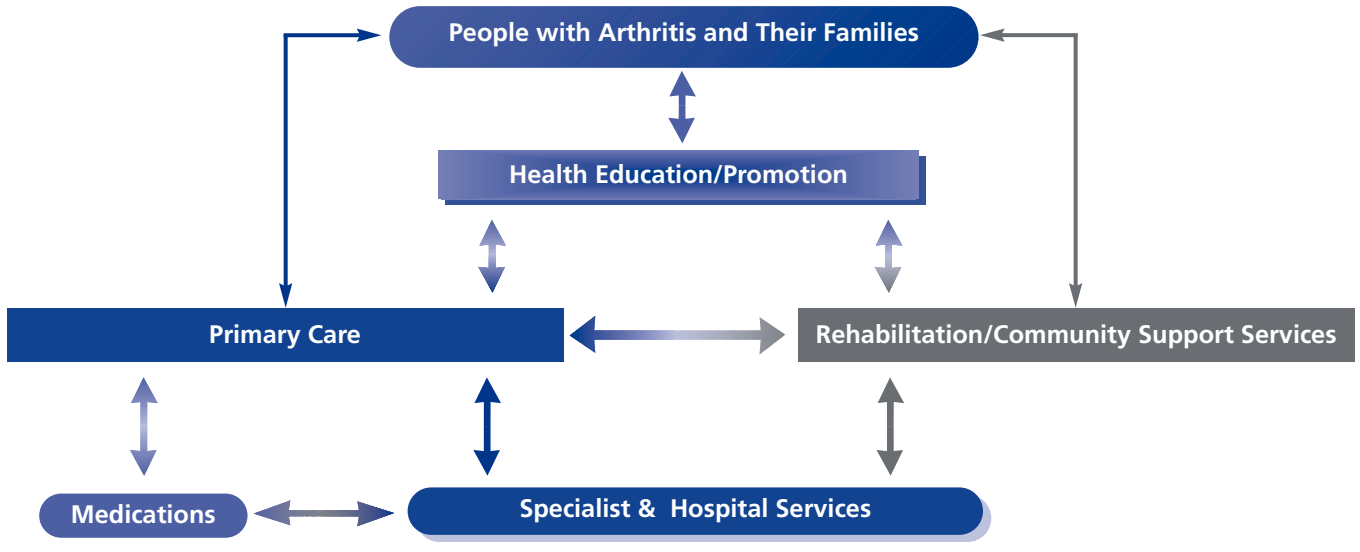
Second, the underlying diagnosis of arthritis is not always recorded in administrative databases, such as physician billings or hospital admissions. Other databases, such as the Ontario Drug Benefits (ODB) database, do not include diagnostic codes. In population survey data, only a general descriptor "arthritis or rheumatism" is used. Despite these challenges, which are not unique to arthritis, a compelling picture emerges.

The 1998 Institute for Clinical Evaluative Sciences (ICES) research atlas presented a template for a comprehensive health strategy including primary care, medications, specialist and hospital care, rehabilitation and community support services, as well as education and health promotion, to reduce the impact of arthritis on the Ontario population (Figure 1.1).[5,21] The ultimate goal of care is to improve the quality of life for individuals with arthritis and their families.[22]

The components of a comprehensive care approach may be viewed as subcomponents of the already-existing health care system. Not all of these components are part of the publicly-funded health care system. Some, including a large portion of outpatient rehabilitation and community-based initiatives, fall outside the public funding envelope. Even with most services in place, inadequacy of care, and lack of availability and accessibility for people with arthritis and related conditions may lead to less than optimal outcomes.

In Ontario, access to hospital and specialist care depends on referral at the primary care level. Likewise, access to medication is mainly dependent on prior access to primary or specialist care. How well the components within the health care system work together likely has great impact on the success of achieving integrated care. Relevant aspects include triage and patient referral, the comprehensiveness and continuity of services, and the appropriateness of care to the stage of disease.[5] The research atlas chapters examine these elements of the health care system.

Figure 1.1 Components of comprehensive care approach for the management of arthritis and related conditions



Source: Adapted from *Patterns of Health Care in Ontario: Arthritis and Related Conditions. An ICES Practice Atlas,* 1998

Chapter Overviews

Burden of disease

Chapter 2 compares figures on the impact of arthritis in Ontario to other chronic conditions. Data from the Ontario portion of the 2000/01 Canadian Community Health Survey (CCHS) shows a higher proportion of people with arthritis than other chronic conditions report pain, disability, poor self-rated health, low labour force participation, and higher use of medications and health care services.[23] The prevalence of arthritis is higher in some sectors of the population. It increases with age, is higher among poor people and those with less education, and twice as many women as men report arthritis.[24] People of Aboriginal origin are also more likely to report arthritis. If the Aboriginal population had the same age composition as the overall Canadian population, the prevalence of arthritis would be equivalent to 27% compared to a national average of 16%.[24]

This chapter also reports on regional variation in arthritis, examines predictors of health care utilization and presents projections for future growth.

Availability of services

Inadequate availability of arthritis health professionals throughout the province clearly results in reduced access to care for arthritis. Chapter 3 updates the findings from the previous report with results from recent surveys of rheumatologists and orthopaedic surgeons.[25,26,27] Regional disparities persist in availability of rheumatological and orthopaedic services.[27] The surveys of specialists point to specific barriers in the provision of care.

Primary and specialist care

Data on use of primary care and specialist services for arthritis and related conditions are presented in Chapter 4, using analyses of provincial physician-billing data. Arthritis and related conditions are among the most frequent reasons for visits to primary care physicians.[12,28,29] These physicians provide the majority of prescriptions for arthritis drugs and act as gatekeepers to other services such as consultations with specialists and rehabilitation professionals.[28,29] Building on the findings presented in the 1998 edition of this report, this chapter provides a more complete picture of ambulatory care by including information on visits to specialists, particularly rheumatologists, internists and orthopaedic surgeons, as well as looking at trends in usage over time.[28,30–32] Rates of visits with these physicians are presented for different types of arthritis, focusing on the grouping of all arthritis and related conditions in general, and specifically on osteoarthritis (OA) and rheumatoid arthritis (RA).

Use of medication

The most frequent type of treatment for arthritis and related conditions is the use of medications.[33] Drug coverage and expenditures are major challenges in the management of arthritis. Chapter 5 builds on the previous edition[34] and examines the prescription and cost of medications commonly advocated for these conditions, including conventional non-steroidal anti-inflammatory drugs (NSAIDs) and the newer COX-2 inhibitors.[13,35,36] The chapter also examines corticosteroids and disease-modifying antirheumatic drugs (DMARDs), presenting information on trends over time in prescription of the different types of DMARDs.[37–40] Data on the newly developed biologic response modifiers, a new category of medications for treating inflammatory conditions such as RA, were not yet available for inclusion in this chapter.

Surgical services

Although most people with arthritis are treated on an outpatient basis, some require admission to a hospital or surgical intervention. Medical admissions may be required to manage the complex consequences of arthritis, arthritis-related pain and disability, or the side effects of drugs used to treat arthritis.[41] Orthopaedic surgery presents a viable alternative for individuals for whom attempts at non-surgical management have failed to adequately prevent joint pain or damage.[33,41] Chapter 6 examines hospital services for arthritis and related conditions, focusing particularly on arthroscopic (keyhole) surgery of the knee, and updating trends in hip and knee replacement surgery.[41–44,45,46] This chapter also reviews some of the critical matters that must be addressed to improve access to hip and knee joint replacement surgery in Ontario.

Rehabilitation for total joint replacement

Rehabilitation is another component of the health care system where access is lacking. Rehabilitation, including physiotherapy and occupational therapy, helps prevent the loss of physical function and restore function after surgery or severe episodes of inflammatory arthritis.[15,47–53] Chapter 7 updates previous findings on the utilization of rehabilitation services for patients following total hip and knee replacements.[54] Unfortunately, systematic information about outpatient rehabilitation and privately-funded rehabilitation for people with arthritis and related conditions is not available.

Education and health promotion

The final component of a comprehensive approach to care for arthritis is education and health promotion. Education and health promotion are important and essential components of a comprehensive approach to the management of arthritis and related conditions.[55–57] Many types of arthritis and related conditions are minor and do not require medical intervention. Education to manage and prevent the complications of these disorders should not only include information on the use of over-the-counter medication and the appropriate use of simple remedies such as ice, heat or mechanical support, but should also provide guidance on when an individual should seek medical care.

Research shows that, compared to the effects of pharmaceutical treatments, patient education interventions provide additional benefits that are 20%–30% as effective for pain relief in arthritis, and 40% as effective for improvement in functional ability in RA.[58] Exercise programs for people with arthritis have been shown to yield significant improvements in pain and disability as well as a decrease in the need for medication.[59–61] Unfortunately, there are no routine sources of data on the use of these modalities. As documented previously, there is also limited availability of programs in Ontario for people with arthritis, in addition to access barriers to those that do exist.[21,62] Like a large proportion of the non-arthritis Canadian population, many people with arthritis are physically inactive, despite the potential benefits of exercise.[63]

Findings and Discussion

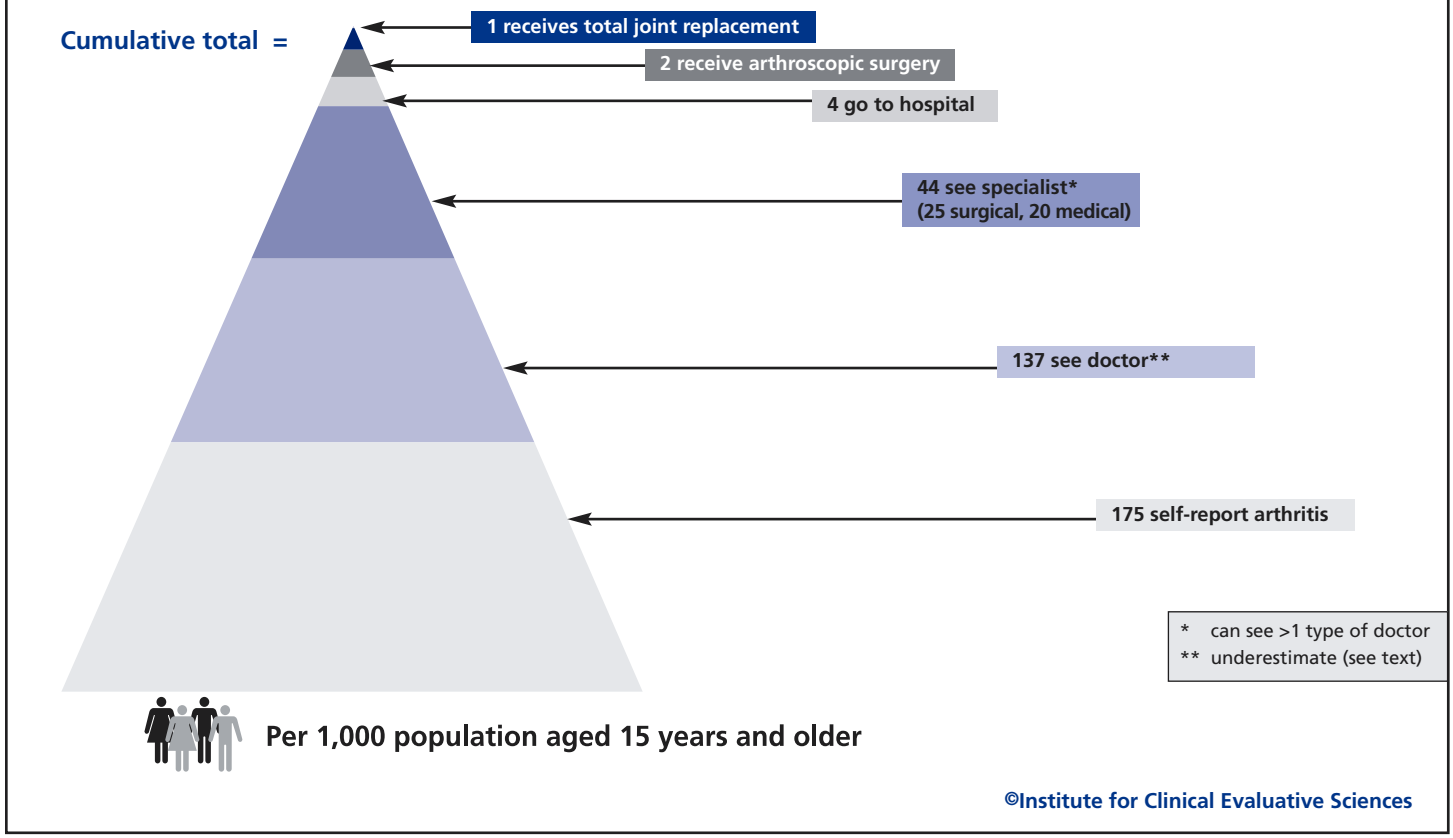
Impact of arthritis on Ontario's health care system

Integrating the findings of all the chapters provides an overview of arthritis care in Ontario (Figure 1.2). In 2000/01, 175 of every 1,000 people in Ontario self-reported arthritis. This rate is somewhat higher than the national average of 160 per 1,000 (Chapter 2). In 2000/01, 137 per 1,000 people made an average of 2.2 physician visits that were allocated billing codes for arthritis or a related diagnosis (Chapter 4). This is a lower estimate than the pooled national average of 160 people, but much of this difference is likely due to a smaller range of possible arthritis billing codes in Ontario.[29] Over 80% of these visits were to primary care physicians.

Overall, it is estimated that 44 people visited specialists, with 20 visiting medical specialists (including 11 to rheumatologists and three to general internal medicine specialists) and 25 visiting surgeons (of whom 20 visited orthopaedic surgeons). Some people visit more than one type of specialist; therefore, the estimated number of visits to various types of specialists does not equal the overall number of visits to specialists. Only 4 per 1,000 were treated in hospital: 2 had arthroscopic surgery, 1 had a hip or knee replacement and 1 had some other orthopaedic surgery or other type of admission. Thus, the overwhelming burden of care for arthritis is in ambulatory care settings, with most visits taking place in the community. Hospital-based care plays only a minor role.

The situation with regard to need for arthritis care is far from static. With the aging of the baby boomer generation, the number of people with arthritis is increasing.[64] In Ontario, the numbers reporting arthritis have increased from 1.3 million in 1994/95 to 1.6 million in 2000/01. Projections of the number of

Figure 1.2 Health care utilization of people with arthritis and related disorders



Source: Integrated data from chapters 2, 4 and 6 of *Arthritis and Related Conditions in Ontario: ICES Research Atlas*

people who will have arthritis in Canada within the next two decades suggest a further increase to 2.8 million by 2026. This is an estimated net annual increase of 70,000 people. Half of this increase will be those aged less than 65 years old, currently the normal age of retirement.

Trends over time are perplexing. Substantial increases in the number of people with arthritis continue, while trends in the numbers of consultations with specialists are static. Although there have been encouraging increases in the numbers of DMARDs prescribed, only half of the estimated one percent of the population with RA and other types of inflammatory arthritis receive prescriptions for these drugs. Modest increases in numbers of hip and knee replacements have largely been achieved by reduced lengths of stay.[65] These do not keep pace with the annual increase in total number of people with arthritis. The use of arthroscopic surgery has shown a slight decline. These trends indicate a widening care gap—an increasing number of people with arthritis not matched by an increase in use of service—that requires further investigation to determine its origin and potential impact.

The care gap is not restricted to trends over time, as the findings presented in this edition of *Arthritis and Related Conditions in Ontario* also show considerable geographic variations in the reported prevalence of arthritis and in access to care, including prescription of various categories of drugs, different types of surgery, and visits to physicians. There are also wide area variations in the availability of primary care physicians, rheumatologists, orthopaedic surgeons, and physical and occupational therapists. Shortages and poor distribution of these professionals are major barriers to service access for arthritis management, particularly in rural and remote areas of Ontario. Bridging this care gap is a major challenge for the future of arthritis care, requiring innovative and imaginative solutions to counteract the resource shortage.

Emerging issues

Costs

Arthritis and related conditions are costly to treat. With the projected increases in numbers of patients the related costs are likely to increase. Arthritis is a member of the larger family of musculoskeletal conditions which, taken together, are second in associated costs only to cardiovascular disease in Canada. In fact, musculoskeletal conditions are more costly than cancer.[66,67] Costs for arthritis have been estimated by Coyte (1998) as $6.2 billion CDN (baseline estimate, converted to 1998 dollars) and in a 2003 Health Canada report as $4.4 billion CDN (1998 dollars), although the latter estimate included a smaller subset of arthritis

conditions.[68,69,67] All costs are likely underestimates as they do not include circumstances in which arthritis is a secondary diagnosis, or costs for care in non-hospital institutions and non-physician health professionals (such as rehabilitation). Also excluded are direct health expenditures such as privately-funded rehabilitation, assistive devices, caregiving (paid out-of-pocket, or provided by family and friends), and over-the-counter (OTC) medications. The costs of OTC non-steriodal anti-inflammatory medications and alternative remedies, such as glucosamine, can be substantial.

Figure 1.3 shows the breakdown of arthritis costs according to Coyte's estimate. The major elements of the direct costs are hospital expenses (12.4%) and medications (4.4%). Until recently, medication costs for arthritis have been modest, however, these costs are likely to rise with the advent of COX-2 inhibitors and new and highly effective biologic drugs for the treatment of inflammatory arthritis. All cost estimates for arthritis concur that at least two-thirds are indirect costs of disability, which provides a measure of lost productivity.

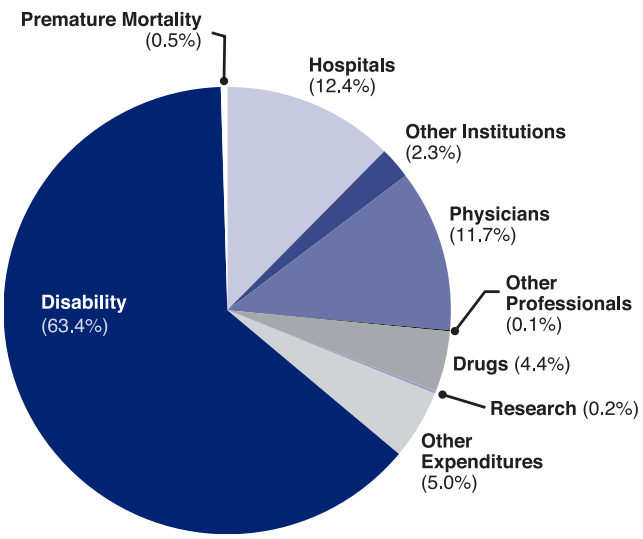
The challenge of reducing the overall costs of arthritis then is to reduce the associated pain and disability. Evidence-based guidelines for arthritis management have shown that the following interventions have the potential to reduce the pain and disability associated with its various forms: treatment of early RA with DMARDs, hip and knee replacement surgery for advanced arthritis, appropriate treatment with analgesics or NSAIDs, and exercise on land and in water (hydrotherapy).[39,70–72] The latter is often part of a rehabilitation program.[59,60,73] The delivery of most of these modalities lies within the scope of the health care system and a dilemma for health policy and planning arises: to reduce the societal costs of arthritis by relieving pain and suffering, health care expenditure must increase.

Access to primary care

Reducing the impact of arthritis in Ontario requires dealing with inequities in access and provision related to geography, gender, and socioeconomic status to ensure all citizens have similar opportunities for access.[15,74] At the same time, investments must be made to diminish gaps in care to ensure that people are not unnecessarily disabled. The challenge is to get the care to people with arthritis when they need it, where they need it, by the provider best suited to meet their needs, and, in a time of constrained resources, to make the best use of the resources that are available. Creative solutions are needed to extend the reach of existing services. The potential scope of some of these solutions is outlined below.

As indicated in Figure 1.1, primary care physicians play a crucial role in the management of arthritis and related disorders, providing the majority of related medication prescriptions and acting as gatekeepers to publicly and privately-funded services, such as specialists and rehabilitation professionals. Primary care

Figure 1.3 Economic cost of arthritis and rheumatism for Canadians



Source: *Patterns of Health Care in Ontario: Arthritis and Related Conditions. An ICES Practice Atlas,* 1998

reform needs to ensure access to services, improve diagnosis of arthritis, encourage use of appropriate medications, and assure timely referral to specialists. These issues are particularly significant in rural and remote areas of Ontario where access to specialist care is not readily available. Previous research has shown inadequacies in the primary care management of arthritis, including inappropriate prescription of medication and lack of timely referral to specialists, especially for early RA and OA needing joint replacement.[37,38,75,76,77] Many primary care physicians report a lack of confidence in examining the joints, an essential step in making a correct diagnosis. Many of these inadequacies relate to lack of training in the management of arthritis, at all levels from undergraduate to continuing medical education.

Following the 1998 release of *Patterns of Health Care in Ontario: Arthritis and Related Conditions, An ICES Practice Atlas,* the Ministry of Health and Long-Term Care (MOHLTC) sponsored an initiative to implement a demonstration project for a patient-centred program for the primary care management of arthritis. This project was developed in collaboration with several Community Health Centres (CHCs) throughout the province, and evaluation showed that such a program had potential to improve patient outcomes.[78] Consequently, federal funding has been awarded to implement this intervention in Primary Health Care Centres throughout Canada. However, special interventions such as these, and those offered by other agencies including industry, while encouraging, have the potential to reach only a small

proportion of Ontario's primary care physicians. A comprehensive strategy is required for primary arthritis care that incorporates enhanced training, coordination across disciplines and community resources, public education about arthritis, and development of new care models.

Access to care for inflammatory arthritis

Rheumatoid arthritis and related types of inflammatory arthritis are autoimmune diseases that can result in severe illness and disability. Approximately one percent of the adult population (almost 100,000 people in Ontario) has RA and other forms of inflammatory arthritis. It is estimated that there is likely to be at most one new case each year in every 2,000 people. This represents less than one new case for each primary care physician. These people require access to specialist care and treatment with appropriate medications such as DMARDs. Mounting and compelling evidence shows that treatment of early RA with DMARDs can slow down the progression of the disease and prevent disability.[39] Technological advances in imaging are likely to have a major impact on diagnosis and identification, particularly of early disease. Treatment is most effective in preventing disability if the disease is identified early.

There are new therapeutic possibilities in biologic drugs, which seem to be effective in "switching off" the disease but are very expensive. While some of these drugs are listed on the Ontario Drug Benefit (ODB) Formulary/Comparative Drug Index (Formulary/CDI), others are available only under special conditions when a rheumatologist requests coverage for patients eligible for the ODB Program or through the Trillium Drug Program.[79,80,81,82] Some arthritis drugs need special arrangements for administration, for example, some are administered in hospital through an intravenous (IV) infusion which is repeated in two weeks, then one month later, and every two months thereafter.[83] Access to these drugs for patients under age 65 years and without supplementary health insurance is an important issue affecting delivery of appropriate health care.

Even if drugs are available, as they are with many DMARDs, not all eligible patients have access. With the potential for serious side effects and the need for close monitoring, specialists usually prescribe these drugs. The nature of the disease and its relatively low incidence warrants special care. A study linking Ontario Health Insurance Plan (OHIP) and ODB data showed that patients with RA seen by a specialist were five times more likely to get appropriate drugs than those seen by a primary care physician, and that people living in areas with poor access to rheumatologists were also less likely to be prescribed DMARDs.[84] Access to appropriate care is clearly an issue given a shortage of rheumatologists in Ontario, difficulties in recruitment, and reported barriers to providing adequate care.[26] There is an urgent need to explore new ways of increasing the reach of these scarce services, even before allowances are made for the aging population and technological advances.

Increasing access to specialist care for RA could be managed in a number of ways. One model is referral of patients with early disease to special clinics in major centres.[40] In Ontario, this might include arrangements to accommodate patients that travel long distances. An alternative is to have the rheumatologists travel and make regular visits to community clinics or hospitals in the underserved areas.[85] Such visits already happen to a limited extent in Ontario.[26,32]

Another possibility is to increase the use of general internal medicine specialists to manage RA. While these specialists are more likely than primary care physicians to prescribe DMARDs, only a minority of RA patients currently see such specialists. Arrangements to provide augmented continuing medical education for these specialists may need to be considered. Primary care physicians may also choose to receive special education to be able to provide some secondary care at the primary level, although this would have implications for training and remuneration.[86]

Therapist practitioner models have also been developed in pediatric rheumatology to assist in the early identification of inflammatory arthritis and the monitoring of therapy. To extend the model to adult care, therapists would work with primary care physicians, rheumatologists, or both.

Modern technology also offers alternative ways of delivering care through telemedicine, although the need to examine the joints, which is literally a hands-on process, means a partnership between a physician and a trained examiner.[87] The latter could be a primary care physician, a physical therapist, or a nurse.

Access to surgery for arthritis

Access to surgery, particularly total hip and knee replacements is another challenge facing patients with arthritis. These procedures have been shown to improve the quality of life of people with advanced hip or knee arthritis, are cost-effective, and may even be cost saving.[70–72,88,89–91,92] Population studies show that there is considerable potential unmet need, even in areas that have comparatively high rates of surgery.[72] Barriers to surgery not only include access to orthopaedic surgeons, but at a more basic level, the attitudes and knowledge of potential patients, and the preparedness of family doctors to make the necessary referrals.[88]

To improve the health of this population the provision of this type of surgery must be increased. This need has to be viewed against the backdrop of scarce resources: the system is already under strain, there are large variations in access based on geography, and wait times for joint replacements are lengthening. A challenge for the profession, along with key stakeholders, is to define the

optimal use of orthopaedic resources. There are issues involving the balance of office and operating room time, and the types of surgical procedures carried out. Almost half of all orthopaedic procedures for arthritis are arthroscopic knee surgery.[41] The role of this type of surgery in arthritis management is not well established.

Over and above these concerns are resource management issues, including policies to prioritize patients according to need; management of waiting lists; availability of resources including operating room time, prostheses, nurses and anesthetists; the role of joint replacement registries; and the role of post-surgical rehabilitation. These issues are discussed in more detail in Chapters 6 and 7.

Although only a minority of people with arthritis have surgery each year, a higher proportion see an orthopaedic surgeon. The findings in Chapter 3 suggest that Ontario orthopaedic surgeons spend only 30% of their time in the operating room, compared to 62% recommended for their American counterparts. This finding is likely a reflection of the Ontario surgeons' contribution to the non-surgical management of arthritis, as well as limitations in access to financial, material and human resources for surgery, especially joint replacement. The lack of an upward trend over time, in either per capita visits to orthopaedic surgeons or for most types of surgery, suggests that the profession is already operating at near capacity.

Conclusions

Arthritis and related conditions create a large burden of morbidity and disability in the population and consequently represent a high direct and indirect cost to society. The Ontario health care system is oriented to acute care and short-term needs and, as a result, it may not be in the best position to deal with long-term and evolving chronic diseases such as arthritis and related conditions. As the population ages, this burden can only be expected to increase. This report provides an evidence-based foundation for the development of a coherent research agenda and strategies to reduce the impact of arthritis on the people of Ontario.

Appendix

1.A Major types of arthritis

Table 1.1 Major types

	Osteoarthritis (OA)	Rheumatoid arthritis (RA)	Systemic lupus erythematosus (SLE)	Ankylosing spondylitis (AS)	Gout
Background	OA results from the deterioration of the cartilage in one or more joints. Leads to joint damage, pain, and stiffness. Typically affects the hands, feet, knees, spine, and hips.	RA is caused by the body's immune system attacking the body's joints (primarily hands and feet). This leads to pain, inflammation and joint damage. RA may also have involvement of other organ systems such as eyes, heart, and lungs.	SLE is a connective tissue disorder causing skin rashes and joint and muscle swelling and pain. There may also be organ involvement. This disease, as with RA, fluctuates over time, with flare-ups and periods of remission.	AS is inflammatory arthritis of the spine. Causes pain and stiffness in the back and bent posture. In most cases the disease is characterized by acute painful episodes and remissions. Disease severity varies widely among individuals.	Gout is a type of arthritis caused by too much uric acid in the body that is normally flushed out by the kidneys. Most often affects the big toe but can also affect the ankle, knee, foot, hand, wrist or elbow.
Prevalence	The most common type of arthritis, affecting an estimated *10% of Canadian adults.*	RA affects approximately *1% of Canadian adults,* and at least twice as many women as men.	SLE affects *0.05% of Canadian adults.* Women develop SLE up to 10 times more often than men.	AS affects as many as *1–2 in 1,000 Canadian adults.* Men develop AS 3 times more often than women.	Gout affects up to *3% of Canadian adults.* Men are 4 times more likely than women to develop gout.
Possible risk factors	Old age, heredity, obesity, and previous joint injury.	Sex hormones, heredity, and race (high disease prevalence is seen among Aboriginal Peoples).	Heredity, hormones and a variety of environmental factors.	Heredity and, possibly, gastrointestinal or genitourinary infections.	Heredity, certain medications (e.g. diuretics), alcohol, and certain foods.
Disease management	*There is no cure for OA.* Treatments exist to decrease pain and improve joint mobility, and include medication (e.g. analgesics, anti-inflammatory drugs), exercise, physiotherapy, and weight loss. In severe cases, the entire joint – particularly the hip or knee – may be replaced through surgery.	*There is no cure for RA.* Early, aggressive treatment by a rheumatologist can prevent joint damage. Drugs used for treatment include non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroids, disease-modifying anti-rheumatic drugs (DMARDs), and biologic response modifiers.	*There is no cure for SLE.* The aim of treatment is to control symptoms, reduce the number of flare-ups and prevent damage. Commonly used medications include analgesics, anti-inflammatory drugs, cortisone, and disease-modifying antirheumatic drugs (DMARDs). Diet and exercise are also important in the management of lupus.	*There is no cure for AS.* Medications similar to those used for other types of arthritis are often prescribed to treat AS. Exercise is the cornerstone of AS management. If damage is severe, surgery may be considered.	*There is no cure for gout.* Non-steroidal anti-inflammatory drugs (NSAIDs) are often used to help reduce the pain and swelling of joints and decrease stiffness. Cortisone may also be used for this purpose. Drugs, such as Allopurinol, can be used on a long-term basis to reduce uric acid levels and prevent future attacks. Other methods for controlling gout include dietary changes, weight loss and exercise.

Data source: www.arthritis.ca

References

1. Badley EM, Rasooly I, Webster GK. Relative importance of musculoskeletal disorders as a cause of chronic health problems, disability, and health care utilization: findings from the 1990 Ontario Health Survey. *J Rheumatology* 1994; 3(21):505–514.

2. Badley EM, Webster GK, Rasooly I. The impact of musculoskeletal disorders in the population: are they aches and pains? Findings from the 1990 Ontario Health Survey. *J Rheumatology* 1995; 4(22):733–739.

3. Badley EM, Wang PP. The contribution of arthritis and arthritis disability to nonparticipation in the labor force: a Canadian example. *J Rheumatology* 2001; 5(28):1077–82.

4. Badley EM. The impact of disabling arthritis. *Arthritis Care Res* 1995; 8:221–228.

5. Badley EM, DesMeules M. Introduction. In: Badley EM, DesMeules M, editors. Arthritis in Canada: an ongoing challenge. Ottawa: Health Canada; 2003. 1–6.

6. Centre for Disease Prevention and Control. Factors associated with prevalent self-reported arthritis and other rheumatic conditions - United States, 1989–1991. *MMWR* 1996; 23(45):487–491.

7. Guidelines for the management of rheumatoid arthritis, 2002 update. American College of Rheumatology Subcommittee on Rheumatoid Arthritis Guidelines. *Arthritis Rheum* 2002; 2(46):328–346.

8. Pope GC. Medical conditions, health status, and health services utilization. *Health Services Research* 1988; 6(22):857–877.

9. Verbrugge L. Women, men and osteoarthritis. *Arthritis Care Res* 2004; 4(8):212–220.

10. www.arthritis.ca. 2004. Ref Type: Electronic Citation.

11. Phillips A, Polisson RP. The rational initial clinical evaluation of the patient with musculoskeletal complaints. *Am J Med* 1997; 103:7S–11S.

12. Badley EM, Rasooly I, Webster GK. Relative importance of musculoskeletal disorders as a course of chronic health problems, disability, and health care utilization: findings from the 1990 Ontario Health Survey. *J Rheumatology* 1994; 21:505–514.

13. Russel A, Haraoui B, Keystone E, Klinkhoff A. Current and emerging therapies for rheumatoid arthritis, with a focus on infliximab: clinical impact on joint damage and cost of care in Canada. *Clin Ther* 2001; 23:1834–1838.

14. Lisse J, Espinoza L, Zhao SZ, Dedhiya SD, Osterhaus JT. Functional status and health-related quality of life of elderly osteoarthritis patients treated with Celecoxib. *J Gerontol A Biol Sci Med Sci* 2001; 3(56):M167–M175.

15. Altman RD, Hochberg MC, Moskowitz RW, Schnitzer TJ. Recommendations for the medical management of osteoarthritis of the hip and knee. *Arthritis Rheum* 2000; 9(43):1905–1915.

16. www.arthritis.ca. 2004. Ref Type: Electronic Citation.

17. Badley EM, Rothman L, Wang PP. Modeling physical dependence in arthritis: the relative contribution of specific disabilities and environmental factors. *Arthritis Care Res* 1988; 11:335–345.

18. Schiff M. Emerging treatments for rheumatoid arthritis. *Am J Med* 1997;(102 (suppl 1A)):11S–15S.

19. American College of Rheumatology. Guidelines for the management of rheumatoid arthritis. *Arthritis Rheum* 2002; 2(46):328–346.

20. Hawker GA. Epidemiology of arthritis and osteoporosis. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 1–10.

21. Badley EM, Williams JI. Issues in health care for arthritis and related conditions. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 171–182

22. Badley EM. The provision of rheumatologic services. In: Hochberg MC, Silman AJ, Smolen JS, Weinblatt ME, Weisman MH, editors. Rheumatology (3rd Edition). Toronto: Mosby; 2003. 37–44.

23. Statistics Canada Canadian Community Health Survey (CCHS), Cycle 1.1. Ottawa: Statistics Canada, Health Statistics Division; 2002. Ref Type: Report.

24. Lagace C, Perruccio A, DesMeules M, Badley EM. The impact of arthritis on Canadians. In: Badley EM, DesMeules M, editors. Arthritis in Canada: an ongoing challenge. Ottawa: Health Canada; 2003. 7–34.

25. Availability of services for people with arthritis. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 35–61.

26. Shipton D, Badley EM, Bookman AA, Hawker GA. Barriers to providing adequate rheumatology care: implications from a survey of rheumatologists in Ontario, Canada. *J Rheumatology* 2002; 11(29):2420–2425.

27. Shipton D, Badley EM, Mahomed NN. Critical shortage of orthopaedic services in Ontario, Canada. *J Bone Joint Surg* 2003; 9(85A American Volume):1710–1715.

28. Glazier R. The role of primary care physicians in treating arthritis. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 63–64.

29. Power JD, Badley EM. Ambulatory care services. In: Badley EM, DesMeules M, editors. Arthritis in Canada: an ongoing challenge. Ottawa: Health Canada. 2003. 51–64.

30. Glazier R, Badley EM. Primary care and the Ontario Health Survey. In: Badley EM, Williams, editors. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 64–67.

31. Glazier R, Arnold WJ. Ambulatory primary care visits in Ontario. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 67–70.

32. Glazier R, Dalby D, Badley EM, Hawker GA, Bell M, Lineker S. et al. ACREU Survey of Ontario Family Physicians. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 70–79.

33. Williams JI. Surgical services for total hip and total knee replacements. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 111–121.

34. Kirshen AJ. Use of medication for arthritis and related conditions. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 93–110.

35. Patino FG, Allison J, Olivieri J, Mudano A, Juarez L, Person S et al. The effects of physician specialty and patient comorbidities on the use and discontinuation of coxibs. *Arthritis Rheum* 2003; 3(49):293–299.

36. Everts B, Wahrborg P, Hedner T. COX-2-specific inhibitors - the emergence of a new class of analgesic and anti-inflammatory drugs. *Clin Rheumatol* 2000; 19:331–343.

37. Stross JK. Relationships between knowledge and experience in the use of disease-modifying antirheumatic agents. *JAMA* 1998; 19(262): 2721–2723.

38. Criswell LA, Such CL, Yelin EH. Differences in the use of second-line agents and prednisone for treatment of rheumatoid arthritis by rheumatologists and non-rheumatologists. *J Rheumatology* 1997; 12(24): 2283–2290.

39. Geletka R, St Clair EW. Treatment of early rheumatoid arthritis. *Best Practice & Research Clinical Rheumatology* 2003; 5(17):791–809.

40. Quinn MA, Conaghan PG, Emery P. The therapeutic approach of early intervention for rheumatoid arthritis: what is the evidence? *Rheumatology* 2001; (40):1211–1120.

41. Shipton D, Mahomed NN, David K, Badley EM. Hospital services for arthritis. In: Badley EM, DesMeules M, editors. Arthritis in Canada: an ongoing challenge. Ottawa: Health Canada; 2003. 77–78.

42. Moseley JB, O'Malley K, Petersen NJ, Menke TJ, Brody BA, Kuykendall DH et al. A controlled trial of arthroscopic surgery for osteoarthritis of the knee. *N Engl J Med* 2002; (347):81–88.

43. Kalunian KC, Moreland LW, Klashman DJ, Brion PH, Concoff AL, Myers S. et al. Visually-guided irrigation in patients with early knee osteoarthritis: a multicenter randomized, controlled trial 1. *Osteoarthritis Cartilage* 2000; (8):412–418.

44. Bradley JD, Heilman DK, Katz BP, Gsell P, Wallick JE, Brandt KD. Tidal irrigation as treatment for knee osteoarthritis a sham-controlled, randomized, double-blinded evaluation. *Arthritis Rheum* 2002; (46): 100–108.

45. DeBoer D, Williams JI. Overall trends in hip and knee replacements. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: Arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 113–121.

46. DeBoer D, Williams JI. Trends in hospital volumes and length of stay for total hip and total knee replacement. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 121–124.

47. Pendleton A, Arden N, Dougados M, Doherty M, Bannwarth B, Bijlsma JWJ. et al. EULAR recommendations for the management of knee osteoarthritis: report of a task force of the Standing Committee for International Clinical Studies Including Therapeutic Trials (ESCISIT). *Ann Rheum Dis* 2000; (59):936–944.

48. Lane NE, Thompson JM. Management of osteoarthritis in the primary-care setting: an evidence-based approach to treatment. *Am J Med* 1997; 6A(103):24S–30S.

49. Elrodt AG, Cho M, Cush JJ, Kavanaugh AF. An evidence-based medicine approach to the diagnosis and management of musculoskeletal complaints. *Am J Med* 1997; 6A(103):3S–6S.

50. Algorithms for the diagnosis and management of musculoskeletal complaints. *Am J Med* 1997; 6A(103):49S–80S.

51. Lee JA. Adult degenerative joint disease of the knee: maximizing function and promoting joint health. *Postgrad Med* 1999; (105):183–197.

52. Guccione AA. Physical therapy for musculoskeletal conditions. *Rheu Dis Clin North Am* 1996; (22):551–562.

53. Helewa A. Physical therapy management for patients with rheumatoid arthritis and other inflammatory conditions. In: Walker JM, Helewa A, editors. Physical therapy in arthritis. Philadelphia: Saunders; 1996. 245–263.

54. Coyte PC, Axcell T. The use of and regional variations in post-acute rehabilitation services for musculoskeletal patients. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 157–170.

55. Lorig KR, Mazonson PD, Holman HR. Evidence suggesting that health education for self-management in patients with chronic arthritis has sustained health benefits while reducing health care costs. *Arthritis Rheum* 1993; (36):439–446.

56. Lorig KR, Lubeck D, Kraines RG, Seleznick M, Holman HR. Outcome of self-help education for patients with arthritis. *Arthritis Rheum* 1985; (28):680–685.

57. Fries JF, Carey C, McShane DJ. Patient education in arthritis: randomized controlled trial of a mail-delivered program. *J Rheumatology* 1997; (24): 1378–1383.

58. Superio-Cabuslay E, Ward MM, Lorig KR. Patient education interventions in osteoarthritis and rheumatoid arthritis: a meta-analytic comparison with nonsteroidal anti-inflammatory drug treatment. *Arthritis Care Res* 1996; (9):292–301.

59. Minor MA, Hewett JE, Webel RR, Anderson SK, Kay DR. Efficacy of physical conditioning exercise in patients with rheumatoid arthritis and osteoarthritis. *Arthritis Care Res* 1989; (32):1396–1405.

60. McKeag DB. The relationship of osteoarthritis and exercise. *Clinical Sports Med* 1991; (11):471–487.

61. Physical activity and health. A report of the Surgeon General, Atlanta, Georgia: The Department, Centers for Disease Control and Prevention, and National Center for Chronic Disease Prevention and Health Promotion. 1996. Ref Type: Report.

62. Elliott-Gibson V, Cott CA, Gignac MAM, Badley EM. A key informant survey of programs and services for Canadians with osteoarthritis and osteoporosis. Toronto: Arthritis Community Research and Evaluation Unit. Working paper 98–93. 1998. Ref Type: Report.

63. Statistics Canada Canadian Community Health Survey (CCHS), Cycle 1.1. Ottawa: Statistics Canada, Health Statistics Division; 2002. Ref Type: Report.

64. Statistics Canada Canadian Community Health Survey (CCHS), Cycle 1.1. Ottawa: Statistics Canada, Health Statistics Division; 2002. Ref Type: Report.

65. Badley EM, Williams JI. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998.

66. Health Canada. Economic burden of illness in Canada. Ottawa: Public Works and Government Services Canada; 1998. (Catalogue # H21–136/198E).

67. Stokes J, Desjardins S, Perruccio A. Economic burden. In: Badley EM, DesMeules M, editors. Arthritis in Canada: an ongoing challenge. Ottawa: Health Canada; 2003. 42–46.

68. Coyte PC, Asche C, Croxford R, Chang B. The economic cost of arthritis and rheumatism in Canada. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 27–34.

69. Coyte PC, Asche C, Croxford R, Chang B. The economic cost of musculo-skeletal disorders in Canada. *Arthritis Care Res* 1998; 5(11):315–325.

70. Towheed TE, Hochberg MC. Health related quality of life following total hip replacement. *Semin Arthritis Rheum* 1996; (26):483–491.

71. Dieppe PA, Basler HD, Chard J, Croft P, Dixon J, Hurley M et al. Knee replacement surgery for osteoarthritis: effectiveness, practice variations, indications and possible determinants of utilization. *Rheumatology* 1999; (38):73–83.

72. Total hip replacement. NIH Consensus Statement. 1994.

73. Physical activity and health. A report of the Surgeon General, Atlanta, Georgia: The Department, Centers for Disease Control and Prevention, and National Center for Chronic Disease Prevention and Health Promotion. 1996. Ref Type: Report.

74. Hawker GA, Wright JG, Coyte PC, Williams JI, Harvey B, Glazier R et al. Differences between men and women in the rate of use of hip and knee arthroplasty. *N Engl J Med* 2000; 342(14):1016–1022.

75. van der Horst-Bruinsma IE, Speyer I, Visser H, Breedveld FC, Hazes JM. Diagnosis and course of early-onset arthritis: results of a special early arthritis clinic compared to routine patient care. *Br J Rheumatol* 1998; 10(37):1084–1088.

76. Yelin EH, Such CL, Criswell LA, Epstein WV. Outcomes for persons with rheumatoid arthritis with a rheumatologist versus a non-rheumatologist as the main physician for this condition. *Med Care* 1998; 4(36):513–522.

77. Felson DT, Meenan RF, Dayno SJ, Gertman. Referral of musculoskeletal disease patients by family and general practitioners. *Arthritis Rheum* 1985; 10(28):1156–1162.

78. An integrated client-centred approach to the management of arthritis: A pilot project. Phase 1 report to the Ontario Ministry of Health and Long-Term Care: needs assessment, evaluation and intervention. Arthritis Community Research and Evaluation Unit. Working paper 00–1. 2000. Ref Type: Report.

79. http://www.health.gov.on.ca/english/providers/program/drugs/formulary/ed38_0_bk.pdf. 2004. Ref Type: Electronic Citation.

80. http://www.health.gov.on.ca/english/public/pub/drugs/section8.html. 2004. Ref Type: Electronic Citation.

81. http://www.health.gov.on.ca/english/public/program/drugs/drugs_mn.html. 2003. Ref Type: Electronic Citation.

82. http://www.health.gov.on.ca/english/public/pub/drugs/trillium.html. 12-18-2003. Ref Type: Electronic Citation.

83. Jerome D, Lane HL. Consumer's guide to arthritis medications. Toronto. 2001.

84. Shipton D, Glazier RH, Guan J, Badley EM. Effects of use of specialty services on disease-modifying antirheumatic drug use in the treatment of rheumatoid arthritis in an insured elderly population. *Medical Care* 2004; 42(9):907–913.

85. Helliwell PS. Comparison of a community clinic with a hospital out-patient clinic in rheumatology. *Br J Rheumatol* 1996; (35):385–388.

86. Helliwell PS, Hetthen J. Primary care rheumatology—leading the way? *Rheumatology* 1999; (38):1174–1176.

87. Davis P, Howard R, Brockway P. An evaluation of telehealth in the provision of rheumatologic consults to a remote area. *J Rheumatology* 2001; (28):1910–1913.

88. Hawker GA, Wright JG, Glazier R, Coyte PC, Harvey B, Williams JI et al. The effect of education and income on need and willingness to undergo total joint arthroplasty. *Arthritis Rheum* 2002; 12(46):3331–3339.

89. Chang RW, Pellissier JM, Hazen GB. A cost-effectiveness analysis of total hip arthroplasty for osteoarthritis of the hip. *JAMA* 1996; (275): 858–865.

90. Hawker GA, Wright JG, Coyte PC, Paul JE, Dittus R, Croxford R et al. Health-related quality of life after knee replacement surgery: results from the Knee PORT Study. *J Bone Joint Surg* (AM) 1998; (80-A):163–173.

91. Williams JI, Llewellyn TH, Arshinoff R, Young N, Naylor CD, and the Ontario Hip and Knee Replacement Project Team. The burden of waiting for hip and knee replacements in Ontario. *J Eval Clin Pract* 1997; (3):59–68.

92. Chang RW, Pellissier JM, Hazen GB. A cost-effectiveness analysis of total hip arthroplasty for osteoarthritis of the hip. *JAMA* 1996; 11(275): 858–865.

INSIDE

2

Chapter

Burden of Disease

AV Perruccio, MHSc, EM Badley, DPhil and J Guan, MSc

Key Messages

- The 2000/01 Statistics Canada Canadian Community Health Survey (CCHS), showed arthritis/rheumatism affects over 1.6 million Ontarians aged 15+ years (17.5% of population). Two-thirds were women, and nearly 3 out of 5 were under age 65.
- One in 3 working age people with arthritis reported being without a job in the year preceding the survey, compared to 1 in 7 with other chronic conditions.
- By 2026, an estimated 2.8 million Ontarians aged 15+ years will have arthritis/rheumatism.
- Regional arthritis prevalence varied considerably. Although higher in northern regions, areas of high prevalence were also found in southern Ontario. Risk factors were older age, female sex, lower education, and Aboriginal ethnicity.
- People with arthritis experienced more pain, long-term disability and disrupted sleep, and were more likely to need help with daily activities and report poor self-rated health than those with other chronic conditions.
- People with arthritis, compared to those with other chronic conditions, were more likely to have 4 or more visits to a primary care physician and 2 or more visits to a specialist in the previous year. A larger proportion also reported taking pain medications and stomach remedies.
- Linkage of 1996/97 Ontario Health Survey (OHS) data to health service utilization data showed that in the two years following the survey people with arthritis had, on average, more claims to the Ontario Drug Benefit (ODB) program (age 65+ years), to the Ontario Health Insurance Plan (OHIP) and for day surgery and inpatient hospital admissions than people with other chronic conditions.

Introduction

This chapter provides an update from the 1998 research atlas *Patterns of Health Care in Ontario: Arthritis and Related Conditions* on the population burden of arthritis, and compares the reports of people with arthritis to those of people with other chronic conditions and those with no chronic condition. The analyses include data from the 2000/01 Canadian Community Health Survey (CCHS) conducted by Statistics Canada and are augmented with selected findings from the 1996/97 Ontario Health Survey (OHS) (part of the National Population Health Survey by Statistics Canada).

The latest estimates of the prevalence of arthritis, and projections of the disease increase expected to coincide with the aging of the population, are also presented in this chapter. Indicators of impact used in the previous research atlas included pain, restriction of activity, self-rated health, medication use, stress, depression and labour force participation. In addition to these, the 2004 edition of the research atlas includes the following new indicators: sleep problems, unmet health care needs, and reported visits to primary care physicians, specialists and other health care professionals.

Background

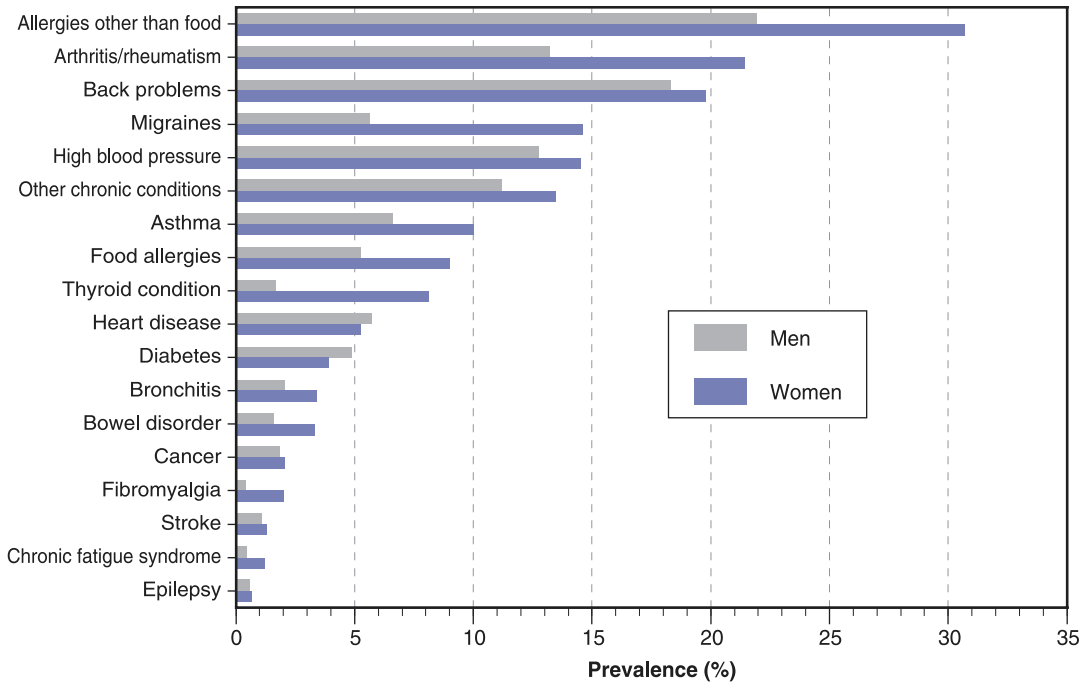
Arthritis and related conditions are among the most prevalent chronic conditions in Canada, and have a major impact on individuals and on society.[1] The 1998 edition of this chapter used health survey data from 1994/95 and presented the relative impact of these diseases in Ontario by comparing people with arthritis/rheumatism to people without.[2] In this chapter, the impact of arthritis is examined with data from the 2000/01 CCHS. The large sample size of the CCHS provides an opportunity for in-depth examination of the variation in occurrence of arthritis/rheumatism throughout the province. Estimates on use of health services by people with arthritis were obtained by linking health care administrative data to that from the 1996/97 OHS.

Findings and Discussion

Prevalence of arthritis/rheumatism

2.1 Prevalence of chronic conditions, by sex, in Ontario, 2000/01

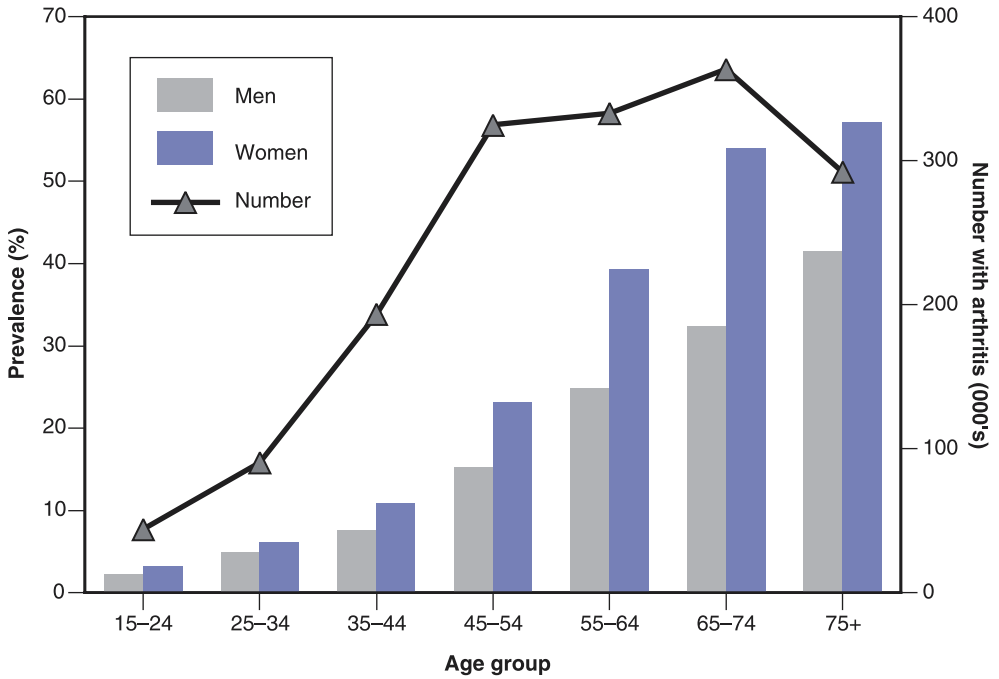
In Ontario, arthritis was the second most prevalent chronic condition, following allergies not related to food. Over 1.6 million people aged 15 years of age and older reported having this disease as a long-term chronic condition; it was the second and third most prevalent chronic condition for women and men, respectively. At a prevalence of 17.5%, more than 1 in 6 people reported having arthritis. Arthritis was more common in women than in men, at 21.4% vs. 13.2% respectively, with women making up almost two-thirds of people with arthritis. In contrast, 52% of people with other chronic conditions were women, as were 40% of people with no chronic condition.



Data source: Canadian Community Health Survey

2.2 Prevalence of, and number of people with, arthritis, by age group and sex, in Ontario, 2000/01

The prevalence of arthritis increased with advancing age in both men and women, reaching a prevalence of more than 40% in those aged 65 years and over. However, because of the large proportion of Canadians in the baby boomer population, the majority of people with arthritis were aged 45 to 74 years. Approximately 3 in 5 of people with arthritis were of working age (≤65 yrs), with 1 in 5 being younger than age 45.



Data source: Canadian Community Health Survey

2.3 Age distribution of people with arthritis, other chronic conditions, and no chronic condition, by sex, in Ontario, 2000/01

As might be expected, a higher proportion of people with arthritis were aged 45 years and older compared to people with other chronic conditions or no chronic condition.

	Arthritis		Other Chronic Conditions		No Chronic Condition	
Age Group	Men (%)	Women (%)	Men (%)	Women (%)	Men (%)	Women (%)
15–24	3.1	2.5	15.9	17.0	24.9	24.9
25–34	6.5	4.9	16.7	19.2	22.3	22.5
35–44	13.0	11.1	23.3	24.4	24.9	25.2
45–54	20.6	19.3	18.3	18.0	16.3	16.5
55–64	20.9	19.9	12.2	9.6	6.6	6.1
65–74	20.9	22.9	8.8	6.5	3.9	3.3
75+	15.1	19.4	5.0	5.4	1.2	1.6

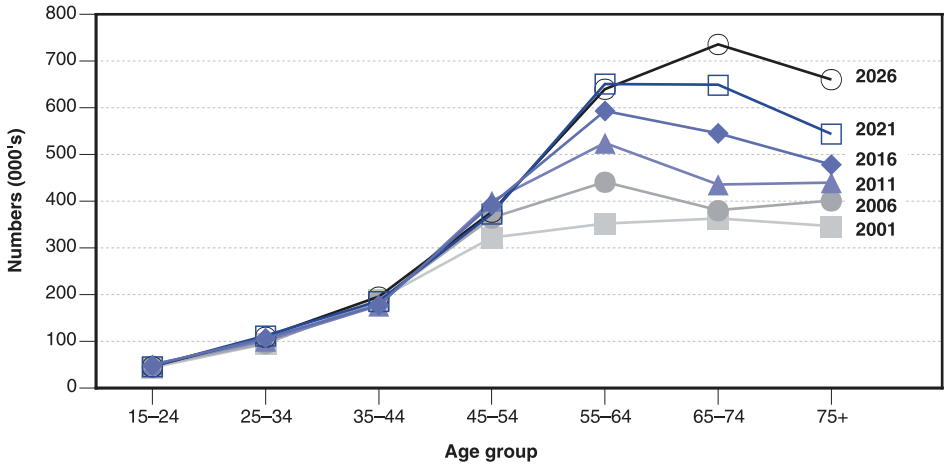
Data source: Canadian Community Health Survey

2.4 Projected number of people with arthritis and prevalence of arthritis, overall, by sex, year, and age group, in Ontario, to 2026

Population projections from Statistics Canada for the years 2001 to 2026 make it possible to estimate the number of people with arthritis and the prevalence for the next twenty years.[5] Projections are based on the age-specific and sex-specific arthritis prevalence estimates from the 2000/01 Canadian Community Health Survey (CCHS), with the assumption that they will remain constant over time.

Given that the prevalence of arthritis increases with age, the aging of the baby boomer population has implications for future prevalence and numbers of people with arthritis. Within 25 years an estimated 2.8 million Ontarians 15 years of age and older will have the disease, with the largest increases among adults aged 55 years and older. The projected prevalence of arthritis among Ontarians 15 years of age and older will increase by almost 1% every five years, to just under 22% by the year 2026. This represents almost two new persons with arthritis for every three who reported having the disease in 2001.

	Men		Women		Overall	
Years	Number with Arthritis	Prevalence %	Number with Arthritis	Prevalence %	Number with Arthritis	Prevalence %
2001	627,220	13.4	1,081,783	22.2	1,709,003	17.5
2006	704,618	14.0	1,210,017	23.0	1,914,635	18.6
2011	784,930	14.5	1,341,824	23.8	2,126,753	19.2
2016	867,034	15.2	1,476,788	24.9	2,343,823	20.1
2021	950,325	15.9	1,609,734	26.0	2,560,060	21.0
2026	1,030,549	16.6	1,733,174	27.0	2,763,723	21.9

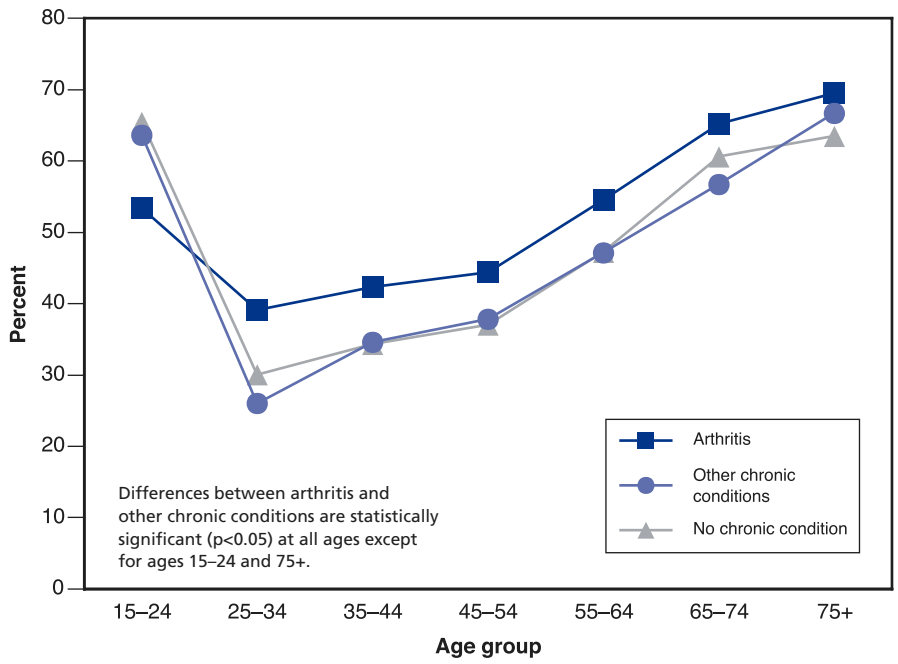


Data sources: Canadian Community Health Survey; Statistics Canada

Prevalence of selected characteristics among people with arthritis

2.5 Proportion of people with secondary school education or less, by age group, in Ontario, 2000/01

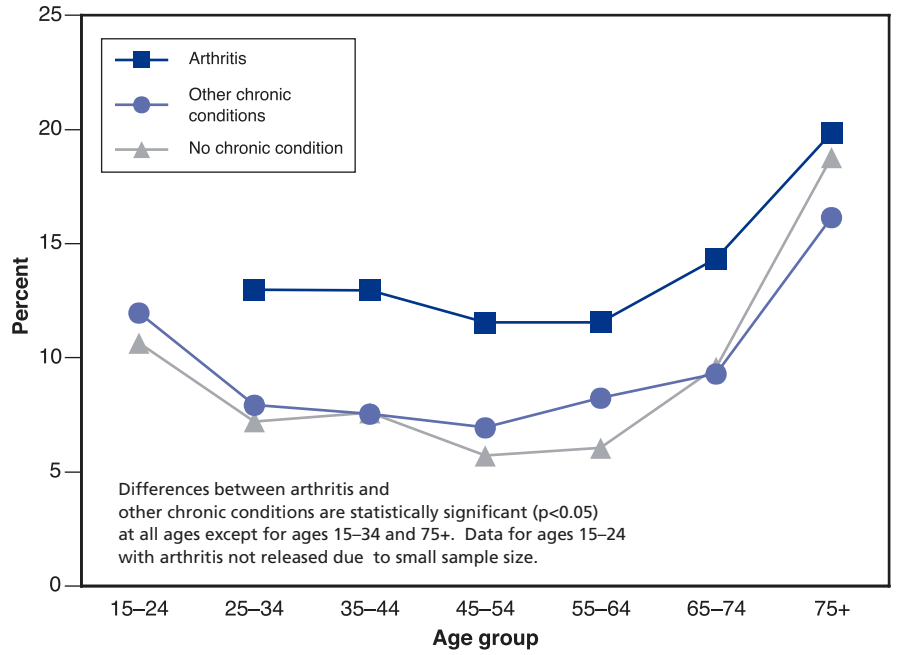
In most age groups, people with arthritis more frequently reported having secondary school education or less. No significant differences in educational level were found between people with other chronic conditions and no chronic condition.



Data source: Canadian Community Health Survey

2.6 Proportion of people in the low to lower-middle income category, by age group, in Ontario, 2000/01

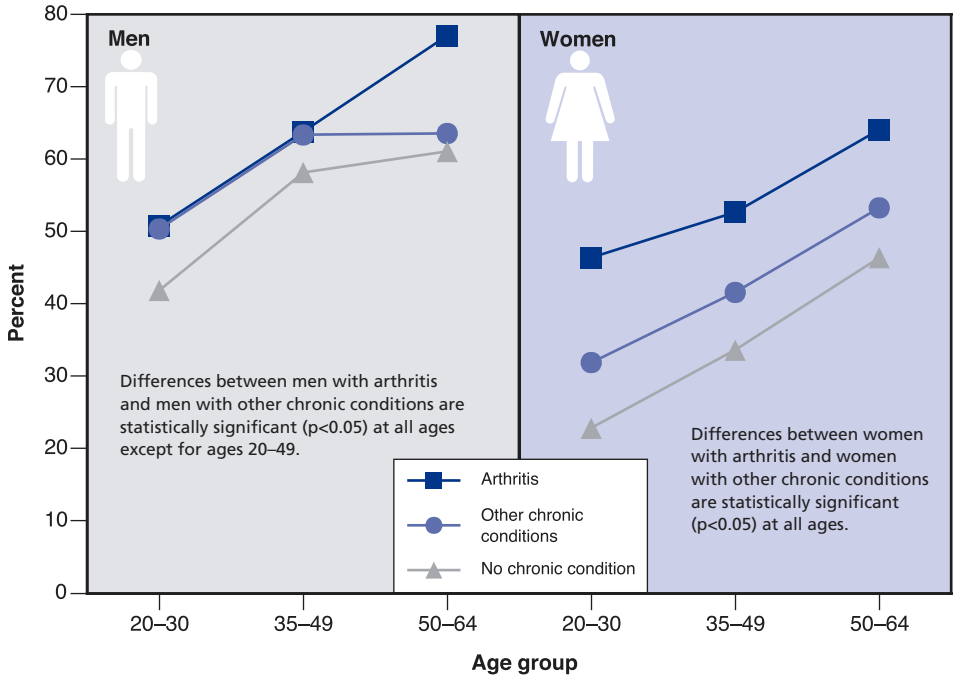
Similarly, the proportion of people within the low to lower-middle income category, as established by Statistics Canada, was highest among people with arthritis within the 35–74 year age group.



Data source: Canadian Community Health Survey

2.7 Proportion of overweight/obese people, by age group and sex, in Ontario, 2000/01

Being overweight has been found to be a contributing factor to the development of arthritis, particularly osteoarthritis of the knee.[6-8] Being overweight/obese (defined as a body mass index (BMI) greater than or equal to 25.0) was calculated in the CCHS only for people 20–64 years of age, excluding pregnant women. Overall, the proportion of overweight/obese people was greatest in the arthritis group, at 69%, compared to people with other chronic conditions and no chronic condition, at 59% and 52% respectively. Also, for people with arthritis, the proportion of overweight/obese men was significantly greater than the proportion of overweight/obese women.



Data source: Canadian Community Health Survey

Geographic prevalence of arthritis

2.8 Number of people with arthritis and crude and age-sex standardized prevalence of arthritis, by District Health Council, in Ontario, 2000/01

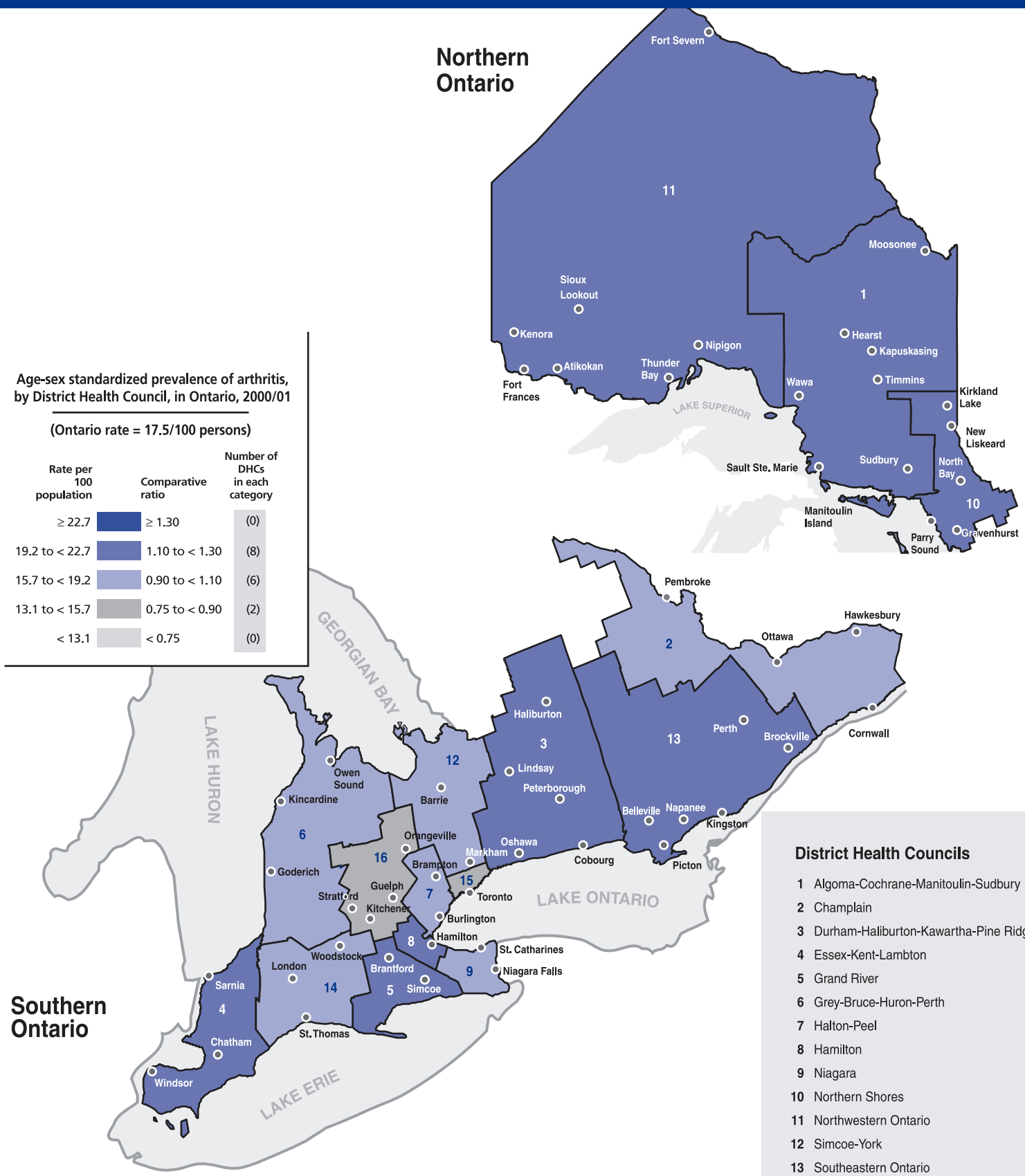
Prevalence of arthritis varied across the province, and while generally higher in the northern parts of the province, areas of high prevalence were also observed in southern Ontario. In the CCHS, the District Health Council (DHC) of Northern Shores reported arthritis most frequently, with almost 24% of respondents, while the lowest proportion of people reporting arthritis was in Halton-Peel, with a prevalence of just over 14%. (see also Exhibit 2.9)

District Health Councils	Number with Arthritis	Crude Prevalence	Standardized Prevalence
Algoma-Cochrane-Manitoulin-Sudbury	74,932	22.8	22.1 *
Champlain	145,954	16.8	16.8
Durham-Haliburton-Kawartha-Pine Ridge	135,253	20.8	20.6 *
Essex-Kent-Lambton	104,274	20.7	20.4 *
Grand River	37,542	19.8	19.3
Grey-Bruce-Huron-Perth	47,252	20.0	18.0
Halton-Peel	161,508	14.4	16.0
Hamilton	86,340	21.4	20.7 *
Niagara	65,604	19.0	17.2
Northern Shores	41,331	23.9	21.5 *
Northwestern Ontario	35,830	20.2	19.7
Simcoe-York	144,892	16.0	16.7
Southeastern Ontario	85,108	21.2	19.5 *
Thames Valley	86,865	18.0	17.9
Toronto	312,966	15.0	15.2 **
Waterloo Region-Wellington-Dufferin	82,395	14.8	15.6 **
Ontario	**1,647,129**	**17.5**	**17.5**

* significantly higher than Ontario prevalence (p<0.05) ** significantly lower than Ontario prevalence (p<0.05)

Data source: Canadian Community Health Survey

2.9 Age-sex standardized prevalence of arthritis, by District Health Council, in Ontario, 2000/01



Age-sex standardized prevalence of arthritis, by District Health Council, in Ontario, 2000/01

(Ontario rate = 17.5/100 persons)

Rate per 100 population	Comparative ratio	Number of DHCs in each category
≥ 22.7	≥ 1.30	(0)
19.2 to < 22.7	1.10 to < 1.30	(8)
15.7 to < 19.2	0.90 to < 1.10	(6)
13.1 to < 15.7	0.75 to < 0.90	(2)
< 13.1	< 0.75	(0)

District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Data source: Canadian Community Health Survey

2.10 Logistic regression analyses examining the significance of predictor variables on a positive response to having arthritis/rheumatism, in Ontario, 2000/01

Logistic regression analyses (see Appendix 2.B) showed that even after adjusting for age, sex, education and ethnicity, compared to the Toronto DHC, there was a significant increase of reporting arthritis in the DHCs of Algoma-Cochrane-Manitoulin-Sudbury, Durham-Haliburton-Kawartha-Pine Ridge, Essex-Kent-Lambton, Hamilton, Northern Shores, and Southeastern Ontario.

Part of the variation in prevalence across the province likely stems from differences in proportions of older age groups, low socioeconomic groups and ethnic groups within the DHC populations. The findings suggest that the likelihood of reporting arthritis rises with age and is higher in women. People with higher levels of education were less likely to report arthritis.

Compared to the Caucasian population, individuals of Asian and other origins were less likely to report arthritis, while North American Aboriginals living off-reserve were twice as likely to report arthritis. The survey did not include Aboriginals living on reserves but a higher prevalence of arthritis in Aboriginal populations has been found in other studies.[9,10–12] A lower prevalence in some Asian populations has also been reported in other studies, but the reduced likelihood of reporting arthritis in this population and people of other ethnic origin could also represent a healthy immigrant effect.[13,14]

Variables of Interest	Odds Ratio	L 95% CI	U 95% CI
Age group[1]			
25–34	**2.58**	1.92	3.46
35–44	**4.45**	3.43	5.76
45–54	**10.07**	7.85	12.93
55–64	**18.86**	14.70	24.21
65–74	**29.62**	22.99	38.17
75+	**36.09**	27.87	46.73
Sex[2]			
Women	**1.87**	1.67	1.96
Education[3]			
Secondary	**0.70**	0.63	0.79
Some post-secondary	0.87	0.72	1.04
Post-secondary	**0.64**	0.58	0.71
Cultural/Racial Origin[4]			
Asian[5]	**0.42**	0.32	0.57
Other[6]	**0.78**	0.60	0.99
Aboriginal – N. Amer.	**2.01**	1.44	2.79
District Health Councils[7]			
Algoma-Cochrane-Manitoulin-Sudbury	**1.39**	1.15	1.68
Champlain	1.02	0.84	1.24
Durham-Haliburton-Kawartha-Pine Ridge	**1.37**	1.12	1.67
Essex-Kent-Lambton	**1.33**	1.09	1.61
Grand River	1.17	0.95	1.45
Grey-Bruce-Huron-Perth	1.04	0.85	1.28
Halton-Peel	1.02	0.84	1.25
Hamilton	**1.34**	1.05	1.72
Niagara	1.02	0.83	1.25
Northern Shores	**1.35**	1.10	1.66
Northwestern Ontario	1.16	0.94	1.43
Simcoe-York	1.06	0.88	1.26
Southeastern Ontario	**1.22**	1.01	1.47
Thames Valley	1.11	0.91	1.35
Waterloo Region-Wellington-Dufferin	0.88	0.72	1.06

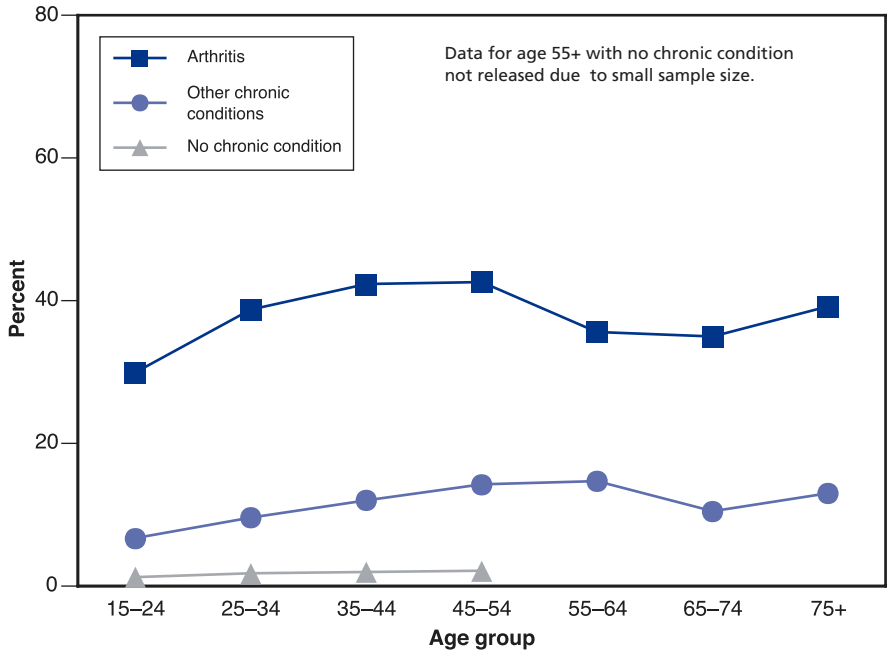
[1]reference: age 15–24 years
[2]reference: men
[3]reference: <secondary school
[4]reference: Caucasian
[5]Asian: Chinese, South Asian, Filipino, Southeast Asian, Japanese, Korean
[6]Other: Black, Latin American, Arab, West Indian, Other
[7]reference: Toronto DHC

Data source: Canadian Community Health Survey

Health outcomes and quality of life

2.11 Proportion of people reporting pain that limits activities, by age group, in Ontario, 2000/01

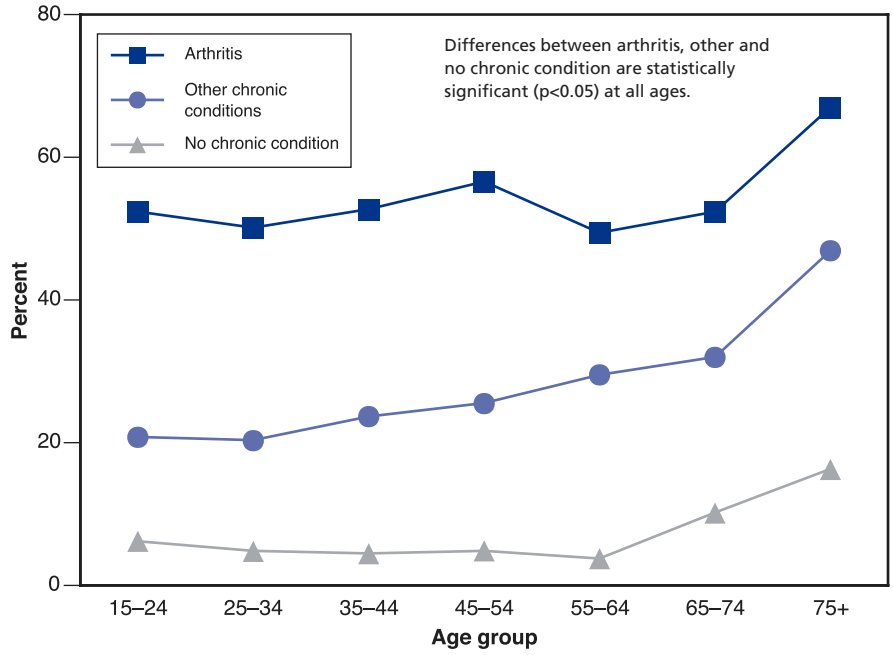
The prolonged course of arthritis may result in pain and suffering and reduced quality of life. The proportion of people with arthritis reporting pain that limits activities ranged from just under one-third to almost half across age groups and was more than three times that reported by people with other chronic conditions overall. The differences between these groups were greatest within the youngest age categories. There were no differences by sex in the proportion of people with arthritis reporting pain that limits activity, and very little variability by age.



Data source: Canadian Community Health Survey

2.12 Proportion of people reporting long-term disability, by age group, in Ontario, 2000/01

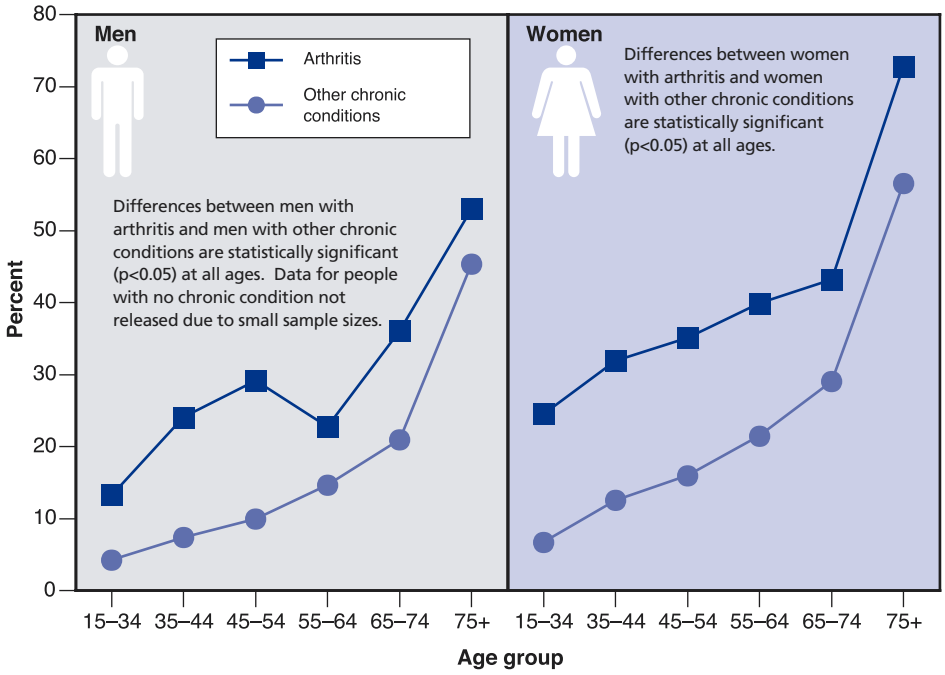
More than 50% of people with arthritis reported long-term disability. Among those under 55 years of age, the proportion of people with arthritis reporting long-term disability was more than twice that of people with other chronic conditions. There were no differences by sex in the proportion of people with arthritis reporting long-term disability and very little variability by age. Once a person has arthritis, it appears that the impact is similar regardless of age or sex.



Data source: Canadian Community Health Survey

2.13 Proportion of people needing help with daily activities, by age group and sex, in Ontario, 2000/01

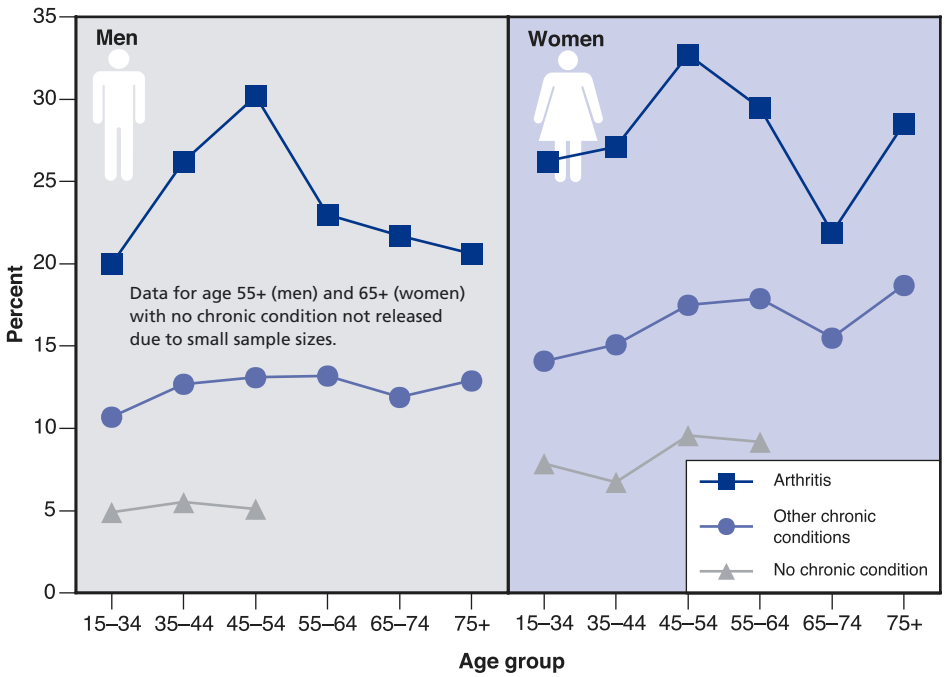
Respondents to the CCHS were asked if, due to a health condition, they required help with meal preparation, grocery shopping, everyday housework, heavy household chores, personal care, or getting around their home. Overall, the proportion of people requiring help was highest for people with arthritis, at 40%, compared to people with other chronic conditions, at 13%. The proportion in all age groups of men and women requiring help was highest for people with arthritis, compared to people with other chronic conditions, except for men aged 75 years and older. For almost every age group, the proportion of women with arthritis requiring help was about ten percentage points higher than for men with arthritis.



Data source: Canadian Community Health Survey

2.14 Proportion of people reporting difficulty sleeping most of the time, by age group and sex, in Ontario, 2000/01

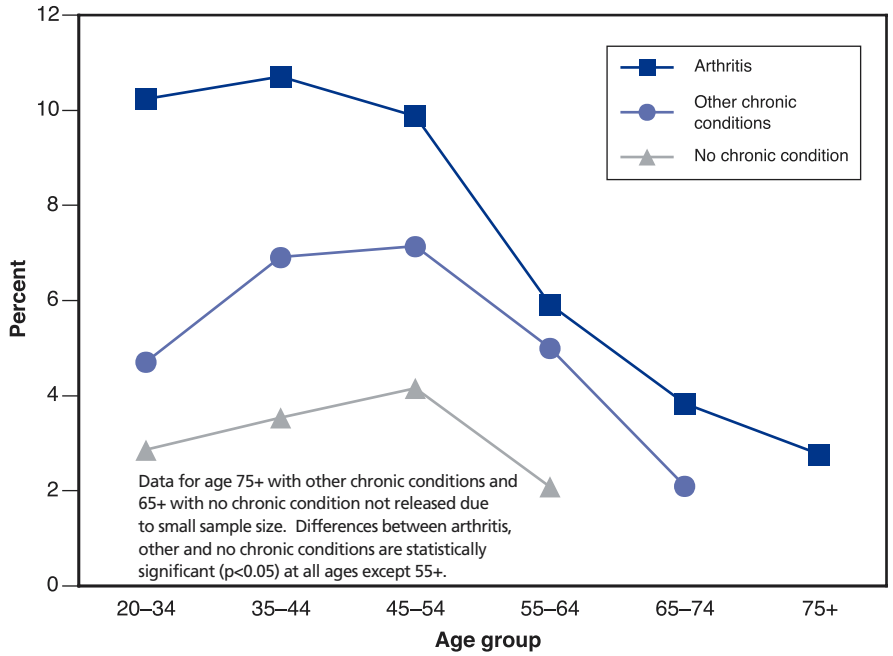
While arthritis is commonly associated with pain and fatigue, it can also disrupt sleep.[15] In all age groups, a greater proportion of people with arthritis than with other chronic conditions reported trouble sleeping most of the time. The largest difference between people with arthritis and other chronic conditions was found among the working age population, 35–64 years, with proportions twice as high for people with arthritis. The only significant differences between men and women with arthritis were for the 55–64 years, and the 75 years and older age groups.



Data source: Canadian Community Health Survey

2.15 Proportion of people reporting life to be extremely stressful, by age group, in Ontario, 2000/01

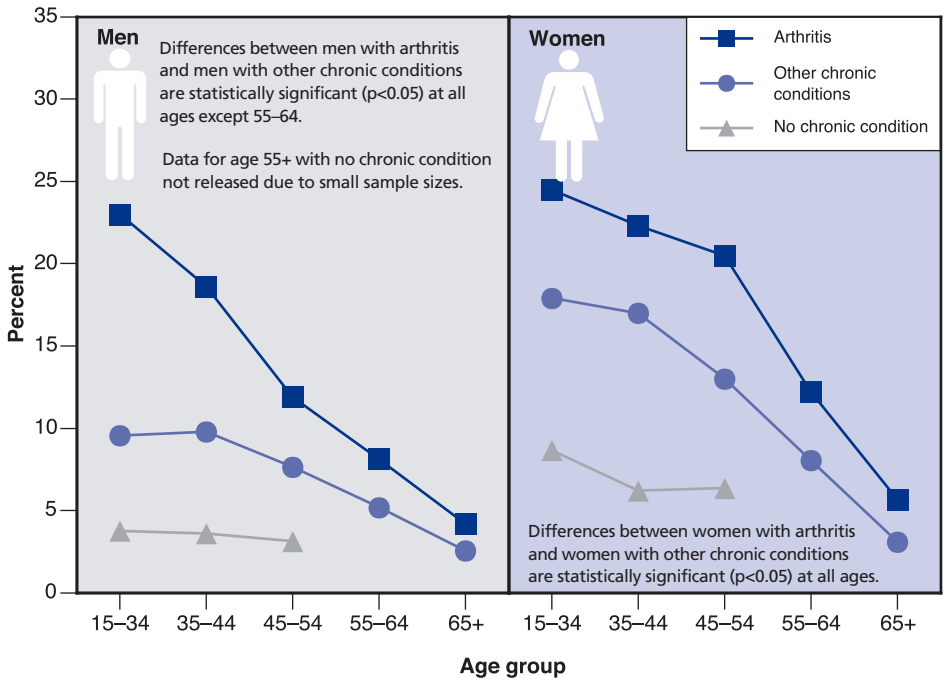
Overall, the proportions of people reporting that they found life extremely stressful declined with increasing age. A higher proportion of people with arthritis (aged 65 years and under) than people with other chronic conditions, reported that they found life to be extremely stressful.



Data source: Canadian Community Health Survey

2.16 Proportion of people with predicted probability of at least 80% of having experienced a major depressive episode (MDE) in the past year, by age group and sex, in Ontario, 2000/01

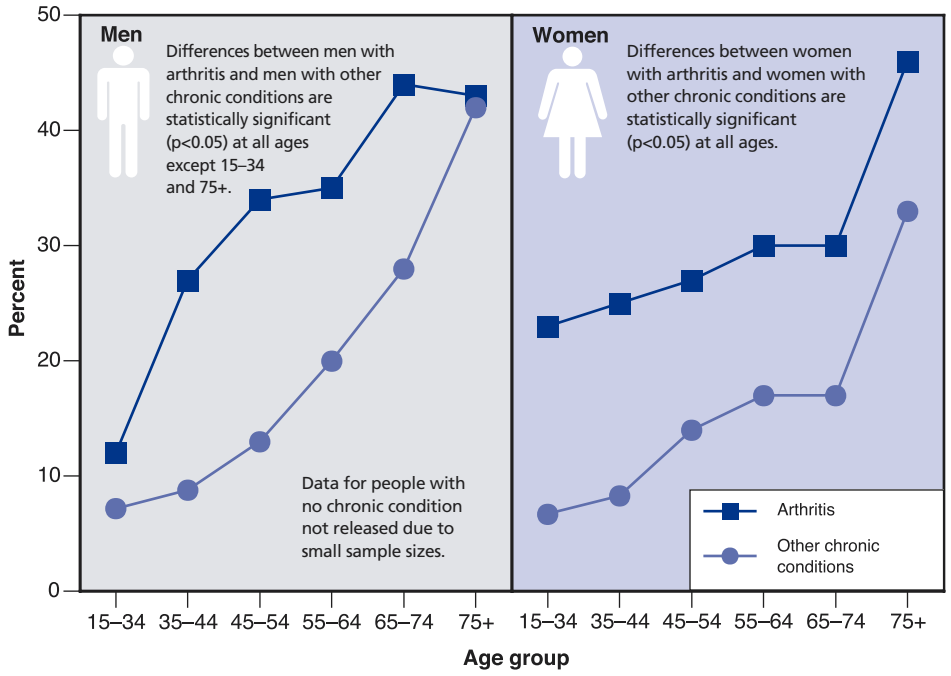
The CCHS included an accepted series of questions that help establish the probability of having experienced a major depressive episode (MDE) in the past year.[16] A significantly higher proportion of people with arthritis in the youngest age group scored at least an 80% probability for a MDE, as compared to people with other chronic conditions.



Data source: Canadian Community Health Survey

2.17 Proportion of people reporting fair/poor self-rated health, by age group and sex, in Ontario, 2000/01

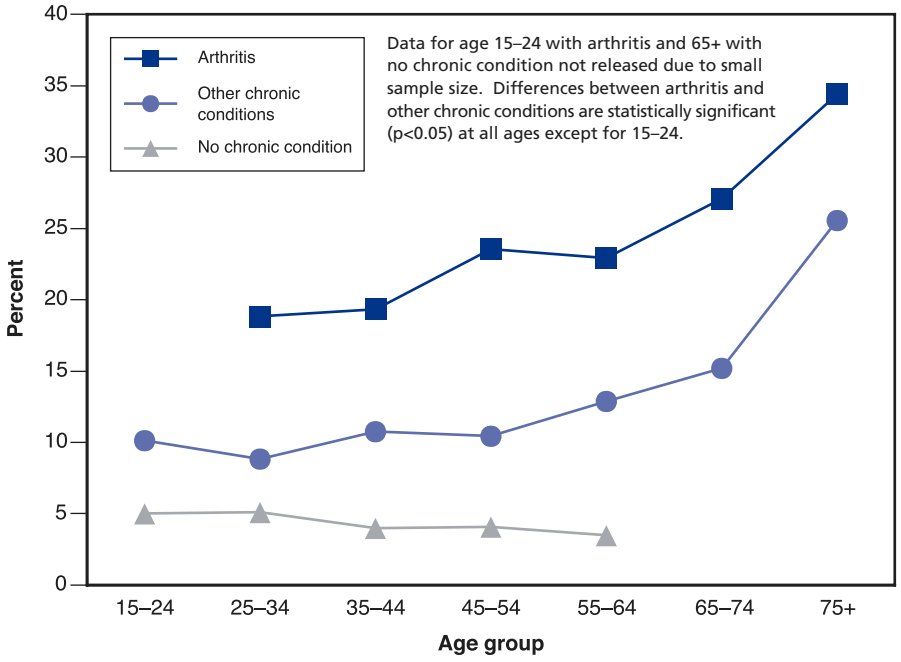
The CCHS asked respondents to rate their health as excellent, very good, good, fair or poor. This exhibit shows the proportion of people that rated their health as either fair or poor. In all age groups, people with arthritis reported poorer self-rated health in greater proportions than people with other chronic conditions and no chronic condition. While almost one-third of people with arthritis reported poorer health, only 12% and 2% of people with other chronic conditions and no chronic condition, respectively, reported the same. Reporting poorer health, not surprisingly, increased with advancing age. For men with arthritis, the proportion reporting poor health increased from 12% in the 15–34 years age group, to almost 44% in the 75 years and older age group, and for women with arthritis from 23% to 46%.



Data source: Canadian Community Health Survey

2.18 Proportion of people reporting worse self-perceived health compared to one year before, by age group, in Ontario, 2000/01

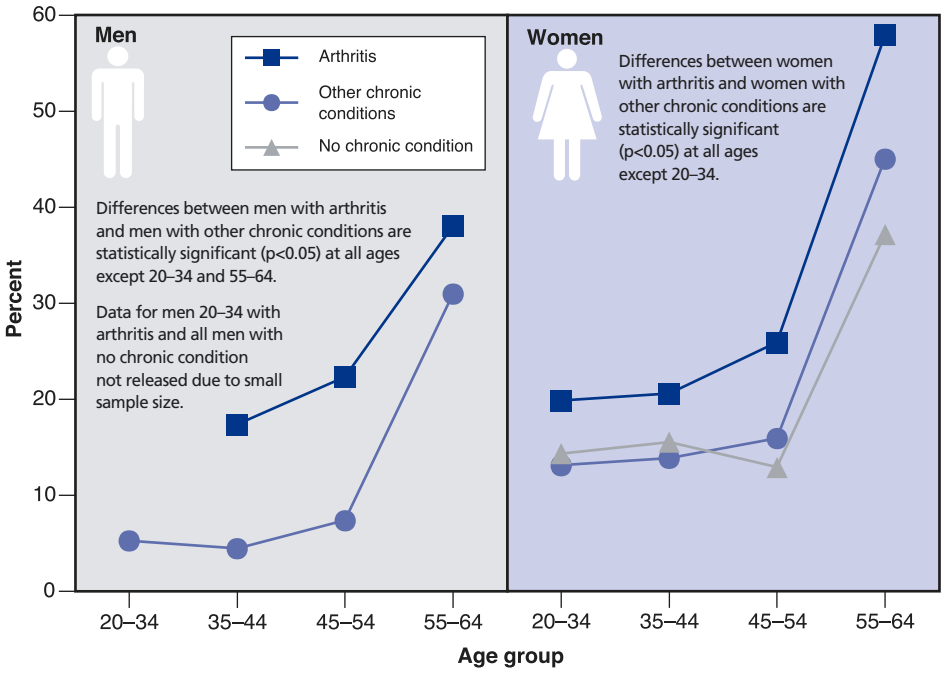
A significantly greater proportion of people with arthritis reported their current state of health as worse compared to one year prior than did people with other chronic conditions and no chronic condition, at all ages except the youngest age group. Similar patterns of increased reporting of worse health with increasing age were found as with self-rated health (Exhibit 2.17). Overall, 1 in 4 people with arthritis reported worse health, compared to 1 in 9 among people with other chronic conditions, and 1 in 21 among people with no chronic condition.



Data source: Canadian Community Health Survey

2.19 Proportion of people without a job throughout, or during part of, the previous year, by age group and sex, in Ontario, 2000/01

A likely consequence of disabling conditions, such as arthritis, is reduced participation in the labour force. While 1 in 7 people with other chronic conditions were without a job within the previous year, nearly 1 in 3 people of working age with arthritis reported being without a job in the previous year. Among men, those with arthritis reported being without a job in greater proportions than those with other chronic conditions in the 35–54 years age group. Among women, those with arthritis reported being without a job in greater proportions within the 35–64 years age group.

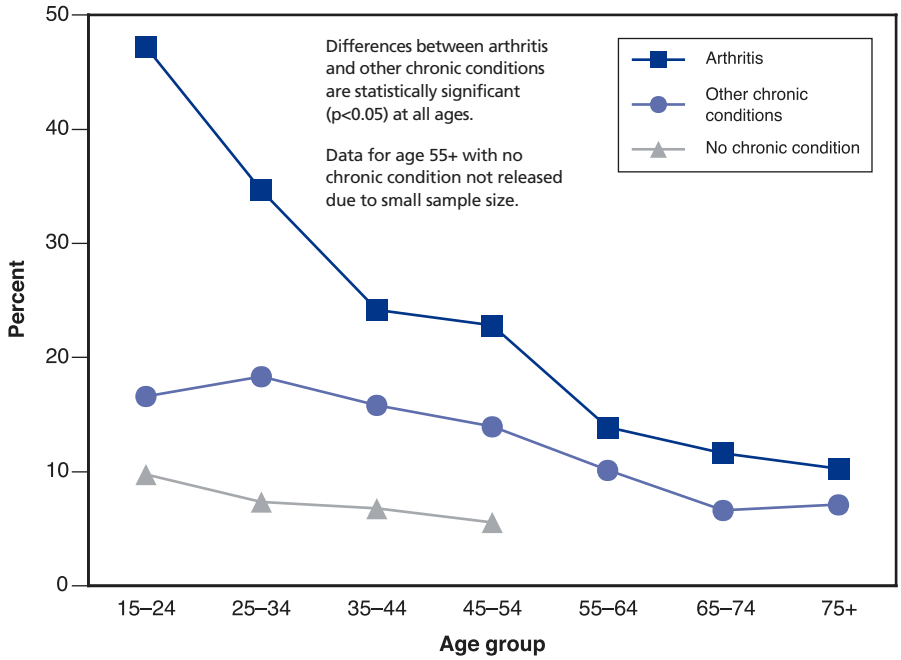


Data source: Canadian Community Health Survey

2.20 Proportion of people reporting self-perceived unmet health care needs, by age group, in Ontario, 2000/01

The CCHS asked if respondents needed health care in the previous 12 months (e.g. treatment for a physical problem or regular check-up) but did not receive it (for reasons such as service not being available in the area or the wait time being too long). In all age groups, the proportion of people that felt they had not received the health care they needed was greatest for people with arthritis compared to people with other chronic conditions and no chronic condition.

Overall, almost 18% of people with arthritis reported not receiving health care when needed. For people with other chronic conditions and no chronic condition, the proportion was 14%, and 7%, respectively. The highest proportion of people reporting lack of access were those with arthritis in the 15–44 years age group, with more than one-third reporting they had not received necessary care. Within the youngest age group, the proportion among those with arthritis reporting unmet health care needs was almost 3 times and 5 times as large as those with other chronic conditions and no chronic condition, respectively. With advancing age, the proportions decreased.



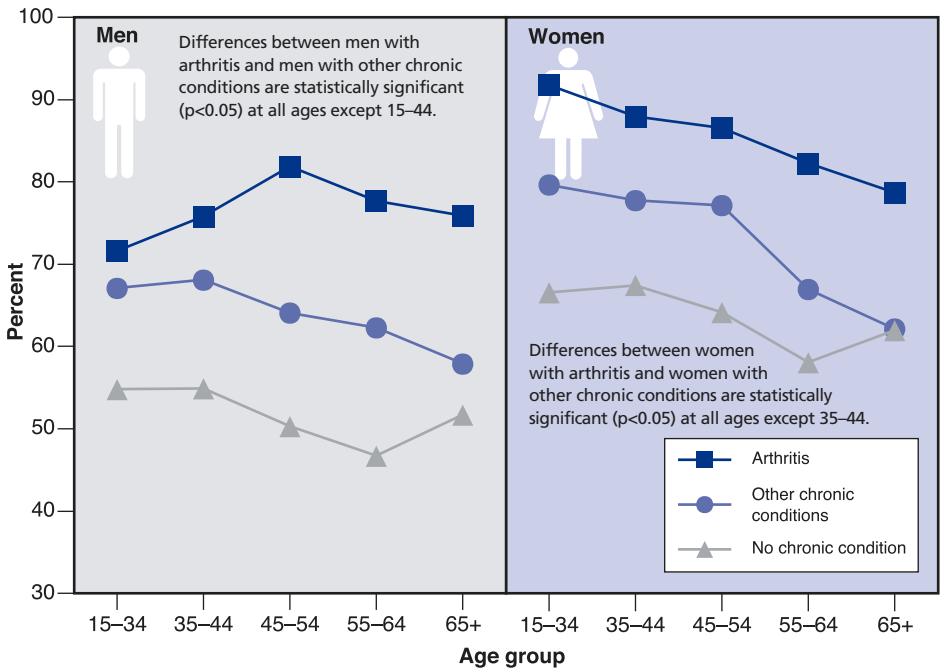
Data source: Canadian Community Health Survey

Use of medications

Usage of several prescribed and over-the-counter medications was incorporated in the CCHS. However, this component of the questionnaire was optional, and the following public health units opted out: Brant County, Haliburton-Kawartha-Pine Ridge, Hastings-Prince Edward, Kingston-Frontenac-Lennox-Addington, Leeds-Grenville-Lanark, City of Ottawa, Renfrew and Eastern Ontario. As a result, the findings are representative of the Ontario population excluding the indicated regions above, representing coverage of 85% of the Ontario population.

2.21 Proportion of people reporting use of pain relievers in the previous month, by age group and sex, in Ontario, 2000/01

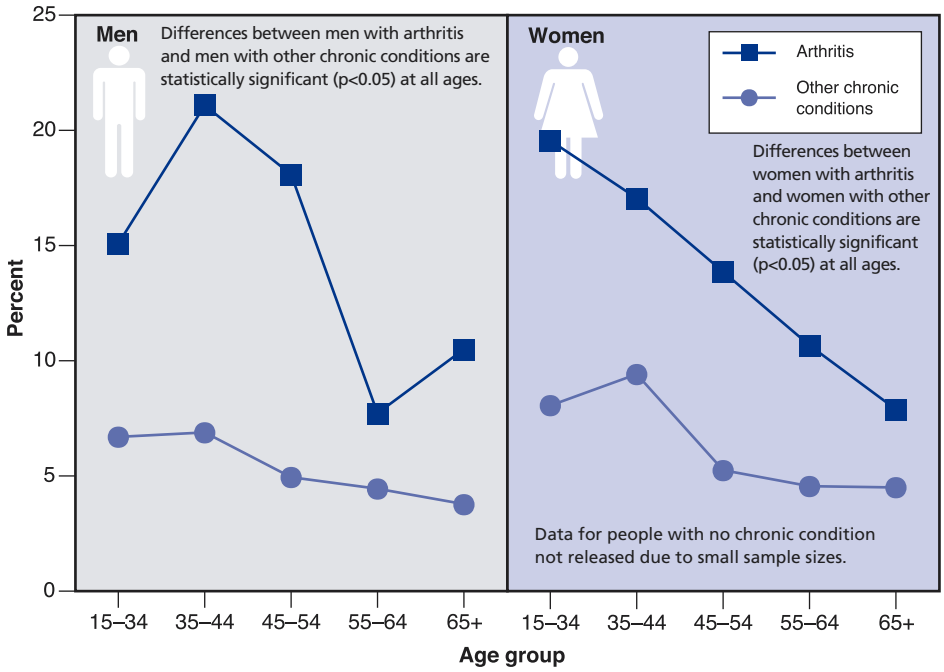
A greater proportion of people with arthritis than those with other chronic conditions reported use of pain relievers in the previous month—significantly so among those aged 45 years and older. The reported use of pain relievers was 80% in people with arthritis, 70% in people with other chronic conditions and just under 60% in people with no chronic condition. Differences between these groups widened with age. Women reported significantly higher use of pain relievers than men in the youngest group aged 15–44 years.



Data source: Canadian Community Health Survey

2.22 Proportion of people reporting use of narcotic medications in the previous month, by age group and sex, in Ontario, 2000/01

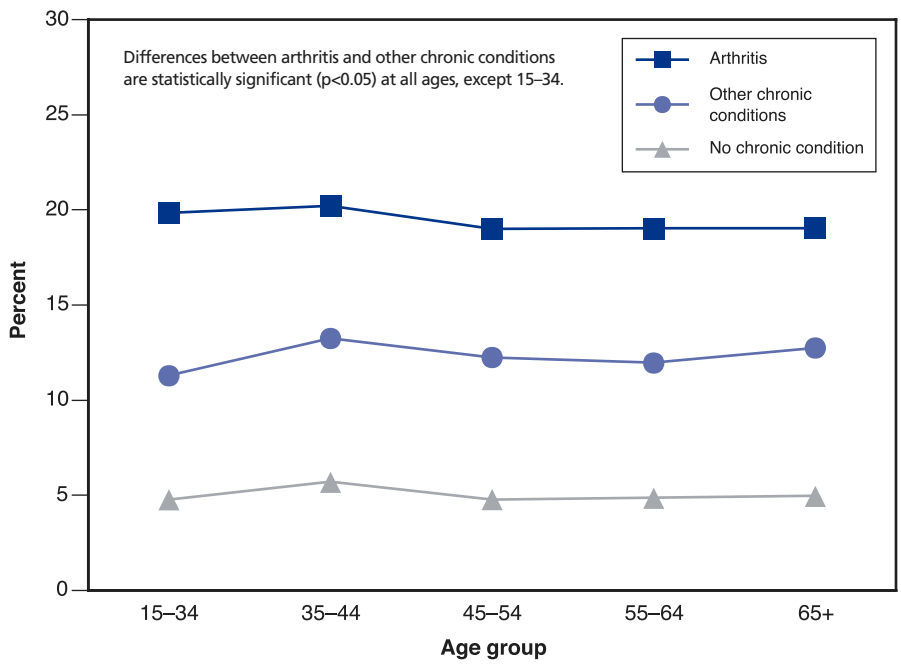
The use of narcotic medication (codeine, Demerol or morphine) in the previous month was also higher among people with arthritis. Compared to people with other chronic conditions (for whom little variation with age was found), the use of narcotic medications by people with arthritis was highest in the younger age groups, at up to 20%. Overall, the proportion of people with arthritis that used narcotic medication was almost twice that of people with other chronic conditions and almost 5 times that of people with no chronic condition.



Data source: Canadian Community Health Survey

2.23 Proportion of people reporting use of stomach remedies in the previous month, by age group, in Ontario, 2000/01

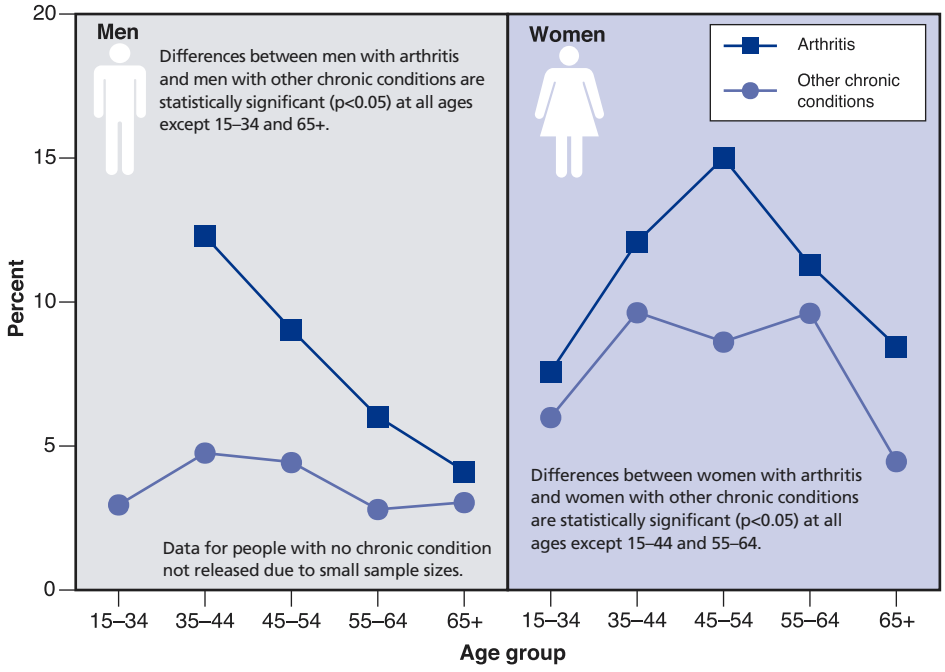
People with arthritis reported a significantly higher use of stomach remedies in the previous month, with proportions about 1.5 times and 4 times greater, in all age groups, than people with other chronic conditions and no chronic condition, respectively. Overall, about 19% of people with arthritis reported using stomach remedies compared to 12% for people with other chronic conditions and 5% for people with no chronic condition. It is possible that the higher use of stomach remedies by people with arthritis is a consequence of side effects from non-steroidal anti-inflammatory drugs. The use of stomach remedies was stable across age groups for all three comparison groups.



Data source: Canadian Community Health Survey

2.24 Proportion of people reporting use of anti-depressants in the previous month, by age group and sex, in Ontario, 2000/01

Overall, the proportion of people reporting the use of anti-depressants was twice as high for people with arthritis, compared to people with other chronic conditions, and was higher for women than men.

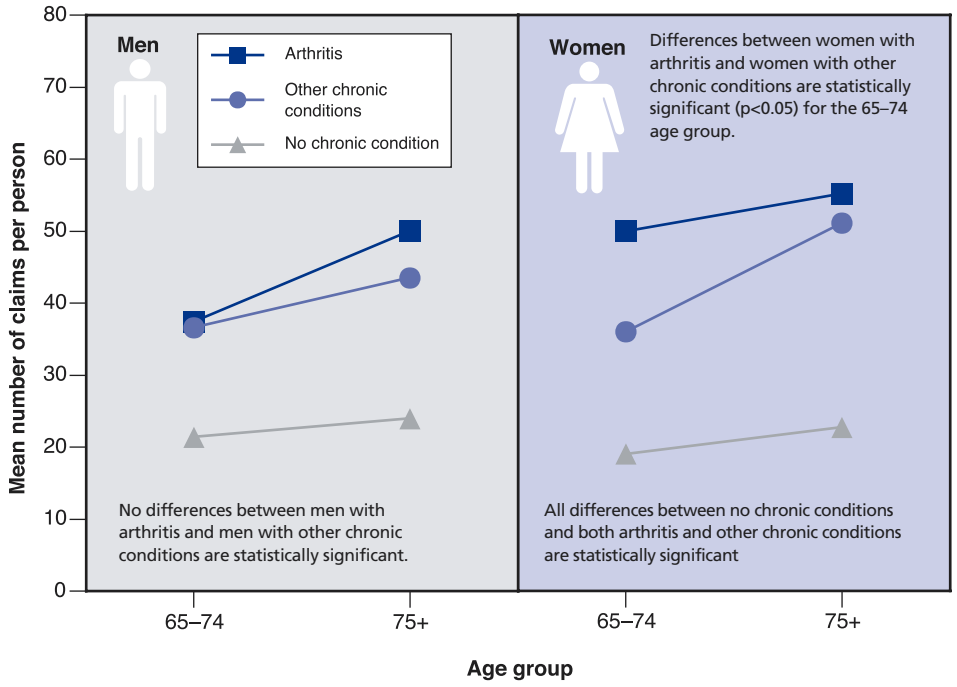


Data source: Canadian Community Health Survey

2.25 Mean number of ODB claims per person aged 65 years and older, in the two years following the OHS survey, by sex, in Ontario, 2000/01

Administrative claim data is available only for Ontarians aged 65 years and older through the Ontario Drug Benefit (ODB) program, which provides access to all drugs on its formulary. Linkage of ODB data with 1996 Ontario Health Survey (OHS) data has potential for insights into differences in usage among people with arthritis, other chronic conditions and no chronic condition. The estimates presented here do not reflect the reason for prescribing the drugs, as ODB administrative data does not include this information.

Overall, the mean number of claims per person in the two years following the OHS survey interview was greater for people with arthritis at 49 claims, compared to 40 and 21 for people with other chronic conditions and no chronic condition, respectively. A significant difference in number of claims was noted between women aged 65–74 years with arthritis and those with other chronic conditions. Women with arthritis made an average of 14 more claims per person during the two years following the survey.



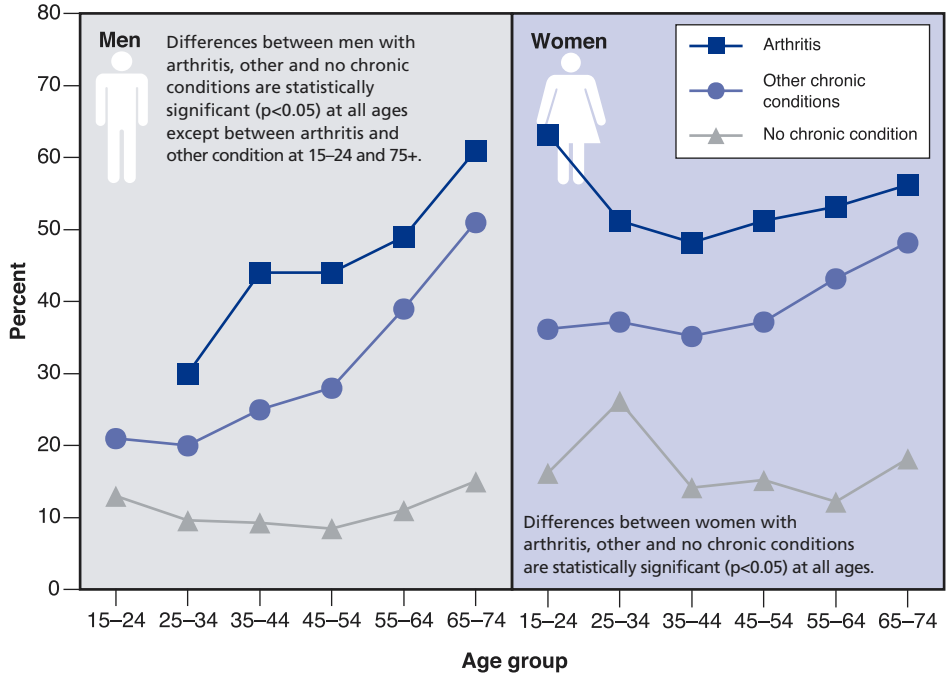
Data sources: Ontario Drug Benefit Program; National Population Health Survey

Use of health care services

The CCHS asked respondents about the number of consultations made in the previous year with a variety of health care professionals, including, but not limited to, doctors, physiotherapists, and chiropractors.

2.26 Proportion of people visiting a family physician/general practitioner at least 4 times in the previous 12 months, by age group and sex, in Ontario, 2000/01

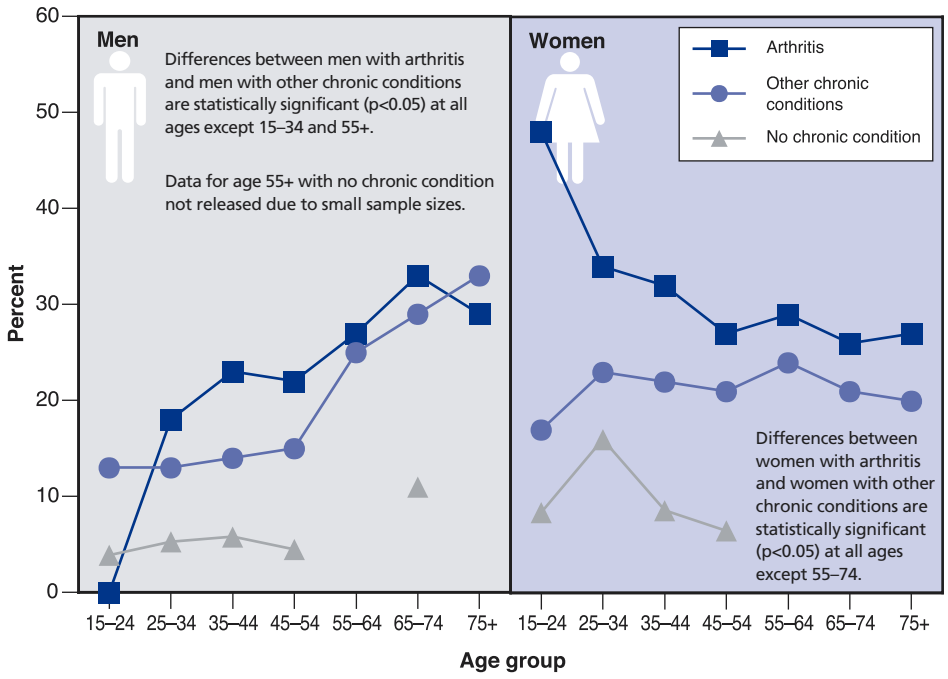
In all age groups, a greater proportion of people with arthritis (more than half) reported having 4 or more visits to a primary care physician, family physician or general practitioner (FP/GP), in the 12 months before the survey, than did people with other chronic conditions (one-third) and no chronic condition (one-seventh). Overall, the proportion of men reporting such visits was almost 51% for those with arthritis, close to 30% for those with other chronic conditions, and just under 11% for those with no chronic condition. Overall, for women, almost 56% of those with arthritis, fewer than 40% of those with other chronic conditions, and fewer than 20% of those with no chronic condition reported making 4 or more FP/GP visits in the previous 12 months.



Data source: Canadian Community Health Survey

2.27 Proportion of people consulting a specialist at least twice in the previous 12 months, by age group and sex, in Ontario, 2000/01

The difference in proportion between those with arthritis and other chronic conditions making 2 or more visits to specialists was not as pronounced as it was for visits to a FP/GP, though it was, nonetheless, greatest for those with arthritis. Overall, 28% of people with arthritis made such visits, compared to 19% and 7% for people with other chronic conditions and no chronic condition, respectively.



Data source: Canadian Community Health Survey

2.28 Logistic regression analyses examining the significance of predictor variables in reporting 4 or more visits to a family physician/general practitioner and 2 or more visits to a specialist in the previous year, in Ontario, 2000/01

Controlling for age, sex, and education, this analysis revealed an increased likelihood of people with arthritis, versus those with other chronic conditions, reporting having had 4 or more consultations with a FP/GP or 2 or more consultations with a specialist in the previous year. Overall, people with arthritis were 70% more likely to report having had 4 or more consultations with a FP/GP and 40% more likely to report having had 2 or more consultations with a specialist, compared to people with other chronic conditions.

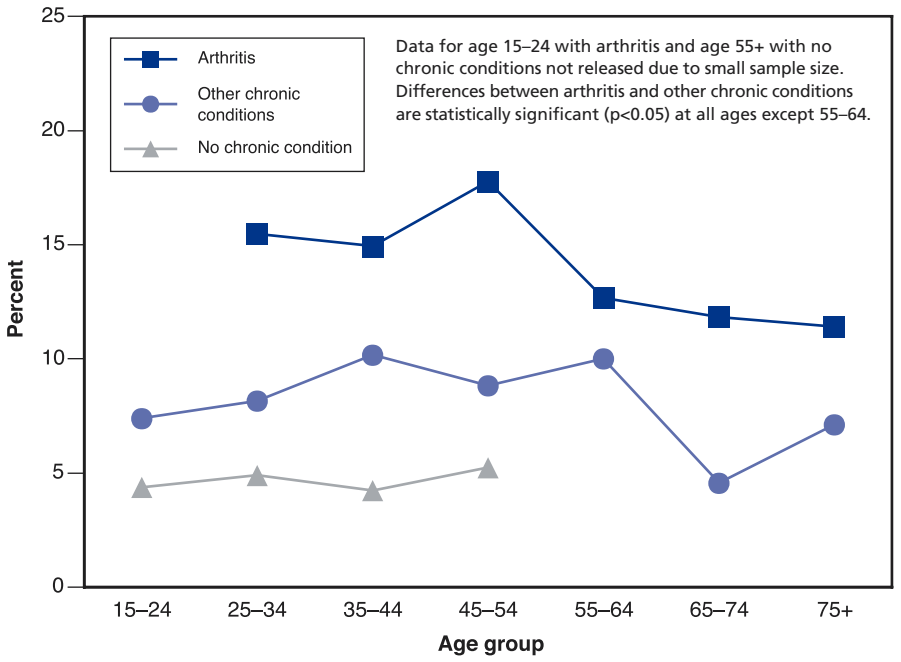
	Outcome: 4+ Visits with GP/FP			Outcome: 2+ Visits with Specialist		
Variables of Interest	**Odds Ratio**	**L 95% CI**	**U 95% CI**	**Odds Ratio**	**L 95% CI**	**U 95% CI**
Age group[1]						
25–34	**1.2**	1.05	1.39	**1.27**	1.07	1.51
35–44	1.1	0.93	1.22	**1.18**	1.01	1.39
45–54	**1.2**	1.04	1.37	1.11	0.93	1.32
55–64	**1.5**	1.30	1.75	**1.51**	1.27	1.79
65–74	**2.0**	1.72	2.28	**1.60**	1.34	1.93
75+	**2.8**	2.42	3.21	**1.52**	1.24	1.88
Sex[2]						
Women	**1.5**	1.39	1.61	**1.32**	1.21	1.43
Education[3]						
Secondary	**0.83**	0.75	0.92	0.95	0.84	1.07
Some post-secondary	**0.72**	0.62	0.83	1.09	0.92	1.29
Post-secondary	**0.72**	0.65	0.79	1.08	0.98	1.20
Condition status[4]						
With arthritis	**1.70**	1.51	1.80	**1.42**	1.29	1.58
No chronic conditions	**0.33**	0.30	0.37	**0.34**	0.30	0.38

[1]reference: aged 15–24 years [2]reference: men [3]reference: <secondary school [4]reference: with other chronic conditions

Data source: Canadian Community Health Survey

2.29 Proportion of people consulting a physiotherapist at least once in the previous 12 months, by age group, in Ontario, 2000/01

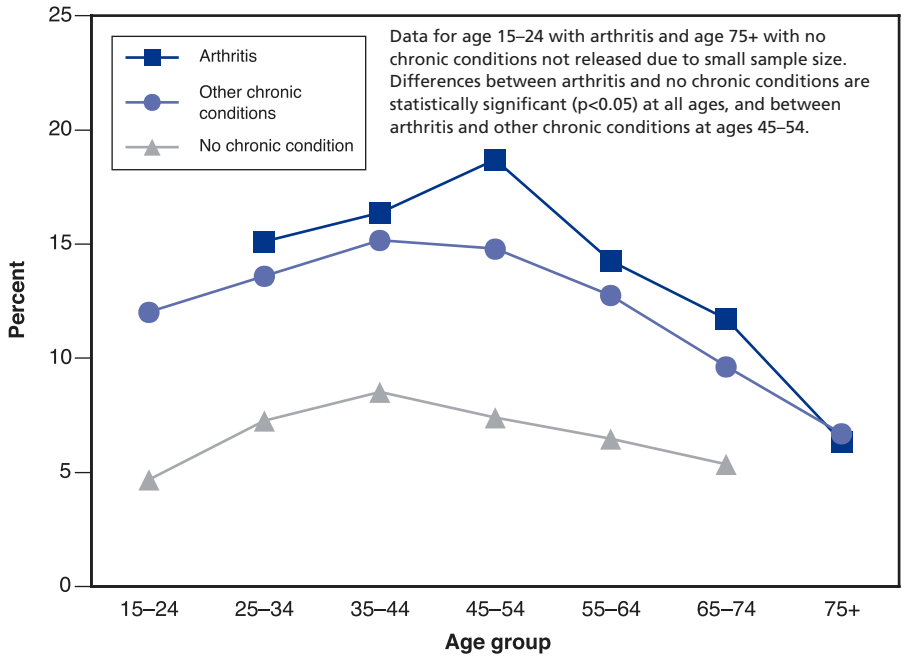
Overall, the proportion of people making at least one visit to a physiotherapist was nearly double for people with arthritis, compared to people with other chronic conditions. Greater proportions of visits by people with arthritis were seen in all age groups (except for the age group 55–64 years), with a gradual decline observed with increasing age.



Data source: Canadian Community Health Survey

2.30 Proportion of people consulting a chiropractor at least once in the previous 12 months, by age group, in Ontario, 2000/01

In contrast to visits to a physiotherapist (Exhibit 2.29) there were no significant differences in the proportions of people with arthritis and with other chronic conditions making at least one visit to a chiropractor. Overall, about 13% of people with arthritis reported at least one visit to a chiropractor. For all age groups, the proportion of people with arthritis with at least one visit to a chiropractor was twice that of people with no chronic condition.



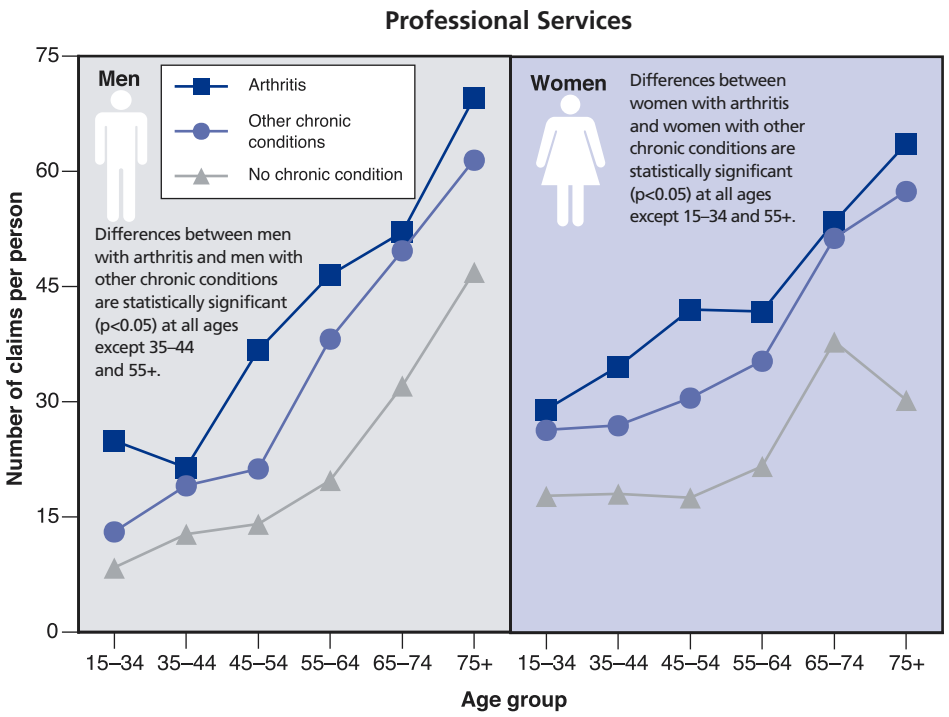
Data source: Canadian Community Health Survey

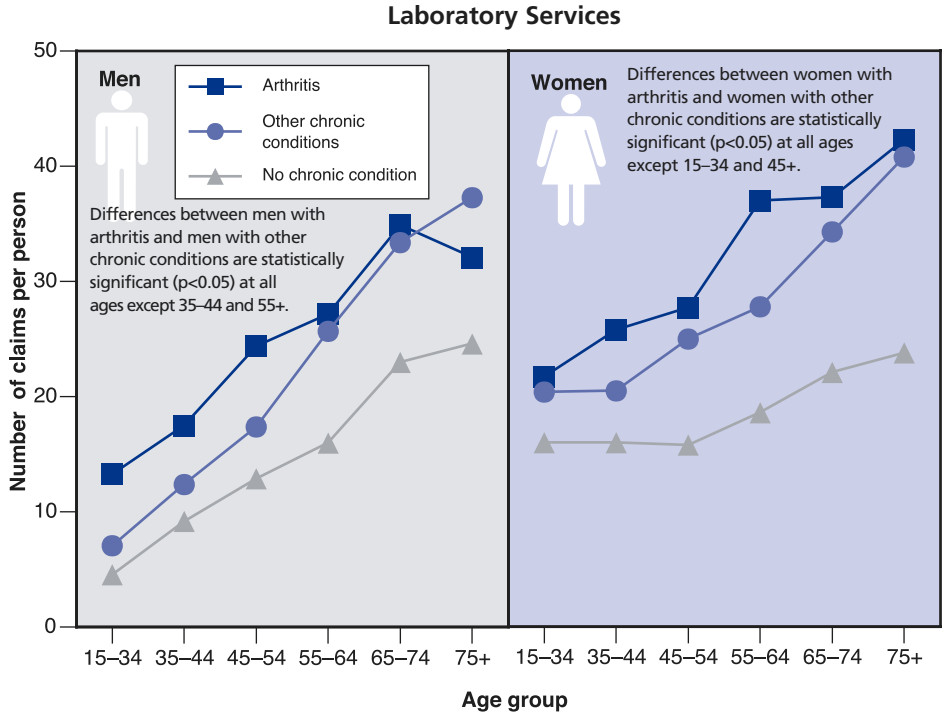
2.31 Number of OHIP claims per person for professional and laboratory services, in the two years following the OHS survey, by age group and sex, in Ontario, 2000/01

Additional information about health care service utilization was obtained by examining Ontario Health Insurance Plan (OHIP) claims for professional and associated laboratory services in the two years following the 1996 OHS. In the linked OHS-OHIP data file, analyses of claims for people with arthritis, other chronic conditions and no chronic condition were stratified by laboratory and professional services. Claims for professional services were primarily physician visits, but also included pathology, radiology and related services. To obtain a global perspective on the differences among people with arthritis, other chronic conditions and no chronic condition, all claims were included irrespective of the diagnoses.

People with arthritis had a greater mean number of OHIP claims per person for professional and laboratory services compared to people with other chronic conditions and no chronic condition. Overall, people with arthritis making at least one claim for professional services had an average of 47 claims per person. People with arthritis making at least one claim for laboratory services had an average of 32 claims per person. In contrast, people with other chronic conditions making at least one claim for professional services, had a mean number of 28 claims per person, and those making at least one claim for laboratory services had a mean number of 20 claims per person. People with no chronic condition making at least one claim for professional services had a mean number of 16 claims per person, and those making at least one claim for laboratory services had a mean number of 12 claims per person.

Significant differences in claim rates for professional and laboratory services were found between men and women.

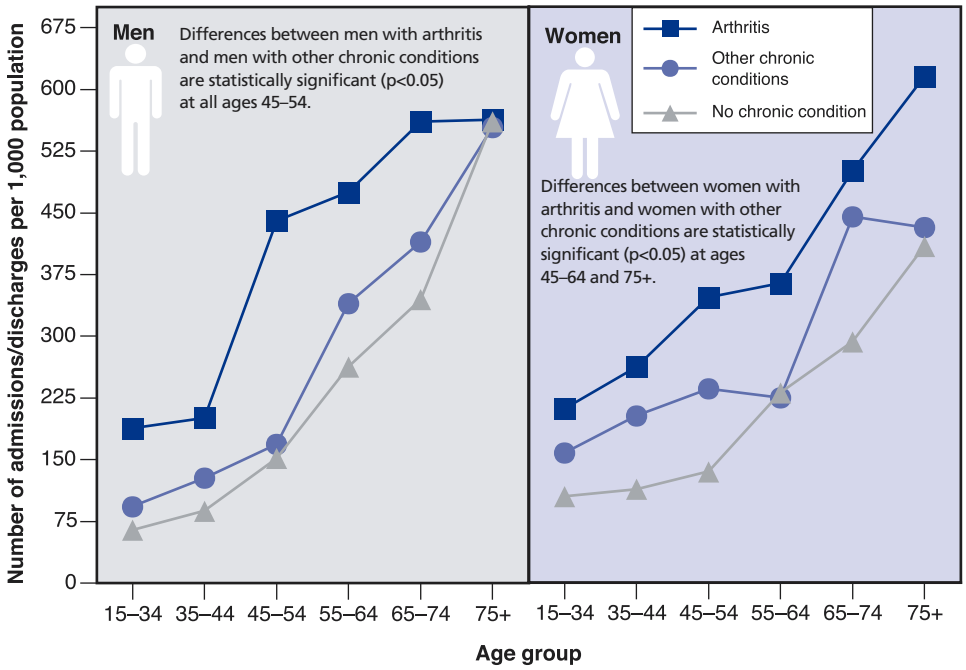




Data sources: Ontario Health Insurance Plan; National Population Health Survey

2.32 Same-day surgery admissions/discharges per 1,000 population, by age group and sex, in Ontario, 2000/01

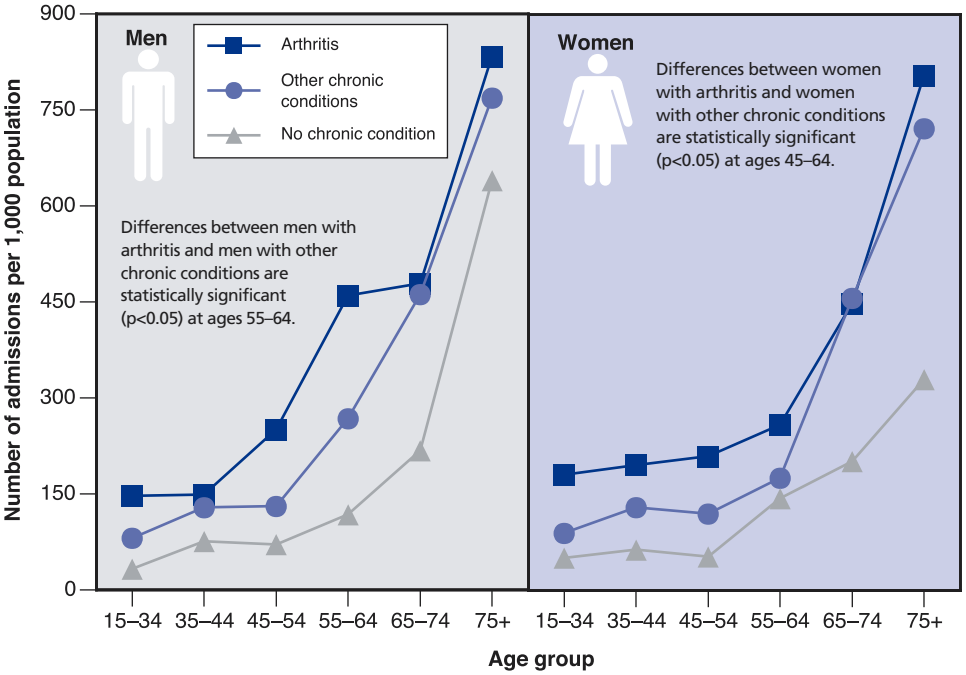
Compared to people with other chronic conditions with an average of 210 same-day surgeries per 1,000 persons, people with arthritis had a greater average number of same-day surgeries, with an average of 430 per 1,000 persons in the two years following the Ontario Health Survey.



Data sources: Canadian Institute for Health Information; National Population Health Survey

2.33 Inpatient admissions per 1,000 population, by age group and sex, in Ontario, 2000/01

Results similar to those found for same-day surgery were found for inpatient admissions. Overall, people with arthritis had an average of 400 admissions per 1,000 persons compared with 180 admissions per 1,000 persons for people with other chronic conditions.



Data sources: Canadian Institute for Health Information; National Population Health Survey

Conclusions

The findings presented here using data from health surveys of the Ontario population confirm that arthritis is a major cause of morbidity, disability and health care utilization in the province. By and large the results echo the findings of the 1998 research atlas.[2] In 2000, 17.5% of Ontarians, some 1.65 million people, reported arthritis or rheumatism as a long-term health condition, an increase from the estimate for 1994/95 of 1.30 million.[2]

The impact of arthritis was not confined to the elderly, with the highest number of affected people being in the later part of their working life. Over the next two decades as the baby boomer population ages, a dramatic increase of people with arthritis is expected, along with rising demand for health care services. Individuals with arthritis tend to make contact with health care service providers in greater proportions than people with other chronic conditions, and this translates into a larger economic burden on the health care system, and a need for more health care providers to adequately service this growing population.

Arthritis was reported more frequently by women, older people, and people with lower levels of education and lower incomes. These findings are consistent with other surveys, suggesting that people who have arthritis may have fewer resources to deal with the consequences of this condition.[9,17–19] The higher prevalence of arthritis among women also raises questions of whether targeted initiatives are necessary to meet the needs of this sector of the population.

There was considerable variation among DHCs in the proportion of the population reporting arthritis or rheumatism, and the ethnic composition of the population may be a contributing factor. Arthritis was more likely to be reported by Aboriginal peoples, and less likely by people of Asian ethnicities. A lower prevalence of arthritis in some Asian populations is reported in the literature, although this is not consistently found.[14,20–24] The lower prevalence may also be an aspect of the healthy immigrant effect as a high proportion of Asians are relatively recent immigrants to Canada.[14,23] It will be of interest to observe if this lower prevalence is maintained over time.

The higher prevalence of arthritis in Aboriginals is also reported in the literature, particularly for specific types of arthritis such as rheumatoid arthritis and ankylosing spondylitis.[11,12] A recent 2003 Health Canada report, based on analysis of the CCHS, noted that the national prevalence of arthritis in Aboriginals was 19%, which was equivalent to 27% if this population had the same age composition as the overall Canadian population.[9] These findings point to the importance of taking initiatives to improve the health of Aboriginal populations, and considering arthritis in the provision of appropriate health services.

A greater proportion of people with arthritis than those with other chronic conditions reported experiencing a wide range of adverse health related outcomes, including pain, disability, sleep disruption, and depression. In addition, a higher proportion of people with arthritis were not currently employed and/or needed at least some help from other people. While these findings cannot be attributed directly to arthritis, they may indicate the differential impact arthritis has compared to other chronic conditions. Although the category "other chronic conditions" includes conditions such as allergies, which are generally perceived as less serious, it should be noted that many people with arthritis also reported additional health conditions, including allergies.

The prevalence of arthritis rises steeply with age and is higher in women. Most health outcomes reported on in this chapter, showed small gradients, or none at all, associated with increasing age among people with arthritis. There is also no difference in the proportion of men and women reporting many of these outcomes. This implies that although the risks of developing arthritis may increase with age and are higher in women, once arthritis is established the impact is much the same. For many of the outcomes the health gap between people with arthritis and with other chronic diseases is widest in younger age groups and narrows with age. Narrowing does not imply a declining impact of arthritis, but rather an increasing frequency of more serious health problems in older people.

Reported stress and depression, however, have the opposite trend, with a greater proportion of younger people reporting these symptoms, similar to findings from other studies.[25] This could be a reflection of the greater potential for psychological and societal costs of chronic conditions, such as arthritis, in younger people.

The linkage of the OHS data with the administrative data provides added evidence of the burden of arthritis. Although a direct estimation was not made, the higher mean numbers of services provided for arthritis compared to other chronic conditions implies higher costs.[2] While the proportion of services due to arthritis is not known, these differences, once again, point to the marginal impact of arthritis over and above other conditions. It is noteworthy that these differences are observed in all age groups, and are generally greater in the age groups under-65 years .

This chapter gives an overall snapshot of the burden of arthritis in Ontario, comparing the burden of arthritis to that of all other chronic conditions. At a population level the burden of arthritis increases with age, and is higher in women than men. There is also some indication that the burden may be higher in the Aboriginal population. At an individual level, the impact of arthritis is similar in all age groups for men and women, and is associated with pain, activity limitation, and use of health care resources. However viewed, the impact of arthritis is considerable, and given the increases projected with the aging of the population, requires action on an individual and population level.

Appendices

2.A How the research was done

Data sources

- Canadian Community Health Survey (CCHS) 2000/01, Statistics Canada
- Ontario Health Survey (OHS) 1996/97, part of the 1996/97 National Population Health Survey (NPHS)
- Ontario Drug Benefit (ODB) program
- Ontario Health Insurance Plan (OHIP)
- Discharge Abstract Database, Canadian Institute for Health Information (CIHI)

The CCHS Cycle 1.1, conducted between September 2000 and November 2001, was the data source used for personal health information.[3] The survey is a cross-sectional general population health survey on health status, health care utilization and health determinants of the Canadian population. Information was collected from people living in private dwellings in the ten provinces and three territories, and excluded people living on Indian Reserves or Crown lands, clients in institutions, full-time members of the Canadian Armed Forces and residents of certain remote regions. The CCHS covered approximately 98% of the Canadian population aged 12 years and older. In Ontario, the CCHS survey achieved an 82% response rate, with 7% proxy response. For this chapter, data for Ontarians aged 15 years and over were analyzed.

Analyses

Arthritis and other chronic conditions were identified from the CCHS list (see Exhibit 2.1). Chronic conditions were defined as lasting, or expected to last, 6 months or more and were diagnosed by a health professional. The groups for which analyses are presented are:

(a) Arthritis—individuals who reported having arthritis and rheumatism and may, or may not, have other chronic conditions;

(b) Other chronic condition—individuals who reported having at least one chronic condition but not arthritis or rheumatism; and

(c) No chronic condition—individuals who did not report having any chronic condition.

In addition, variables related to the prevalence of arthritis, health impacts on quality of life, and use of health care services were selected for analysis, including:

- Demographic and personal factors (age, sex, highest level of education attained, total household income, obesity, and ethnic origin);
- District Health Council of residence;
- Participation in the labour force;
- Health factors (pain that limits activity, long-term disability, need for help with daily activities, sleep disruption, self-rated health, depression and stress);
- Health care utilization (4 or more visits to a primary care physician/general practitioner, 2 or more visits to a specialist, any visit to a physiotherapist, or any visit to a chiropractor, all in the previous 12 months; any use of pain relievers, narcotic medications, stomach remedies, or anti-depressants in the previous four weeks).

To obtain additional information about health care use by people with arthritis, data from the 1996/97 OHS was linked to health care administrative data. The 1996/97 OHS, part of the Statistics Canada 1996/97 NPHS, has an extra large sample for Ontario.[4] The methods for the 1996/97 NPHS are very similar to those of the CCHS, so are not described here. Respondents to the OHS were asked for their health card number and permission to link the questionnaire responses to health care administrative data for research purposes. In collaboration with provincial ministries of health, Statistics Canada created NHPS sharing files with questionnaire responses and the encrypted health card numbers.[2] Through a special research agreement with the Ontario Ministry of Health and Long-Term Care, a copy of the NPHS sharing file for Ontario was obtained and information from health care administrative data for the 22,249 respondents was extracted.

Data was then linked in the NPHS sharing file for Ontario with health care administrative data for the 24 months following the survey interview dates. These data included: prescription drug claims (for respondents aged 65 years and older) from the ODB; claims data for professional and laboratory services from OHIP; and the Discharge Abstract Database data for hospital inpatients and same-day surgery patients obtained from CIHI.[2]

For additional details about analytic methods see Appendix 2.B.

Limitations

Though substantial, it is likely that the prevalence of arthritis reported here is underestimated. The surveys asked respondents about arthritis or rheumatism diagnosed by a health professional. This question fails to capture many people with arthritis or chronic joint problems who do not see a physician and whose condition remains undiagnosed, as well as to those who may have recent or intermittent problems. Most of the data used for this chapter came from cross-sectional surveys, therefore, temporal or causal relationships cannot be assumed.

Two further limitations should be considered when interpreting results. First, the surveys' reliance on self-reports of medical conditions and health-related outcomes (including pain, activity limitation, and physician visits)—as noted, the reason for these adverse outcomes or health service use cannot be directly attributed to any particular underlying health condition. Second, the impact of arthritis is compared to an aggregate of other chronic conditions and the findings should not be generalized to compare the impact of arthritis with any specific condition.

2.B Detailed analytic methods

A more detailed description of the CCHS is available from Statistics Canada.[3] All analyses performed on the CCHS data were weighted to ensure that derived estimates were meaningful or representative of the entire targeted Ontario population 15 years of age and older. Where cell sample sizes were less than 30, estimates were withheld in accordance with Statistics Canada release guidelines. To estimate measures of precision, the bootstrap method was recommended by Statistics Canada and used for analysis of the CCHS data.[1,33,26] This method was employed to determine the statistical significance of differences between ratios (i.e. differences in proportions between those with arthritis, other chronic conditions and no chronic condition). A similar methodology was employed to analyze data from the 1996 Ontario Health Survey.[4]

Age-specific and sex-specific rates were calculated for the major demographic, health and health care utilization data (including that from the linked OHS file for Ontario) for people reporting arthritis and related conditions, other chronic conditions, or no chronic condition in the 2000/01 CCHS or 1996/97 OHS as appropriate. The mean number of units of service per person for these three groups was calculated from the linked health service administrative data:

- Number of prescriptions, from the ODB program data;
- Services from, or visits to, health professionals; and laboratory services and other tests, from the OHIP data; and,
- Hospital admissions and same-day surgery, from the CIHI Discharge Abstract Database.

As services related to pregnancy can skew utilization rates for younger women, hospital discharges and professional and laboratory services were flagged for all diagnoses related to pregnancy and excluded from the study.

Comparative ratios by DHC for the age-sex standardized prevalence of arthritis were calculated and displayed as a map. The comparative ratio is the ratio of the DHC rate to the overall Ontario rate.

Logistic regression analyses estimated the degree to which selected demographic characteristics influence the probability of reporting arthritis as a long-term health condition. This statistical method calculates an odds ratio to provide an indication of the independent contribution of each characteristic to the risk of arthritis. Similar analyses identified the characteristics of individuals that influence the probability of 4 or more visits to a primary care physician or general practitioner, or 2 or more visits to a specialist.

It should be noted that information about prescriptions for persons under 65 years of age were not available. Information about the uses and costs of non-prescription drugs consumed during the study period could not be obtained. In addition, admissions to rehabilitation facilities, chronic care hospitals and other long-term care settings are excluded from the data on hospital admissions, and the findings are limited to acute care services.

References

1. Badley EM, DesMeules M (eds), Health Canada. Arthritis in Canada: an ongoing challenge. Ottawa: Health Canada; 2003.

2. Williams JI, Iron K, Wu K. Estimating the impact of arthritis on the burden of disability and the costs of health services. In: Williams JI, Badley EM, editors. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 11–25.

3. Statistics Canada. Canadian Community Health Survey (CCHS), Cycle 1.1. Public use microdata file documentation. Ottawa: Statistics Canada, Health Statistics Division; 2002.

4. Statistics Canada. National Population Health Survey, NPHS. Public use microdata documentation. Ottawa: Statistics Canada; 1997.

5. Statistics Canada. Population projections for Canada, 2001–2026. CANSIM II, table 052-0001. Ottawa: Statistics Canada; 2002.

6. Felson DT, Lawrence RC, Dieppe PA, Hirsch R, Helmick CG, Jordan JM et al. Osteoarthritis: new insights. Part I. *Ann Intern Med* 2000; 133(8):635–646.

7. Gilmore J. Body mass index and health. *Health Rep* 1999; 11(1):31–43.

8. Centre for Disease Prevention and Control. Factors associated with prevalent self-reported arthritis and other rheumatic conditions—United States, 1989–1991. *Morb Mortal Wkly Rep* 1996; 45(23):487–491.

9. Legace C, Perruccio A, DesMeules M, Badley EM. The impact of arthritis on Canadians. In: Badley EM, DesMeules M, editors. Arthritis in Canada: an ongoing challenge. Ottawa: Health Canada; 2003. 7–34.

10. Negoita S, Swamp L, Benson K, Carpenter DO. Chronic disease surveillance of St. Regis Mohawk Health Service patients. *J Public Health Management Practice* 2001; 7(1):84–91.

11. Peschken CA, Esdaile J. Rheumatic diseases in North America's indigenous people. *Sem Arthritis Rheumatism* 1999; 28(6):368–391.

12. Newbold KB. Problems in search of solutions: health and Canadian aboriginals. *J Community Health* 1998; 23(1):59–73.

13. Wang PP, Elsbett-Koeppen R, Geng G, Badley EM. Arthritis prevalence and place of birth: findings from the 1994 Canadian National Population Health Survey. *Am J Epidemiol* 2000; 152(5):442–445.

14. Chen J, Ng E, Wilkins R. The health of Canada's immigrants in 1994–95. *Health Rep* 1996; 7:33–45, 37–50.

15. Sutton DA, Moldofsky H, Badley EM. Insomnia and health problems in Canadians. *Sleep* 2001; 24(6):665–670.

16. Kessler RC, Andrews G, Mroczek D, Ustun B, Wittchen HU. The World Health Organization composite international diagnostic interview short form (CIDI-SF). *Int J Methods Psychiatr Res* 1998; 7:171–185.

17. Badley EM, Ibanez D. Socioeconomic risk factors and musculoskeletal disability. *J Rheumatology* 1994; 21:515–522.

18. Wang PP, Badley EM. The contribution of arthritis and arthritis disability to non-participation in the labour force: a Canadian example. *J Rheumatology* 2001; 28(5):1077–1078.

19. Badley EM. The effects of osteoarthritis on disability and health care use in Canada. Third international symposium on osteoarthritis: challenges for the 21st century. Val David, Quebec. *J Rheumatology* 1994; 22 (Suppl 43) (1):19–22.

20. Dans LF, Tankeh-Torres S, Amante CM, et al. The prevalence of rheumatic diseases in a Filipino urban population: a WHO-ILAR COPCORD study. World Health Organization. International League of Associations for Rheumatology. Community oriented programme for the control of rheumatic diseases. *J Rheumatology* 1997; 24:1814–1819.

21. Lau EM, Symmons DP, Croft P. The epidemiology of hip osteoarthritis and rheumatoid arthritis in the orient. *Clin Orthop* 1996; 323:81–90.

22. Prevalence and impact of arthritis by race and ethnicity- United States, 1989–1991. *Morb Mortal Wkly Rep* 1996; 45:373–378.

23. Matuk LC. Health status of newcomers. *Can J Public Health* 1996; 87:52–55.

24. Mijiyawa M. Epidemiology and semiology of rheumatoid arthritis in third world countries. *Rev Rhum Engl Ed* 1995; (62):121–126.

25. Birren JE, Renner VJ. Concepts and criteria of mental health and aging. In: Birren JE, Sloan RB, editors. Handbook of mental health and aging. *Am J Orthopsychiatry* 1981; 51(2):242–254.

26. Yeo D, Mantel H, Liu TP. Bootstrap variance estimation for the National Population Health Survey. American Statistics Association Conference. Ottawa, Ontario: Douglas Yeo, Statistics Canada. 1999.

INSIDE

3

Chapter

Availability of Services

D Shipton, PhD and EM Badley, DPhil

The authors acknowledge the contributions of Dr. Nizar Mahomed and Dr. Gillian Hawker to the orthopaedic surgeon and rheumatologist surveys, respectively.

Key Messages

- The general level of services for people with arthritis has remained fairly static since 1997. As the number of people with arthritis increases, this translates into declining levels of service per individual, and likely has implications for health care providers' ability to provide adequate care.
- There was considerable regional disparity in distribution of arthritis-related services and providers. Low provision was not limited to northern regions, and was also observed in areas of southern Ontario.
- Regions with the lowest level of rheumatology service provision had the longest waiting times for non-urgent cases, suggesting that disparities in service provision adversely affect care. Across the province, waiting times for likely inflammatory arthritis patients were shorter and less variable, suggesting that, given an adequate referral process, they have priority access to appropriate care. A noted exception is the northern regions, where waiting times are significantly longer than the provincial average.
- Ontario's orthopaedic surgeons dedicate only 35% of their time to surgery, compared to the 62% recommended for US orthopaedic surgeons.[1] This points to the role of this specialty in the non-surgical management of arthritis and related conditions and to barriers imposed by limited access to operating room time, joint prostheses and other resources.

Introduction

This chapter provides updates for estimates published in the 1998 edition of *Patterns of Health Care in Ontario: Arthritis and Related Conditions* of regional variation in availability of medical and health specialists that most commonly provide arthritis-related clinical services to people in Ontario. Based on data for the period of 2000 to 2002, the main focus is to highlight the variation in numbers of available practitioners in regions across Ontario, including rheumatologists, orthopaedic surgeons, general practitioners, chiropractors, physiotherapists, occupational therapists, and therapists of the Arthritis Society Consultation and Rehabilitation Services and to determine levels of service delivery. In addition, highlights of practice patterns obtained from recent surveys of rheumatologists and orthopaedic surgeons are featured.

Background

Approximately three million people in Canada report having arthritis. Over one hundred forms of arthritis, varying from mild and self-limiting disease to chronic conditions, cause significant disability.[2-4] Depending on the type and severity of the arthritis, appropriate care ranges from a single visit to a health care professional, such as a primary care physician (general practitioner or family doctor), to long-term management by a multidisciplinary team, including physiotherapists, occupational therapists, chiropractors and physician specialists, such as orthopaedic surgeons and rheumatologists.[5]

Individuals with arthritis who do seek traditional medical care will generally see a primary care physician.[6] Primary care physicians play a central role in establishing early diagnosis and coordinating the ongoing management and monitoring of arthritis.[7] A primary care physician will generally manage the medical care of patients with non-joint related rheumatism, most osteoarthritis and uncomplicated inflammatory arthritis.[5] However, some of these individuals will require a referral to a specialist.

It is generally recommended that the management of rheumatoid arthritis and other arthritis conditions with potential for serious consequences should involve a rheumatologist.[8-11] Some individuals will make a single visit to a rheumatologist for diagnosis, with the remaining care managed by other health care professionals, while others will be co-managed by rheumatologists throughout the course of their disease.

When all attempts at non-surgical management have failed to adequately prevent joint pain or disability, orthopaedic surgery is effective in reducing pain and restoring function. In Canada, orthopaedic surgeons also play a relatively large role in the non-surgical management of their patients.[12] Details on arthritis-relevant orthopaedic procedures are provided in Chapter 6.

Physiotherapy and occupational therapy play a central role in the care of arthritis patients with functional limitations in areas such as pain management, energy conservation, joint protection, muscle strengthening and the use of assistive devices.[13-17] Rehabilitation is important to restore function following certain orthopaedic surgeries, such as knee replacement and hip replacement.

Services received by individuals with arthritis will, in part, be driven by availability in their locality. The 1998 edition of this research atlas, drawing on data from 1997, provided information on the geographical distribution of arthritis-relevant health care professionals, demonstrating considerable area variation in the provision of such services across Ontario.[18] In this edition, figures have been updated with data from 2000 to 2002 and comparisons with provision in 1997 are made where possible.

To establish estimates of regional variation of arthritis-related services in Ontario, various indicators were used.

Key measures

- Number of active practitioners in each discipline and geographic distribution of practitioners
- Ratio of practitioners to regional populations (per 100,000)
- Number of half-day rheumatology clinics per week (per 100,000 population) and geographic distribution
- Number of half-day orthopaedic clinics per week (per 100,000 population) and geographic distribution
- Number of half-days surgery per week (per 100,000 population) and geographic distribution
- Wait times for new non-urgent patients and new likely inflammatory patients

Findings and Discussion

Geographic variation

Rheumatology services

3.1 Availability of rheumatology services per 100,000 population by District Health Council, in Ontario, 2000

A total of 158 physicians in Ontario in 2000 were identified as having received rheumatology training and having a practice of rheumatology care. All of these physicians completed the questionnaire section on practice patterns and 83% completed the section on service barriers.

On average, approximately 9 half-day rheumatology clinics per week per 100,000 population were reported in Ontario. The level of provision varied considerably by District Health Council (DHC) (extremal quotient=31.6), ranging from 0.5 in Northern Shores to 15.8 half-day clinics per week per 100,000 population in Hamilton (see also Exhibit 3.2). The North Ministry of Health and Long-Term Care (MOHLTC) planning region had the lowest rate of provision with fewer than 3 half-day clinics per week per 100,000 while Toronto had the highest at approximately 15 half-day clinics per week per 100,000.

While there has been no change in the overall level of rheumatology care provision since 1997, differences have been noted within the DHCs. The largest increase (3 half-day clinics per week per 100,000) was observed in Essex-Kent-Lambton. Among the DHCs in northern Ontario, which had some of the lowest levels of rheumatology services, provision increased by 0.2 half-day clinics per week per 100,000 population in 2 of the DHCs (Northern Shores and Northwestern Ontario) and fell by more than 1 half-day clinic per week per 100,000 population in Algoma-Cochrane-Manitoulin-Sudbury.

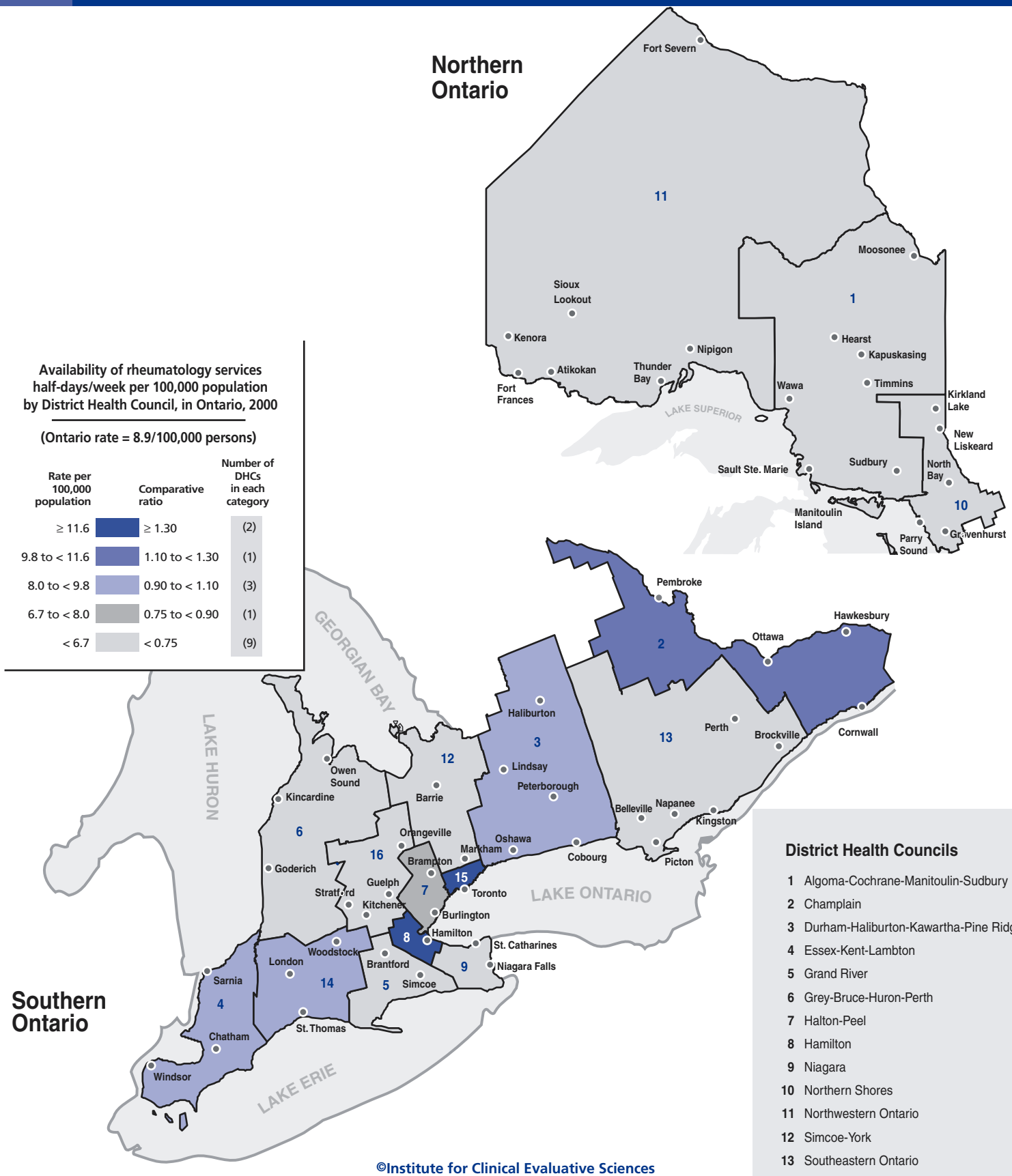
The estimated time a patient waited for a new consultation with a rheumatologist was stratified by type of patient. Non-urgent arthritis patients waited an average of 10 weeks for an initial rheumatology consultation, while patients with likely inflammatory arthritis waited less than 4 weeks.

Health Planning Regions & District Health Councils	Half-day Rheumatology Clinics per Week per 100,000	Change in Half-day Rheumatology Clinics per Week per 100,000 Since 1997	Average Wait Time for New Non-urgent Patients (wks)	Average Wait Time for New Likely Inflammatory Arthritis Patients (wks)
North				
Algoma-Cochrane Manitoulin-Sudbury	3.6	-1.3	22.6	10.7
Northern Shores	0.5	0.2	19.3	19.3
Northwestern Ontario	4.3	0.2	56.0	19.0
	3.0	*	**29.5**	**14.3**
South West				
Essex-Kent-Lambton	8.1	3.0	9.0	1.8
Grey-Bruce-Huron-Perth	0.7	0.7	12.0	4.0
Thames Valley	8.3	0.7	16.6	3.4
	6.8	*	**12.6**	**2.9**
Central West				
Halton-Peel	7.3	-0.6	9.2	2.1
Waterloo Region-Wellington-Dufferin	4.6	-0.2	10.4	1.6
	6.4	*	**9.5**	**2.0**
Central South				
Grand River	1.4	-1.8	4.7	2.7
Hamilton	15.8	-2.4	19.0	6.3
Niagara	6.4	0.0	8.0	2.9
	9.4	*	**9.2**	**3.5**
Toronto				
	15.1	**0.4**	**5.9**	**2.3**
Central East				
Simcoe-York	6.2	2.4	11.3	2.8
Durham-Haliburton-Kawartha-Pine Ridge	8.3	-0.4	11.5	2.8
	7.1	*	**11.5**	**2.8**
East				
Champlain	11.1	-3.3	8.8	3.6
Southeastern Ontario	6.5	2.6	9.1	2.4
	9.6	*	**8.8**	**3.3**
Ontario	8.9	0.0	10.1	3.5

* Due to changes in health planning regions since 1997, direct comparisons cannot be made.

Data source: Arthritis Community Research and Evaluation Unit (ACREU) Ontario Survey of Rheumatologists

3.2 Availability of rheumatology services half-days/week per 100,000 population by District Health Council, in Ontario, 2000



District Health Councils

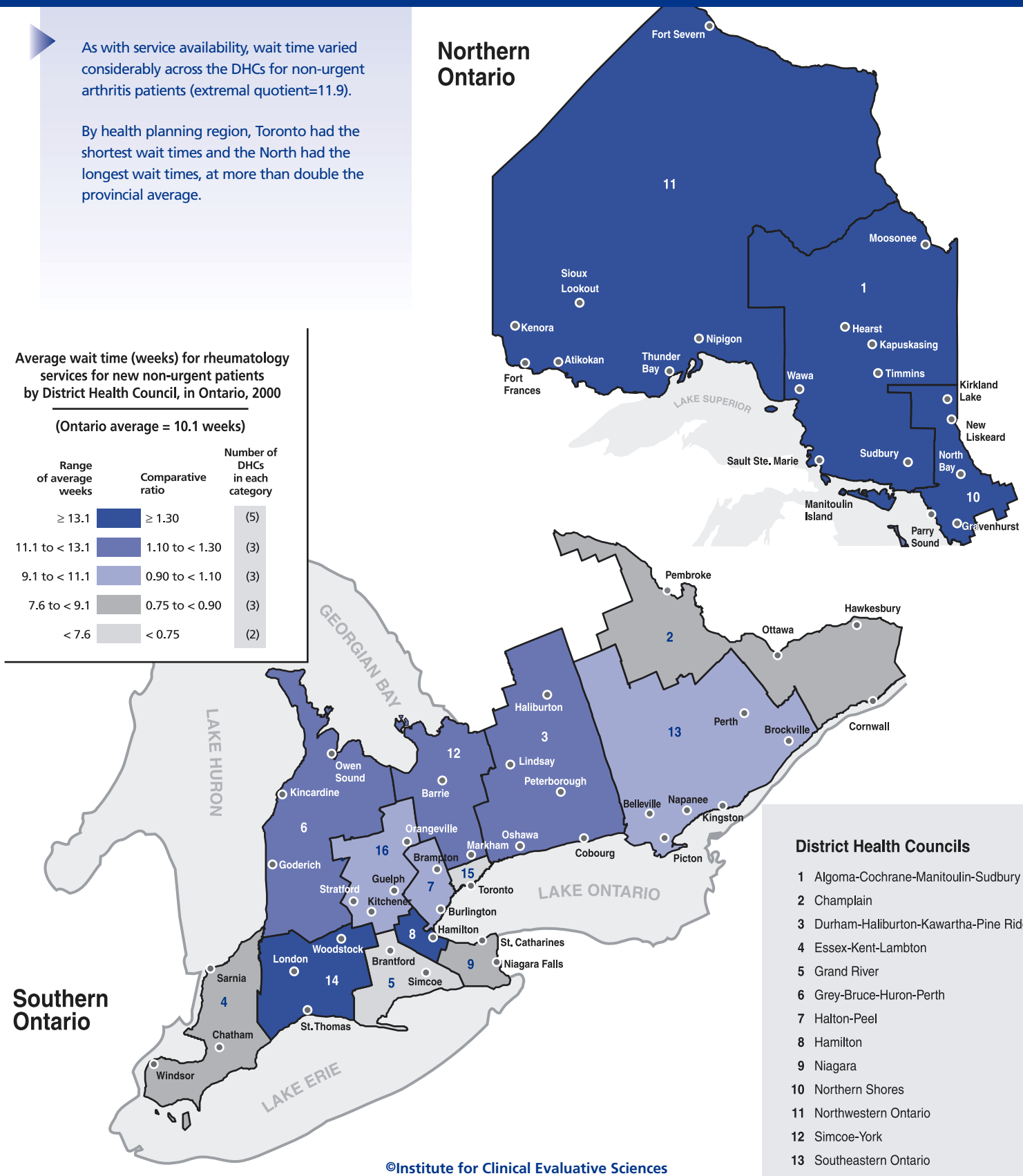
1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Data source: Arthritis Community Research and Evaluation Unit (ACREU) Ontario Survey of Rheumatologists

3.3 Average wait time (weeks) for rheumatology services for new non-urgent patients by District Health Council, in Ontario, 2000

As with service availability, wait time varied considerably across the DHCs for non-urgent arthritis patients (extremal quotient=11.9).

By health planning region, Toronto had the shortest wait times and the North had the longest wait times, at more than double the provincial average.



Average wait time (weeks) for rheumatology services for new non-urgent patients by District Health Council, in Ontario, 2000

(Ontario average = 10.1 weeks)

Range of average weeks	Comparative ratio	Number of DHCs in each category
≥ 13.1	≥ 1.30	(5)
11.1 to < 13.1	1.10 to < 1.30	(3)
9.1 to < 11.1	0.90 to < 1.10	(3)
7.6 to < 9.1	0.75 to < 0.90	(3)
< 7.6	< 0.75	(2)

District Health Councils

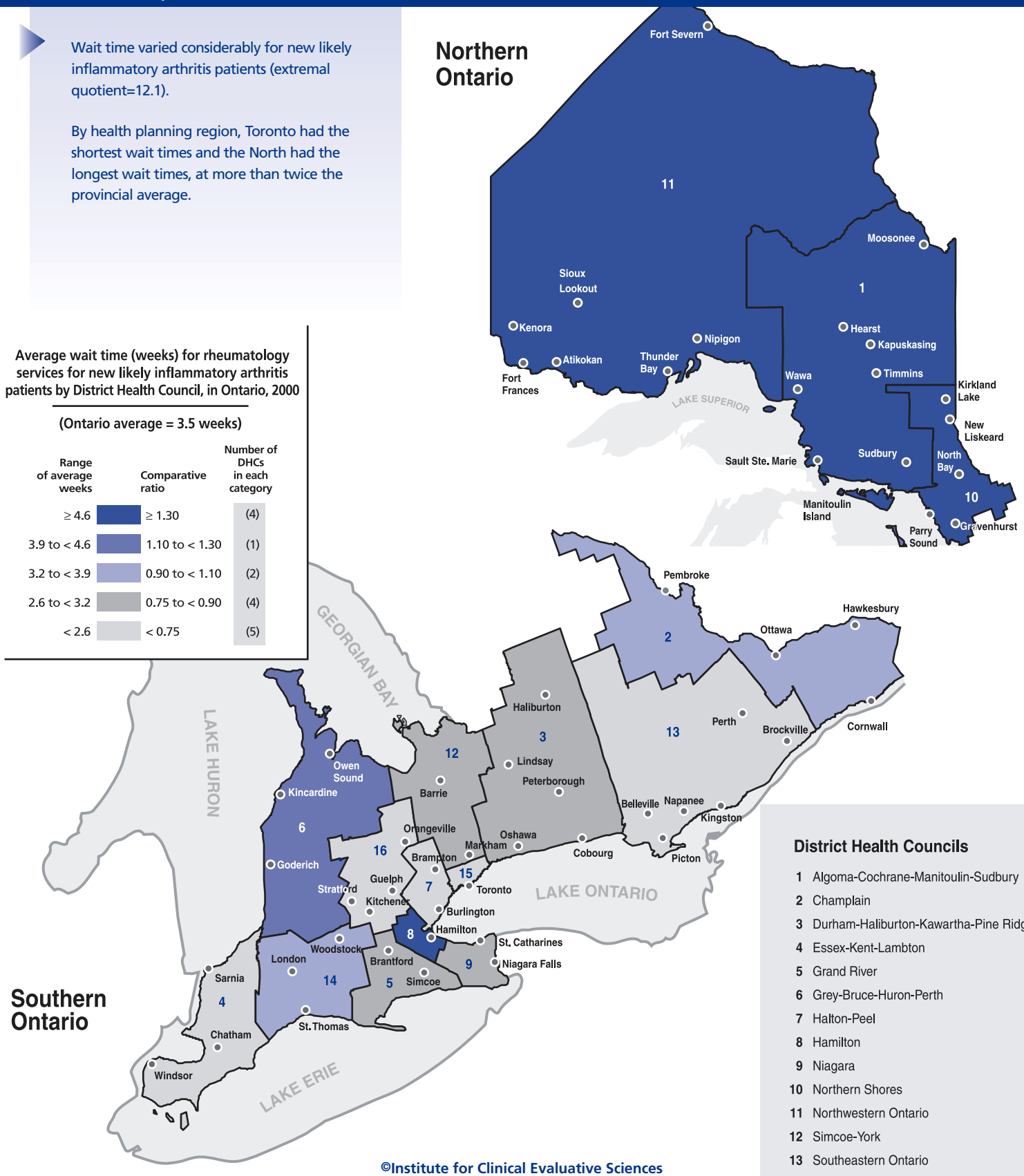
1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Data source: Arthritis Community Research and Evaluation Unit (ACREU) Ontario Survey of Rheumatologists

3.4 Average wait time (weeks) for rheumatology services for new likely inflammatory arthritis patients by District Health Council, in Ontario, 2000

Wait time varied considerably for new likely inflammatory arthritis patients (extremal quotient=12.1).

By health planning region, Toronto had the shortest wait times and the North had the longest wait times, at more than twice the provincial average.



Average wait time (weeks) for rheumatology services for new likely inflammatory arthritis patients by District Health Council, in Ontario, 2000

(Ontario average = 3.5 weeks)

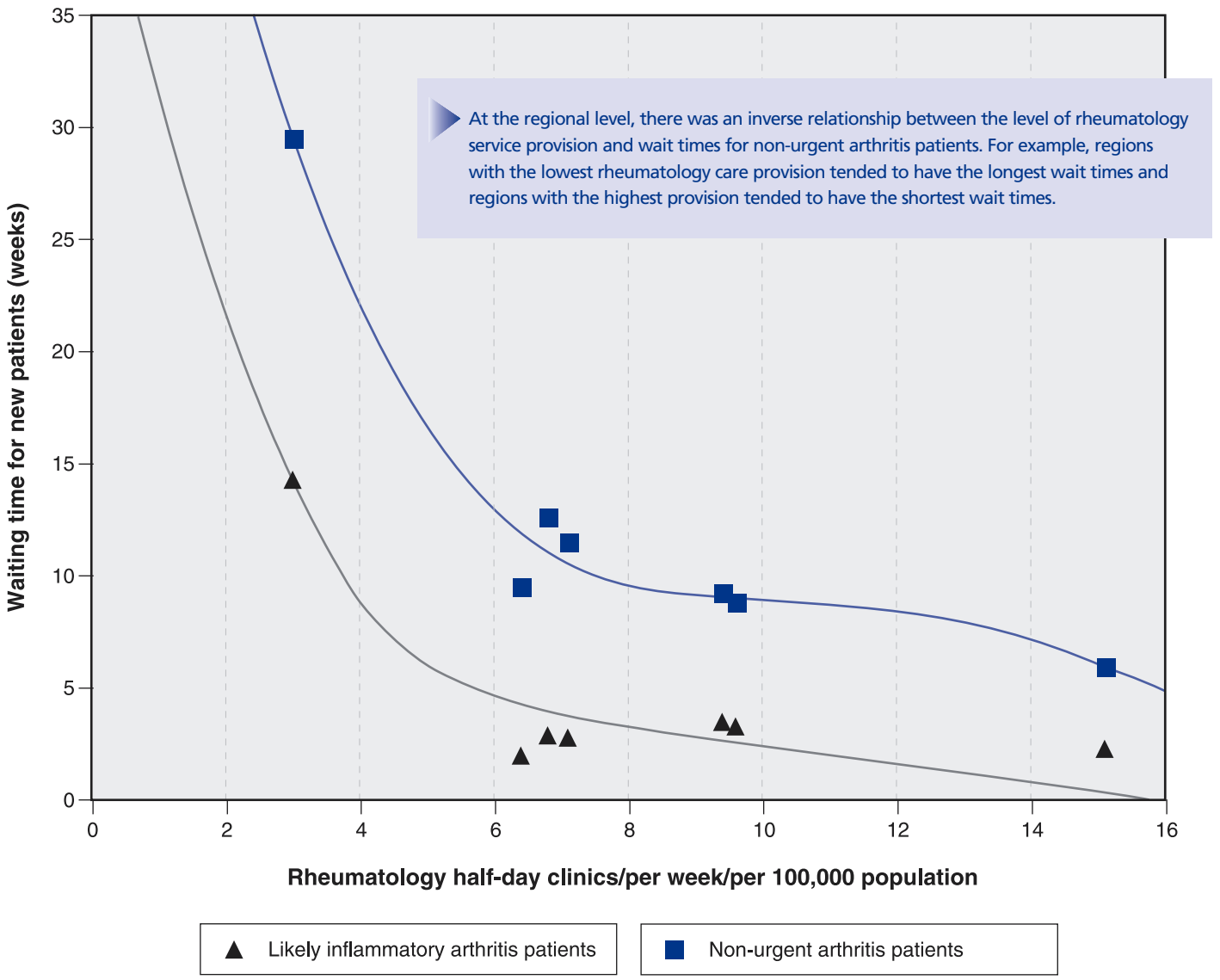
Range of average weeks	Comparative ratio	Number of DHCs in each category
≥ 4.6	≥ 1.30	(4)
3.9 to < 4.6	1.10 to < 1.30	(1)
3.2 to < 3.9	0.90 to < 1.10	(2)
2.6 to < 3.2	0.75 to < 0.90	(4)
< 2.6	< 0.75	(5)

Data source: Arthritis Community Research and Evaluation Unit (ACREU) Ontario Survey of Rheumatologists

District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

3.5 Relationship between rheumatology half-day clinics per week per 100,000 population and wait time for new non-urgent patients and likely inflammatory arthritis patients by Health Planning Region, in Ontario, 2000



Data source: Arthritis Community Research and Evaluation Unit (ACREU) Ontario Survey of Rheumatologists

Geographic variation

Orthopaedic services

3.6 Availability of orthopaedic services per 100,000 population by District Health Council, in Ontario, 2000

Of the 357 orthopaedic surgeons identified in Ontario in 2000, 337 (94%) responded to the survey, of which 315 (93%) reported having at least some arthritis patients.

Overall, approximately 14 half-days of office time and 8 half-days of surgery time were provided in Ontario per week per 100,000 population by surgeons with some arthritis patients in their practice.

The level of orthopaedic service provision fell by just over 2 half-days per week per 100,000 population (approximately 200 half-days per week across Ontario), between 1997 and 2000. Decreases in service provision were seen in 11 of the 16 DHCs. A notable exception was Northwestern Ontario, which experienced a 40% rise in the number of office/surgery half-days, likely related to recent surgeon recruitments to this region.

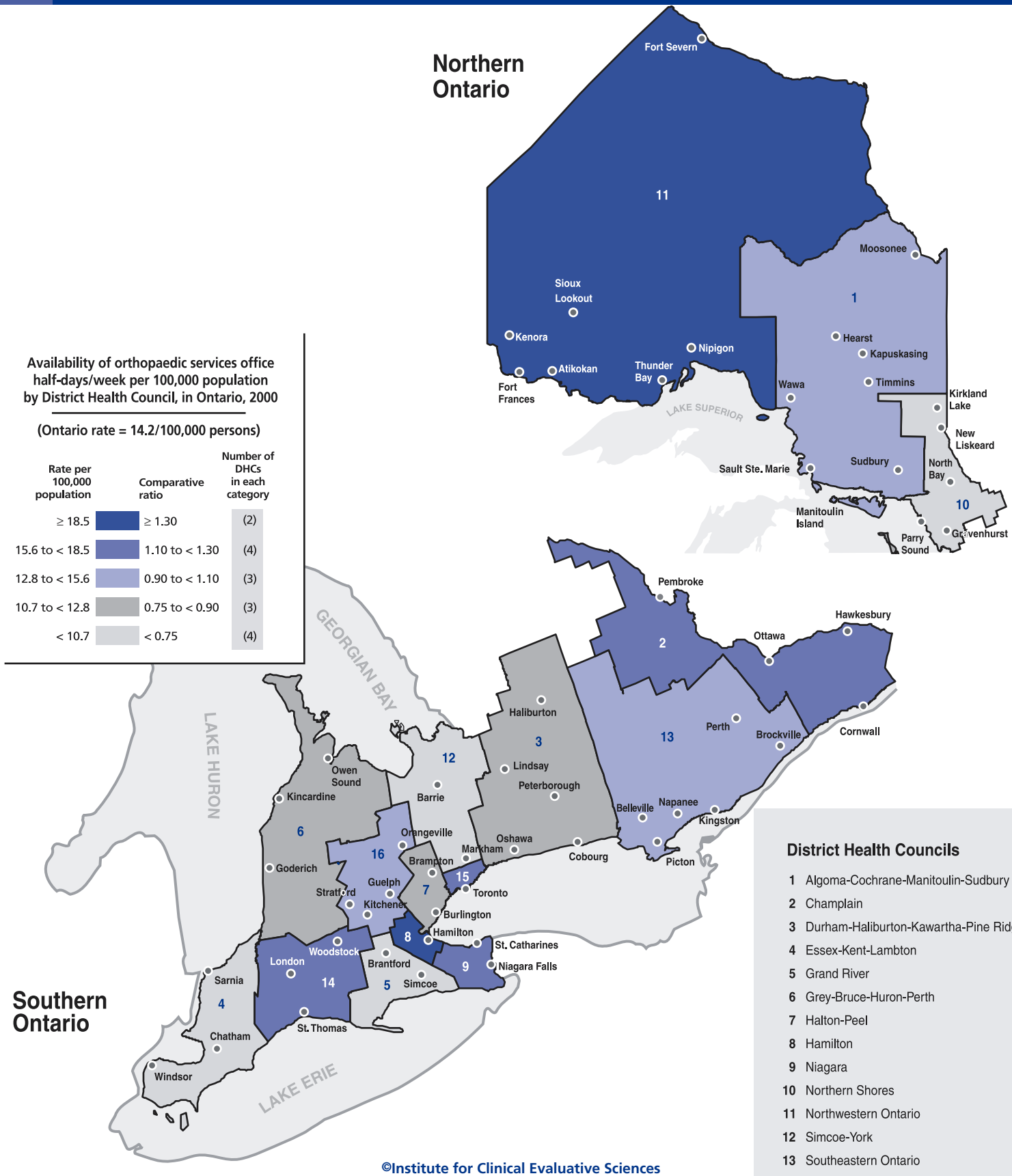
There was considerable variation among DHCs in the provision of orthopaedic services, in terms of half-days of office time (extremal quotient=2.6) (see map in Exhibit 3.7) and surgery time (extremal quotient=3.6) (see map in Exhibit 3.8). Simcoe-York had the lowest level of orthopaedic office and surgery provision, while Hamilton had the highest rate of orthopaedic office provision and Thames Valley had the highest rate of surgery provision. The number of office time half-days varied by health planning region, from approximately 9 (Central East region) to over 18 (Toronto) per week per 100,000 population. The number of surgery half-days varied from 4 (Central East region) to more than 10 (Toronto) per week per 100,000 population. As expected, health planning regions with a high number of office half-days tended to also have high numbers of surgery half-days. Total orthopaedic half-days (office and surgery) ranged from 13.5 (Central East region) to 28.8 (Toronto) (See map in Exhibit 3.9).

Health Planning Regions & District Health Councils	Half-days per Week per 100,000 Population			Half-days of Office and Surgery Time per Week per Surgeon	Change in Half-days of Office and Surgery Time per Week per 100,000 Since 1997
	Office	Surgery	Office and Surgery		
North					
Algoma-Cochrane Manitoulin-Sudbury	13.7	8.1	21.9	8.3	-5.2
Northern Shores	9.0	4.4	13.4	9.8	-0.3
Northwestern Ontario	18.7	10.7	29.4	9.2	11.4
	13.9	**7.9**	**21.9**	**8.8**	*
South West					
Essex-Kent-Lambton	10.3	7.6	17.9	8.6	-1.7
Grey-Bruce-Huron-Perth	12.5	8.3	20.9	7.8	4.2
Thames Valley	16.9	13.1	30.0	7.8	-4.5
	13.3	**9.9**	**23.2**	**8.2**	*
Central West					
Halton-Peel	11.8	4.9	16.7	8.3	1.5
Waterloo Region-Wellington-Dufferin	12.8	5.4	18.2	9.0	3.3
	12.1	**5.1**	**17.3**	**8.5**	*
Central South					
Grand River	8.4	4.3	12.7	10.0	-4.5
Hamilton	20.2	12.8	33.0	8.2	-2.2
Niagara	17.8	7.6	25.4	8.3	-5.6
	16.9	**9.2**	**26.1**	**8.4**	*
Toronto					
	18.2	**10.6**	**28.8**	**7.8**	**-4.2**
Central East					
Simcoe-York	7.9	3.6	11.5	8.6	-4.0
Durham-Haliburton-Kawartha-Pine Ridge	11.2	4.6	15.9	7.6	0.5
	9.4	**4.1**	**13.5**	**8.1**	*
East					
Champlain	16.0	7.3	23.3	7.6	-4.9
Southeastern Ontario	15.2	9.6	24.8	9.5	-5.7
	15.8	**8.0**	**23.8**	**8.2**	*
Ontario	14.2	7.8	22.0	8.2	-2.3

* Due to changes in health planning regions since 1997, direct comparisons cannot be made.

Data source: Arthritis Community Research and Evaluation Unit (ACREU) Ontario Survey of Orthopaedic Surgeons

3.7 Availability of orthopaedic services office half-days/week per 100,000 population by District Health Council, in Ontario, 2000

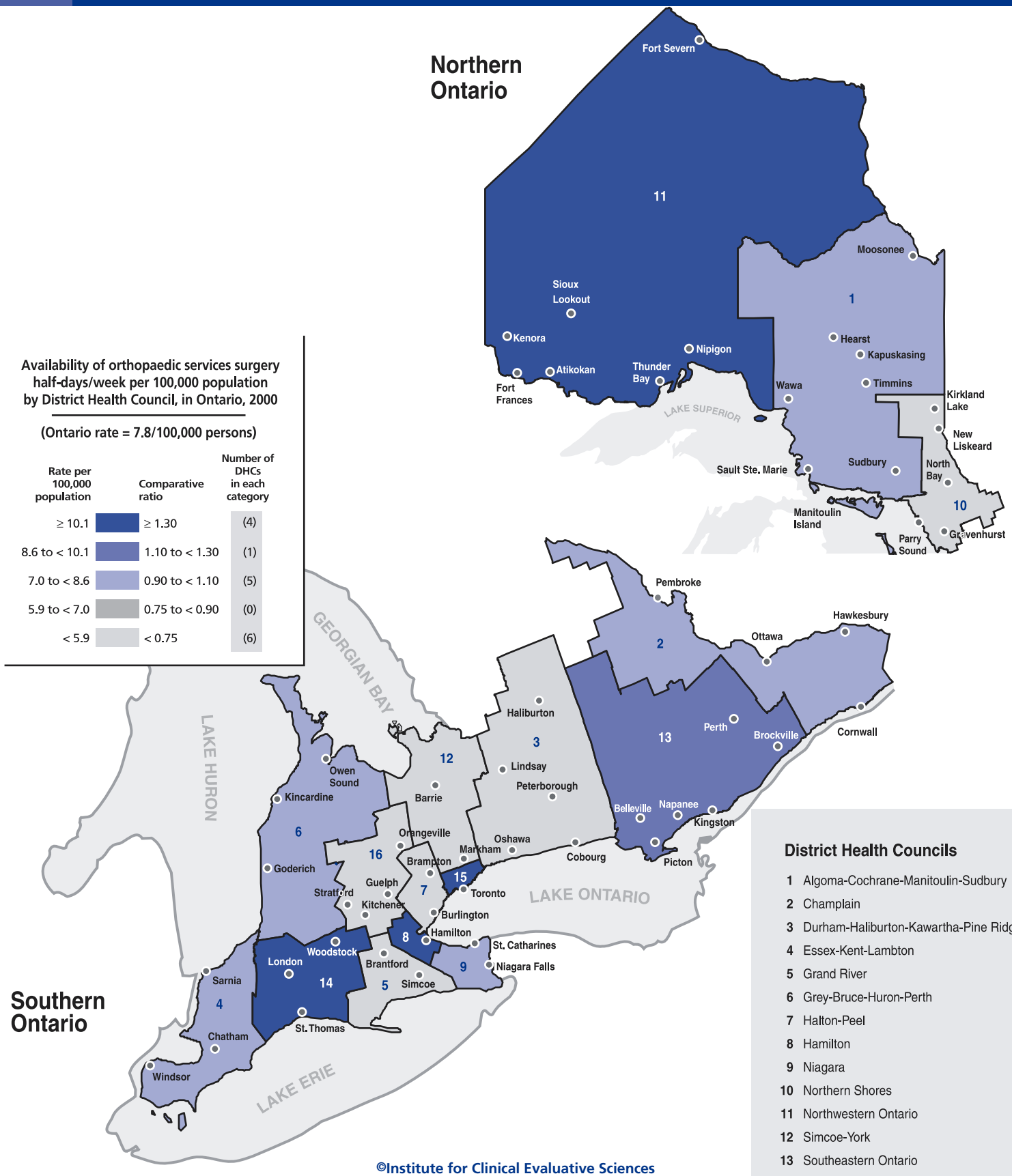


District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Data source: Arthritis Community Research and Evaluation Unit (ACREU) Ontario Survey of Orthopaedic Surgeons

3.8 Availability of orthopaedic services surgery half-days/week per 100,000 population by District Health Council, in Ontario, 2000

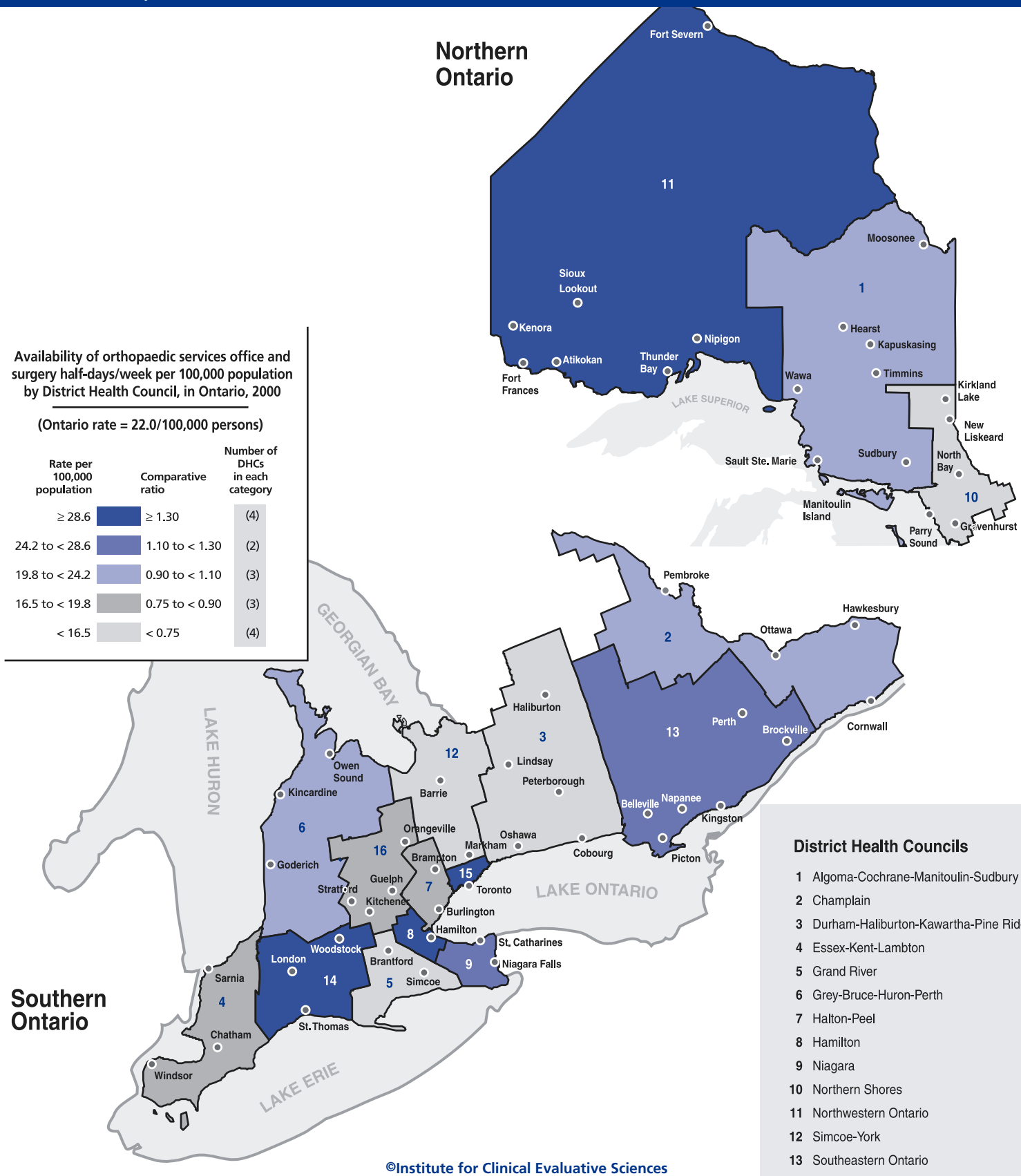


District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Data source: Arthritis Community Research and Evaluation Unit (ACREU) Ontario Survey of Orthopaedic Surgeons

3.9 Availability of orthopaedic services office and surgery half-days/week per 100,000 population by District Health Council, in Ontario, 2000



Data source: Arthritis Community Research and Evaluation Unit (ACREU) Ontario Survey of Orthopaedic Surgeons

District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Geographic variation

Allied health services

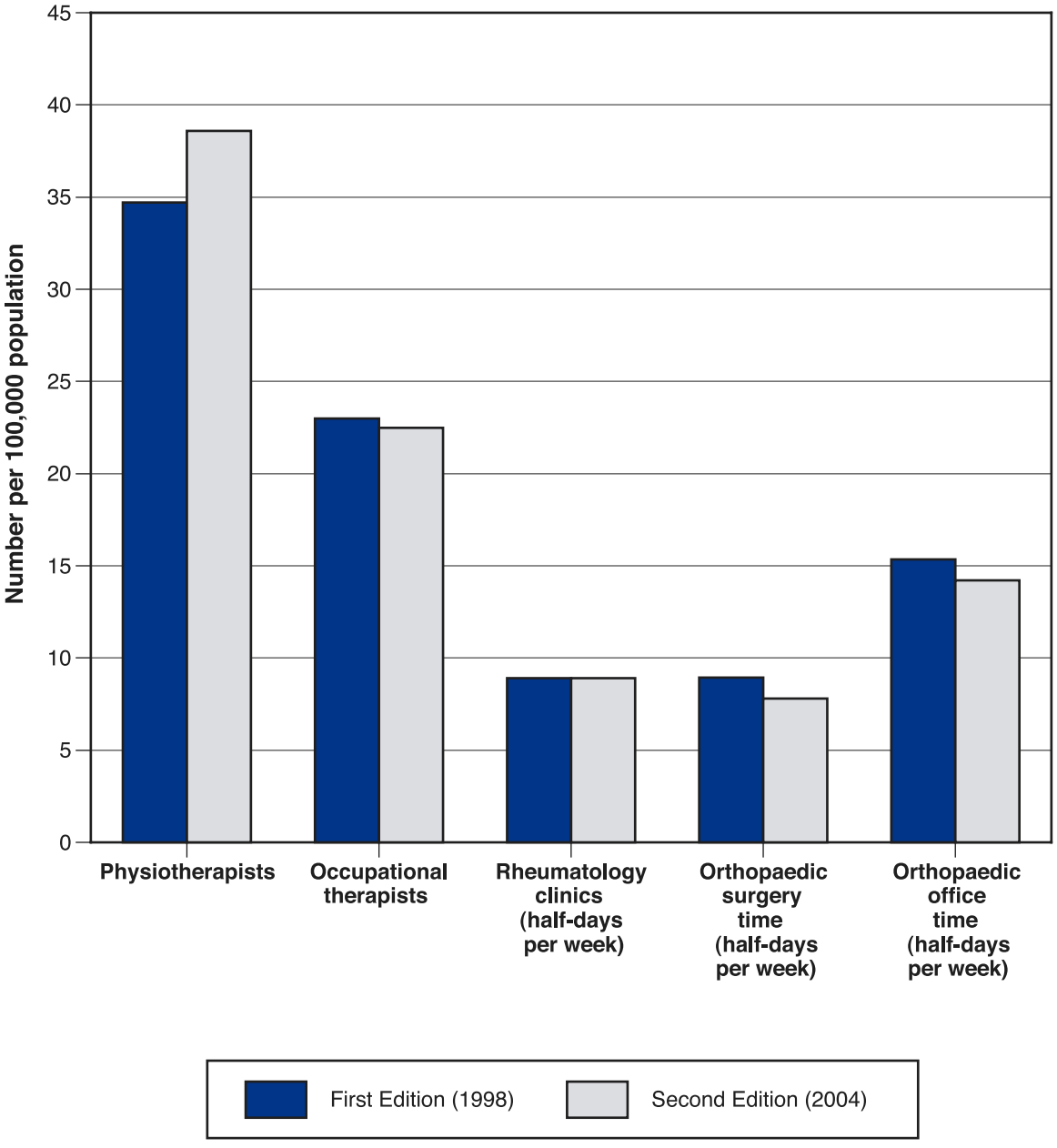
3.10 Availability of allied health professionals per 100,000 population by District Health Council, in Ontario, 2002

Health Planning Regions & District Health Councils	General Practitioners	Physiotherapists	Occupational Therapists	Arthritis Rehabilitation and Education Program Therapists (FTE)	Arthritis Rehabilitation and Education Program Clients	Chiropractors
North						
Algoma-Cochrane Manitoulin-Sudbury	81.3	36.9	17.7			16.7
Northern Shores	96.0	34.5	18.8			19.8
Northwestern Ontario	87.6	41.2	27.4			16.5
	86.7	**37.5**	**20.7**	**0.7**	**175.8**	**17.4**
South West						
Essex-Kent-Lambton	55.8	29.7	16.8			19.3
Grey-Bruce-Huron-Perth	77.7	36.6	17.6			25.1
Thames Valley	83.7	39.3	36.0			17.5
	71.0	**34.8**	**24.5**	**0.4**	**145.5**	**19.7**
Central West						
Halton-Peel	68.5	35.7	13.2			22.1*
Waterloo Region-Wellington-Dufferin	68.0	37.3	18.0			22.4
	68.3	**36.2**	**14.8**	**0.3**	**69.1**	**22.2***
Central South						
Grand River	62.0	30.0	11.4			11.8
Hamilton	84.9	41.5	35.8			16.5
Niagara	63.9	35.1	22.7			24.8
	72.6	**36.8**	**26.1**			**18.6**
Toronto						
	105.8	**36.7**	**32.8**	**0.2**	**62.4**	**21.0**
Central East						
Simcoe-York	70.1	49.2	11.6			22.3*
Durham-Haliburton-Kawartha-Pine Ridge	67.3	28.4	17.0			20.6
	69.0	**40.6**	**13.8**			**21.6***
East						
Champlain	96.7	49.4	24.3			
Southeastern Ontario	98.1	45.6	21.1			14.1
	97.2	**48.2**	**23.3**	**0.6**	**124.9**	**14.1**
Ontario	82.5	38.6	22.5	0.3	91.8	91.7

* As only combined data were provided for Halton-Peel and Simcoe-York, availability has been estimated for these DHCs on a per capita basis.

Data source: See Table 3.1 in Appendix 3.A.

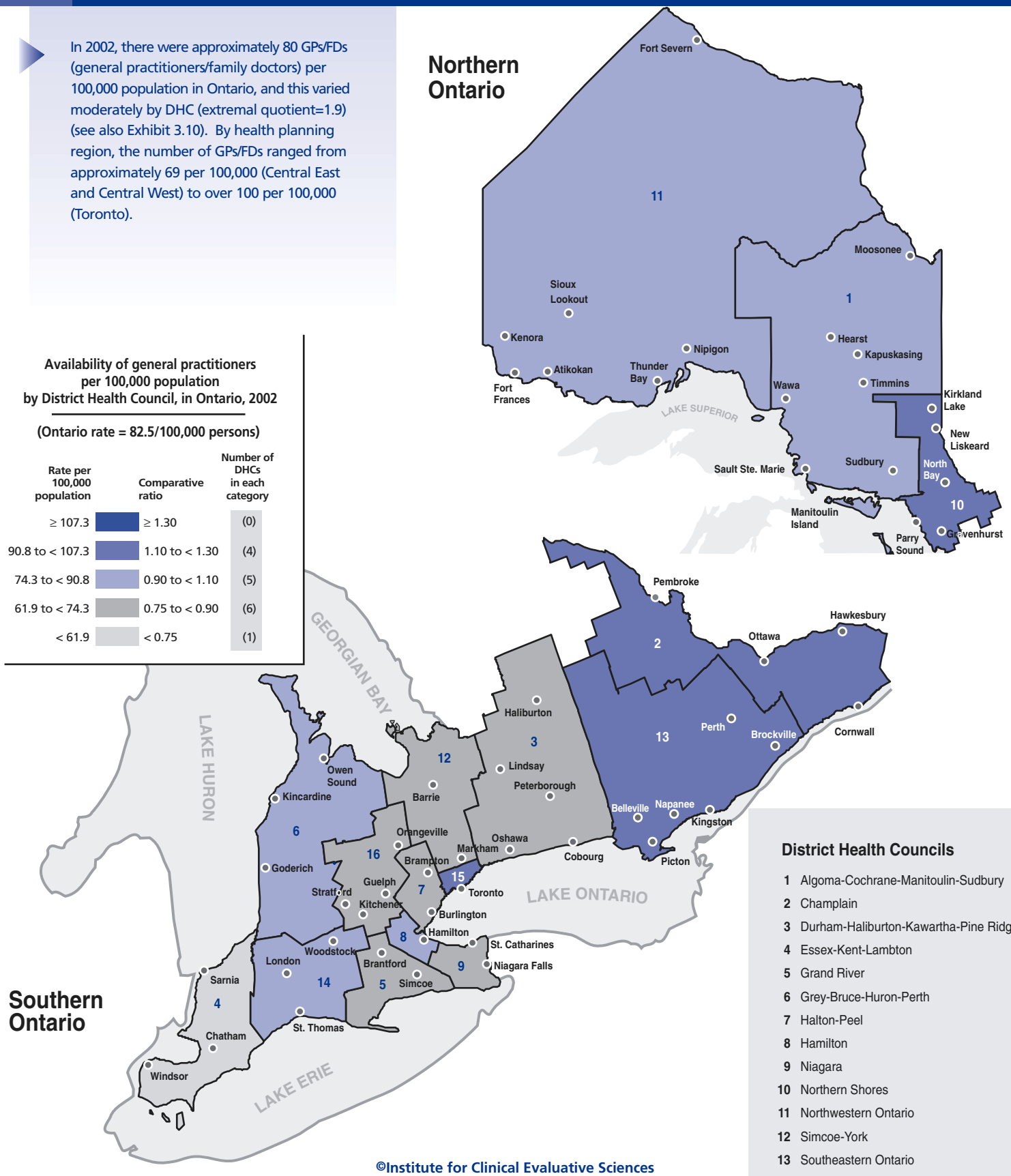
3.11 A comparison of arthritis-related health care professionals and services per 100,000 population in the 1998 and 2004 ICES research atlases on arthritis and related conditions



Data source: See Table 3.1 in Appendix 3.A.

3.12 Availability of general practitioners per 100,000 population by District Health Council, in Ontario, 2002

In 2002, there were approximately 80 GPs/FDs (general practitioners/family doctors) per 100,000 population in Ontario, and this varied moderately by DHC (extremal quotient=1.9) (see also Exhibit 3.10). By health planning region, the number of GPs/FDs ranged from approximately 69 per 100,000 (Central East and Central West) to over 100 per 100,000 (Toronto).



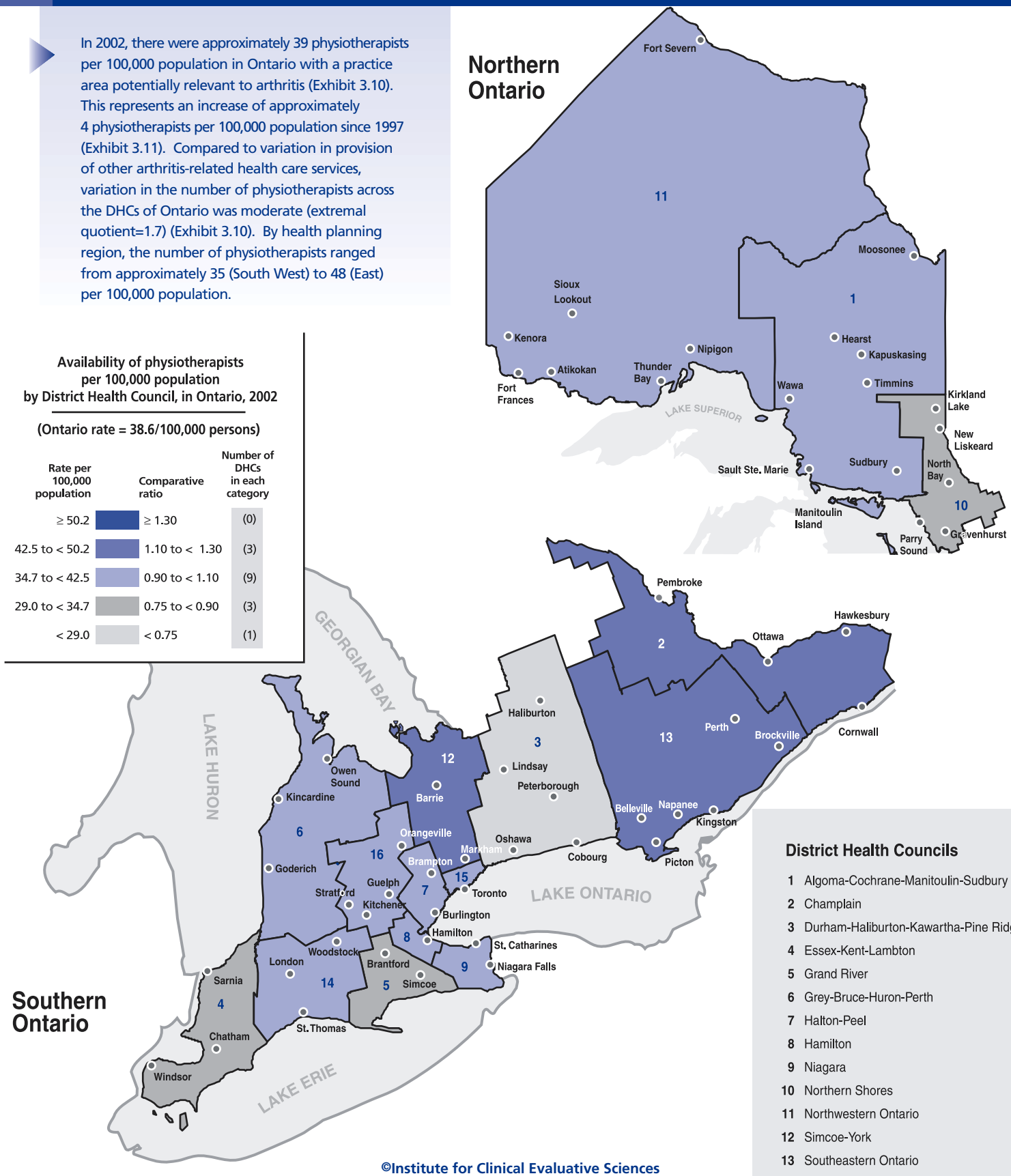
District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Data sources: Ontario Health Insurance Plan (OHIP); Corporate Provider Database

3.13 Availability of physiotherapists per 100,000 population by District Health Council, in Ontario, 2002

In 2002, there were approximately 39 physiotherapists per 100,000 population in Ontario with a practice area potentially relevant to arthritis (Exhibit 3.10). This represents an increase of approximately 4 physiotherapists per 100,000 population since 1997 (Exhibit 3.11). Compared to variation in provision of other arthritis-related health care services, variation in the number of physiotherapists across the DHCs of Ontario was moderate (extremal quotient=1.7) (Exhibit 3.10). By health planning region, the number of physiotherapists ranged from approximately 35 (South West) to 48 (East) per 100,000 population.



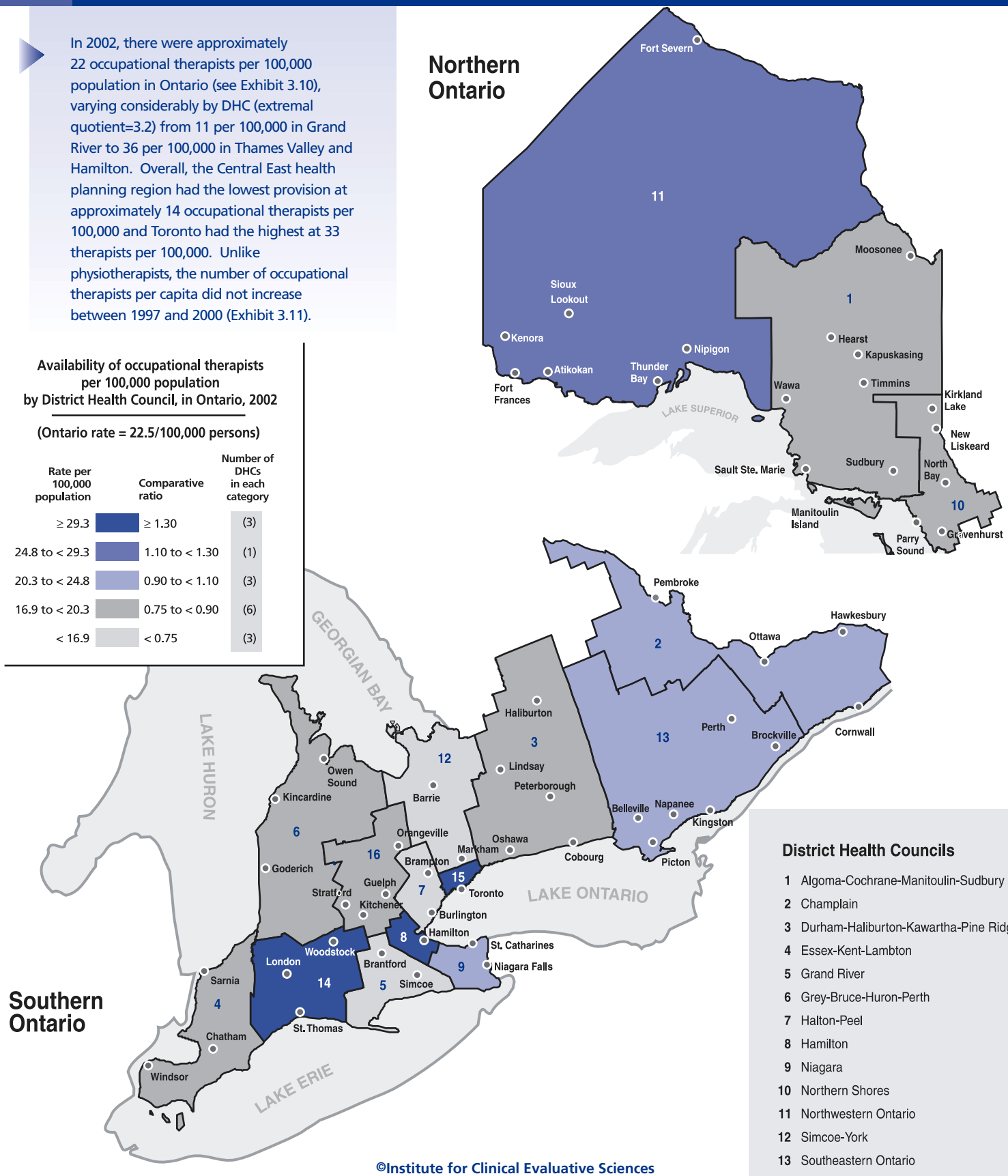
District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Data source: College of Physiotherapists of Ontario Database on Employment Information

3.14 Availability of occupational therapists per 100,000 population by District Health Council, in Ontario, 2002

In 2002, there were approximately 22 occupational therapists per 100,000 population in Ontario (see Exhibit 3.10), varying considerably by DHC (extremal quotient=3.2) from 11 per 100,000 in Grand River to 36 per 100,000 in Thames Valley and Hamilton. Overall, the Central East health planning region had the lowest provision at approximately 14 occupational therapists per 100,000 and Toronto had the highest at 33 therapists per 100,000. Unlike physiotherapists, the number of occupational therapists per capita did not increase between 1997 and 2000 (Exhibit 3.11).



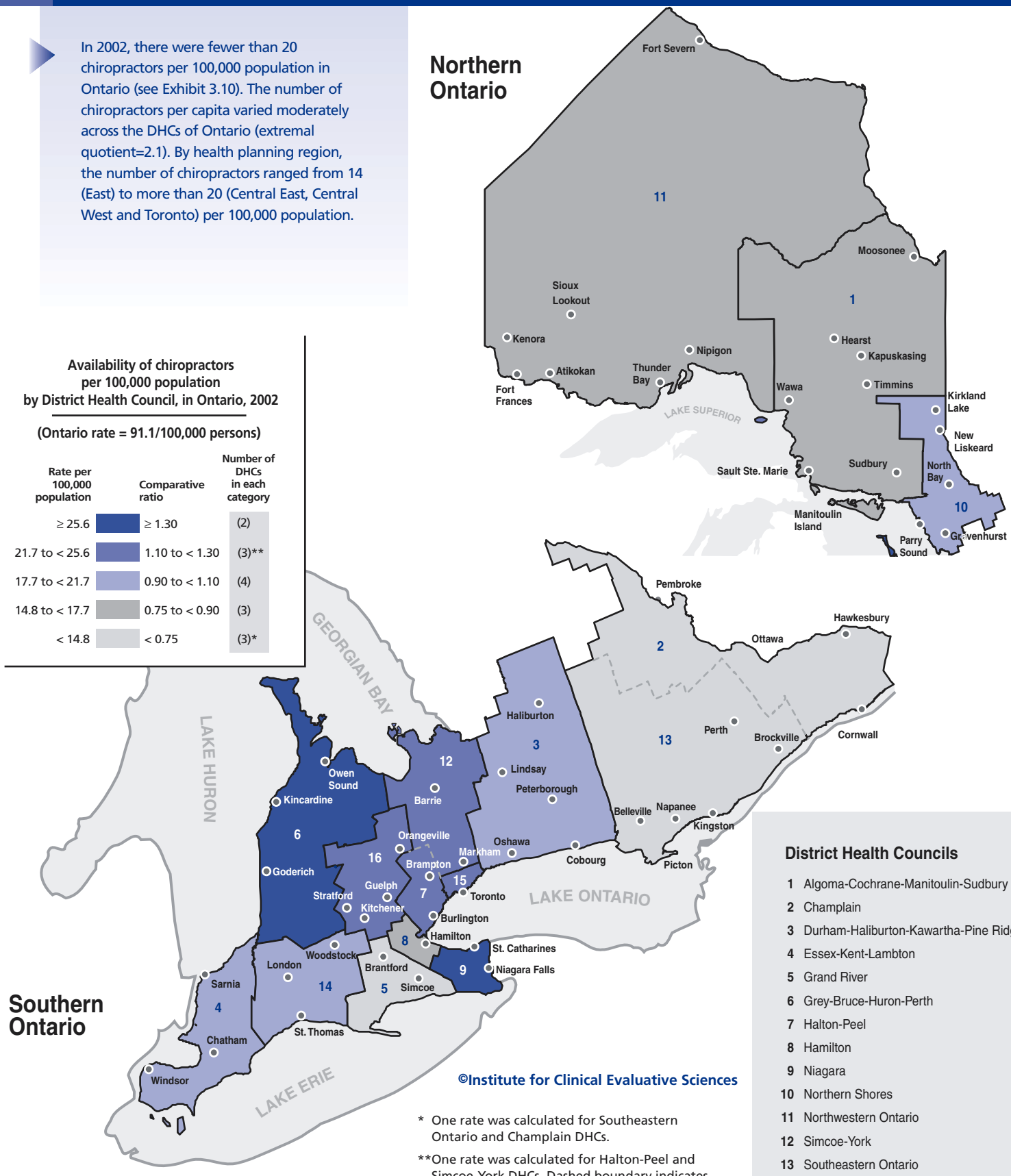
District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Data source: College of Occupational Therapists of Ontario Database Mailing List

3.15 Availability of chiropractors per 100,000 population by District Health Council, in Ontario, 2002

In 2002, there were fewer than 20 chiropractors per 100,000 population in Ontario (see Exhibit 3.10). The number of chiropractors per capita varied moderately across the DHCs of Ontario (extremal quotient=2.1). By health planning region, the number of chiropractors ranged from 14 (East) to more than 20 (Central East, Central West and Toronto) per 100,000 population.



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* One rate was calculated for Southeastern Ontario and Champlain DHCs.

**One rate was calculated for Halton-Peel and Simcoe-York DHCs. Dashed boundary indicates where joined.

District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Data source: Ontario Chiropractors Association

Arthritis rehabilitation and education program

The Arthritis Society provides consultation and rehabilitation therapy, which includes physiotherapy and occupational therapy, for people with arthritis. The number of full-time equivalent therapists per 100,000 population in Ontario in 2002 was 0.3, slightly less than the 0.4 full-time equivalents available in 1997 (see Exhibit 3.10). The number of clients served, however, has nearly doubled in number since 1997.

Service levels

Between 1997 and 2000, there has been little change in Ontario in the per capita provision of rheumatological or orthopaedic services, or in the number of arthritis-relevant health care professionals, with one exception, which is reflected in a 10% increase in the per capita number of physiotherapists. The observed increase in physiotherapists between 1997 and 2000 could be attributed to an increase in the overall number of physiotherapists or an increase in the number of physiotherapists working in areas related to arthritis. As the number of Canadians with arthritis rises, the static nature of arthritis-related health care is likely to have implications for access to health care by those with arthritis or related conditions. [21,22]

3.16 Ranking of service rates by Health Planning Region in Ontario, 2000 to 2002

Health Planning Regions	Half-day Rheumatology Clinics per Week per 100,000 Population	Average Rheumatology Wait Time for New Non-urgent Patients (wks)	Average Rheumatology Wait Time for New Likely Inflammatory Arthritis Patients (wks)	Orthopaedic Office Half-days per Week per 100,000 Population	Orthopaedic Surgery Half-days per Week per 100,000 Population	General Practitioner per 100,000 Population	Physio-therapist per 100,000 Population	Occupational Therapist per 100,000 Population	Chiropractor per 100,000 Population
North	7	7	7	4	5	3	3	5	6
South West	5	6	4	5	2	5	7	3	4
Central West	6	4	1	6	6	7	6	6	1
Central South	3	3	6	2	3	4	4	2	5
Toronto	1	1	2	1	1	1	5	1	3
Central East	4	5	3	7	7	6	2	7	2
East	2	2	5	3	4	2	1	4	7

1 (best) = highest provision or shortest wait time

1 2 3 4 5 6 7

Ranking

7 (worst) = lowest provision or longest wait time

Overall, the Toronto region had the highest levels of arthritis-related health care service and personnel. As Toronto also provides the most tertiary arthritis services in the province, it is also serving people living in areas outside of Toronto. The North, followed by the Central East and Central West regions, had the lowest levels of arthritis-related health care services and personnel. It is noteworthy that the geographical variation observed was not accounted for solely by low service provision in northern regions of Ontario.

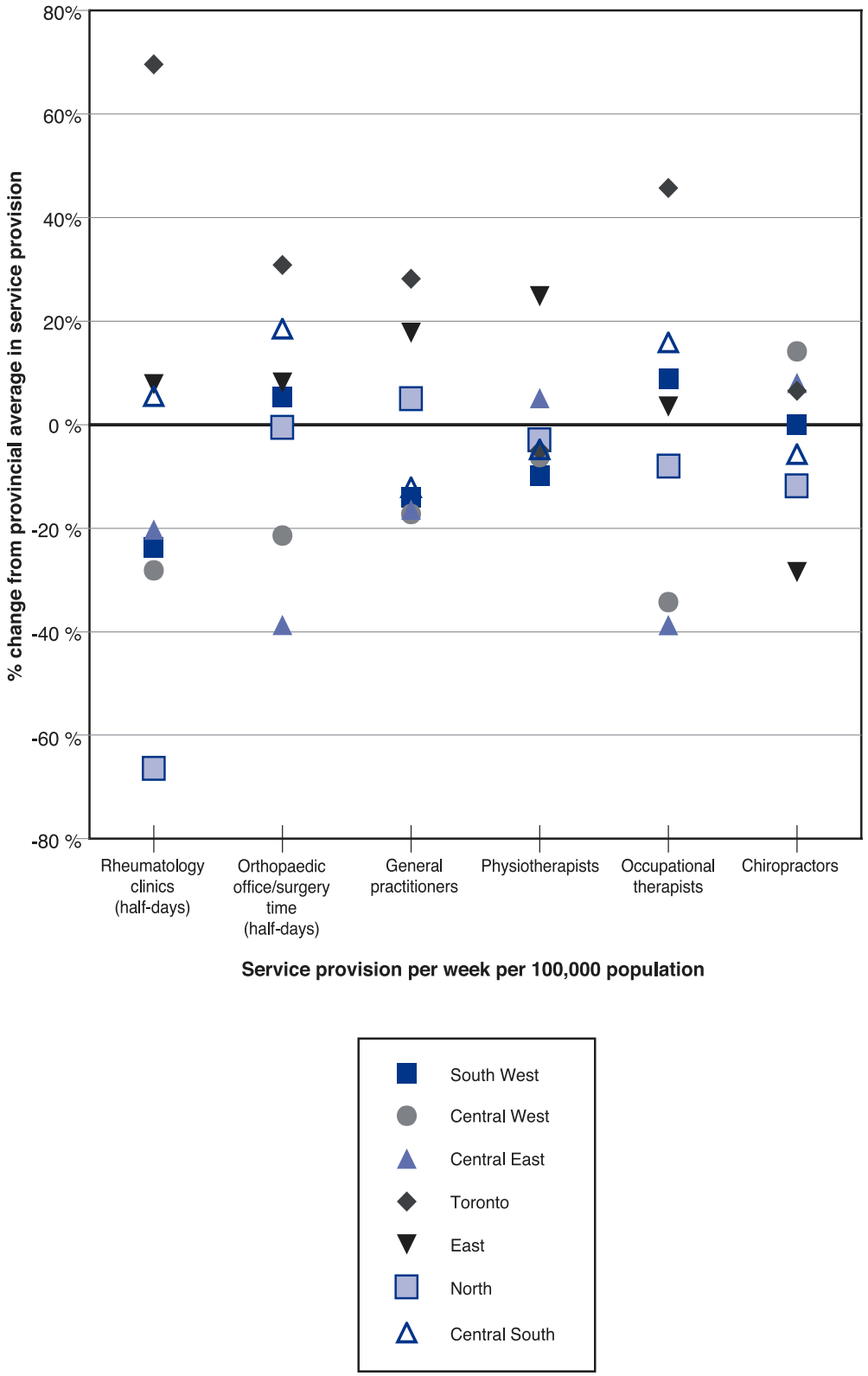
Data source: See Table 3.1 in Appendix 3.A.

3.17 Percentage deviation from provincial average in provision of arthritis-related services by Health Planning Region in Ontario, 2000

The greatest geographical variation in provision was seen for rheumatology and occupational therapy services, suggesting barriers to access in certain geographical regions. The observed inverse relationship between rheumatology service provision and wait time for non-urgent arthritis patients suggests that the level of services provided is not necessarily in accord with the level of demand and that low service provision does have adverse effects on access to care.

Interestingly, the wait times for likely inflammatory arthritis patients were considerably shorter, and varied less by region, than that for non-urgent arthritis patients, suggesting that, in general, the referral and triage systems work fairly well for urgent cases. However, the rheumatology wait times in the North Health Planning Region were much longer for all types of patients, indicating that accommodation of urgent rheumatology patients in this region is problematic.

Findings in this chapter correspond with those in Chapter 4 (Primary and Specialist Care), which observed the lowest utilization of rheumatology services in the North Health Planning Region, in keeping with low availability of rheumatologists in that region. The North region also had the highest rates of rheumatoid arthritis (RA) seen only by a primary care physician (>60% of RA patients), a finding that strongly suggests inadequate rheumatological care in that region.



Data source: See Table 3.1 in Appendix 3.A.

Barriers to provision of adequate arthritis-related care

The surveys conducted in 2000 collected data on the practice patterns of Ontario rheumatologists and orthopaedic surgeons, in addition to data on the provision of rheumatology services and orthopaedic surgery. The full results are published elsewhere but barriers to effective service are highlighted here.[12,19]

The majority of rheumatologists in Ontario reported significant barriers to providing adequate care (see Figure 3.1).

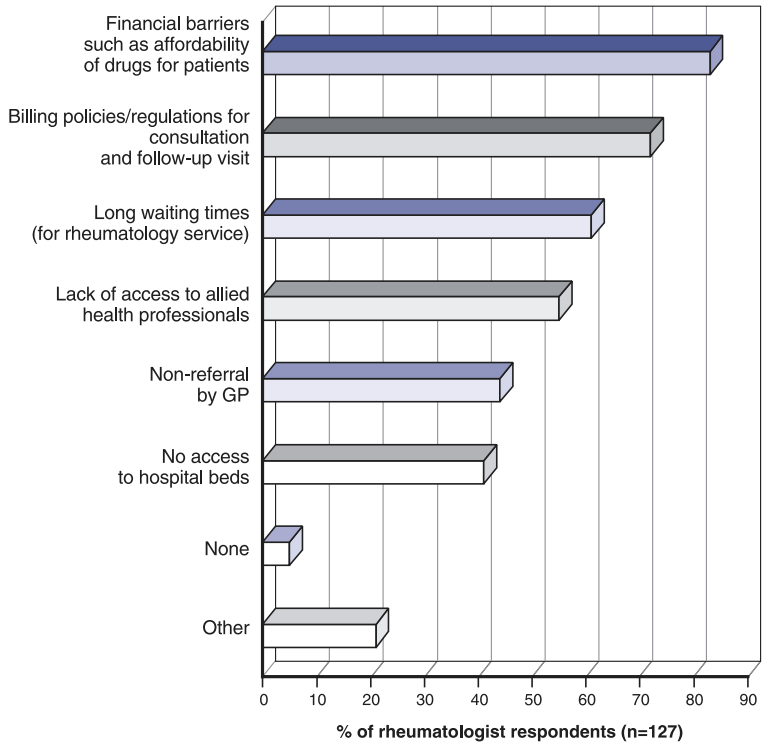
1. The most common barrier noted was **cost of drugs** for the patient. This most likely refers to drugs for inflammatory arthritis, a condition for which some of the newer drugs are very expensive and not currently on the Ontario formulary (see Chapter 5, Use of Medication).

2. The second most commonly reported barrier was **billing policies and regulations for consultation and follow-up visits**. Rheumatologic care is often longitudinal, especially for inflammatory conditions, yet Ontario's fee schedule rewards initial consultations at a much higher level than follow-up care.

3. Further, **medical assessments are poorly remunerated in comparison with procedures**. It is more difficult to generate income in specialties such as rheumatology in which the majority of care is provided through time-intensive review of patient history and physical examination. The data also suggested that many rheumatologists are increasing the amount of work they do in areas that provide additional income, such as independent medical services (e.g. third party billing for insurance companies and workers' compensation) and pharmaceutical company work.

4. **Long wait times** for patients were also frequently reported as barriers to care. Rheumatologists reporting long wait times as a barrier had significantly longer wait times for non-urgent arthritis patients than those not reporting wait time as a barrier (12 weeks vs. 4 weeks). However, the wait times for likely inflammatory arthritis patients did not differ significantly by reporting of wait time as a barrier. This supports earlier findings that, with the exception of the North Health Planning Region, most urgent rheumatology patients are accommodated.

Figure 3.1 Barriers that affect delivery of services to Ontario patients as reported by rheumatologists



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Conclusions

Concern for adequate health human resources to meet growing need

This chapter provides the most recent estimates of the variation in the provision of arthritis-relevant health care services and professionals over time and across regions. Where necessary, the number of health care professionals per capita has been used as a proxy for the provision of services provided by each type of health care professional. It must be noted, therefore, that variations in the number of hours of service provided per health care worker may occur and would explain some of the differences seen between time periods or across regions, although this is unlikely to account for the large variations seen across some regions.

The data presented in this chapter indicates that there were 1.35 rheumatologists per 100,000 population in Ontario in 2000. The Canadian Council of Academic Rheumatologists (CCAR) has stated that the current recruitment rate of rheumatologists is insufficient to maintain the current health human resources level, let alone future needs.[23] The CCAR predicts that Canada will require a rheumatology personnel increase of 64% by the year 2026, if the recently recommended target of 1.9 rheumatologists per 100,000 population is to be met.[23] Therefore, it is important to address barriers to adequate rheumatological care, which affect recruitment of rheumatologists.

The average orthopaedic surgeon in Ontario is working at near capacity, providing 8 half-days of office and surgery time per week. There is, therefore, little potential to increase orthopaedic surgery care with the current workforce and work practices. Surgery comprises only 35% of the orthopaedic surgeons' time, with the remainder spent on non-surgical management of patients.

The proportion of time spent on surgery is similar to that reported in the 1998 research atlas, and is considerably less than that recommended in a recent U.S. study.[1] Surgery rates in Ontario could theoretically increase with current health human resources, however, it is important to ensure that the non-surgical management of patients can be adequately managed by other health care professionals such as rheumatologists or primary care physicians.

It is unclear if the current balance of surgery and office time of orthopaedic surgeons is through choice, resource shortages or administrative restrictions. With the single payer health care system in Ontario, availability of resources, including operating room time and prosthetic joints, is limited by the global health care budget. Thus, individual surgeons probably have limited ability to alter the relative proportion of their workweek spent in the operating room.

In addition to the challenges already outlined, there is a chronic shortage of women in most surgical specialties and the data in this chapter indicate that orthopaedics is no different. In 1997 and 2000, female orthopaedic surgeons were greatly underrepresented at only 6% of the profession. Overall, the profession also aged significantly from a mean age of 45 years in 1997 to 49 years in 2000, and will not be able to sustain current levels of service over time.

Appendix

3.A How the research was done

Data sources

The data used in this chapter provides updates for similar figures presented in the 1998 research atlas, *Patterns of Health Care in Ontario: Arthritis & Related Conditions,* and were obtained through a variety of sources. A comparison between the two editions is shown in Table 3.1 (next page).

Rheumatologists

A survey of practising rheumatologists was carried out in 2000 to update information obtained in similar surveys completed in 1997 and 1992.[19,18,20]

Rheumatologists (212) were identified from the mailing list of the College of Physicians and Surgeons of Ontario, directory listings of the Canadian Rheumatology Association, and lists of recent graduates from rheumatology training programs across Ontario. In October 2000, these individuals were sent a self-administered and semi-structured survey containing 22 questions with a stamped, addressed return envelope. Telephone follow-up of non-responders began four weeks after the mail-out.

The questionnaire included two sections. The first section probed practice patterns (in half-days, defined as 4 hours) of clinic time provided by the rheumatologist at primary and secondary locations, and estimates of the wait time (in weeks) for new non-urgent arthritis patients and new likely inflammatory arthritis patients. The second section covered practice conditions including what barriers, if any, impede ability to practice rheumatology more effectively (see Figure 3.1).

Orthopaedic surgeons

A survey of all practising orthopaedic surgeons was carried out in 2000 and updates results from a similar survey conducted in 1997.[12,18]

Orthopaedic surgeons were identified from the mailing list of the College of Physicians and Surgeons of Ontario, directory listings of the Ontario Orthopaedic Association and graduate training programs. These individuals were sent a self-administered survey that included questions on the length (in hours) of office and surgery time provided at primary and secondary locations. The responses were used to calculate the following (per 100,000 population): half-days of office time per week, half-days of surgery time per week, half-days of office and surgery time (combined) per week. Half-days of office and surgery time (combined) per week per surgeon was also calculated. Service provision data from only those surgeons reporting at least some arthritis-related practice are represented.

Primary care physicians

The number and location of primary care physicians in Ontario in 2002 were obtained from the Institute of Clinical Evaluative Sciences physician file, which contains information primarily from billing data submitted to the Ontario Health Insurance Plan (OHIP) and the corporate provider database of the Ministry of Health and Long-Term Care (MOHLTC). Billing data from OHIP were used to identify physicians not certified as general practitioners but with a family medicine practice.

Therapists

The number and location of physiotherapists and occupational therapists practising in Ontario in 2002 were obtained through their colleges. To estimate the number of physiotherapists likely to be treating at least some patients with arthritis, a subset of therapists with this area of practice was included. For the occupational therapists, only therapists reporting at least some patient contact were included.

Arthritis rehabilitation and education program

Data on clients, physiotherapists and occupational therapists of the Arthritis Rehabilitation and Education Program (formerly the Consultation and Rehabilitation Service) of The Arthritis Society have been presented because these services represent a unique type of care specializing in patients with arthritis. These therapists are also members of their respective colleges and, therefore, the figures do not represent services additional to those reported for physiotherapists and occupational therapists. The provision of services by the Arthritis Rehabilitation and Education Program in 2002 was reported in terms of full-time equivalents (FTEs), assuming one FTE represented a 7-hour workday, 5-day week and 48-week year. Data were provided for the health planning regions, but not the District Health Councils (DHCs) in Ontario.

Chiropractors

The number of chiropractors practising in Ontario in 2002 was obtained from the Ontario Chiropractors Association (OCA), which represents approximately 80% of chiropractors practising in Ontario. Detailed data on the location of non-OCA members were not available.

Table 3.1 Data sources for arthritis-related health care services in Ontario, 2000 to 2003

	2004 Report			
Health Care Professional	Data Source	Criteria for Inclusion	Date	Comparable with 1998 Report
Rheumatologists	Arthritis Community Research and Evaluation Unit (ACREU); Ontario Survey of Rheumatologists; College of Physicians and Surgeons of Ontario, Canadian Rheumatology Association, and rheumatology training programs	Reported clinical practice	2000	Yes
Orthopaedic surgeons	Arthritis Community Research and Evaluation Unit (ACREU); Ontario Survey of Orthopaedic Surgeons; College of Physicians and Surgeons of Ontario, Canadian Orthopaedic Association, and orthopaedic training programs	Reported clinical practice	2000	Yes
General practitioners	Administrative data from the Ontario Health Insurance Plan (OHIP) and the Corporate Provider Database (CPDB)	Submitting billing claims to OHIP	2002	No
Physiotherapists	College of Physiotherapists of Ontario Database on Employment Information	Therapists who worked in general practice, gerontology, hand injuries, hydrotherapy, orthopaedics, pain management, prevention/health promotion, rheumatology, sports medicine and pediatric assessment	2002	Yes
Occupational therapists	College of Occupational Therapists of Ontario Mailing List	Therapists who reported some direct/indirect patient care	2002	Yes
Therapists—Arthritis Rehabilitation and Education Program (formerly the Consultation and Rehabilitation Service)	The Arthritis Society, Arthritis Rehabilitation and Education Program Staff List	All therapists included	2002	Yes
Clients—Arthritis Rehabilitation and Education Program (formerly the Consultation and Rehabilitation Service)	The Arthritis Society, Arthritis Rehabilitation and Education Program Database	All reported client care	2002	No
Chiropractors	Ontario Chiropractors Association	Ontario Chiropractors Association members only	2002	No

Analyses

To determine the availability of health care professionals per capita, the numbers of professionals per 100,000 population were calculated. Population data were obtained from Statistics Canada census data; intercensal estimates based on 1996 and 2001 census data were used.

The service provision in each of the 16 DHCs of Ontario is presented where possible. Data are also presented for the DHCs grouped into seven MOHLTC planning regions. Direct comparisons with the data from 1997 cannot be made by health planning region, as they have changed since the 1998 research atlas. The degree of variation in the examined rates by DHC is quantified using the extremal quotient (ratio of the highest to the lowest rate). Data by DHC is also presented using maps based on comparative ratios (ratio of the DHC rate to the overall Ontario rate).

The geographical location of the therapists, chiropractors and primary care physicians was determined by the location of the office/practice and does not necessarily reflect the catchment area of the practice.

References

1. Lee PP, Jackson CA, Relles DA. Demand-based assessment of workforce requirements for orthopaedic services. *J Bone Joint Surg Am* 1998; 80:313–326.

2. Badley EM. The impact of disabling arthritis. *Arthritis Care Res* 1995; 8:221–228.

3. Badley EM. The effect of osteoarthritis on disability and health care use in Canada. *J Rheumatol Suppl* 1995; 43:19–22.

4. Verbrugge LM, Lepkowski JM, Konkol LL. Levels of disability among U.S. adults with arthritis. *J Gerontol* 1991; 46:S71–S83.

5. Badley EM. The provision of rheumatologic services. In: Klippel JH, Dieppe P, editors. Rheumatology, 2nd ed., Vol. 1. London: Mosby; 1998. 2.1–2.8.

6. Badley EM, Tennant A. Impact of disablement due to rheumatic disorders in a British population: estimates of severity and prevalence from the Calderdale Rheumatic Disablement Survey. *Ann Rheum Dis* 1993; 52:6–13.

7. Glazier R. Managing early presentation of rheumatoid arthritis. Systematic overview. *Can Fam Physician* 1996; 42:913–922.

8. Binder AI. Current management of rheumatoid arthritis. *Br J Hosp Med* 1992; 48:106–114.

9. Ward MM. Rheumatology visit frequency and changes in functional disability and pain in patients with rheumatoid arthritis. *J Rheumatol* 1997; 24:35–42.

10. Yelin EH, Such CL, Criswell LA et al. Outcomes for persons with rheumatoid arthritis with a rheumatologist versus a non-rheumatologist as the main physician for this condition. *Med Care* 1998; 36:513–522.

11. Criswell LA, Such CL, Neuhaus JM et al. Variation among rheumatologists in clinical outcomes and frequency of office visits for rheumatoid arthritis. *J Rheumatol* 1997; 24:1266–1271.

12. Shipton D, Badley EM, and Mahomed NN. Critical shortage of orthopaedic services in Ontario, Canada. *J Bone Joint Surg Am* 2003; Sept; 85-A(9):1710–5.

13. Recommendations for the medical management of osteoarthritis of the hip and knee: 2000 update. American College of Rheumatology Subcommittee on Osteoarthritis Guidelines. *Arthritis Rheum* 2000; 43:1905–1915.

14. Doherty M, Dougados M. Evidence-based management of osteoarthritis: practical issues relating to the data. *Best Pract Res Clin Rheumatol* 2001; 15: 517–525.

15. O'Reilly S, Doherty M. Lifestyle changes in the management of osteoarthritis. *Best Pract Res Clin Rheumatol* 2001; 15:559–568.

16. Pendleton A, Arden N, Dougados M et al. EULAR recommendations for the management of knee osteoarthritis: report of a task force of the Standing Committee for International Clinical Studies Including Therapeutic Trials (ESCISIT). *Ann Rheum Dis* 2000; 59:936–944.

17. Felson DT, Lawrence RC, Hochberg MC et al. Osteoarthritis: new insights. Part 2: treatment approaches. *Ann Intern Med* 2000; 133:726–737.

18. Badley EM, Rothman L, Stephens MR et al. Availability of services for people with arthritis. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis & related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 35–62.

19. Shipton D, Badley EM, Bookman AA et al. Barriers to providing adequate rheumatology care: implications from a survey of rheumatologists in Ontario, Canada. *J Rheumatol* 2002; 29:2420–2425.

20. Hawker GA, Badley EM. The provision of specialist rheumatology care: implications from a survey of rheumatologists in Ontario, Canada. *J Rheumatol* 1995; 22:959–966.

21. Badley EM, Wang PP. Arthritis and the aging population: projections of arthritis prevalence in Canada 1991 to 2031. *J Rheumatol* 1998; 25:138–144.

22. Lagace C and Perruccio A, DesMeules M, Badley EM. The impact of arthritis on Canadians. In: Badley EM, DesMeules M, editors. Arthritis in Canada: an ongoing challenge. Ottawa: Health Canada; 2003.

23. Hanly JG. Manpower in Canadian academic rheumatology units: current status and future trends. *J Rheumatol* 2001; 28:1944–1951.

INSIDE

4

Chapter

Primary and Specialist Care

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Key Messages

- Almost one-quarter of Ontario's population 15 years of age and older saw a physician for a musculoskeletal condition in 2000/01 and more than one in eight had a visit for an arthritis and related condition. The burden on Ontario's ambulatory health care system is expected to increase with the aging of the population.
- The majority of 2.8 million visits for arthritis and related conditions in 2000/01 were to primary care physicians, with more than 80% of those with arthritis visits seeing a primary care physician at least once. These findings highlight the central role of Ontario's primary care physicians in the management of arthritis and related conditions. However, concerns about sub-optimal primary care arthritis management point to a need for new and concerted efforts for improvement.
- One-third of those with a physician visit for an arthritis and related condition saw a specialist. Among specialists, orthopaedic surgeons were the most frequently seen, followed by rheumatologists. There was significant regional variation in arthritis specialty care, with differences three-fold and higher for rheumatology, internal medicine and orthopaedic surgery.
- Contrary to current clinical guidelines, which state that rheumatoid arthritis (RA) should be treated by a rheumatologist, only one-third of Ontarians with a physician visit for RA saw a rheumatologist. The lowest rheumatology visit rates were found in the northern District Health Councils (DHCs) of Algoma-Cochrane-Manitoulin-Sudbury and Northern Shores, although there were also lower than average rates in southern Ontario. These findings indicate serious under-utilization and most likely inadequate care for RA in these regions. Initiatives are needed to enhance access to specialty care and ensure equity in its delivery across the province.

Introduction

The primary focus of this chapter is the subset of musculoskeletal patients with at least one arthritis related ambulatory encounter. In particular, the ambulatory physician visits by adults for arthritis and related conditions were examined including the pattern of visits by specific condition, age and sex, and medical specialty, across Ontario regions and over time. This research extends the work published in the 1998 research atlas, *Patterns of Health Care in Ontario: Arthritis and Related Conditions,* using data from the Ontario Health Insurance Program database to include visits to medical and surgical specialists, with particular emphasis on rheumatologists, general internists and orthopaedic surgeons. Data are presented for arthritis and related conditions overall, and in more detail, for rheumatoid arthritis (RA) and osteoarthritis (OA).

This chapter marks the first time that regional variation and trends over time for ambulatory care of arthritis and related conditions in Ontario have been examined. The percentage of individuals in each Ontario District Health Council (DHC) with visits for RA, OA and all arthritis and related conditions as a group that saw a primary care physician, rheumatologist, internist and orthopaedic surgeon are also presented. Trends are examined for all of Ontario from 1992/93 to 2000/01.

Background

This chapter builds on and extends the findings from The Role of Primary Care Physicians in Treating Arthritis[1] in the 1998 edition of *Patterns of Health Care in Ontario: Arthritis and Related Conditions*. In that chapter, the large impact of arthritis and musculoskeletal (MSK) disorders on the general population and in primary care, and the large increase in arthritis and arthritis disability expected as the population ages, were noted.[2,3,4] Despite a heavy impact in primary care, medical schools and postgraduate training programs provided little and uneven training for MSK conditions. Individuals with arthritis made more frequent use of primary care physician services than expected, independent of age, sex and socio-economic status. In 1996, visits to Ontario primary care physicians for MSK disorders ranked second in frequency out of 18 diagnostic categories, with only visits for respiratory system disorders being more frequent. Among specific diagnoses, MSK signs and symptoms not yet diagnosed ranked 7th, while OA ranked 14th in the number of individuals visiting a primary care physician.

The results of a 1993 survey of Ontario primary care physicians showed low rates of referral to medical and non-medical specialists for RA, especially early in its presentation, preference for the use of non-steroidal anti-inflammatory drugs over exercise and physical therapy for OA, and low confidence in performing a comprehensive MSK exam. More than half of respondents reported access barriers to obtaining timely consultations with physiotherapists, occupational therapists, social workers, rheumatologists, orthopaedic surgeons and rehabilitation medicine specialists. The policy implications of those findings included the need to improve primary care training in MSK management and to expand access to MSK specialty care in Ontario.

Specialist care for people with arthritis is usually indicated for inflammatory conditions, situations where the diagnosis or treatment approach are in doubt, and conditions that are unresponsive to first line therapy. Appropriate use of disease-modifying anti-rheumatic drugs (DMARDs) for RA is key to controlling RA.[5–7] While DMARDs are most often initiated and monitored by rheumatologists, lack of referral and late referral to rheumatologists for RA appears to be frequent in Ontario.[1] Rheumatologists are also consulted for a wide variety of other arthritis and related conditions. General internists sometimes serve in the role of consultant for arthritis management, especially in settings where rheumatologists are not available or among internists who have developed special expertise in arthritis care. Orthopaedic surgery, indicated for joint replacement therapy when symptoms and/or disability cannot be controlled medically, is highly effective in restoring function and reducing pain. Orthopaedic surgeons, however, also deal with a wide variety of MSK conditions. The extent to which rheumatologists, general internists and orthopaedic surgeons provide care for people with arthritis and related conditions has not previously been examined in Ontario, nor has area variation in this care.

Ambulatory physician claims have not been frequently used in Canadian health services research based on concerns about completeness and accuracy. In the 1998 atlas, population prevalence rates for RA, OA and ankylosing spondylitis were found to closely match the epidemiological prevalence of these conditions. Age distributions and male to female ratios for different conditions closely matched the patterns that were expected. Although MSK diagnostic codes have not been fully validated, they are the codes used by Ontario physicians on reimbursement claims and do appear to agree with expected population prevalence of these conditions. While more validation work is needed, ambulatory claims are likely to be useful for planning and policy purposes.

To determine the pattern of physician visits of patients with arthritis and related conditions, the following indicators were used.

Key measures

- Population visit rates for each musculoskeletal diagnosis
- Percentage of individuals that saw physicians of different specialties, for each arthritis and related condition
- Percentage according to age/sex that saw orthopaedic surgeons, rheumatologists and internists for arthritis and related conditions, OA, and RA
- Breakdowns of specialist visits by DHC
- Person visit rates for fiscal years 1992/93 to 1999/00

Findings and Discussion

Physician visits for musculoskeletal conditions

4.1 Ambulatory visits to all physicians for musculoskeletal disorders in Ontario, 2000/01

Condition	Persons Visiting Physicians per 1,000 Population									
	Age Group				Sex					
	All Ages 15+	15-44	45-64	65+	Men	Women	Number of Persons (thousands)	Number of Visits (thousands)	Mean Number of Visits per Person	Ratio #Women: #Men
Osteoarthritis	56.6	14.6	77.1	170.5	43.6	69.0	533	1073	2.0	1.7
Synovitis	41.9	32.5	56.9	48.1	37.9	45.7	394	615	1.6	1.3
Other MSK disorders	26.5	21.2	34.2	31.5	22.1	30.6	249	412	1.7	1.5
Joint derangement, Dupuytren's contracture	14.1	12.1	17.3	15.4	14.4	13.8	133	214	1.6	1.0
Fibrositis	8.7	6.5	12.6	9.5	5.8	11.5	82	144	1.8	2.1
Rheumatoid arthritis	8.5	3.4	12.2	20.2	5.4	11.4	80	228	2.9	2.2
Gout	5.0	2.0	7.4	11.3	7.9	2.2	47	71	1.5	0.3
Connective tissue disorders	1.8	1.1	2.3	3.3	0.8	2.8	17	38	2.3	3.6
Traumatic arthritis, pyogenic arthritis	1.7	1.1	2.3	3.0	1.6	1.8	16	28	1.7	1.2
Ankylosing spondylitis	0.9	0.8	1.2	1.0	1.0	0.8	9	16	1.8	0.9
Arthritis and related conditions	**137.1**	**82.8**	**180.6**	**253.6**	**118.4**	**155.0**	**1290**	**2839**	**2.2**	**1.4**
Signs and symptoms not yet diagnosed	84.3	69.6	101.7	105.4	74.0	94.1	793	1365	1.7	1.3
Spine disorders	59.9	48.8	74.8	72.4	56.9	62.7	563	1090	1.9	1.2
Bone disorders	17.2	3.9	25.9	48.9	5.1	28.7	161	241	1.5	5.9
MSK disorders	**239.1**	**171.8**	**300.5**	**369.4**	**208.6**	**268.2**	**2249**	**5535**	**2.5**	**1.4**

In 2000/01, there were over 5.5 million physician visits for musculoskeletal (MSK) conditions in Ontario including 2.8 million visits for arthritis and related (A&R) conditions made by those aged 15 years and older. This translates to 8.4% of all adult ambulatory physician visits in Ontario being attributed to MSK conditions and 4.3% attributed to A&R conditions, specifically.

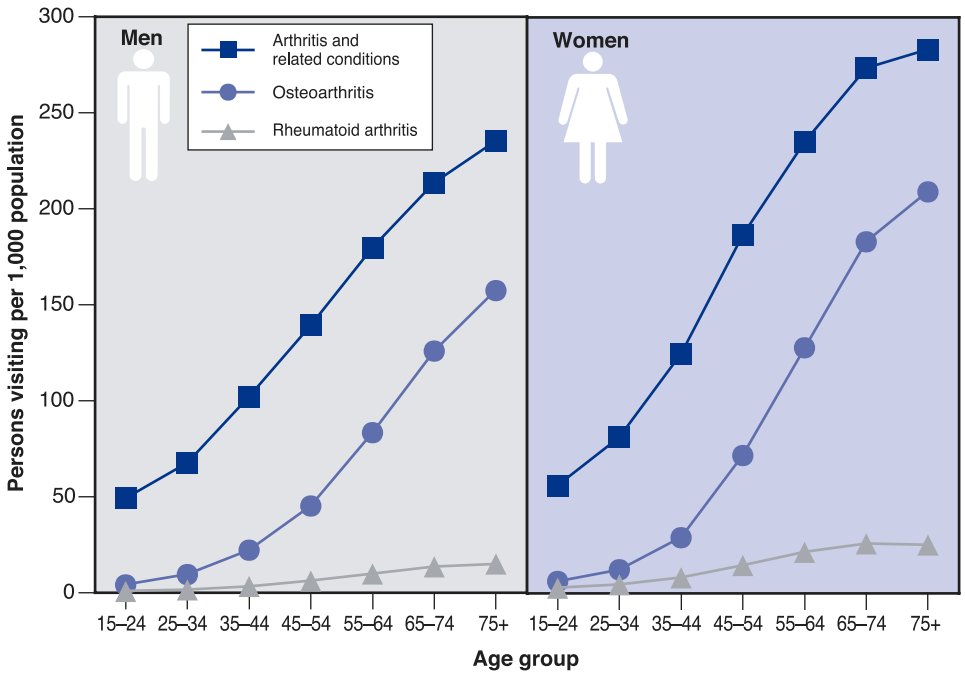
Out of every 1,000 Ontarians over age 15 years, 239 made at least one visit to a physician for an MSK condition and 137 consulted a physician for an A&R condition. Person visit rates for MSK and A&R conditions increased with age and were higher in women than men, with 1.4 times as many women making visits as men, for both condition groupings. The mean number of visits for all MSK and all A&R conditions were 2.5 and 2.2 visits per person, respectively. Mean visits were highest for inflammatory forms of arthritis, including rheumatoid arthritis (RA) and connective tissue disorders, at 2.9 and 2.3 visits per person, respectively.

The majority of MSK visits were coded as "signs and symptoms not yet diagnosed". In the Ontario Health Insurance Plan (OHIP), this code is described as including leg cramps, leg pain, muscle pain, joint pain, arthralgia, joint swelling or masses. Out of every 1,000 adult Ontarians, 84 made at least one physician visit for which the diagnostic code corresponding to these symptoms was entered on the physician claim. Osteoarthritis (OA) was the most common A&R condition diagnosis, with 57 in every 1,000 persons aged 15+ years consulting a physician for this condition. Synovitis (inflammation of a joint-lining membrane) and other MSK disorders were the second and third most common A&R condition diagnoses, with 42 and 27 in every 1,000 persons making at least one physician visit for these conditions, respectively.

Data sources: Ontario Health Insurance Plan; Registered Persons Database

4.2 Number of men and women per 1,000 population visiting all physicians for arthritis and related conditions, for osteoarthritis, and rheumatoid arthritis, in Ontario, 2000/01

For each of the three condition groupings, person visit rates were higher for women than men in every age group. Rates for men grew with increasing age, as did those for women, with the exception of RA, where a slight decrease was seen for women in the highest age group.



Data sources: Ontario Health Insurance Plan; Registered Persons Database

4.3 Distribution of patients with visits for arthritis and related conditions by type of physician consulted, in Ontario, 2000/01

Overall, 81.3% of Ontarians who made a physician visit for any type of A&R condition in 2000/01 saw a primary care physician at least once; 19.3% saw a surgical specialist; and 15.5% saw a medical specialist at least once. (Some row percentages add to greater than 100% as it is possible for an individual to visit more than one type of physician for arthritis in a year.) Orthopaedic surgeons were the most commonly consulted type of specialist, particularly for joint derangement and Dupuytren's contracture, and also for OA. Individuals with visits for RA, connective tissue disorders and ankylosing spondylitis saw medical specialists in higher percentages than those consulting for other types of A&R conditions, and were less likely to see primary care physicians. Of patients with visits for RA, 33.1% saw a rheumatologist and 6.4% saw an internist at least once.

	Type of Physician							
				Medical Specialists			Surgical Specialists	
Condition	All Physicians (n)	Primary Care (%)	All Specialists (%)	All (%)	Rheumatologists (%)	Internists (%)	All (%)	Orthopaedic Surgeons (%)
Osteoarthritis	532,617	84.5	25.0	10.8	6.1	2.3	15.9	15.0
Synovitis	393,953	80.8	23.9	8.2	4.2	1.4	16.0	10.6
Other MSK disorders	248,921	67.4	37.2	21.9	6.5	1.8	17.2	9.4
Joint derangement, Dupuytren's contracture	132,502	49.2	53.7	3.7	0.8	0.6	50.2	45.0
Fibrositis	81,820	77.6	25.5	22.5	15.2	3.0	3.1	1.5
Rheumatoid arthritis	79,792	70.9	44.3	41.5	33.1	6.4	5.0	3.4
Gout	46,882	91.9	11.4	9.9	6.2	2.3	1.6	0.6
Connective tissue disorders	16,920	31.6	74.4	71.3	56.4	9.8	3.9	0.2
Traumatic arthritis, pyogenic arthritis	16,296	68.6	31.9	17.2	5.0	6.0	15.1	13.6
Ankylosing spondylitis	8,595	33.2	70.5	57.9	49.8	4.8	12.8	10.5
Arthritis and related conditions	**1,290,059**	**81.3**	**32.4**	**15.5**	**8.4**	**2.5**	**19.3**	**15.2**

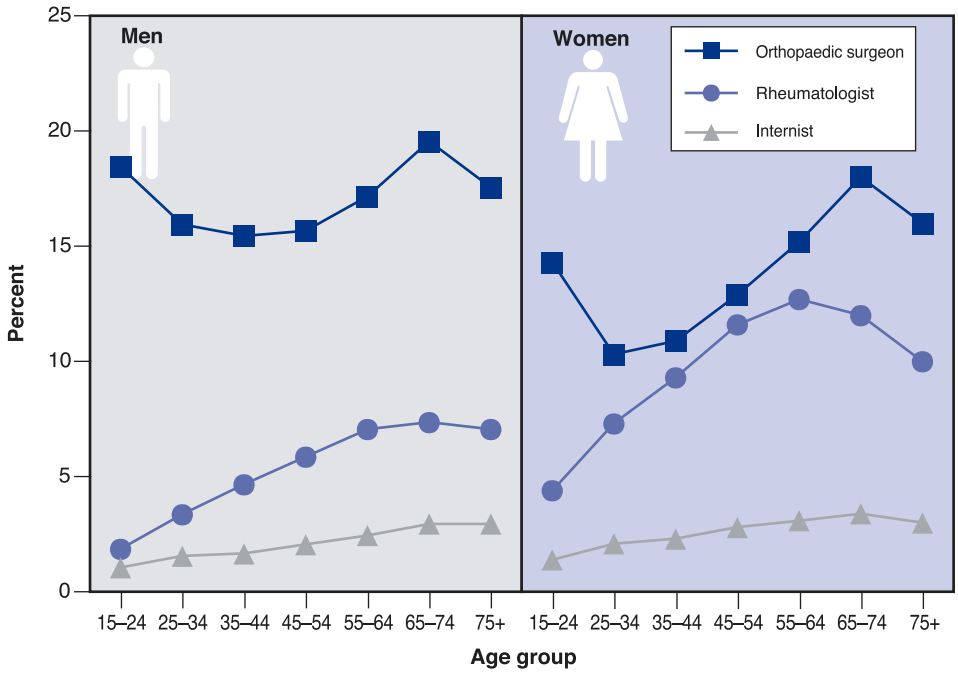
NB: Row percentages do not add to 100% because an individual can visit more than one type of physician in a year.

Data sources: Ontario Health Insurance Plan; Registered Persons Database; Corporate Provider Database

4.4 Percentage of men and women that consulted a specialist for arthritis and related conditions at least once, in Ontario, 2000/01

Types of specialists consulted for A&R conditions were observed to vary by patient gender. For example, men with A&R visits saw orthopaedic surgeons in higher percentages than women in every age group. Women with these conditions saw rheumatologists and internists in higher percentages than men.

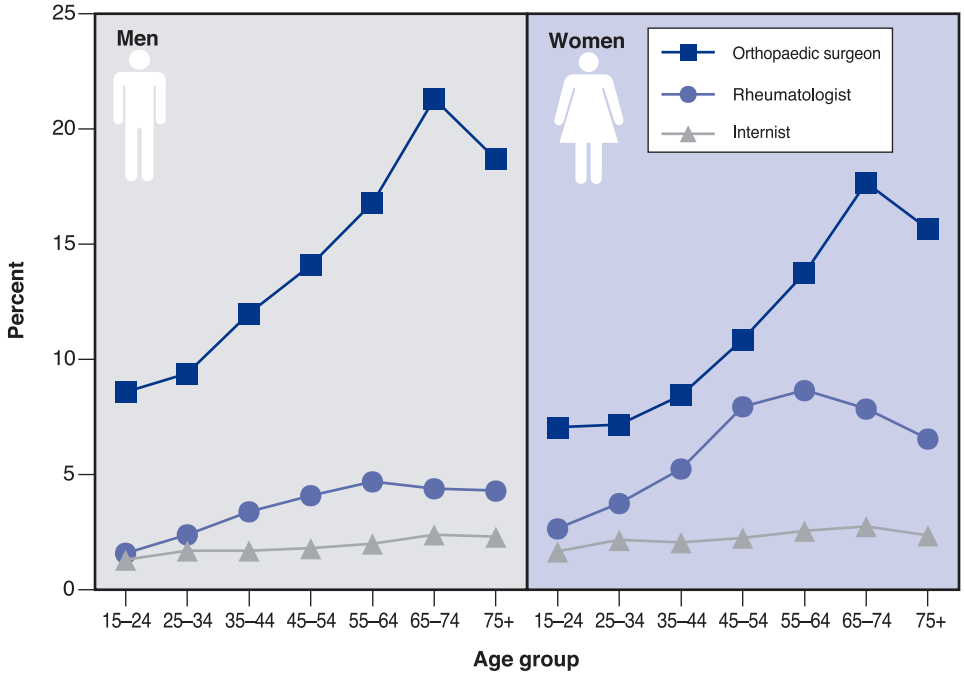
Overall, the percentage of individuals consulting orthopaedic surgeons, rheumatologists or internists for A&R conditions increased with age, peaking for those aged 55–64 and 65–74 years, and then declining for those aged 75 years and older. A relatively high proportion of men and women aged 15–24 years with physician visits for A&R conditions saw an orthopaedic surgeon. This is likely related to trauma or sports injuries.



Data sources: Ontario Health Insurance Plan; Registered Persons Database; Corporate Provider Database

4.5 Percentage of men and women that consulted a specialist for osteoarthritis at least once, in Ontario, 2000/01

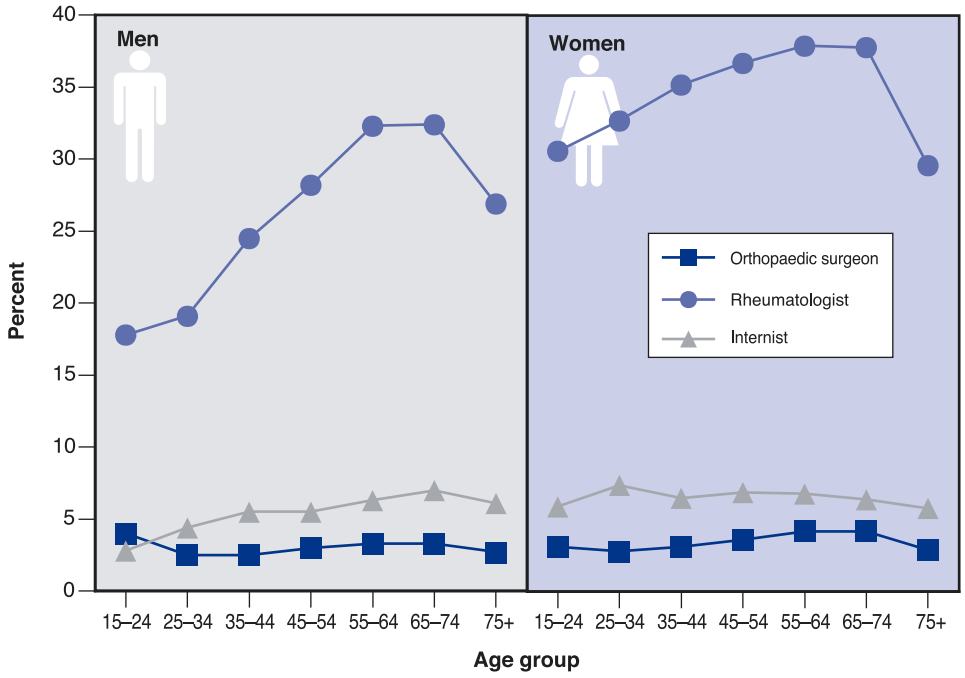
Men saw orthopaedic surgeons in higher percentages than women in every age group. Women with this condition saw rheumatologists and internists in higher percentages than men.



Data sources: Ontario Health Insurance Plan; Registered Persons Database; Corporate Provider Database

4.6 Percentage of men and women that consulted a specialist for rheumatoid arthritis at least once, in Ontario, 2000/01

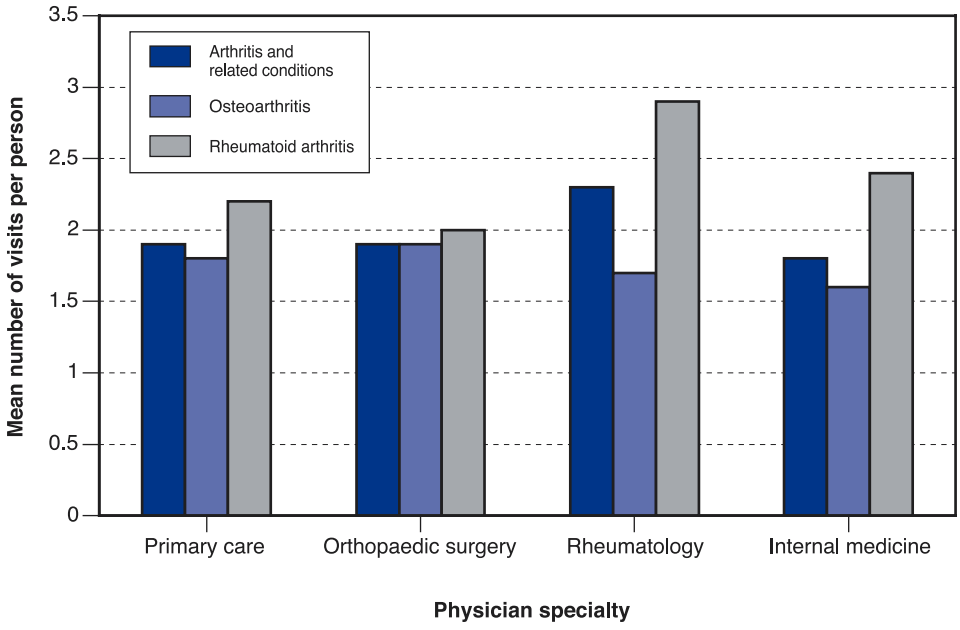
Women with physician visits for RA generally saw specialists (rheumatologists, internists, orthopaedic surgeons) in higher percentages than men with visits for this condition. Exceptions to this were for those 15–24 years of age who saw orthopaedic surgeons and those aged 65 to 74 years and 75 years and older who saw internists.



Data sources: Ontario Health Insurance Plan; Registered Persons Database; Corporate Provider Database

4.7 Mean number of visits for arthritis and related conditions, osteoarthritis, and rheumatoid arthritis, by physician speciality, in Ontario, 2000/01

The mean number of visits for A&R conditions varied somewhat by type of physician. Patients with at least one physician visit for any type of A&R condition made more visits per person to rheumatologists than to primary care physicians, orthopaedic surgeons or internists. This was also true for individuals with visits for RA, specifically. For those with visits for OA, more visits per person were made to orthopaedic surgeons and primary care physicians than to rheumatologists or internists.



Data sources: Ontario Health Insurance Plan; Registered Persons Database; Corporate Provider Database

Findings and Discussion

Geographic variation

4.8 Distribution of patients with visits for arthritis and related conditions by type of physician consulted, by District Health Council, in Ontario, 2000/01

Primary care physicians were responsible for the majority of A&R conditions visits in DHCs across the province. The area variation for primary care physician visits was relatively small, with an extremal quotient (ratio of highest proportion to lowest proportion) of 1.2. There was marked area variation for rheumatologists (extremal quotient = 3.5), internists (extremal quotient= 8.6) and orthopaedic surgeons (extremal quotient = 3.0). DHCs that had relatively high rheumatology visits such as Champlain and Hamilton tended to have relatively low internists visits. However, areas that had relatively low rheumatology visits did not correspond with areas that had high internist visits.

NB: Row percentages do not add to 100% because an individual can visit more than one type of physician in a year.

District Health Councils	Primary Care (%)	Rheumatologists (%)	Internists (%)	Orthopaedic Surgeons (%)
Algoma-Cochrane-Manitoulin-Sudbury*	78.7	4.6	3.9	19.4
Champlain	78.9	11.8	2.0	14.9
Durham-Haliburton-Kawartha-Pine Ridge	81.9	9.8	1.2	16.0
Essex-Kent-Lambton	82.3	7.1	0.7	17.9
Grand River	81.3	5.5	1.7	16.6
Grey-Bruce-Huron-Perth	86.0	4.2	2.2	16.6
Halton-Peel	82.4	8.3	2.7	14.4
Hamilton*	71.2	11.5	2.0	21.6
Niagara	78.1	9.4	1.3	21.0
Northern Shores	88.0	3.4	2.9	8.8
Northwestern Ontario	75.8	5.2	0.5	26.8
Simcoe-York	83.0	9.3	3.0	11.5
Southeastern Ontario**	87.1	4.0	1.2	14.3
Thames Valley	82.2	6.3	1.0	17.6
Toronto	82.2	9.7	3.7	12.4
Waterloo Region-Wellington-Dufferin*	76.4	5.3	4.3	16.7
Extremal Quotient	1.2	3.5	8.6	3.0
Ontario	**81.3**	**8.4**	**2.5**	**15.2**

4.9 Percentage of patients with visits for arthritis and related conditions that consulted a primary care physician only, a specialist only, and a primary care physician plus specialist, by District Health Council, in Ontario, 2000/01

There was small variation in the proportion of patients that consulted a primary care physician only for A&R visits across the DHCs (extremal quotient=1.3) (Exhibit 4.13). Areas that had a high proportion of people with A&R visits that saw orthopaedic surgeons and rheumatologists such as Champlain and Northwestern Ontario also had high proportion of patients who saw a specialist only. There was a relatively low amount of care by both a primary care physician and a specialist for A&R conditions across the province, with Northwestern Ontario having the highest proportion at 15.6%.

NB: Row percentages do not add to 100% because an individual can visit more than one type of physician in a year.

District Health Councils	Only Consulted a Primary Care Physician (%)	Only Consulted a Specialist‡ (%)	Consulted a Primary Care Physician and a Specialist‡
Algoma-Cochrane-Manitoulin-Sudbury*	64.3	21.3	14.4
Champlain	64.8	21.1	14.1
Durham-Haliburton-Kawartha-Pine Ridge	67.4	18.1	14.5
Essex-Kent-Lambton	68.3	17.7	14.0
Grand River	66.8	18.6	14.6
Grey-Bruce-Huron-Perth	72.5	14.1	13.4
Halton-Peel	68.6	17.6	13.9
Hamilton*	57.2	28.9	13.9
Niagara	63.3	21.9	14.8
Northern Shores	75.5	12.1	12.4
Northwestern Ontario	60.2	24.2	15.6
Simcoe-York	70.0	17.0	13.0
Southeastern Ontario**	76.5	12.9	10.5
Thames Valley	69.3	17.8	12.9
Toronto	68.6	17.8	14.4
Waterloo Region-Wellington-Dufferin*	63.5	23.6	12.9
Extremal Quotient	1.3	2.4	1.5
Ontario	**67.6**	**18.7**	**13.7**

* Primary care utilization in Hamilton, Waterloo Region-Wellington-Dufferin and Algoma-Cochrane-Manitoulin-Sudbury DHCs is underestimated because a high proportion of primary care physicians in these areas belong to alternative payment plans.

** Specialist (rheumatologist, internist, orthopaedic surgeon) utilization in Southeastern Ontario is underestimated because a high proportion of specialists belong to the Southeastern Ontario Academic Medical Organization (SEAMO) alternative payment plan.

‡ Specialists were defined as all physicians who were not primary care physicians, including rheumatologists, internists, orthopaedic surgeons and other specialists.

Data sources: Ontario Health Insurance Plan; Registered Persons Database; Corporate Provider Database

4.10 Distribution of patients with osteoarthritis visits, by type of physician consulted, by District Health Council, in Ontario, 2000/01

Patients with OA generally saw a primary care physician for their condition. There was very little variation across the province (extremal quotient=1.2). However, there was a large variation in the proportion of patients who saw a rheumatologist for OA ranging from 1.4% to 12.6% (extremal quotient =9.0). There was some variation in the proportion of patients visiting orthopaedic surgeons across the province (extremal quotient=2.5). The areas that had the highest proportion of primary care visits, such as Northern Shores, had the lowest proportion for orthopaedic visits.

NB: Row percentages do not add to 100% because an individual can visit more than one type of physician in a year.

District Health Councils	Primary Care (%)	Rheumatologists (%)	Internists (%)	Orthopaedic Surgeons (%)
Algoma-Cochrane-Manitoulin-Sudbury*	84.1	2.2	2.7	18.4
Champlain	82.3	9.0	1.5	16.2
Durham-Haliburton-Kawartha-Pine Ridge	86.0	5.9	1.0	16.2
Essex-Kent-Lambton	84.2	4.2	0.5	17.4
Grand River	87.2	4.0	1.5	14.7
Grey-Bruce-Huron-Perth	87.0	1.5	2.0	18.8
Halton-Peel	84.3	6.6	2.8	13.2
Hamilton*	74.8	12.6	2.6	19.8
Niagara	86.5	5.5	1.5	15.3
Northern Shores	91.8	1.4	1.9	8.9
Northwestern Ontario	81.8	2.0	0.5	22.6
Simcoe-York	84.7	7.1	3.4	12.9
Southeastern Ontario**	90.5	1.7	0.8	12.1
Thames Valley	85.4	2.8	0.8	19.2
Toronto	84.8	8.1	3.4	11.9
Waterloo Region-Wellington-Dufferin*	78.8	3.4	4.0	19.3
Extremal Quotient	**1.2**	**9.0**	**8.0**	**2.5**
Ontario	**84.5**	**6.1**	**2.3**	**15.0**

4.11 Percentage of patients with osteoarthritis visits that consulted a primary care physician only, a specialist only, and a primary care physician plus specialist, by District Health Council, in Ontario, 2000/01

The proportion of patients that saw only a primary care physician for OA ranged from 64.0% to 85.5% across the DHCs (extremal quotient=1.3). There was area variation in the proportion of patients who saw only a specialist for OA with an extremal quotient of 3.1. It was unusual for patients to see both a specialist and a primary care physician for OA.

NB: Row percentages do not add to 100% because an individual can visit more than one type of physician in a year.

District Health Councils	Only Consulted a Primary Care Physician (%)	Only Consulted a Specialist‡ (%)	Consulted a Primary Care Physician and a Specialist‡
Algoma-Cochrane-Manitoulin-Sudbury*	75.0	15.9	9.1
Champlain	72.7	17.7	9.6
Durham-Haliburton-Kawartha-Pine Ridge	75.7	14.0	10.3
Essex-Kent-Lambton	74.5	15.8	9.7
Grand River	77.8	12.6	9.5
Grey-Bruce-Huron-Perth	76.9	13.0	10.1
Halton-Peel	74.8	15.7	9.5
Hamilton*	64.0	25.3	10.7
Niagara	77.5	13.5	9.1
Northern Shores	85.5	8.2	6.3
Northwestern Ontario	72.5	18.2	9.3
Simcoe-York	75.3	15.3	9.4
Southeastern Ontario**	83.9	9.5	6.6
Thames Valley	75.9	14.6	9.4
Toronto	74.8	15.2	10.0
Waterloo Region-Wellington-Dufferin*	69.5	21.3	9.2
Extremal Quotient	**1.3**	**3.1**	**1.7**
Ontario	**75.0**	**15.5**	**9.5**

* Primary care utilization in Hamilton, Waterloo Region-Wellington-Dufferin and Algoma-Cochrane-Manitoulin-Sudbury DHCs is underestimated because a high proportion of primary care physicians in these areas belong to alternative payment plans.

** Specialist (rheumatologist, internist, orthopaedic surgeon) utilization in Southeastern Ontario is underestimated because a high proportion of specialists belong to the Southeastern Ontario Academic Medical Organization (SEAMO) alternative payment plan.

‡ Specialists were defined as all physicians who were not primary care physicians, including rheumatologists, internists, orthopaedic surgeons and other specialists.

Data sources: Ontario Health Insurance Plan; Registered Persons Database; Corporate Provider Database

4.12 Distribution of patients with visits for rheumatoid arthritis and related conditions by type of physician consulted, by District Health Council, in Ontario, 2000/01

While there is evidence to support the central role of rheumatologists in the management of RA, primary care physicians, internists, and orthopaedic surgeons also play an important role.

The extremal quotient for primary care RA visits was 1.5. There was a high degree of area variation for the proportion of patients that saw an internist for RA (extremal quotient= 13.5). There was some area variation for orthopaedic and rheumatology visits (extremal quotients 4.8 and 4.3, respectively).

NB: Row percentages do not add to 100% because an individual can visit more than one type of physician in a year.

District Health Councils	Primary Care (%)	Rheumatologists (%)	Internists (%)	Orthopaedic Surgeons (%)
Algoma-Cochrane-Manitoulin-Sudbury*	78.3	11.2	15.8	4.9
Champlain	62.4	44.8	3.2	4.5
Durham-Haliburton-Kawartha-Pine Ridge	64.7	48.1	3.1	3.6
Essex-Kent-Lambton	76.3	29.5	1.5	3.6
Grand River	75.0	31.9	3.7	2.7
Grey-Bruce-Huron-Perth	77.9	28.0	6.6	3.2
Halton-Peel	71.8	33.7	6.3	2.8
Hamilton*	65.9	34.2	3.2	4.7
Niagara	58.8	45.8	5.2	3.0
Northern Shores	87.5	15.2	13.2	1.9
Northwestern Ontario	79.5	31.3	1.3	6.3
Simcoe-York	75.1	32.9	4.3	1.3
Southeastern Ontario**	81.1	18.2	5.0	4.9
Thames Valley	71.4	35.3	4.4	4.3
Toronto	68.4	33.7	8.0	2.6
Waterloo Region-Wellington-Dufferin*	61.0	34.0	17.5	4.4
Extremal Quotient	1.5	4.3	13.5	4.8
Ontario	**70.9**	**33.1**	**6.4**	**3.4**

* Primary care utilization in Hamilton, Waterloo Region-Wellington-Dufferin and Algoma-Cochrane-Manitoulin-Sudbury DHCs is underestimated because a high proportion of primary care physicians in these areas belong to alternative payment plans.

** Specialist (rheumatologist, internist, orthopaedic surgeon) utilization in Southeastern Ontario is underestimated because a high proportion of specialists belong to the Southeastern Ontario Academic Medical Organization (SEAMO) alternative payment plan.

Data sources: Ontario Health Insurance Plan; Registered Persons Database; Corporate Provider Database

4.13 Percentage of patients with rheumatoid arthritis visits that consulted a primary care physician only, a specialist only, and a primary care physician plus specialist, by District Health Council, in Ontario, 2000/01

The proportion of patients that consulted a primary care physician only for RA ranged from 43.8% to 69.5% (extremal quotient=1.6). Areas that had high rheumatology visit rates such as Niagara, Durham-Haliburton-Kawartha-Pine Ridge also had a high proportion of patients that saw a specialist only.

District Health Councils	Only Consulted a Primary Care Physician (%)	Only Consulted a Specialist‡ (%)	Consulted a Primary Care Physician and a Specialist‡
Algoma-Cochrane-Manitoulin-Sudbury*	62.8	21.7	15.6
Champlain	47.6	37.6	14.8
Durham-Haliburton-Kawartha-Pine Ridge	45.8	34.9	19.3
Essex-Kent-Lambton	64.7	23.8	11.6
Grand River	57.8	24.9	17.3
Grey-Bruce-Huron-Perth	59.3	22.1	18.6
Halton-Peel	57.5	28.3	14.3
Hamilton*	56.3	34.1	9.6
Niagara	43.8	41.2	15.1
Northern Shores	69.5	12.8	17.7
Northwestern Ontario	60.9	20.5	18.6
Simcoe-York	59.8	25.1	15.1
Southeastern Ontario**	69.1	19.1	11.8
Thames Valley	53.5	28.4	18.0
Toronto	53.8	31.6	14.7
Waterloo Region-Wellington-Dufferin*	44.3	39.1	16.7
Extremal Quotient	1.6	3.2	2.0
Ontario	**55.8**	**29.2**	**15.1**

* Primary care utilization in Hamilton, Waterloo Region-Wellington-Dufferin and Algoma-Cochrane-Manitoulin-Sudbury DHCs is underestimated because a high proportion of primary care physicians in these areas belong to alternative payment plans.

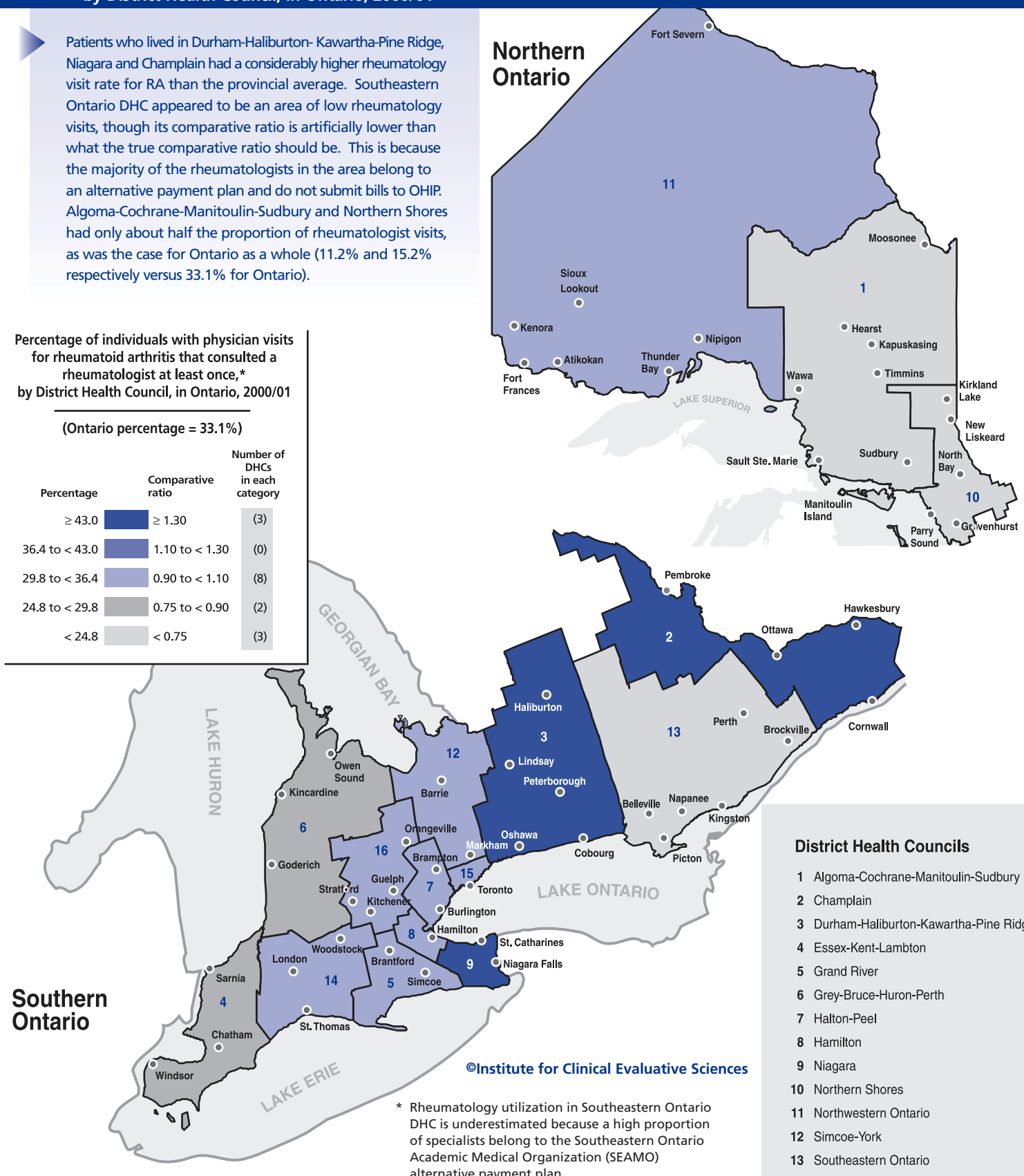
** Specialist (rheumatologist, internist, orthopaedic surgeon) utilization in Southeastern Ontario is underestimated because a high proportion of specialists belong to the Southeastern Ontario Academic Medical Organization (SEAMO) alternative payment plan.

‡ Specialists were defined as all physicians who were not primary care physicians, including rheumatologists, internists, orthopaedic surgeons and other specialists.

Data sources: Ontario Health Insurance Plan; Registered Persons Database; Corporate Provider Database

4.14 Percentage of individuals with physician visits for rheumatoid arthritis that consulted a rheumatologist at least once,* by District Health Council, in Ontario, 2000/01

Patients who lived in Durham-Haliburton- Kawartha-Pine Ridge, Niagara and Champlain had a considerably higher rheumatology visit rate for RA than the provincial average. Southeastern Ontario DHC appeared to be an area of low rheumatology visits, though its comparative ratio is artificially lower than what the true comparative ratio should be. This is because the majority of the rheumatologists in the area belong to an alternative payment plan and do not submit bills to OHIP. Algoma-Cochrane-Manitoulin-Sudbury and Northern Shores had only about half the proportion of rheumatologist visits, as was the case for Ontario as a whole (11.2% and 15.2% respectively versus 33.1% for Ontario).



* Rheumatology utilization in Southeastern Ontario DHC is underestimated because a high proportion of specialists belong to the Southeastern Ontario Academic Medical Organization (SEAMO) alternative payment plan.

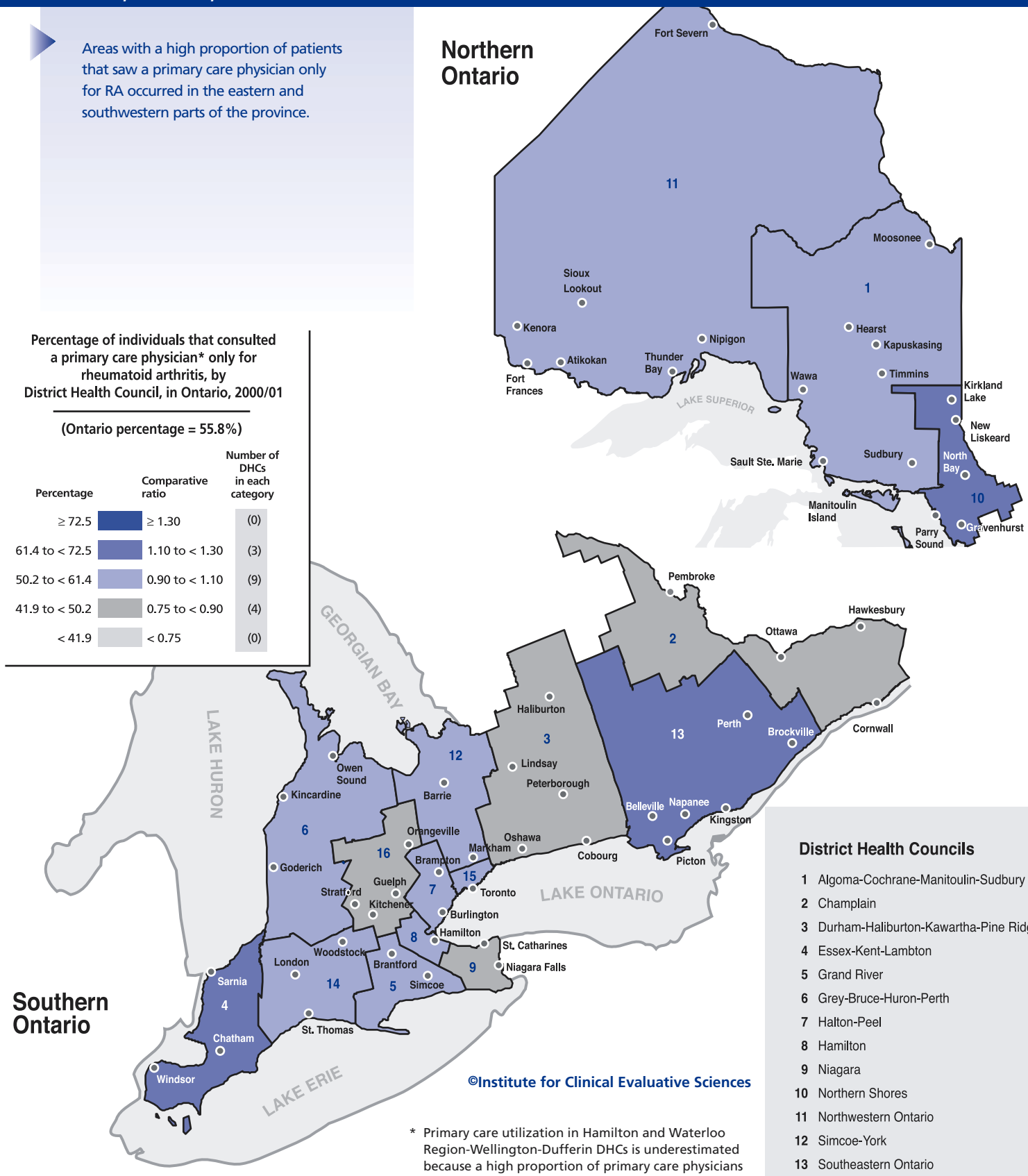
District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Data sources: Ontario Health Insurance Plan; Registered Persons Database; Corporate Provider Database

4.15 Percentage of individuals that consulted a primary care physician* only for rheumatoid arthritis, by District Health Council, in Ontario, 2000/01

Areas with a high proportion of patients that saw a primary care physician only for RA occurred in the eastern and southwestern parts of the province.



Percentage of individuals that consulted a primary care physician* only for rheumatoid arthritis, by District Health Council, in Ontario, 2000/01

(Ontario percentage = 55.8%)

Percentage	Comparative ratio	Number of DHCs in each category
≥ 72.5	≥ 1.30	(0)
61.4 to < 72.5	1.10 to < 1.30	(3)
50.2 to < 61.4	0.90 to < 1.10	(9)
41.9 to < 50.2	0.75 to < 0.90	(4)
< 41.9	< 0.75	(0)

* Primary care utilization in Hamilton and Waterloo Region-Wellington-Dufferin DHCs is underestimated because a high proportion of primary care physicians in these areas belong to alternative payment plans.

District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

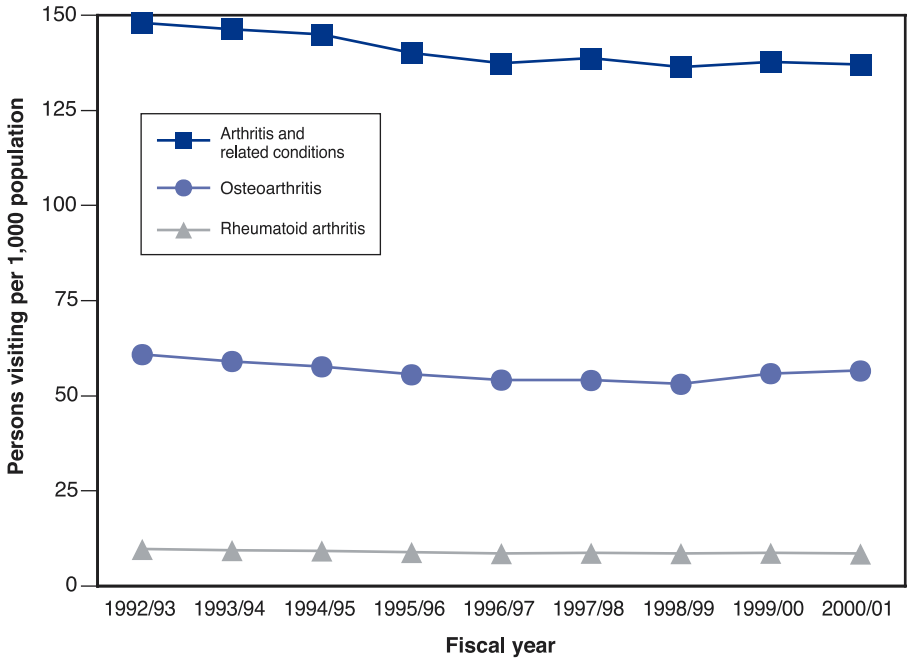
Data sources: Ontario Health Insurance Plan; Registered Persons Database; Corporate Provider Database

Findings and Discussion

Time trends

4.16 Standardized person visit rates to all physicians for arthritis and related conditions, osteoarthritis and rheumatoid arthritis in Ontario, 1992/93 to 2000/01

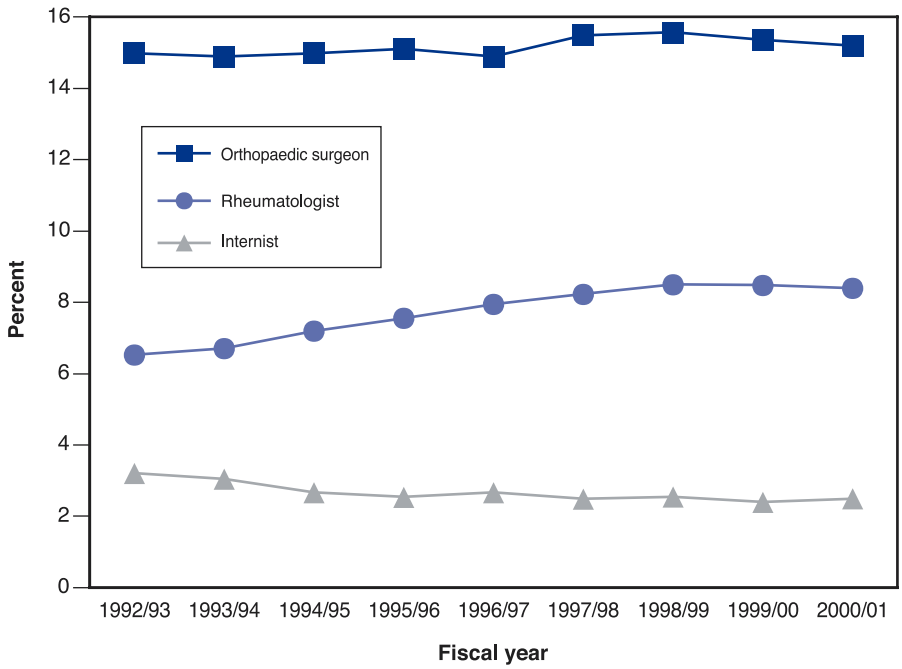
There was an overall decline in age/sex standardized rates of persons visiting physicians for A&R conditions between 1992/93 and 2000/01 from 148 per 1,000 population to 137 per 1,000 population. There was also a decrease in the crude person visit rate for A&R conditions over this same time period (data not shown), although the decrease was smaller than that for the standardized rates. Over the same time period, age/sex standardized person visit rates to physicians for OA and RA, specifically, decreased from 60.9 to 56.6 per 1,000 population and from 9.7 to 8.6 per 1,000 population, respectively.



Data sources: Ontario Health Insurance Plan; Registered Persons Database

4.17 Percentage of patients with visits for arthritis and related conditions that consulted a specialist at least once in Ontario, 1992/93 to 2000/01

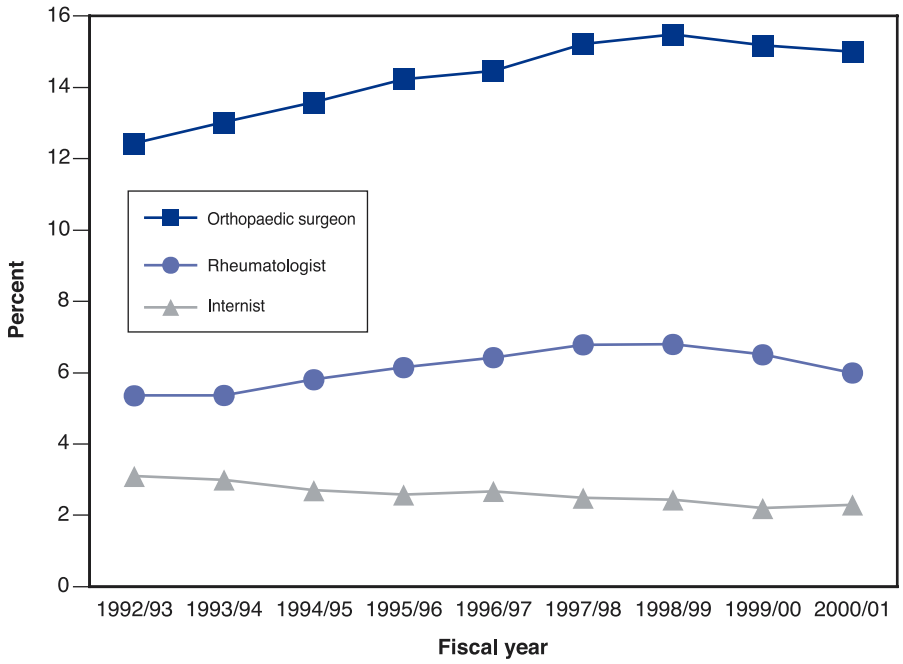
The percentage of individuals with A&R condition physician visits that saw an orthopaedic surgeon did not vary greatly from 1992/93 to 2000/01. The percentage that saw a rheumatologist over the same time period increased somewhat from 6.5% to 8.4%, while the percentage that saw an internist declined from 3.2 % to 2.5%



Data sources: Ontario Health Insurance Plan; Registered Persons Database; Corporate Provider Database

4.18 Percentage of patients with osteoarthritis visits that consulted a specialist at least once in Ontario, 1992/93 to 2000/01

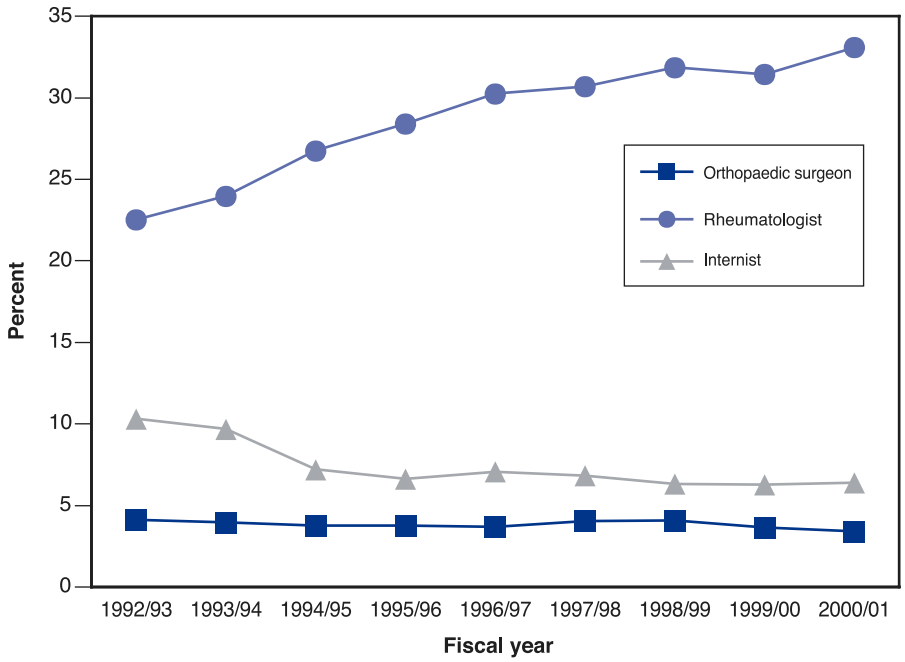
For individuals with OA physician visits, there was also a slight increase in the percentage of individuals that saw a rheumatologist and a decrease in the percentage that saw an internist between 1992/93 and 2000/01.



Data sources: Ontario Health Insurance Plan; Registered Persons Database; Corporate Provider Database

4.19 Percentage of patients with rheumatoid arthritis visits that consulted a specialist at least once in Ontario, 1992/93 to 2000/01

There was a 10.6% increase over time in the percentage of RA patients that saw a rheumatologist, from 22.5% (1992/93) to 33.1% (2000/01). Although the increase is encouraging, this is still a relatively low proportion of RA patients being cared for by arthritis specialists.



Data sources: Ontario Health Insurance Plan; Registered Persons Database; Corporate Provider Database

Conclusions

Despite the cautions that apply to interpretation of these data, these findings have several important implications for health care delivery in Ontario. Almost one-quarter of Ontario's adult population sees a physician for a musculoskeletal (MSK) condition each year and more than one in eight has a visit for arthritis and related (A&R) conditions. Visit rates increase with age and are more frequent for women than men. The majority of 2.8 million annual visits for an A&R condition are to primary care physicians, with more than 80% of those with A&R visits seeing a primary care physician at least once. Primary care physician visits are more frequent than specialist visits in all A&R categories except for joint derangement/ Dupuytren's contracture, connective tissue disorders and ankylosing spondylitis. As in the 1998 atlas, these findings highlight the central role of Ontario's primary care physicians in the management of A&R conditions.

Findings about sub-optimal primary care arthritis management published in the 1998 atlas prompted the formation of an Arthritis Strategic Action Group (ASAG), comprised of Ministry of Health and Long-Term Care (MOHLTC), Arthritis Society, Arthritis Community Research and Evaluation Unit (ACREU), consumer and academic representatives. Among its recommendations were the enhancement of undergraduate and postgraduate MSK training in Ontario's medical schools and implementation of a community-based arthritis pilot project in Ontario's community health centres to improve arthritis care at the primary care level. However, as the MOHLTC has not reconvened the ASAG, MSK training enhancements have not gone forward. While the pilot project showed very promising results, including enhanced provision of arthritis information, increased referral to the Arthritis Society and improved provider confidence, without the ASAG the project lacks a mechanism for province-wide dissemination.

No other large-scale primary care arthritis interventions have taken place in Ontario. In this context, new and concerted efforts will be needed to enhance primary care management of arthritis in Ontario. The Ontario Ministry of Health and Long-Term Care, The Arthritis Society, Ontario's medical schools and professional bodies such as the College of Family Physicians would be among the key players in such an effort.

The findings also point to the important role of specialty care in the management of A&R conditions in Ontario. One-third of patients with an A&R visit see a specialist and among specialists, orthopaedic surgeons are most frequently seen, followed by rheumatologists. Orthopaedic surgery involvement in many aspects of care for A&R conditions points to an important role of orthopaedic surgeons in the non-surgical as well as surgical care of these conditions.

As expected, rheumatologists play a leading role for patients with connective tissue disorders, rheumatoid arthritis (RA) and ankylosing spondylitis, while orthopaedic care is spread among many A&R conditions. There is substantial evidence to support the central role of rheumatologists in the management of RA[8–13] and current clinical practice guidelines state that people with RA should be treated by a rheumatologist.[6] In contrast to these recommendations, our findings show that rheumatology care for RA is the exception rather than the rule. The use of tentative rather than actual diagnoses could explain some of this discrepancy. However, given that OHIP claims agree with the epidemiological prevalence of RA, these findings suggest that the majority of Ontarians with RA do not see a rheumatologist, even on an annual basis.

The person visit rates we derived from administrative data are under-estimates of true population prevalence rates. They should be interpreted as estimates of treated prevalence (population rate of receiving care for a given diagnosis), which provide an indication of the burden of a given condition on the health care system. The person visit rate for A&R conditions in Ontario at 13.7% of the population is less than the 2000/01 CCHS prevalence estimate of 17.4% (Chapter 2). Not everyone with arthritis will see a physician in the course of a single year and it is possible that some A&R visits were coded as MSK visits, particularly given the frequent use of the MSK "signs and symptoms not yet diagnosed" code.

Similar considerations are likely to explain why the person visit rate for osteoarthritis (OA) at approximately 6% is lower than epidemiological estimates which suggest a prevalence of 10 to 12% in the adult population.[14,15] It is quite likely that many people with OA do not consult a physician, particularly those with early or mild disease. Physicians may also code a visit for a non-arthritis co-morbid condition when individuals with arthritis see a doctor for more than one reason.

Person visit rates for inflammatory types of A&R conditions, such as RA and ankylosing spondylitis, are consistent with epidemiological estimates. Estimates suggest the prevalence of RA in adults is 10 per 1,000 population with approximately 2.5 times more women affected than men.[14,15] Based on OHIP claims data, 9 per 1,000 population in Ontario made at least one physician visit for RA in 2000/01, with 2.2 times as many women making visits as men.

There was a decrease in the crude person visit rate to all physicians for A&R conditions between 1992/93 and 2000/01, despite the fact that the number of people with arthritis in the population is increasing.[4,16] Age/sex standardized rates decreased to a greater extent over the same time period. These findings may be related to changes in coding practices. For example, physicians may have become more selective in their use of A&R codes or more likely to code visits for co-morbid conditions.

Regional patterns of arthritis care demonstrate only small variations for primary care. In contrast, there is large regional variation in specialty care, with at least threefold differences for all specialties for A&R condition visits. The lowest rheumatology A&R condition visit rates appear in northeast Ontario and lower than average rates are also found in southwest Ontario. This regional pattern also holds for rheumatology visits for RA, even after accounting for care provided by general internists. Care for RA by primary care physicians alone is especially evident in the northeast. This is consistent with the low availability of rheumatologists in the northeast found in Chapter 3. Because overall visit rates to rheumatologists for RA are generally very low, these findings indicate serious under-utilization and most likely inadequate care for RA in these regions. Large variations in care by general internists and orthopaedic surgeons also suggest under-utilization in certain areas.

It is difficult to know to what extent the regional variations in arthritis specialty care reflect regional variations in the availability of health human resources, particularly specialists (Chapter 3). The variation is likely to be exacerbated by the growing health human resources shortage in rheumatology and orthopaedic surgery. Whatever the reason, these variations point to the challenges in providing care for all who potentially need it.

Strategies to improve access to appropriate care, particularly for conditions like RA where both the disease and therapies need close monitoring, include:

- Increased use of shared care particularly between primary care and rheumatology; and,
- A greater role for arthritis-trained rehabilitation professionals.

Further work is needed to confirm the patterns of care described in this chapter and to design policy interventions that will enhance access to specialty care and equity in its delivery in Ontario. Future directions for research include:

- An improved understanding of access to and the quality of primary care for MSK conditions;
- Ways to improve the organization and coordination of multidisciplinary arthritis care; and,
- The relationships between provision of specialty arthritis services and their use, and ways to improve primary care and access to specialty care for MSK conditions.

Appendices

4.A How the research was done

Data sources

The main source of data for this chapter was the Ontario Health Insurance Plan (OHIP). Most Ontario doctors operate on a fee-for-service basis and must submit a reimbursement claim to OHIP for each patient encounter which includes: a diagnostic code specifying the reason for the visit, fee codes for the services provided, the patient's health card number and physician identification number. Health card numbers used in this analysis were encrypted for privacy and confidentiality.

Linkage to Ontario's Registered Persons Database (RPDB) was used to derive age and sex for each claimant and linkage with the Physician File was used to derive physician characteristics.

The classification scheme of diagnoses used in OHIP consists of 3-digit truncated codes adapted from the International Classification of Diseases. For a list of musculoskeletal (MSK) diagnostic codes used in these analyses refer to Table 4.1 (page 85) .

All individuals aged 15 years and older with at least one ambulatory encounter during the fiscal year 2000/01 (April 1, 2000 to March 31, 2001) for which the physician claim contained a fee code with a prefix of "A" or "K" and a MSK diagnostic code were included. Patients' residential postal codes were obtained from the RPDB and linked to OHIP data using the encrypted health number. Postal codes were then grouped into Ontario's 16 District Health Councils (DHCs) for regional analyses.

Physician specialty was determined using information from the Corporate Provider Database (CPDB) of the Ministry of Health and Long-Term Care and verified against information in the Ontario Physician Human Resource Data Centre. These databases were linked to the OHIP physician claims file. Population denominators for rates were obtained from Statistics Canada census data. For fiscal years 1992/93 to 1995/96 intercensal estimates based on 1991 and 1996 census data were used. Intercensal estimates based on 1996 and 2001 census data were used for fiscal years 1996/97 to 2000/01.

Analyses

The percentage of all ambulatory physician visits in Ontario in 2000/01 with a MSK diagnosis code was calculated, as well as the percentage with an arthritis and related (A&R) diagnostic code.

For each MSK diagnosis, population visit rates to all doctors, referred to as person visit rates, were calculated for 2000/01. Person visit rates were defined as the number of persons with at least one visit for the diagnosis of interest per thousand population. These rates were calculated by age group and by sex. The total number of visits for each diagnosis was determined, as well as the mean number of visits per person. The ratio of women with at least one visit to men with at least one visit was calculated. Person visit rates for the groupings of A&R conditions, osteoarthritis (OA) and rheumatoid arthritis (RA) were calculated for age/sex groups.

For each A&R condition, the percentage of individuals with at least one visit that saw physicians of different specialties was determined. Physicians were divided into the following specialties: primary care physicians, specialists, all medical specialists, rheumatologists, internists, all surgical specialists, and orthopaedic surgeons. Primary care physicians were defined as those in general practice or family medicine. Specialists were defined as all medical specialists and all surgical specialists (i.e. all doctors who were not primary care physicians). All medical specialists included rheumatologists, internists and other medical specialists. All surgical specialists included orthopaedic surgeons, as well as other surgical specialties.

ICES holds information on the specialty of each physician from the Corporate Provider Database and the Ontario Physician Human Resource Data Centre (OPHRDC). For the purpose of identifying rheumatologists, the latter is considered more accurate because OPHRDC pools multiple sources of information and calls physicians' offices periodically to verify current practice information.

For individuals with visits for A&R conditions, OA, and RA, the percentage that saw orthopaedic surgeons, rheumatologists and internists was calculated for age/sex groups. The mean number of visits per person to primary care physicians, orthopaedic surgeons, rheumatologists and internists, was also determined for these conditions.

The percentage of individuals with visits for A&R conditions, OA and RA that saw primary care physicians, orthopaedic surgeons, rheumatologists and internists was determined for each of the 16 DHCs in Ontario. The percentage of individuals with visits for these conditions that saw only a primary care physician, saw

only a specialist or saw both types of physicians during 2000/01 was also calculated for each DHC and for all of Ontario. The degree of regional variation for the examined proportions was quantified using the extremal quotient (ratio of the highest to the lowest proportion). For RA, comparative ratios by DHC for the percentage of patients that saw only a primary care physician and the percentage that saw a rheumatologist by DHC were calculated and displayed as maps. These comparative ratios are the ratio of the DHC percentage to the overall Ontario percentage.

Person visit rates age/sex standardized to the 2000 Ontario population were calculated for A&R conditions, OA, and RA for the fiscal years 1992/93 to 1999/00. The percentage of individuals with visits for these conditions that saw an orthopaedic surgeon, rheumatologist and internist for each of these years was also determined.

Limitations

The data presented in this chapter were collected for administrative reasons. Therefore, some caution should be exercised in interpreting results. Key issues are summarized as follows.

It is unknown to what extent the data on persons visiting physicians for arthritis and related conditions capture the full spectrum of people with arthritis in Ontario. Not all people with arthritis see a physician in the course of a year. Further, some visits for arthritis may have been missed because they were coded using more general MSK codes, such as "signs and symptoms not yet diagnosed", or coded more unpredictably using codes not included in this chapter. Some MSK visits may have also been missed because visits coded for strains and sprains were excluded.

The diagnostic codes provided in physician claims are not validated. Further, many types of visits are not easily coded by diagnosis. For example, visits to discuss negative test results and visits for non-specific conditions are challenging to code and physicians may vary in how they assign such codes. It may also be that individual physicians routinely use a small subset of codes for convenience. Conversely, this may mean that an infrequently used code, such as that for RA, is more likely to be used appropriately, particularly in a primary care setting where the physician may have to look up the code.

Only a single diagnosis code can be entered on a physician claim form. This means that if a patient had more than one reason for visiting, some diagnoses were not documented. It is possible that arthritis is seen as a secondary rather than primary diagnosis and therefore it could be coded less often than warranted by its frequency of presentation. In the analyses, individuals were included for a particular condition if they made at least one visit to any type of physician and the diagnostic code corresponded to that condition, which may have led to the inclusion of patients with tentative diagnoses. It may be that when physicians initially investigate a patient's condition the diagnosis entered on the claim form is later ruled out by test results or further examination.

OHIP claims include only fee-for-service claims, so that physicians enrolled in alternate physician payment plans, such as Community Health Centres and Health Service Organizations, are not included. It is estimated that 95% of all physician services in Ontario are captured in OHIP claims, including "shadow billings" (bills submitted for accountability purposes but not paid on a fee-for-service basis) submitted by physicians in some alternative payment plans. Omission of some of those covered by alternate payment plans means that the findings are likely to be underestimates of ambulatory care for arthritis and related conditions in Ontario. There are a few regions in Ontario where the proportion of doctors enrolled in alternate payment plans is relatively high. The possible impact of this effect on regional variation in ambulatory care for arthritis is outlined in the "Findings and Discussion" section.

To calculate population rates of physician visits, OHIP claims were used as the numerator and Canada census counts as the denominator. The number of people in Ontario's health care registry is considerably higher than that in the census, a result of incomplete removal of deceased persons and lack of routine address updating. This variation is more pronounced in some regions than others, precluding the calculation of accurate area-based population rates. Instead, we have based area analyses on proportional visits. Since only those alive and with active health coverage appear in the numerator and because the census provides an accurate population count, provincial age-sex specific visit rates are relatively unaffected by this difference.

4.B OHIP diagnostic codes

Table 4.1 OHIP Diagnostic Codes*

Disease Category		Condition	Diagnostic Categories	OHIP Diagnostic Code(s)
Musculoskeletal Disorders	Arthritis and Related Conditions	Osteoarthritis	osteoarthritis	715
		Rheumatoid arthritis	rheumatoid arthritis, Still's disease	714
		Synovitis	synovitis, tenosynovitis, bursitis, bunion, ganglion	727
		Fibrositis	fibrositis, myositis, muscular rheumatism	729
		Connective tissue disorders	disseminated lupus erythematosus, generalized scleroderma, polyarteritis nodosa, temporal arteritis	710,446
		Ankylosing spondylitis	ankylosing spondylitis	720
		Gout	gout	274
		Traumatic arthritis, pyogenic arthritis	traumatic arthritis, pyogenic arthritis	716,711
		Joint derangement, Dupuytren's contracture	joint derangement, recurrent dislocation, ankylosis, Dupuytren's contracture	718,728
		Other MSK disorders	other diseases of musculoskeletal system and connective tissue	739
	Non-arthritis and Related Conditions	Spine disorders	lumbar strain, lumbago, coccydynia, sciatica, invertebral disc disorders, scoliosis, kyphosis, lordosis	724, 722, 737
		Bone disorders	osteomyelitis, osteitis deformans, Paget's disease of bone, osteochondritis, Legg-Perthes disease, osteoporosis, spontaneous fracture, other diseases of the bone and cartilage, flat foot, pes planus, hallux vagus, hallux varus, hammer toe	730, 731, 732, 733, 734, 735
		Signs and symptoms not yet diagnosed	leg cramps, leg pain, muscle pain, joint pain	781

* Diagnostic categories have been slightly modified from those used in the 1998 atlas on *Arthritis and Related Conditions* on the Role of Primary Care Physicians in Treating Arthritis.[1]

References

1. Glazier R. The role of primary care physicians in treating arthritis. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis & related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 63–92.

2. Badley EM, Rasooly I, Webster GK. Relative importance of the musculoskeletal disorders as a cause of chronic health problems, disability, and health care utilization: findings from the 1990 Ontario Health Survey. *J Rheumatol* 1994; 21: 505–514.

3. Felts W, Yelin E. The economic impact of the rheumatic diseases in the United States. *J Rheumatol* 1989; 16: 867–884.

4. Badley EM, Wang PP. Arthritis and the aging population: projections of arthritis prevalence in Canada 1991 to 2031. *J Rheumato*l 1998; 25: 138–144.

5. American College of Rheumatology Subcommittee on Rheumatoid Arthritis Guidelines. Guidelines for the management of rheumatoid arthritis: 2002 update. *Arthritis Rheum* 2002; 46: 328–346.

6. Holbrook AM (Chair). Ontario treatment guidelines for osteoarthritis, rheumatoid arthritis and acute musculoskeletal injury. 32–40. Toronto: Queen's Printer of Ontario; 2000. Ref Type: Report.

7. Scott DL, Shipley M, Dawson A et al. The clinical management of rheumatoid arthritis and osteoarthritis: strategies for improving clinical effectiveness. *Br J Rheumatol* 1998; 37: 546–554.

8. Criswell LA, Such CL, Yelin EH. Differences in the use of second-line agents and prednisone for treatment of rheumatoid arthritis by rheumatologists and non-rheumatologists. *J Rheumatol* 1997; 24: 2283–2290.

9. MacLean CH, Louie R, Leake B et al. Quality of care for patients with rheumatoid arthritis. *JAMA 2000*; 284: 984–992.

10. Newman J, Silman AJ. A comparison of disease status in rheumatoid arthritis patients attending and not attending a specialist clinic. *Br J Rheumatol* 1996; 35: 1169–1171.

11. Ward MM, Leigh JP, Fries JF. Progression of functional disability in patients with rheumatoid arthritis. *Arch Intern Med* 1993; 1993: 2229–2237.

12. Ward MM. Rheumatology visits frequency and changes in functional disability and pain in patients with rheumatoid arthritis. *J Rheumatol* 1997; 24: 35-42.

13. Yelin EH, Such CL, Criswell LA et al. Outcomes for persons with rheumatoid arthritis with a rheumatologist versus a non-rheumatologist as the main physician for this condition. *Med Care* 1998; 36: 513–522.

14. Hawker G. Epidemiology of arthritis and osteoporosis. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis & related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 1–10.

15. Lawrence RC, Helmick CG, Arnett FC et al. Estimates of the prevalence of arthritis and selected musculoskeletal disorders in the United States. *Arthritis Rheum* 1998; 41: 778–799.

16. Lagace C and Perruccio A, DesMeules M, Badley EM. The impact of arthritis on Canadians. In: Badley EM, DesMeules M, editors. Arthritis in Canada: an ongoing challenge. Ottawa: Health Canada, 2003.

INSIDE

Chapter 5

Use of Medication

NM Kasman, MSc, JD Power, MHSc, MM Mamdani, PharmD, MA, MPH and EM Badley, DPhil

Key Messages

- The number of prescriptions for COX-2 inhibitors, a type of non-steroidal anti-inflammatory introduced in 1999, has been increasing dramatically. Over 844,000 prescriptions were written for those aged 65 years and older in 2001.
- The total cost of arthritis-related prescriptions increased by 224% between 1998 and 2001 to over $60 million for those aged 65+ years in 2001, due mostly to COX-2 inhibitors. These costs will only increase with the trend toward combination therapy with disease-modifying antirheumatic drugs (DMARDs) and use of newly developed biologic drugs. New drugs for osteoarthritis are also on the horizon and associated costs will be substantial, given the high prevalence and chronicity of the disorder. However, drugs have the potential to reduce long-term economic and social costs of arthritis-related disability. Pharmacoeconomic analysis of new arthritis drugs will help ensure this potential is realized.
- It is recommended that treatment with DMARDs be established as soon as a definite diagnosis of rheumatoid arthritis is made. Data presented in this chapter show a steady climb in the number of DMARD prescriptions written annually between 1992 and 2001. However, the overall rate of provision of these drugs falls well short of the estimated prevalence of rheumatoid arthritis and there is regional variation in the rate of prescription. Access to arthritis medications that have proven to be effective in preventing joint damage is a key issue. This includes DMARDs, as well as the new biologic drugs.

Introduction

This chapter provides an update of the information on the use of arthritis-related medications presented in the 1998 edition of *Patterns of Health Care in Ontario: Arthritis and Related Conditions.* Data on provincial variation in the use of prescription medications for arthritis is a new feature in this research atlas, and this chapter includes several new drugs released in the past few years that were not included in the 1998 edition.

The analysis used data from the Ontario Drug Benefit (ODB) program, for people aged 65 years and older and was stratified by District Health Councils (DHCs). Included in the analyses are non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroids, and disease-modifying antirheumatic drugs (DMARDs). The NSAID category is separated into conventional NSAIDs and COX-2 inhibitors. See Table 5.1 for the list of drugs included in the analyses.

The chapter provides estimates of the number of arthritis-related prescriptions written from 1992 to 2001, as well as prescription rates for 2000/01. The cost of arthritis-related medications is provided for the years 1998 to 2001, the only years for which data are available.

Background

Arthritis is a complex set of conditions treated with a wide variety of medications. Because there is no known cure for arthritis, the goal of drug therapies is to relieve pain, preserve joint function and limit disease progression. Without effective treatment, arthritis can result in joint destruction, which often leads to long-term disability. Medications used in the treatment of arthritis include analgesics, NSAIDs, and for inflammatory arthritis, low-dose corticosteroids, DMARDs, and the newly available biologic response modifiers (biologics). Simple analgesics, such as acetaminophen, are first-line therapy for arthritis and related conditions where there is pain, but not inflammation. However, since analgesics are available without a prescription, they are not considered in this chapter.

For patients with arthritis or related conditions, NSAIDs are a mainstay of clinical care. While conventional NSAIDs are effective in the treatment of pain and inflammation associated with arthritis,[1–3] they are also associated with a variety of side effects, including gastrointestinal toxicity, acute liver and renal injury, fluid retention, increased blood pressure, and rarely, congestive heart failure and adverse reproductive outcomes.[4,5] The activity of NSAIDs is primarily related to the inhibition of 2 enzymes, cyclooxygenases 1 and 2 (COX-1 and COX-2, respectively). The inhibition of COX-2 activity is believed to be responsible for the anti-inflammatory/analgesic effects of NSAIDs, whereas much of the toxicity is related to COX-1 inhibition.[6] COX-2-specific inhibitors, such as celecoxib (Celebrex™) and rofecoxib (Vioxx™), were released into the Canadian market in 1999, and appear to be as effective in the control of pain and inflammation as conventional NSAIDs, but with some reduction in gastrointestinal ulcers.[5,7] Other systemic adverse effects appear to be similar to

conventional NSAIDs.[8] There is controversy about the degree of reduction in clinically important gastrointestinal events and whether rofecoxib is associated with increased cardiovascular risk compared to a traditional NSAID (naproxen).[9,10]

Physicians have used intra-articular steroids to treat rheumatic diseases for nearly 50 years despite the fact that little is known about the long-term outcomes of joints injected with steroids.[11] However, judicious use of steroids has been shown to be very helpful in selected cases for temporarily reducing joint pain and inflammation and facilitating increased motion and function. As well, adverse effects of steroids appear to be few when the number of injections per joint is limited to 4 or less per year.[12] Oral corticosteroids are also used at times to treat inflammatory arthritis. They can decrease the signs and symptoms of inflammation and possibly retard joint damage, but many people will experience side effects with long-term use, including a loss of bone mass which can lead to osteoporosis and fractures.[13–17]

In contrast to the symptom management role of NSAIDs and corticosteroids, DMARDs and biologics are used to prevent the progression of inflammatory diseases such as rheumatoid arthritis (RA). Early treatment of RA with DMARDs has been shown to be highly effective in slowing the bone and joint damage that results in loss of function.[18–20] In fact, the benefit of early DMARD therapy over placebo or delayed therapy is unquestionable, with reduction in bone damage and preservation of function. DMARD therapy is clearly accepted as the primary treatment for RA, although adverse reactions to DMARDs require physician and laboratory monitoring.[18,21,22] Combination therapy with more than one DMARD has been shown to have increased efficacy over monotherapy and the trend is for RA patients to be on more than one DMARD at a time.[23–25] Unfortunately, drop-out rates for combination therapy are high due to lost effectiveness and side effects over time.[26,27] That DMARDs are effective in treating RA is beyond question—just how effective they are, and what combinations of DMARDs will show improved efficacy, have yet to be determined.[28]

Biologics are a new category of drugs that have been designed to modify specific biological targets that cause the inflammation in rheumatic diseases like RA. Currently, there are three such biologic agents available in Canada—etanercept (Enbrel™), infliximab (Remicade™), and anakinra (Kineret™). These drugs have only recently been released on the market, so data were not yet available for inclusion in this report.

To determine an overall picture of medication use related to arthritis management, the following indicators were used.

Key measures

- Number of prescriptions for people aged 65 years and older for NSAIDs, corticosteroids, and DMARDs
- Number of people in Ontario aged 65 years and older per 1,000 population with prescriptions for each type of drug and stratified by DHC
- Total cost per year and mean cost per person for each type of drug from 1998 to 2001

Table 5.1 Specific drugs used in analyses

Non-steroidal Anti-inflammatories	Disease-modifying Antirheumatic Agents	Corticosteroids
Conventional	**Gold**	• Cortisone
• Diclofenac	• Auranofin	• Dexamethasone
• Diflunisol	• Aurothioglucose	• Hydrocortisone
• Etodolac	• Sodium aurothiomalate	• Methylprednisolone
• Fenoprofen	**Immunosuppressive Agents**	• Prednisolone
• Flurbiprofen	• Cyclosporine	• Prednisone
• Ibuprofen	• Azathioprine	• Triamcinolone
• Indomethacin	• Penicillamine	
• Ketoprofen	• Methotrexate	
• Ketorolac	**Non-immunosuppressive Agents**	
• Mefenamic Acid	• Hydroxychloroquine	
• Nabumetone	• Sulfasalazine	
• Naproxen	**Anti-malarial Drugs**	
• Oxaprozin	• Chloroquine	
• Piroxicam	**Other**	
• Sulindac	• Leflunomide	
• Tenoxicam		
• Tiaprofenic Acid		
• Tolmetin		
COX-2 Inhibitors		
• Celecoxib		
• Rofecoxib		

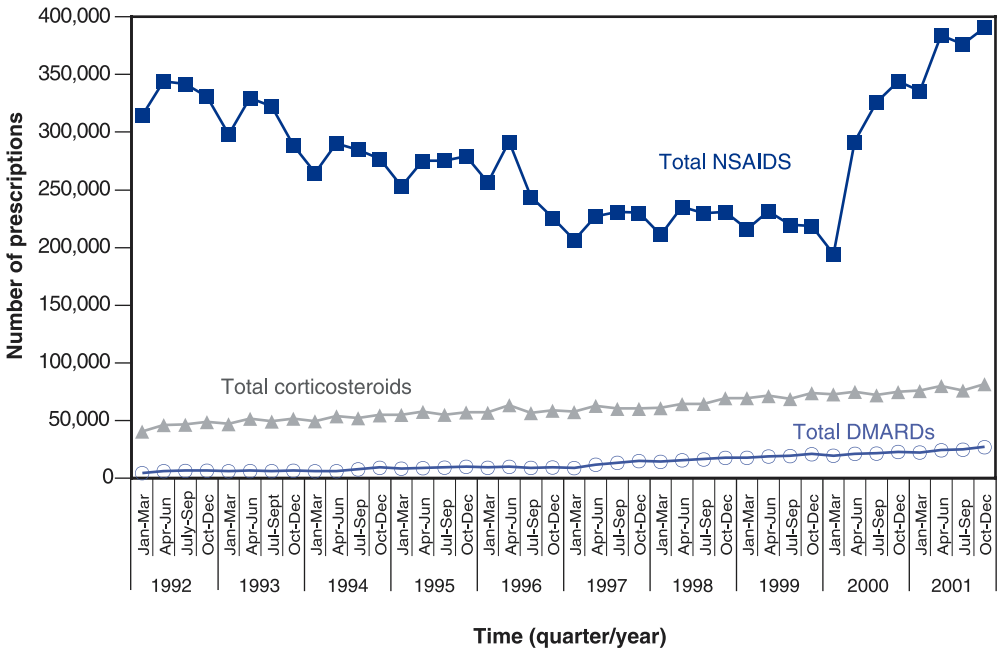
Findings and Discussion

Numbers of prescriptions written

All category drugs

5.1 Number of prescriptions written for non-steroidal anti-inflammatory drugs, corticosteroids, and disease-modifying antirheumatic drugs, for Ontario residents aged 65 years and older, 1992 to 2001

Note that the data for each of the three major drug categories were also examined as population rates with very similar results. NSAIDs were the most commonly prescribed of the arthritis-related medications, followed by corticosteroids. However, while DMARDs had the fewest number of prescriptions written, they are the most likely to have been written specifically for arthritis and related conditions.

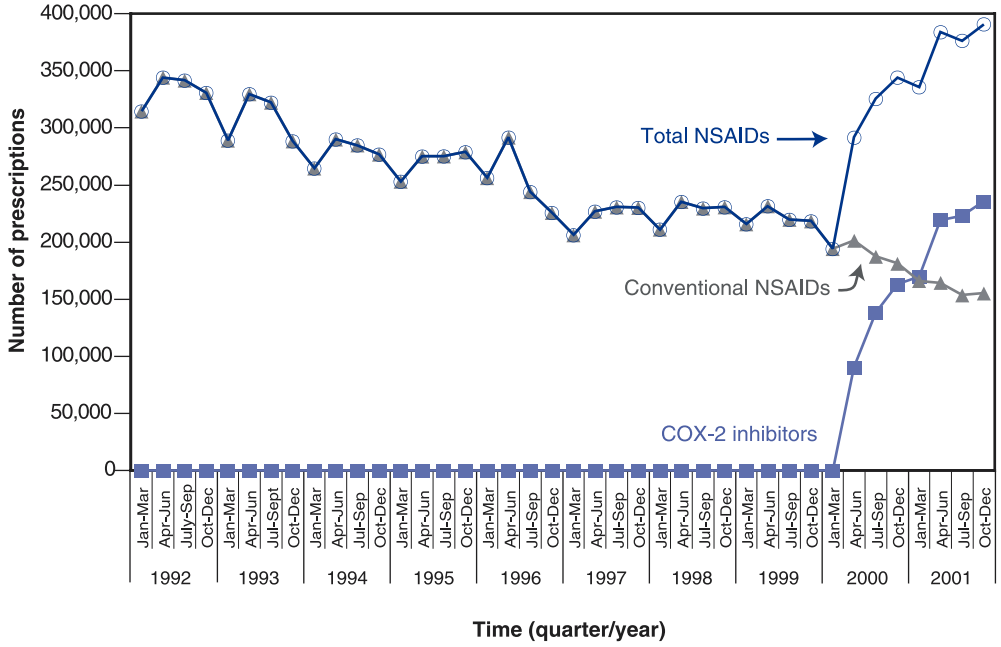


Data source: Ontario Drug Benefit Program

Non-steroidal anti-inflammatory drugs

5.2 Number of prescriptions written for overall and conventional non-steroidal anti-inflammatory drugs and COX-2 inhibitors for Ontario residents aged 65 years and older, 1992 to 2001

The number of prescriptions written for NSAIDs followed a steady pattern of decline from 1992 until the beginning of 2000. Following this, the number of prescriptions for conventional NSAIDs continued to decrease while the newly introduced COX-2 inhibitors began a steep rise in prescription numbers, which has continued until the present. In the last quarter of 2001, the total number of prescriptions for NSAIDs (conventional and COX-2 inhibitors) reached over 390,000. This surpassed the previous maximum of approximately 344,000, which was reached ten years earlier and over 235,000 (approximately 60%) of these prescriptions were for COX-2 inhibitors. Over the whole year of 2001, there were more than 844,000 prescriptions written for COX-2 inhibitors.

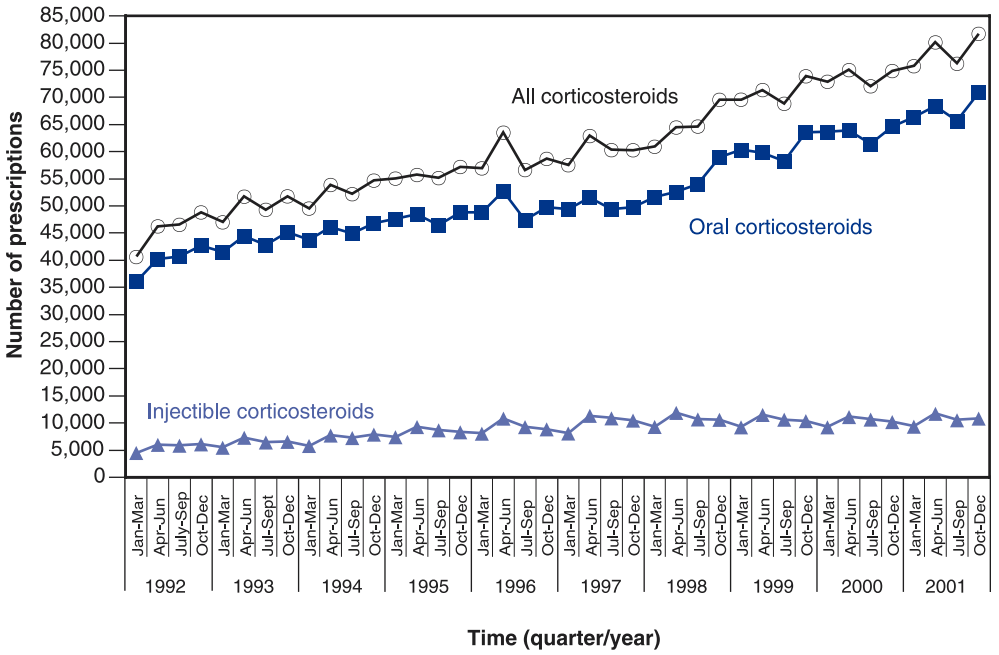


Data source: Ontario Drug Benefit Program

Corticosteroids

5.3 Number of prescriptions written for oral, injectable, and overall corticosteroids, for Ontario residents aged 65 years and older, 1992 to 2001

Corticosteroids were divided into two categories on the basis of their mode of administration—oral and injectable. The number of prescriptions written quarterly for the more commonly prescribed oral corticosteroids almost doubled over the ten year time period examined, ranging from 36,000 in the first quarter of 1992 to a maximum of nearly 71,000 during the final quarter of 2001. Injectable corticosteroids showed a fairly noticeable seasonal pattern, with the highest number of prescriptions being written in the months of April, May and June. Injectable corticosteroids also showed a steady increase over the time period, resulting in the overall (oral and injectable combined) number of corticosteroid prescriptions written during the year 2001 being just under 314,000.

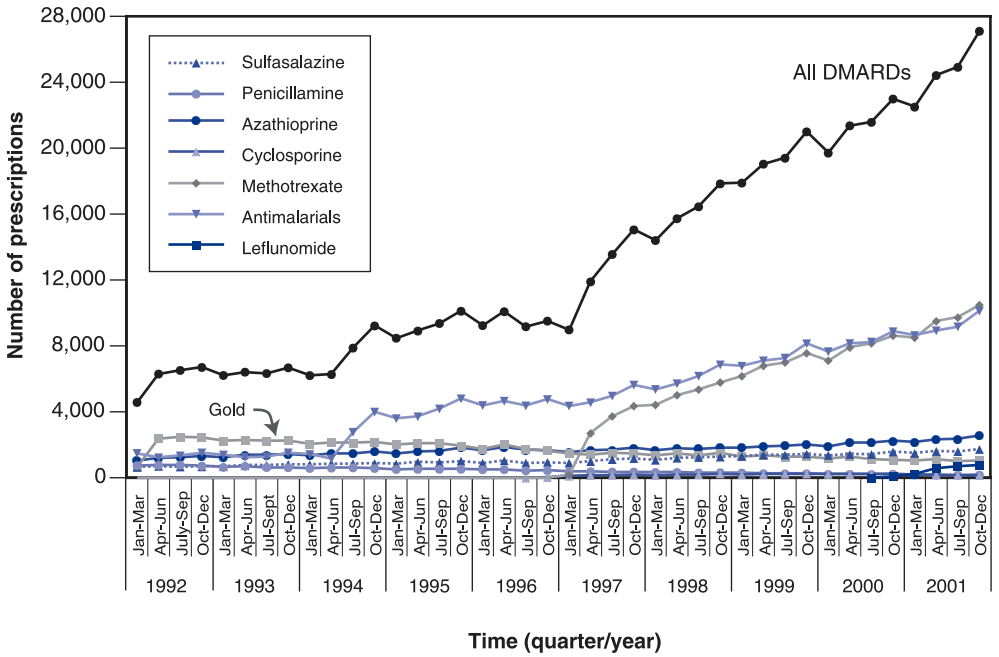


Data source: Ontario Drug Benefit Program

Disease-modifying antirheumatic drugs

5.4a Number of prescriptions written for overall and individual disease-modifying antirheumatic drugs, for Ontario residents aged 65 years and older, 1992 to 2001

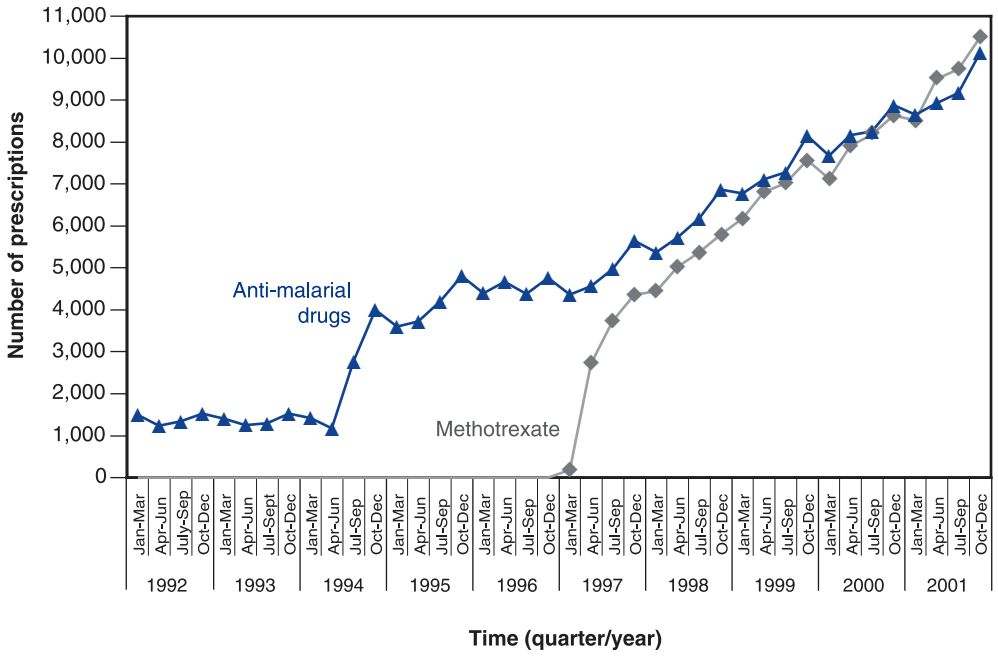
Eight individual groups of drugs were included in the DMARD category. Overall, the number of DMARD prescriptions increased sixfold over the 10 years of analysis, from 4,590 in the first quarter of 1992 to 27,118 during the last quarter of 2001. Over the whole year of 2001, there was a total of just under 99,000 prescriptions for DMARDs.



Data source: Ontario Drug Benefit Program

5.4b Number of prescriptions written for disease-modifying antirheumatic drugs with more than 3,000 prescriptions in any one annual quarter, for Ontario residents aged 65 years and older, 1992 to 2001

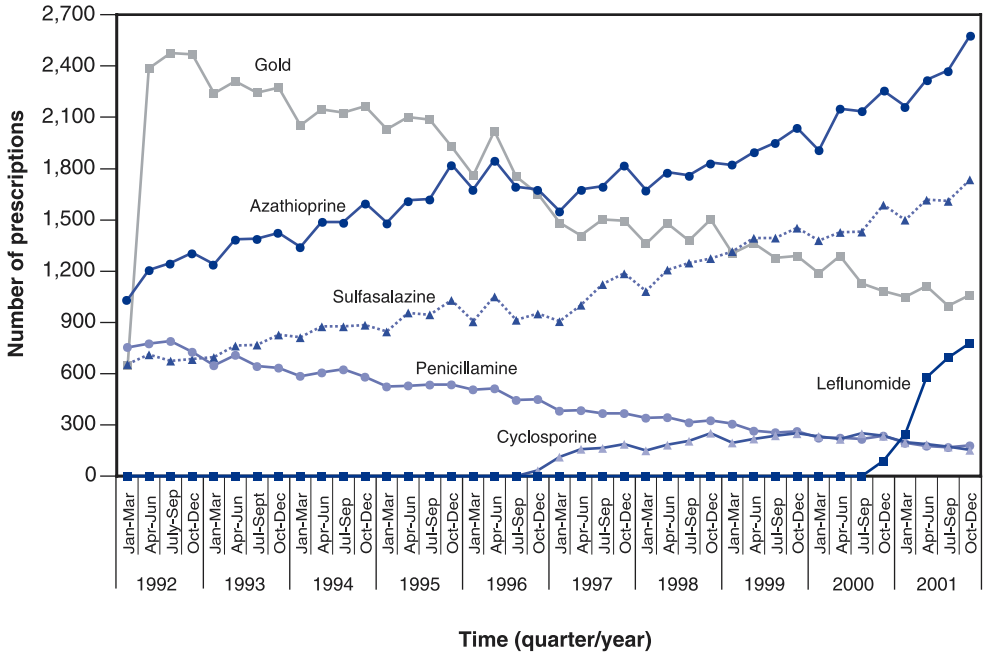
The two most commonly prescribed DMARDs were anti-malarial drugs and methotrexate (following 1996 when it was first included on the ODB formulary). Each of these medications had almost 11,000 prescriptions written during the last quarter of 2001.



Data source: Ontario Drug Benefit Program

5.4c Number of prescriptions written for disease-modifying antirheumatic drugs with fewer than 3,000 prescriptions in any one annual quarter, for Ontario residents aged 65 years and older, 1992 to 2001

The remaining DMARDs all had fewer than 2,600 prescriptions written for them in any one quarter of a year. Over the ten years, gold medications and penicillamine decreased in numbers, while azathioprine and sulfasalazine showed moderate increases. Cyclosporine appeared on the formulary in the last quarter of 1996 with 33 prescriptions and never reached more than 250 prescriptions in any quarter. Leflunomide only became available at the end of 2000 and became relatively popular, increasing from 89 prescriptions in its first few months to 779 prescriptions written in the final quarter of the following year.



Data source: Ontario Drug Benefit Program

Geographic variation

5.5 Number of people aged 65 years and older per 1,000 population with prescriptions for arthritis-related medications, by District Health Council, in Ontario, 2000/01

In 2000/01, 173 people per 1,000 population aged 65 years and older in Ontario had a prescription for a conventional NSAID, 111 per 1,000 had a prescription for a COX-2 inhibitor, 69 per 1,000 had a prescription for an oral or injectable corticosteroid and 12 per 1,000 had a DMARD prescription . There was moderate variation in the rate of use of these arthritis-related medications by DHC. Extremal quotients were 1.5 for the rate of use of conventional NSAIDs and COX-2 inhibitors, and were 1.4 and 1.6 for corticosteroids and DMARDs, respectively.

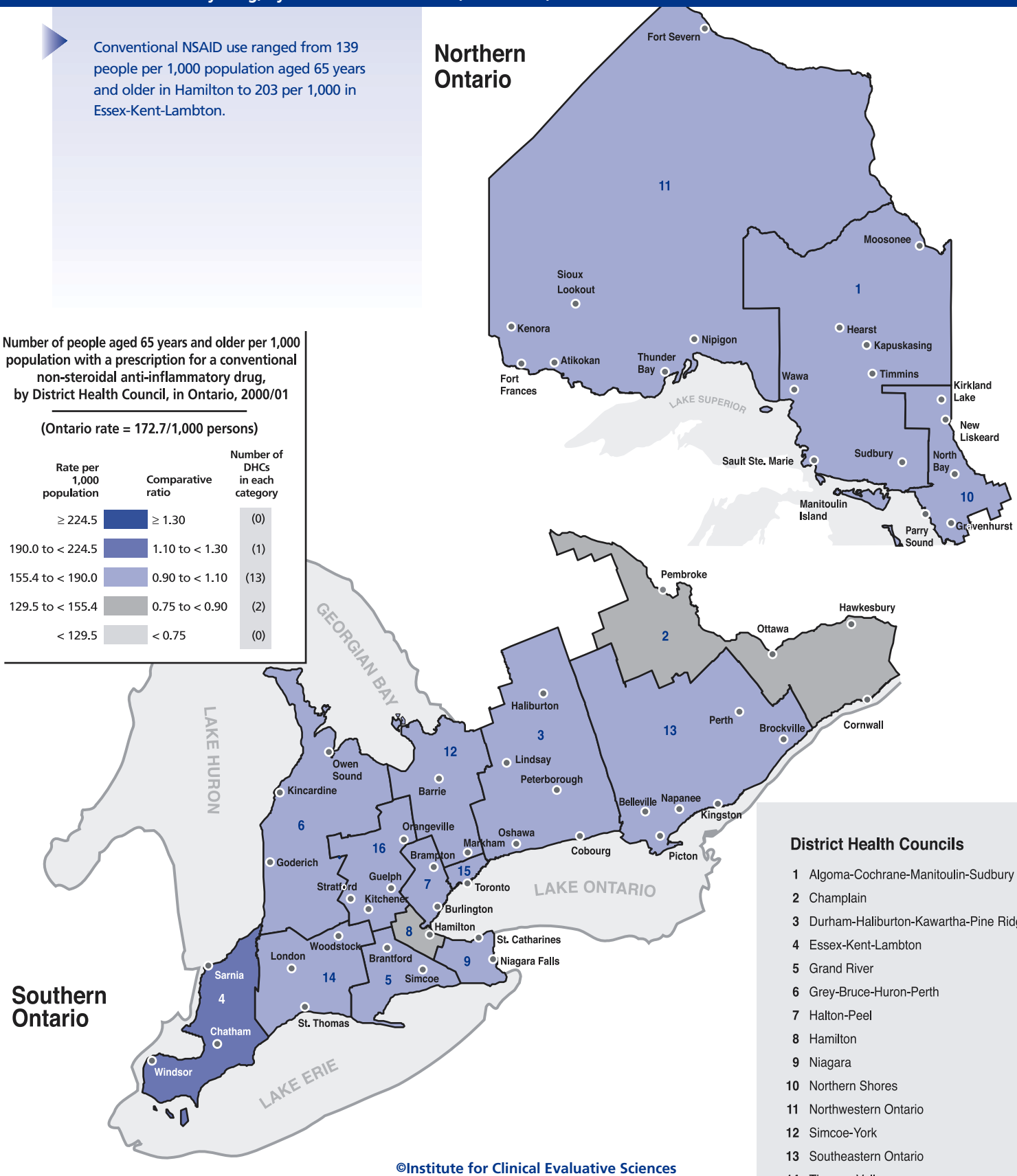
Number of People (65+) per 1,000 Population with a Prescription

District Health Councils	Conventional Non-steroidal Anti-inflammatory Drugs	COX-2 Inhibitors	Corticosteroids (oral and injectable)	Disease-modifying Antirheumatic Drugs
Algoma-Cochrane-Manitoulin-Sudbury	181.8	91.7	70.9	13.2
Champlain	149.6	110.1	71.1	13.4
Durham-Haliburton-Kawartha-Pine Ridge	168.3	95.8	73.2	13.0
Essex-Kent-Lambton	203.4	100.2	69.3	10.2
Grand River	172.1	141.0	78.9	11.1
Grey-Bruce-Huron-Perth	167.1	103.2	70.1	10.5
Halton-Peel	181.4	109.6	65.2	14.2
Hamilton	138.8	128.6	72.7	11.2
Niagara	180.5	101.2	75.1	8.9
Northern Shores	181.5	125.7	72.8	11.2
Northwestern Ontario	167.0	128.2	54.7	14.3
Simcoe-York	161.1	115.2	60.2	12.0
Southeastern Ontario	169.2	108.0	69.1	11.8
Thames Valley	164.1	112.5	66.4	10.7
Toronto	187.1	119.6	71.1	10.7
Waterloo Region-Wellington-Dufferin	156.2	91.1	56.1	11.6
Ontario	**172.7**	**111.0**	**68.6**	**11.6**

Data source: Ontario Drug Benefit Program

5.6 Number of people aged 65 years and older per 1,000 population with a prescription for a conventional non-steroidal anti-inflammatory drug, by District Health Council, in Ontario, 2000/01

Conventional NSAID use ranged from 139 people per 1,000 population aged 65 years and older in Hamilton to 203 per 1,000 in Essex-Kent-Lambton.



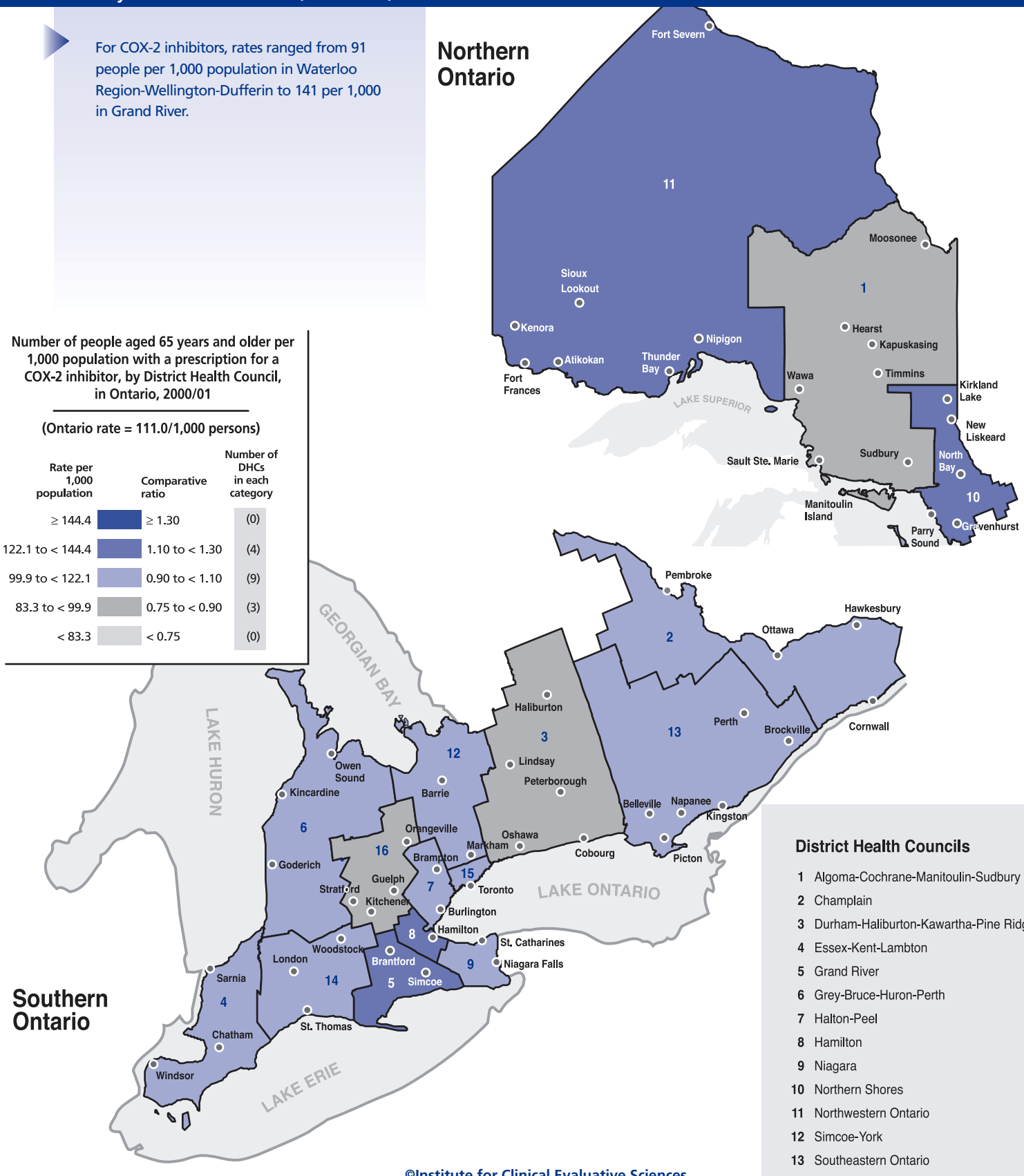
District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Data source: Ontario Drug Benefit Program

5.7 Number of people aged 65 years and older per 1,000 population with a prescription for a COX-2 inhibitor, by District Health Council, in Ontario, 2000/01

For COX-2 inhibitors, rates ranged from 91 people per 1,000 population in Waterloo Region-Wellington-Dufferin to 141 per 1,000 in Grand River.



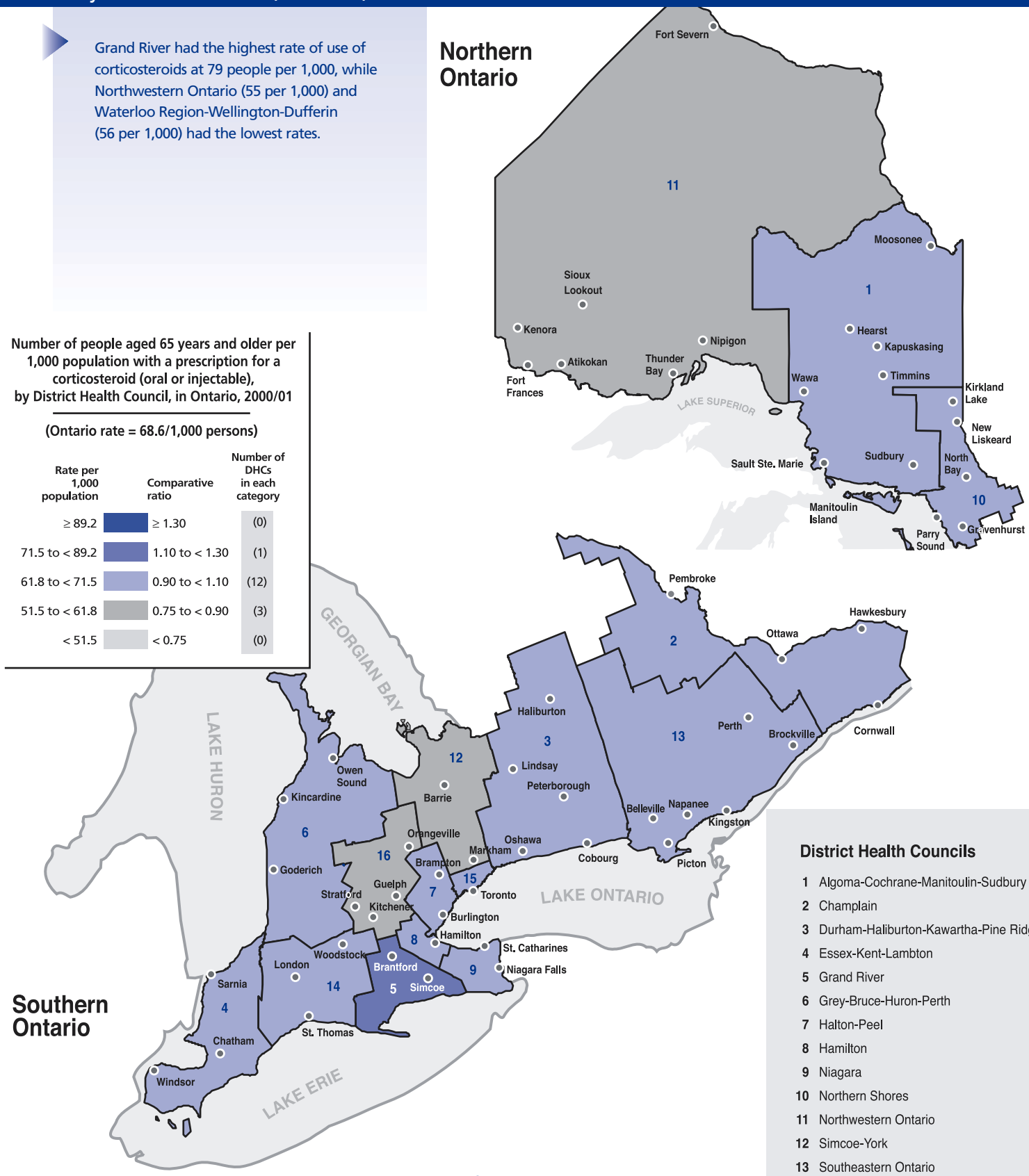
District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Data source: Ontario Drug Benefit Program

5.8 Number of people aged 65 years and older per 1,000 population with a prescription for a corticosteroid (oral or injectable), by District Health Council, in Ontario, 2000/01

Grand River had the highest rate of use of corticosteroids at 79 people per 1,000, while Northwestern Ontario (55 per 1,000) and Waterloo Region-Wellington-Dufferin (56 per 1,000) had the lowest rates.



Number of people aged 65 years and older per 1,000 population with a prescription for a corticosteroid (oral or injectable), by District Health Council, in Ontario, 2000/01

(Ontario rate = 68.6/1,000 persons)

Rate per 1,000 population	Comparative ratio	Number of DHCs in each category
≥ 89.2	≥ 1.30	(0)
71.5 to < 89.2	1.10 to < 1.30	(1)
61.8 to < 71.5	0.90 to < 1.10	(12)
51.5 to < 61.8	0.75 to < 0.90	(3)
< 51.5	< 0.75	(0)

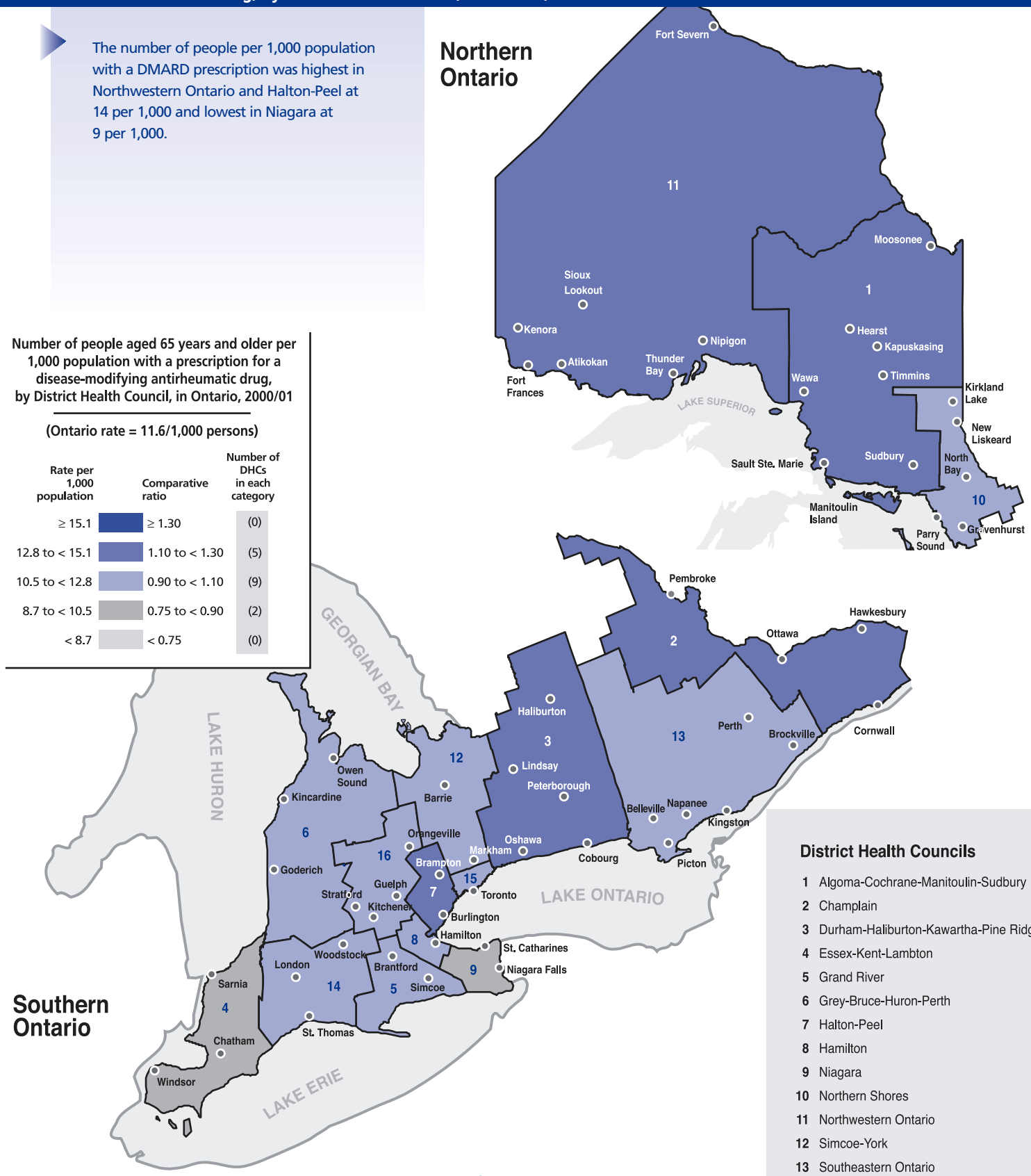
District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Data source: Ontario Drug Benefit Program

5.9 Number of people aged 65 years and older per 1,000 population with a prescription for a disease-modifying antirheumatic drug, by District Health Council, in Ontario, 2000/01

The number of people per 1,000 population with a DMARD prescription was highest in Northwestern Ontario and Halton-Peel at 14 per 1,000 and lowest in Niagara at 9 per 1,000.



District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Data source: Ontario Drug Benefit Program

Prescription costs

5.10 Cost to the Ontario government for arthritis-related prescriptions for people aged 65 years and older, 1998 to 2001

In 1998, the first year for which prescription cost data were available, the total cost of all arthritis-related prescriptions written was almost 19 million dollars. The majority of this (70%) was attributed to conventional NSAID prescriptions, followed by oral and injectable corticosteroids (combined=12%). However, the highest mean cost per person was seen for various DMARDs, primarily D-penicillamine ($428.94 per person) and azathioprine ($426.71 per person). Despite the introduction of COX-2 inhibitors the following year, little change was seen in overall prescription costs, as only a limited number of COX-2 inhibitor prescriptions were dispensed in 1999 and these numbers were offset by a decrease in the cost of some of the conventional NSAIDs and certain DMARDs.

In 2000, however, the total cost of arthritis-related prescriptions more than tripled from the previous year, reaching more than $52.6 million. The majority of this change was due to COX-2 inhibitors, which cost the Ontario government almost $37 million. Between 2000 and 2001, the number and cost of COX-2 prescriptions continued to rise, pushing the total cost to more than $60 million. Overall, the cost of arthritis-related medications increased by 224% between 1998 and 2001.

	Total Cost (mean cost per person)				
	1998	1999	2000	2001	% Change (1998 to 2001)
Disease-modifying Antirheumatic Drugs	$	$	$	$	
Anti-malarial drugs	1,212,251.69 (166.17)	1,456,918.45 (182.86)	1,649,506.09 (193.83)	1,788,396.03 (206.19)	47.5 24.1
Methotrexate	972,187.18 (174.95)	1,314,492.50 (198.58)	1,587,191.97 (207.23)	1,642,413.53 (192.33)	68.9 9.9
Azathioprine	652,318.38 (426.71)	474,220.59 (292.67)	518,711.06 (290.70)	573,840.18 (308.72)	-12.0 -27.7
Sulfasalazine	119,012.75 (94.30)	134,066.81 (98.92)	147,769.73 (101.71)	159,825.74 (106.13)	34.3 12.5
D-Penicillamine	104,530.63 (428.94)	90,508.16 (404.55)	75,617.68 (385.82)	66,163.95 (396.21)	-36.7 -7.6
Gold	406,045.29 (278.18)	378,151.04 (274.59)	341,948.93 (279.36)	298,868.16 (270.51)	-26.4 -2.8
Conventional NSAIDs	13,056,675.47 (60.62)	11,496,562.02 (57.88)	9,173,438.15 (54.05)	7,372,191.30 (52.23)	-43.5 -13.8
COX-2 Inhibitors	0.00 (0.00)	16,809.67 (166.80)	36,953,316.15 (226.11)	46,116,772.89 (275.40)	N/A N/A
Corticosteroids					
Oral	1,551,816.50 (21.04)	1,559,216.40 (20.16)	1,603,752.10 (20.86)	1,784,917.60 (23.17)	15.0 10.1
Injectable	598,849.55 (20.02)	589,761.71 (19.73)	605,240.51 (20.35)	625,229.55 (20.03)	4.4 0.0
Total	**18,673,687.44**	**17,510,707.35**	**52,656,492.37**	**60,428,618.93**	**223.6**

Data source: Ontario Drug Benefit Program

Conclusions

Three of the five main categories of drugs for treating arthritis have been discussed here—NSAIDs (conventional and COX-2 inhibitors), corticosteroids, and DMARDs. Biologics are the newest arthritis drugs which early research has suggested show promise for markedly reducing disease progression, although data on the use of these drugs in Ontario were not yet available for inclusion in this chapter. Analgesics are commonly used to treat the pain associated with arthritis and related conditions. However, these drugs are available without a prescription, so their use is not captured by the ODB database and they could not be included in this analysis.

Pharmaceutical methods for treating arthritis have changed dramatically over the past century, largely corresponding with the development of new medications, such as acetylsalicylic acid (aspirin) in 1899, gold salts in 1927, and corticosteroids in 1948. One of the more recent concepts in arthritis treatment is that of early intervention with DMARD therapy, an idea that has gained popularity over the past decade. Up until the mid-1970s the preferred method for treating RA was the therapeutic "pyramid", whereby the patient was first treated with a well tolerated but less effective drug, and then escalated to a more effective, albeit less well tolerated drug if the initial response was not satisfactory.[30]

During the past two decades, however, it has become clear that early treatment with DMARDs may alter the course of the disease and delay the onset of long-term joint damage.[18,19,20] Therefore, this therapeutic "pyramid" has now been inverted and the use of DMARDs is now begun as soon as a definite diagnosis of RA is established.[31] This can be seen in the graphs in this chapter by the steady climb in the number of DMARD prescriptions written each year.

Nevertheless, the overall rate of provision of these drugs falls well short of the estimated prevalence of RA and there is regional variation in the rate of their prescription. The percentage of the population aged 65+ years with a DMARD prescription in 2000 was approximately 1.2%. The prevalence of RA for this age group is estimated to be almost double this amount.[32] This raises concern about the adequacy of care provided to these patients.

Rheumatologists have been shown to be more likely to prescribe DMARDs than primary care physicians.[33] Findings in Chapter 4 indicate that only one-third of individuals in Ontario who consulted a physician about RA in 2000/01 saw a rheumatologist at least once. Additionally, the availability of rheumatological services was found to vary greatly by region in Chapter 3 and was found to be fairly static over time, suggesting declining levels of provision per individual with arthritis. Barriers to accessing appropriate care for RA need to be further investigated and addressed.

In recent years, the efficacy of new prescription medications to treat arthritis, such as biologics, has greatly increased, and along with this improvement has come a large increase in cost. In this analysis, total cost of arthritis-related medications for those over 65 years of age was found to have increased by 224% between 1998 and 2001. This will continue to grow with the trend toward combination DMARD therapy and use of the new biologic drugs, which were not included here. Annual drug costs per patient treated with the biologic drugs infliximab or etanercept are estimated at over $12,500 USD, with total treatment costs at approximately $18,000 USD for infliximab and $12,600 USD for etanercept.[34]

There are new drugs for osteoarthritis (OA) on the horizon, including those to prevent progression in early OA and disease-modifying drugs for established OA. The availability of these drugs will increase the pool of people for whom drug treatment is appropriate and costs will be staggering, given the high prevalence and chronicity of the disorder. However, when considering the economic cost of arthritis, the direct costs (such as hospitalization and medications) are far less than the indirect costs caused by lost wages and production loss due to disability.[35,36] In fact, the total cost of drugs—including the management of drug toxicity—constitutes only 15% to 20% of the direct costs of arthritis.[35,36] Given the considerable economic burden of arthritis (estimated to be in excess of $4.4 billion for all of Canada in 1998),[37] drug therapy has the potential for significant economic benefit especially if such therapy can be shown to reduce the costs associated with disability, loss of productivity and premature mortality.[36,38] Therefore, pharmacoeconomic analysis of new arthritis drugs should play a major role in determining whether the ODB will include specific drugs on the formulary.

Data has been presented on prescribing patterns of arthritis-related medications for Ontario. It is apparent from the findings that these patterns have varied across time and to a moderate extent, across regions. Some of the observed increases/decreases in prescriptions may be a result of changes in the ODB plan and formulary over time. The findings in this chapter indicate that trends in the use of arthritis-related drugs have continued to change since the 1998 edition of this ICES research atlas. One of the most notable findings is the high rate of prescriptions for the recently developed COX-2 inhibitors and the subsequent great increase in the total cost of arthritis-related medication as a result. This chapter also examines the prescribing patterns of DMARDs for the first time. This is particularly relevant, as one of the most important challenges for arthritis care is ensuring access to the medications that are more effective at preventing joint damage, such as DMARDs and the newly developed biologic drugs.

Appendix

5.A How the research was done

Data sources

Data were obtained from the Ontario Drug Benefit (ODB) program database for the years 1992 to 2001, inclusive. The Drug Programs Branch of the Ontario Ministry of Health and Long-Term Care administers the ODB, which provides access to all drugs on the program's formulary to Ontario residents who are over the age of 65. The ODB formulary identifies drug products designated as benefits under the program, as well as those brands of drugs that are considered to be interchangeable, and serves as a prescribing and reimbursement guide for doctors and pharmacists. Although it is not 100% comprehensive, the ODB currently covers over 2,500 drug products. Products listed in the ODB formulary are reviewed on a continuous cycle.

Every drug product in Canada that is approved for use by Health Canada's Therapeutic Products Directorate is assigned a unique Drug Identification Number (DIN) which can be found through Health Canada's Drug Product Database (DPD). The information on the DPD is updated on a weekly basis. In addition to the DIN, the prescription claims data submitted to the ODB each contain the date the prescription was filled, the quantity of drug dispensed, the total cost of the prescription, the professional fees included in the total cost, and the unique identifying numbers for the beneficiary, prescriber and dispenser. Drug costs for seniors who reside in chronic care institutions, rehabilitation facilities, or acute-care hospitals are paid out of the budget for these institutions, so these data were not available for inclusion in the study.

Analyses

Arthritis-related medications—namely the major categories of NSAIDs (separated into conventional and COX-2 inhibitors), corticosteroids, and DMARDs—were identified through a review of the literature and in consultation with both a rheumatologist and pharmacologist. Claims that involved these arthritis-related drugs were identified by their unique DIN in the ODB program dataset. See Table 5.1 (page 89) for the list of drug names and categories that were included in the analyses.

The number of people aged 65 years and older with a prescription for each of the arthritis-related drugs was extracted for the years 1992–2001. The total number of prescriptions written was determined quarterly for NSAIDS (conventional and COX-2 inhibitors), corticosteroids (oral and injectable) and DMARDS. The number of prescriptions was also determined for the specific types of DMARDS. For fiscal year 2000/01 (April 1, 2000 to March 31, 2001), the number of people aged 65 years and older per 1,000 population with a prescription for conventional NSAIDs, COX-2 inhibitors, corticosteroids (oral or injectable) and DMARDs was determined for each of the 16 District Health Councils (DHCs) in Ontario. Population denominators for rates were obtained from Statistics Canada census data; intercensal estimates based on 1996 and 2001 census data were used. Comparative ratios for rates (ratio of DHC rate to the overall Ontario rate) were calculated and displayed as maps. The degree of regional variation was also quantified using the extremal quotient (ratio of the highest to the lowest rate).

Data were also obtained on the total cost to the Ontario government for arthritis-related medications for the years 1998 to 2001, which was the only period for which cost data were available. Total cost per year and the mean cost per person were calculated for DMARDs (6 types), conventional NSAIDs, COX-2 inhibitors and corticosteroids (oral and injectable), as well as for all of these medications combined. The percentage change in the total cost and the mean cost per person from 1998 to 2001 was also determined for each drug grouping.

Limitations

Changes to the ODB have taken place over the period during which the analyses were carried out and these changes may have affected the results in this chapter. These changes include the introduction of co-payments by the provincial government in 1996. Prior to this, the ODB program covered the full cost of all prescriptions outlined in the formulary. With the implementation of co-payments, individuals over the age of 65 years with annual incomes above a certain cut-off must pay an initial deductible of $100 and approximately $6 per prescription above the deductible. Following this policy change, many seniors began to substitute less expensive over-the-counter medications for their prescriptions. This was found to be particularly true for NSAIDs, as shown in the 1998 ICES atlas on *Patterns of Health Care in Ontario: Arthritis and Related Conditions* in the chapter on Use of Medication for Arthritis and Related Conditions.[29] Data on costs for prescription medications in this chapter does not include the cost of co-payments incurred by individuals.

Other changes to the ODB include the delisting of certain formulary drugs (i.e. ibuprofen without a prescription), and the inclusion of newly discovered and/or developed drugs on the formulary. This was particularly evident for the introduction of COX-2 inhibitors in 1999. The inclusion of recently developed drugs has also had a noticeable effect on the pattern of DMARD prescribing; a pattern which will likely continue as research into DMARDs and biologics results in further drug discoveries. Additionally, there are often restrictions in the ODB on the prescription of new drugs, such that they are only included in the formulary for individuals who meet specific criteria or those who have obtained special permission. Data on the use of such drugs will show large increases, once these restrictions are lifted.

Another limitation of the data presented in this chapter is that no data were available relating to diagnoses associated with each of the prescriptions written. Since many of the drugs are used to treat multiple conditions (e.g. methotrexate can also be used in the treatment of certain cancers, cyclosporine is used to prevent rejection following organ transplants and steroids are used for many conditions including allergic reactions, asthma, inflammatory bowel disease and many autoimmune diseases), it is possible that the prescriptions included in these analyses were, in fact, written for non-arthritis conditions.

References

1. Buckley CD. Science, medicine, and the future. Treatment of rheumatoid arthritis. *BMJ* 1997; 315: 236–238.

2. Hochberg MC, Altman RD, Brandt KD et al. Guidelines for the medical management of osteoarthritis. Part I. Osteoarthritis of the hip. American College of Rheumatology. *Arthritis Rheum* 1995; 38:1535–1540.

3. Hochberg MC, Altman RD, Brandt KD et al. Guidelines for the medical management of osteoarthritis. Part II. Osteoarthritis of the knee. American College of Rheumatology. *Arthritis Rheum* 1995; 38:41–66.

4 Hernandez-Diaz S, Garcia-Rodriguez LA. Epidemiologic assessment of the safety of conventional nonsteroidal anti-inflammatory drugs. *Am J Med* 2001; 110 Suppl 3A:20S–7S.

5. Silverstein FE, Faich G, Goldstein JL et al. Gastrointestinal toxicity with celecoxib vs. nonsteroidal anti-inflammatory drugs for osteoarthritis and rheumatoid arthritis. The CLASS study: a randomized controlled trial. Celecoxib long-term arthritis safety study. *JAMA* 2000; 284: 1247–1255.

6. Osiri M, Moreland LW. Specific cyclooxygenase 2 inhibitors: a new choice of nonsteroidal anti-inflammatory drug therapy. *Arthritis Care Res* 1999; 12:351–362.

7. Cannon GW, Breedveld FC. Efficacy of cyclooxygenase-2-specific inhibitors. *Am J Med* 2001; 110 Suppl 3A:6S–12S.

8. Whelton A, Maurath CJ, Verburg KM et al. Renal safety and tolerability of celecoxib, a novel cyclooxygenase-2 inhibitor. *Am J Ther* 2000; 7:159–175.

9. Wright JM. The double-edged sword of COX-2 selective NSAIDs. *CMAJ* 2002; 167:1131–1137.

10. Howes LG, Krum H. Selective cyclo-oxygenase-2 inhibitors and myocardial infarction: how strong is the link? *Drug Saf* 2002; 25:829–835.

11. Neeck G. Fifty years of experience with cortisone therapy in the study and treatment of rheumatoid arthritis. *Ann NY Acad Sci* 2002; 966:28–38.

12. Caldwell JR. Intra-articular corticosteroids. Guide to selection and indications for use. *Drugs* 1996; 52:507–514.

13. Jones G, Halbert J, Crotty M et al. The effect of treatment on radiological progression in rheumatoid arthritis: a systematic review of randomized placebo-controlled trials. *Rheumatology* (Oxford) 1999; 42:6–13.

14. Laan RF, Jansen TL, van Riel PL. Glucocorticosteroids in the management of rheumatoid arthritis. *Rheumatology* (Oxford) 1999; 38:6–12.

15. van Staa TP, Leufeken HG, Cooper C. The epidemiology of corticosteroid induced osteoporosis: a meta-analysis. *Osteoporosis Int* 2002; 13:777–787.

16. Cooper C, Coupland C, Mitchell M. Rheumatoid arthritis, corticosteroid therapy and hip fracture. *Ann Rheum Dis* 1995; 54:49–52.

17. Verstraeten A, Dequeker J. Vertebral and peripheral bone mineral content and fracture incidence in postmenopausal patients with rheumatoid arthritis: effect of low dose corticosteroids. *Ann Rheum Dis* 1986; 45:852–857.

18. Quinn MA, Conaghan PG, Emery P. The therapeutic approach of early intervention for rheumatoid arthritis: what is the evidence? *Rheumatology* (Oxford) 2001; 40:1211-1220.

19. Munro R, Hampson R, McEntegart A et al. Improved functional outcome in patients with early rheumatoid arthritis treated with intramuscular gold: results of a five-year prospective study. *Ann Rheum Dis* 1998; 57:88–93.

20. Egsmose C, Lund B, Borg G et al. Patients with rheumatoid arthritis benefit from early 2nd line therapy: 5-year followup of a prospective double blind placebo controlled study. *J Rheumatol* 1995; 22:2208–2213.

21. Schiff M. Emerging treatments for rheumatoid arthritis. *Am J Med* 1997; 102:11S–5S.

22. Wolfe F. The epidemiology of drug treatment failure in rheumatoid arthritis. *Baillieres Clin Rheumatol* 1995; 9:619–632.

23. Calguneri M, Pay S, Caliskaner A et al. Combination therapy versus monotherapy for the treatment of patients with rheumatoid arthritis. *Clin Exp Rheumatol* 1999; 17:699–704.

24. Mottonen T, Hannonen P, Leirisalo-Repo M et al. Comparison of combination therapy with single-drug therapy in early rheumatoid arthritis: a randomised trial. *Lancet* 1999; 353:1568–1573.

25. Mikuls TR, O'Dell J. The changing face of rheumatoid arthritis therapy: results of serial surveys. *Arthritis Rheum* 2000; 43:464–465.

26. Menninger H. Basic therapeutic combination therapy in chronic poly-arthritis: an overview. *J Rheumatol* 1998; 57:25–30.

27. van den Borne BE, Landewe RB, Goei The HS et al. Combination therapy in recent onset rheumatoid arthritis: a randomized double blind trial of the addition of low dose cyclosporine to patients treated with low dose chloroquine. *J Rheumatol* 1998; 25:1493–1498.

28. Li E, Brooks P, Conaghan PG. Disease-modifying antirheumatic drugs. *Curr Opin Rheumatol* 1998; 10:159–168.

29. Kirshen AJ. Use of medications for arthritis and related conditions. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis & related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998. 93–110.

30. Fries JF. Current treatment paradigms in rheumatoid arthritis. *Rheumatology* (Oxford) 2000; 39 Suppl 1:30–5.

31. Guidelines for the management of rheumatoid arthritis. American College of Rheumatology Ad Hoc Committee on Clinical Guidelines. *Arthritis Rheum* 1996; 39:713–722.

32. Lawrence RC, Helmick CG, Arnett FC et al. Estimates of the prevalence of arthritis and selected musculoskeletal disorders in the United States. *Arthritis Rheum* 1998; 41:778–799.

33. Criswell LA, Such CL, Yelin EH. Differences in the use of second-line agents and prednisone for treatment of rheumatoid arthritis by rheumatologists and non-rheumatologists. *J Rheumatol* 1997; 24: 2283–2290.

34. Nuijten MJ, Engelfriet P, Duijn K et al. A cost-cost study comparing etanercept with infliximab in rheumatoid arthritis. *Pharmacoeconomics* 2001; 19:1051–1064.

35. Maetzel A, Strand V, Tugwell P et al. Cost-effectiveness of adding leflunomide to a 5-year strategy of conventional disease-modifying antirheumatic drugs in patients with rheumatoid arthritis. *Arthritis Rheum* 2002; 47:655–661.

36. Tugwell P. Pharmacoeconomics of drug therapy for rheumatoid arthritis. *Rheumatology* (Oxford) 2000; 39 Suppl 1:43–47.

37. Stokes J, Desjardins S, Perruccio A. The burden of arthritis in Canada: economic burden. In: Badley EM, Desmeules M, editors. Arthritis in Canada: an ongoing challenge. Ottawa: Health Canada; 2003.

38. Callahan LF. The burden of rheumatoid arthritis: facts and figures. *J Rheumatol Suppl* 1998; 53:8–12.

INSIDE

6

Chapter

Surgical Services

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Key Messages

Arthroscopic knee surgery

- The provincial age and sex standardized rate of all arthroscopic knee procedures was 200 per 100,000 population in 2001/02, a decrease of 10% between 1992/93 and 2001/02.
- The most common type of knee arthroscopic procedure performed was debridement alone, followed by menisectomy with or without debridement. The rates of debridement dropped between 1992/93 and 2001/02, while the rates of menisectomy with or without debridement increased.
- The rate of all arthritis-related knee arthroscopic procedures for both men and women increased with age up to the 55–64 year age group for women, and up to 45–64 year age group for men.
- The rate of all arthroscopic knee procedures varied by District Health Council (DHC), with the highest rate 3.3 times the lowest. The rates decreased for all but two DHCs between 1992/93 and 2001/02.
- The exact role of arthroscopy in the management of osteoarthritis of the knee remains unclear and warrants further investigation.

Total joint replacements

- During the 1990s, the numbers of surgical procedures increased, on average, 6.6% for total knee replacements (TKR) and 4.1% for total hip replacements (THR) annually.
- There was geographic variation in THR and TKR rates by DHC in Ontario. The highest rate was 1.5 times the lowest rate for THRs and a two-fold variation existed between the high and low rates for TKR.

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Introduction

Although most care for arthritis and related conditions takes place in ambulatory care settings, people with arthritis are admitted to hospital for surgical and non-surgical reasons more frequently than individuals without arthritis.[1] For individuals with arthritis for whom non-surgical modalities have failed to adequately control the condition, surgical intervention can often relieve pain and restore function. Arthritis-related procedures comprise the majority of orthopaedic surgery.

This chapter focuses on arthroscopic knee surgery, total hip and knee replacement surgery (arthroplasty) and the challenges involved in increasing access to joint replacement surgery.

Background

Each year almost 44,000 surgical procedures are carried out in Ontario specifically for arthritis and related disorders (see Figure 6.1). Taken together, hip and knee joint replacement and arthroscopic knee surgery represent more than 80% of the total, with arthroscopic knee surgery (keyhole surgery) alone accounting for almost half of all surgical procedures.

Arthroscopic knee surgery

Arthritis-related surgical procedures of the knee, specifically arthroscopic procedures, are a key focus for two reasons. First, the knee is the most commonly operated on joint for arthritis and related reasons.[1] Second, the majority of orthopaedic surgeries of the knee, with the exclusion of knee replacements, are performed arthroscopically. Knee damage requiring arthroscopic surgery can be caused by the degenerative processes of arthritis or by injury.

Many orthopaedic procedures performed in the past with open techniques can now be performed arthroscopically. The advantages of the arthroscopic approach over open surgery include fewer complications, less rehabilitation time, and ability to perform the procedure in an outpatient setting.[2] The large number of arthroscopic procedures of the knee allows detailed examination of variation in rates of surgery by geographic area.

For this report, the arthritis-relevant arthroscopic procedures have been categorized into three groups:

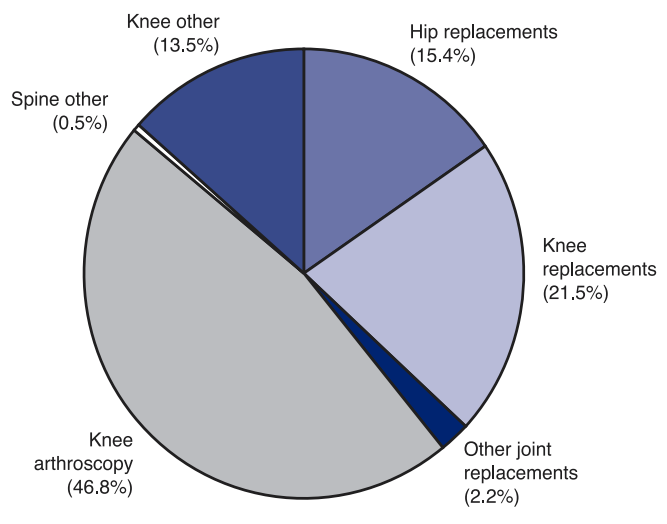
1. Menisectomy with or without debridement;
2. Debridement without menisectomy; and,
3. Other arthritis-related arthroscopic procedures.

Debridement refers to the trimming off of flaps and tears in the articular cartilage and the removal of loose debris within the knee joint. Menisectomy involves the removal of unstable tears of the meniscus of the knee.

Debridement, including menisectomy, has been shown to be very effective in treating damage caused by injury.[3] The long-term benefits of debridement for individuals with degenerative damage of the knee remain unclear,[4] with improvement demonstrated by some

- From 1993/94 to 2001/02, median wait times for surgery increased from 20 weeks to 29 weeks for primary total knee replacement (primary TKR) and from 16 weeks to 20 weeks for primary total hip replacement (primary THR). In 2001/02, 59% of primary THR and 47% of primary TKR were performed within preferred wait times, while one-fifth of patients with primary THRs and 29% of patients with primary TKRs waited more than 12 months for surgery.
- There remains unmet need for TJR and the demand is likely to increase with the aging of the population and an associated increase in the number of people with arthritis.[1] Women and people with less education and/or lower income were more likely to have potential unmet need.[26,27]
- Strategies to reduce wait times and ensure those most in need get priority for surgery are urgently needed in the short-term. In the longer term, it is essential to increase the capacity for TJR. For this, the supply of orthopaedic surgeons and access to resources such as operating rooms, prostheses, anesthetists, nurses, hospital beds, and post-operative rehabilitation are crucial.

Figure 6.1 Arthritis-relevant orthopaedic procedures in Ontario, 2000



Data source: Canadian Institute for Health Information

studies[5,6] but not others.[7,8] In a recent study, the outcomes of patients with osteoarthritis (OA) of the knee that underwent arthroscopic debridement were no better than those that had a placebo procedure.[7] However, the full range of the population with OA and meniscal tears of the knee was not addressed in this study. In addition, the patient's clinical features appear to be an important determinant of the effectiveness of the surgery in restoring function or relieving pain. Arthroscopic surgery has been less successful in patients with joint malalignment, joint instability, long duration of symptoms or patients with extensive knee arthritis.[9–13] The exact role of arthroscopy in the management of OA of the knee remains unclear.

Although the long-term benefits of debridement and the other arthroscopic procedures of the knee are not clear, many surgeons view arthroscopic knee procedures as providing the short-term benefits necessary to delay the need for knee replacement surgery.[14–16] This is particularly relevant for individuals for whom knee replacement surgery would pose significant problems or for whom revision surgery is likely to be required within their lifetime, for example, in those under 50 years of age.

Total joint replacements

Total joint replacements (TJR) of hips and knees are among the most commonly performed of all surgical procedures in Ontario. In fiscal year 2001/02, there were 8,000 total hip replacements and 11,000 total knee replacements for arthritis and related conditions in Ontario. The majority of TJRs are due to OA, a leading cause of long-term disability that typically destroys the articular cartilage and underlying bones of the hips, knees, spine, and small joints of the hand and feet. TJRs are established, cost-effective treatments for advanced hip and knee OA.[17–19]

The Institute for Clinical Evaluative Sciences (ICES) has been tracking the provision of TJRs for the past ten years.[20–25] The rates of TJRs continue to increase over time, as do the wait times. In this report, THR and TKR trends are updated, regional variations in rates are shown and wait times by District Health Council (DHC) are examined. Much has been said about the aging of the population and the implications of growing numbers of elderly on the uses of health services. We project the potential demand for TJRs over the next 15 years, taking into account both the increases in rates and the aging of the population, and outline the implications for managing waiting lists and wait times.

The provision of TJRs is a priority program for the Ministry of Health and Long-Term Care (MOHLTC). The Ministry is working with orthopaedic surgeons and hospitals in Ontario to address the dual challenges of the demand for TJRs and reducing the waiting lists and wait times for the procedures. Later in this chapter, the potential impact of the policies and procedures for managing waiting lists and wait times in Ontario and elsewhere is examined.

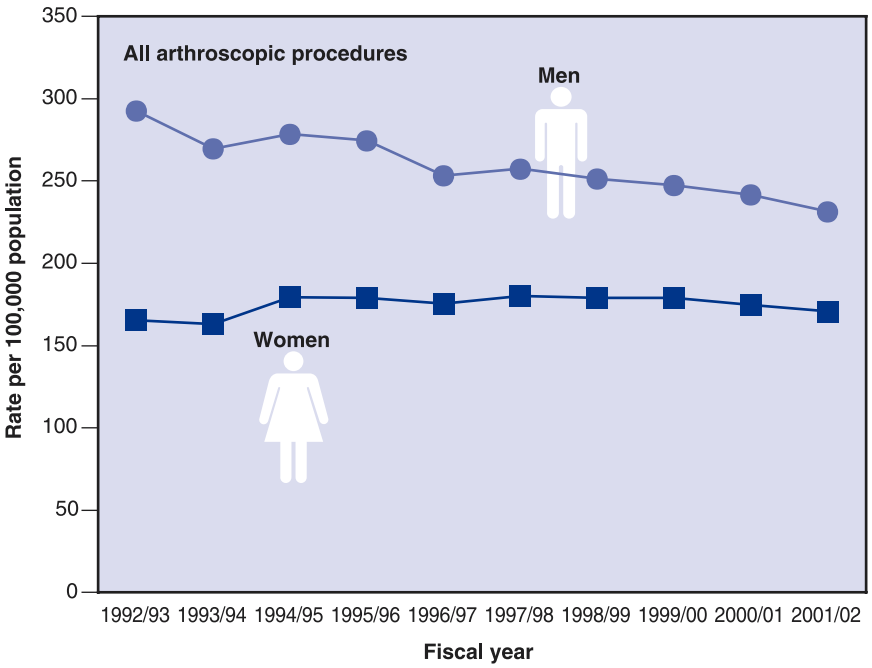
Findings and Discussion

Arthroscopic knee procedures

Variation by age and sex

6.1 Age standardized rate of all arthroscopic procedures per 100,000 population aged 15 years and older, in Ontario, 1992/93 to 2001/02

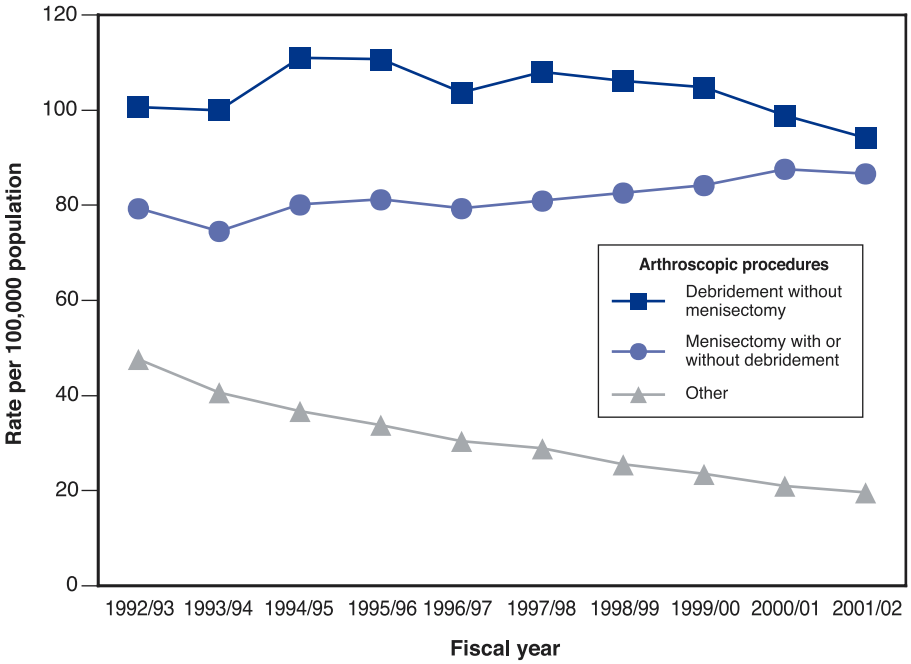
In Ontario in 2001, the provincial age and sex standardized rate of all knee arthroscopic procedures was 200 per 100,000 population, a decrease of approximately 10% since 1992/93. Although rates for men in 2001/02 were approximately 35% higher than the rates for women, the gender difference had narrowed since 1992/93, resulting in a 26% decrease in rates for men and a 3% increase in the rates for women.



Data sources: Ontario Health Insurance Plan; Registered Persons Database; Statistics Canada

6.2 Age and sex standardized rate of arthroscopic procedures per 100,000 population aged 15 years and older, in Ontario, 1992/93 to 2001/02

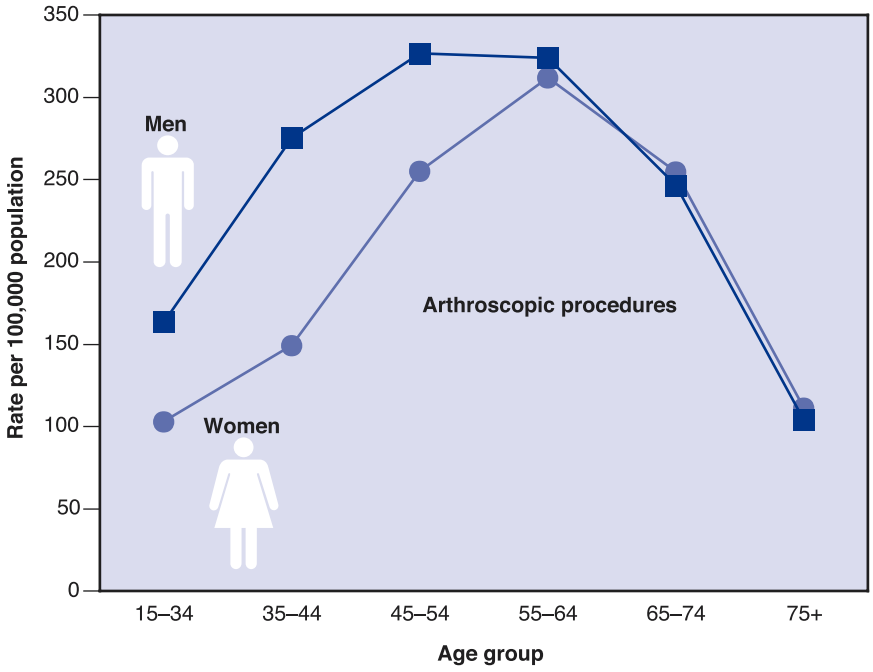
The most common type of knee arthroscopic procedures performed was debridement alone, followed by menisectomy with or without debridement. From 1992/93 to 2001/02, the rates for debridement alone dropped by 6% while the rates for menisectomy with or without debridement increased by approximately 10%. The greatest decrease, however, was in the rate of the other arthroscopic procedures, which fell by approximately 60%.



Data sources: Ontario Health Insurance Plan; Registered Persons Database; Statistics Canada

6.3 Age and sex specific rate of arthroscopic procedures per 100,000 population aged 15 years and older, in Ontario, 1992/93 to 2001/02

The rate of all arthritis-related knee arthroscopic procedures increased with age up to the age group 55 to 64 years for women and the age group 45 to 64 years for the men, and then decreased. The rate for men is considerably higher than for women in those under 55 years of age, after which there is little or no difference in the rates between the sexes.

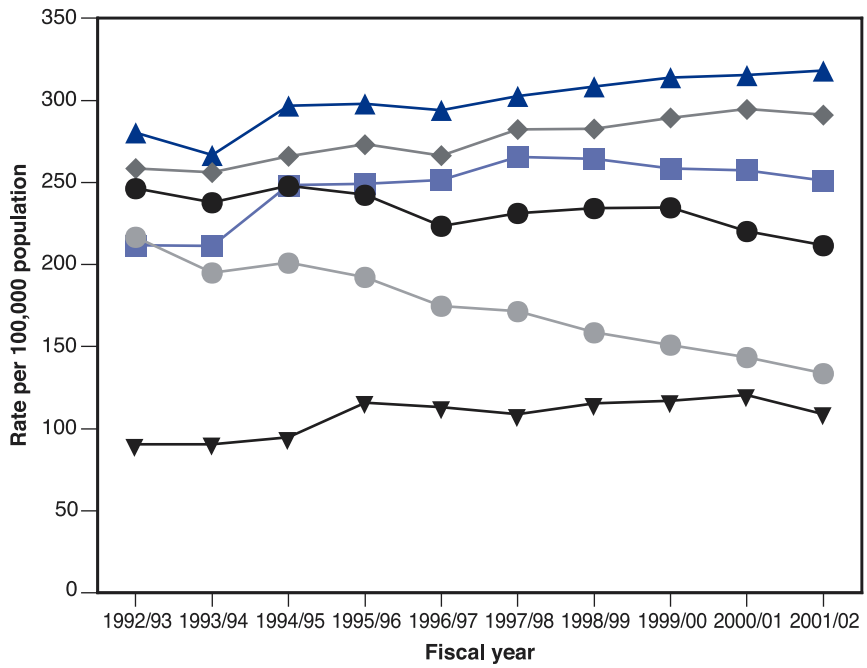


Data sources: Ontario Health Insurance Plan; Registered Persons Database; Statistics Canada

6.4 Sex standardized rate of all arthroscopic procedures per 100,000 population aged 15 years and older, in Ontario, 1992/93 to 2001/02

Although the rate of all arthritis-related knee arthroscopic procedures decreased between 1992/93 and 2001/02, the change in rate was not consistent across the age groups: decreases of up to 40% were seen in individuals aged 15 to 44 years, while increases of 12% to 20% were observed for the older age groups.

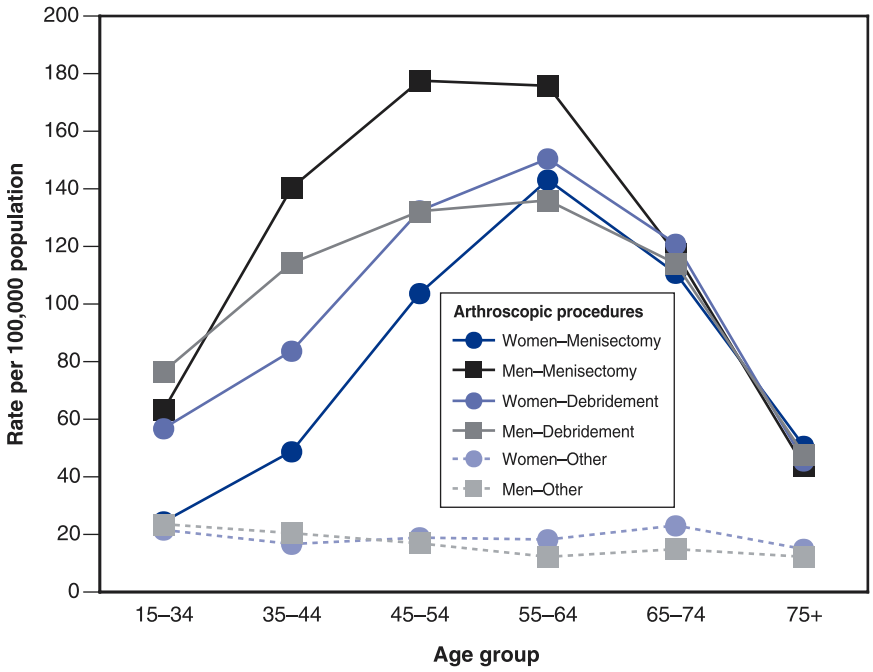
The decrease in rate in the younger age group may be related to increased use of MRI for diagnosis instead of diagnostic arthroscopy. In addition, there may also have been increases in other non-arthritis-related arthroscopic procedures for meniscal and ligament repair (see Exhibit 6.2).



Data sources: Ontario Health Insurance Plan; Registered Persons Database; Statistics Canada

6.5 Age and sex specific rate of all arthroscopic procedures per 100,000 population aged 15 years and older, in Ontario, 1992/93 to 2001/02

Examining the age and sex distribution of the types of arthroscopic procedures can shed light on the patient population on which the procedure is commonly performed. Overall, the rate of menisectomy with and without debridement and the rate of debridement alone increases with age, peaking in the middle age groups and falling in the elderly. In general, the rates for men were higher than women in the younger age groups but were more similar in the older age groups. The rate of the other arthroscopic procedures decreased with age for both men and women.

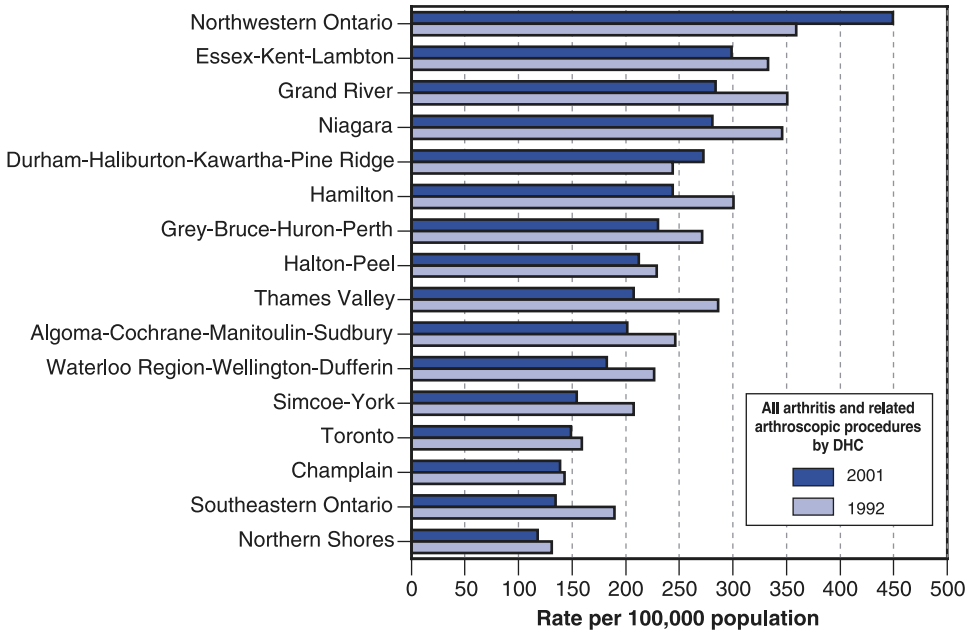


Data sources: Ontario Health Insurance Plan; Registered Persons Database; Statistics Canada

Geographic variation

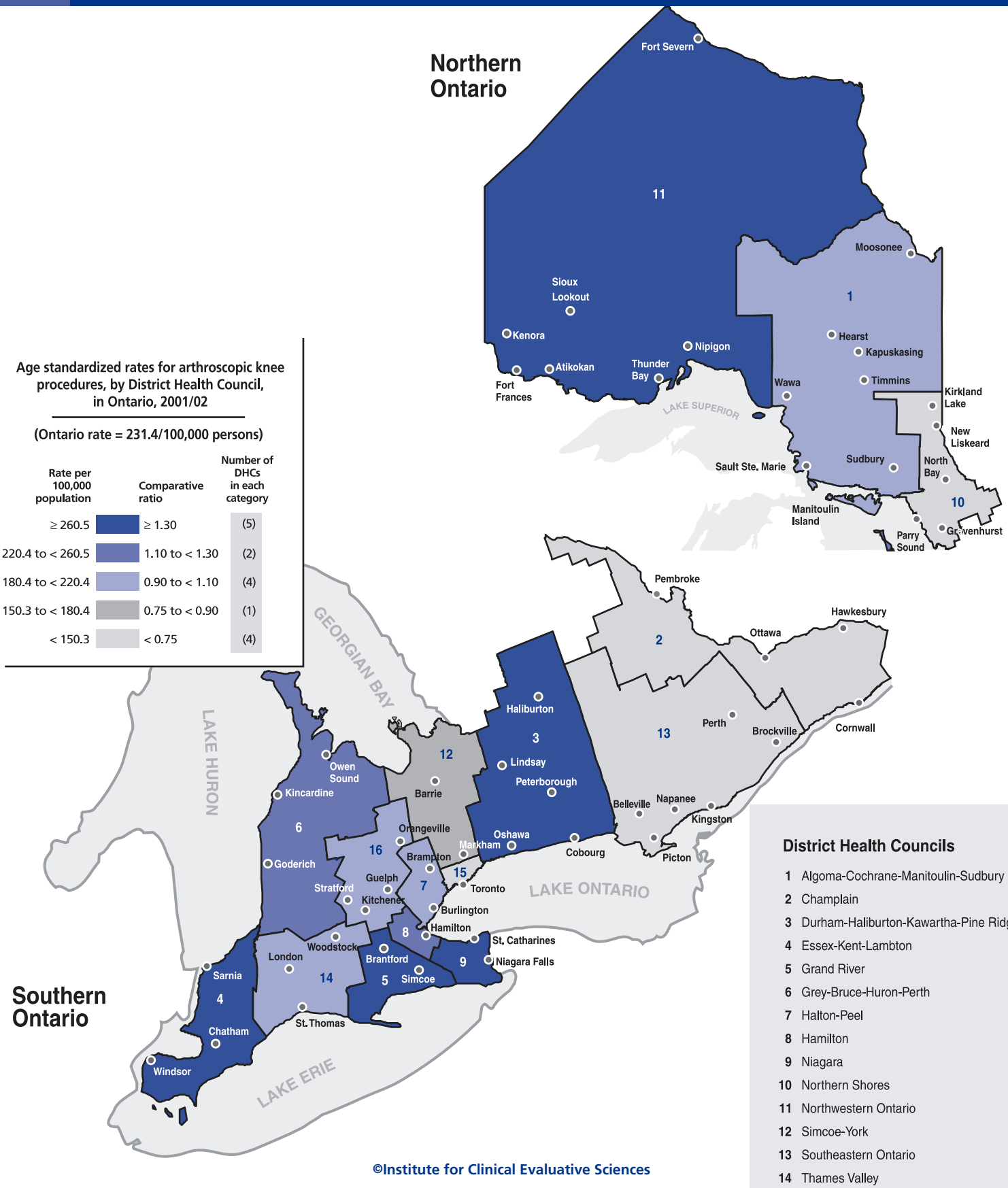
6.6 Age and sex standardized rate of all arthritis and related arthroscopic procedures per 100,000 population aged 15 years and older, by District Health Council, in Ontario, 1992/93 to 2001/02

The rate of all arthroscopic knee procedures varied by DHC with the highest rate 3.8 times the lowest rate in 2001. (see also map in Exhibit 6.7). Between 1992 and 2001, the rate decreased for most DHCs, except for Northwestern Ontario and Durham-Haliburton-Kawartha-Pine Ridge, which had increases of between 11% and 20%.



Data sources: Ontario Health Insurance Plan; Registered Persons Database; Statistics Canada

6.7 Age standardized rates for arthroscopic knee procedures, by District Health Council, in Ontario, 2001/02



Age standardized rates for arthroscopic knee procedures, by District Health Council, in Ontario, 2001/02

(Ontario rate = 231.4/100,000 persons)

Rate per 100,000 population	Comparative ratio	Number of DHCs in each category
≥ 260.5	≥ 1.30	(5)
220.4 to < 260.5	1.10 to < 1.30	(2)
180.4 to < 220.4	0.90 to < 1.10	(4)
150.3 to < 180.4	0.75 to < 0.90	(1)
< 150.3	< 0.75	(4)

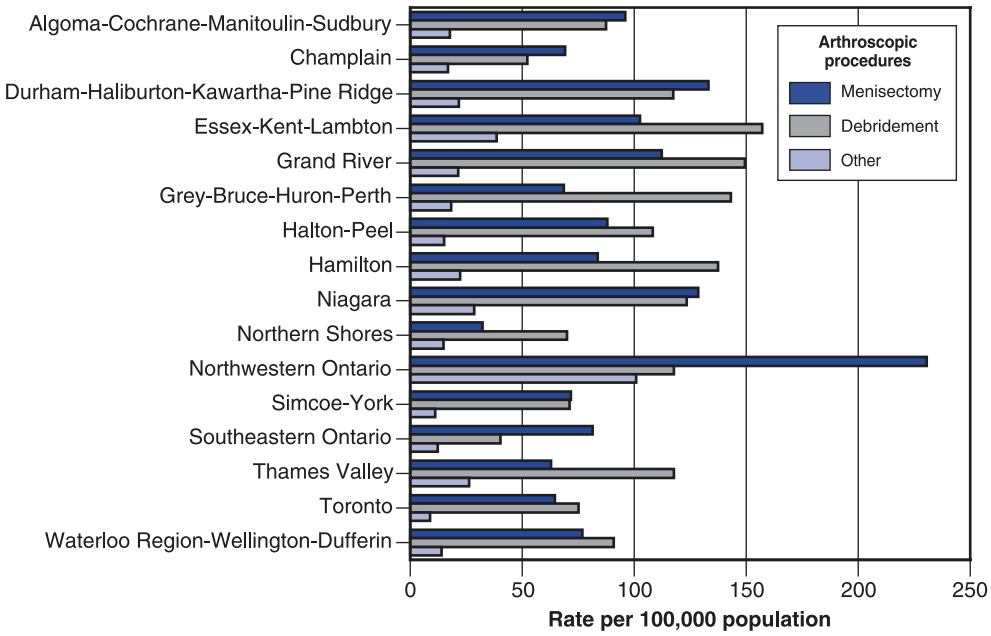
District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

Data sources: Ontario Health Insurance Plan; Registered Persons Database; Statistics Canada

6.8 Age and sex standardized rate of arthroscopic procedures per 100,000 population aged 15 years and older, by District Health Council, in Ontario, 2001/02

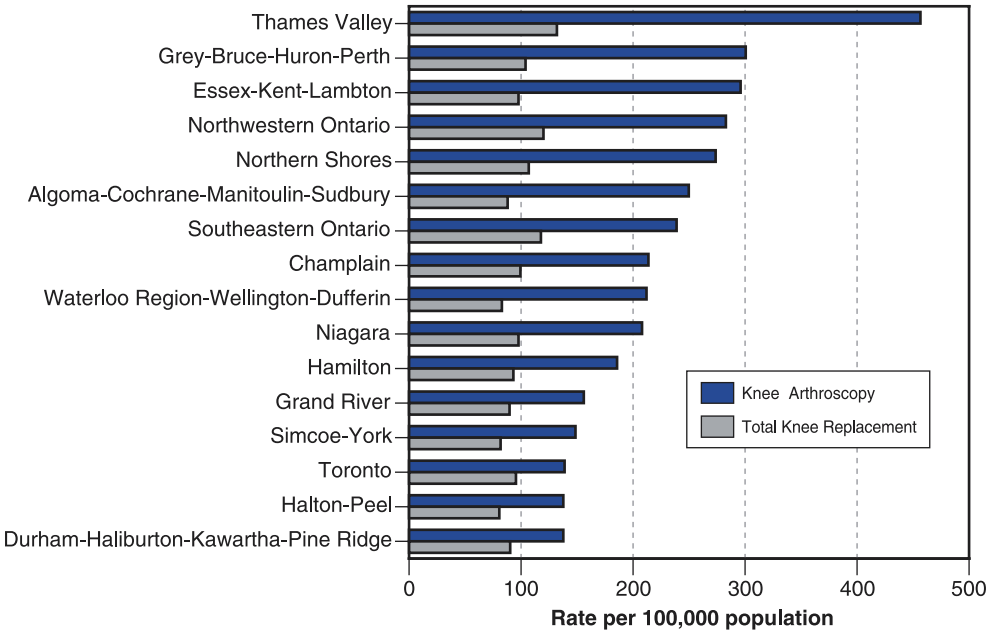
There was considerable geographic variation in the proportional rates for different types of arthroscopic knee procedures. For example, in some DHCs, the rate of menisectomy exceeded that for debridement, while in other DHCs, debridement was the most frequently performed procedure. However, there was no relationship between the proportional rates of the procedures and the overall rate of arthroscopic procedures. Rates of menisectomy with or without debridement exceeding the rate of debridement alone were observed in DHCs with high and low overall arthroscopic procedure rates.



Data sources: Ontario Health Insurance Plan; Registered Persons Database; Statistics Canada

6.9 Age and sex standardized rate of total knee replacement and knee arthroscopy, per 100,000 population aged 15 years and older, by District Health Council, in Ontario, 2001/02

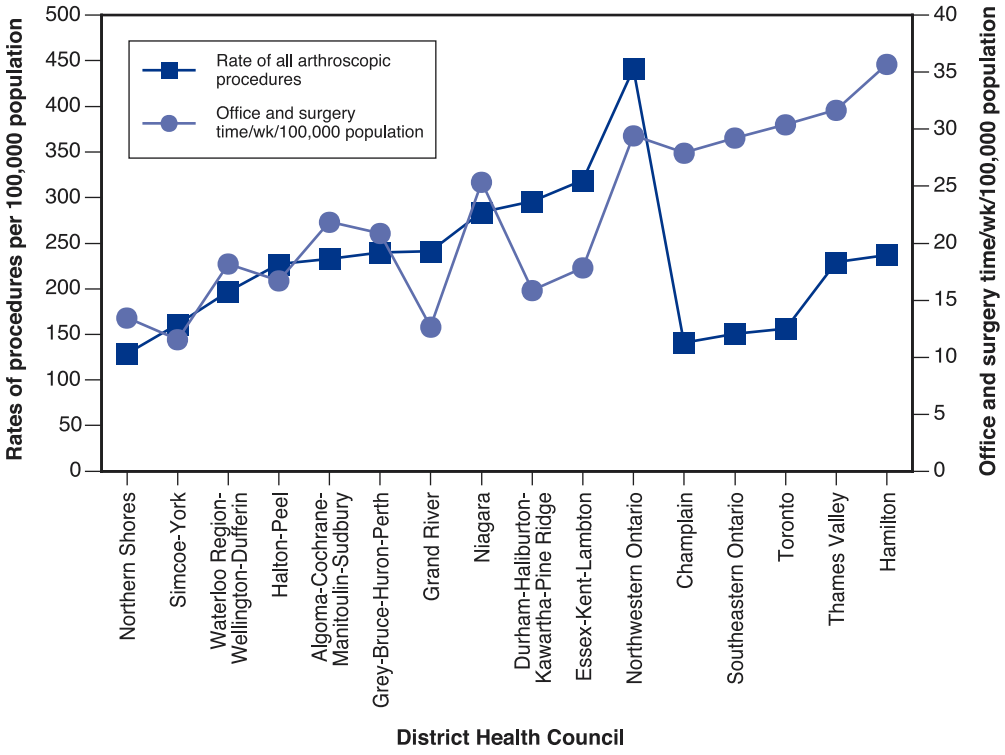
In general, the age and sex distribution of all arthroscopic procedures by DHC was similiar to that for the province as a whole, regardless of the overall rate in the DHC. In general, there was no relationship between the rate of knee replacement and the rate of arthroscopy.



Data sources: Ontario Health Insurance Plan; Registered Persons Database; Statistics Canada

6.10 Relationship between age and sex standardized rates of all arthroscopic knee procedures and the orthopaedic surgeon density, per 100,000 population aged 15 years and older, by District Health Council, in Ontario, 2000/01

Drawing on data presented in Chapter 3 (Availability of Services), the rate of arthroscopic procedures was shown to have a relationship with the number of surgeons per 100,000 population. Data are presented in increasing order of orthpaedic provision for the 11 DHCs with non-teaching hospitals and the 5 DHCs with teaching hospitals. The five DHCs with teaching hospitals (shown on the right) have relatively lower arthroscopy rates despite high orthopaedic provision.



Data sources: Ontario Health Insurance Plan; Arthritis Community Research and Evaluation Unit (ACREU)—Ontario Survey of Orthopaedic Surgeons; Statistics Canada

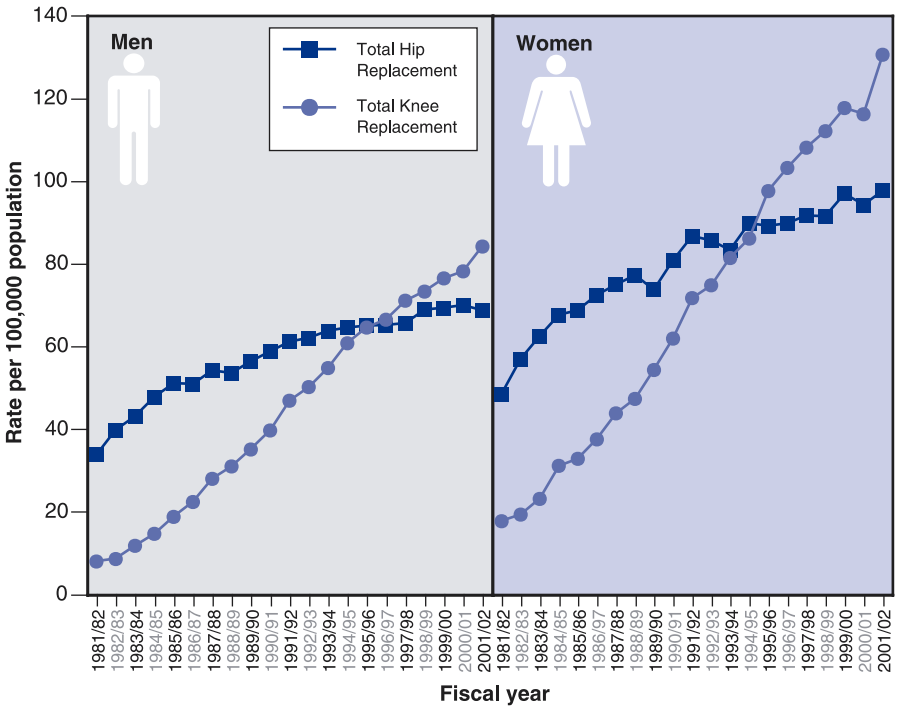
Findings and Discussion

Total hip and knee replacements

Variation by age and sex

6.11 Rates for total joint replacement by sex, per 100,000 population aged 15 years and older, in Ontario, 1981/82 to 2001/02

Procedures for THRs were well established by 1980 and it was around 1985 before the procedures for TKR became established. This exhibit shows the age-standardized rates for TJRs by sex. The age-standardized rates for both THRs and TKRs were higher for women than for men. From 1981/82 to 2001/02, the rates for TKR increased per 100,000 population from 7.8 to 130.7 for women and from 8.1 to 84.3 for men. From 1981/82 to 2001/02, THR rates for women increased from 48.5 to 97.8, and increased for men from 33.9 to 68.8. In 1995/96, TKR rates surpassed THR rates and the difference continued to increase. During the 1990s, the annual number of surgeries increased, on average, 6.6% for TKRs and 4.1% for THRs.



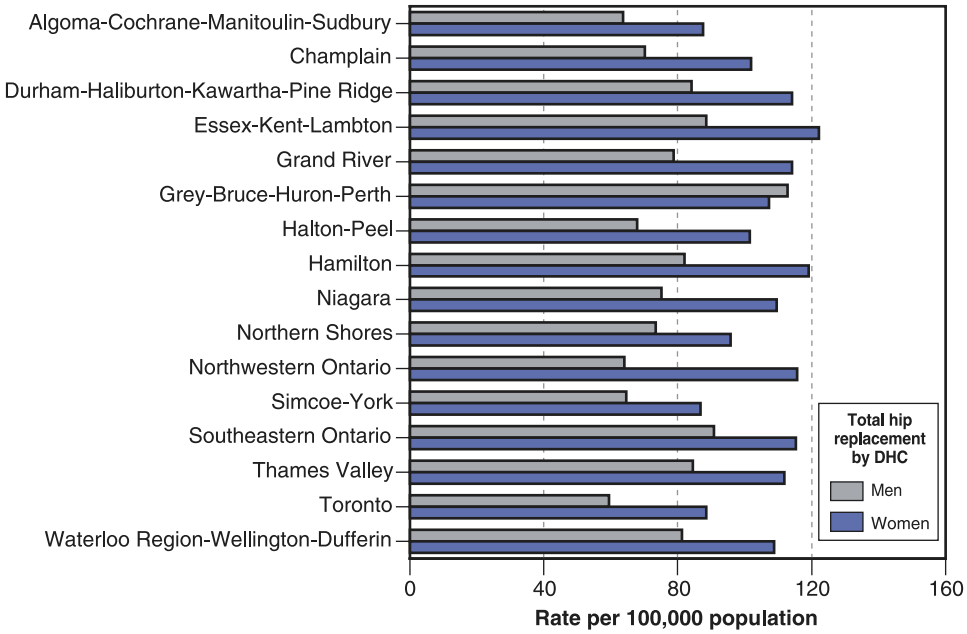
Data sources: Canadian Institute for Health Information; Statistics Canada

Geographic variation

6.12 Rates for total hip replacement by sex and District Health Council, per 100,000 population aged 15 years and older, in Ontario, 2001/02

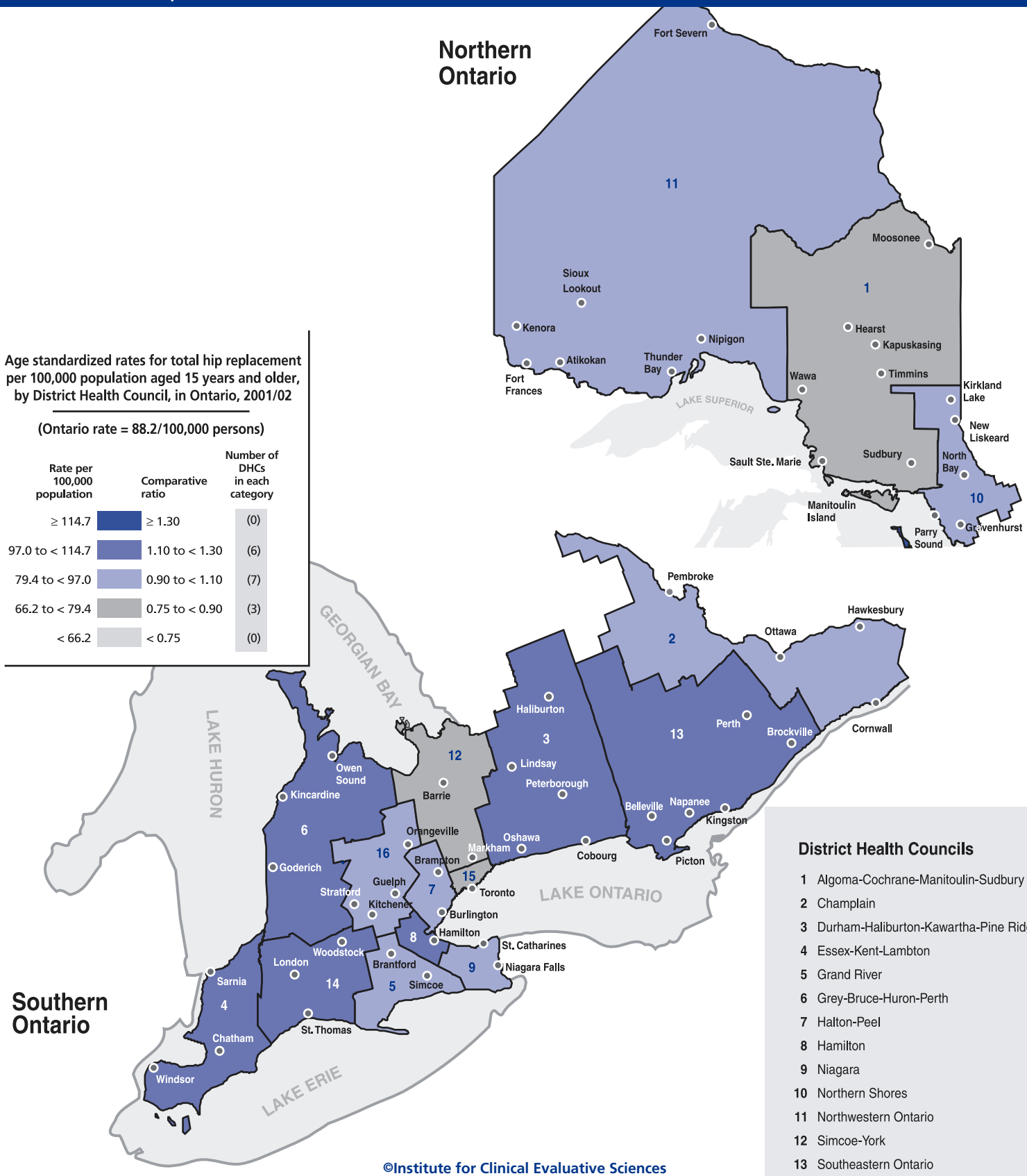
The highest rate for THR per 100,000 population (109.9 for Grey-Bruce-Huron-Perth) is 1.5 times the lowest rate (74.4 for Toronto). (See also map in Exhibit 6.13). The DHCs with lower THR rates were Toronto, Simcoe-York, and, Algoma-Cochrane-Manitoulin-Sudbury. The DHCs with higher rates were Grey-Bruce-Huron-Perth, Essex-Kent-Lambton, and Southeastern Ontario.

In the 1998 research atlas, rankings of surgery rates by DHC were relatively consistent. However, they cannot be directly compared to results in this atlas as the rates were standardized to the population aged 20 years and older. This difference in methodology should not affect the rankings. Two notable changes in ranking occurred in Grand River and Thames Valley where the rankings dropped. This may be a result of the standardized rates in these DHCs remaining about the same for the past five years while rates for other DHCs increased.



Data sources: Canadian Institute for Health Information; Statistics Canada

6.13 Age standardized rates for total hip replacement per 100,000 population aged 15 years and older, by District Health Council, in Ontario, 2001/02



Age standardized rates for total hip replacement per 100,000 population aged 15 years and older, by District Health Council, in Ontario, 2001/02

(Ontario rate = 88.2/100,000 persons)

Rate per 100,000 population	Comparative ratio	Number of DHCs in each category
≥ 114.7	≥ 1.30	(0)
97.0 to < 114.7	1.10 to < 1.30	(6)
79.4 to < 97.0	0.90 to < 1.10	(7)
66.2 to < 79.4	0.75 to < 0.90	(3)
< 66.2	< 0.75	(0)

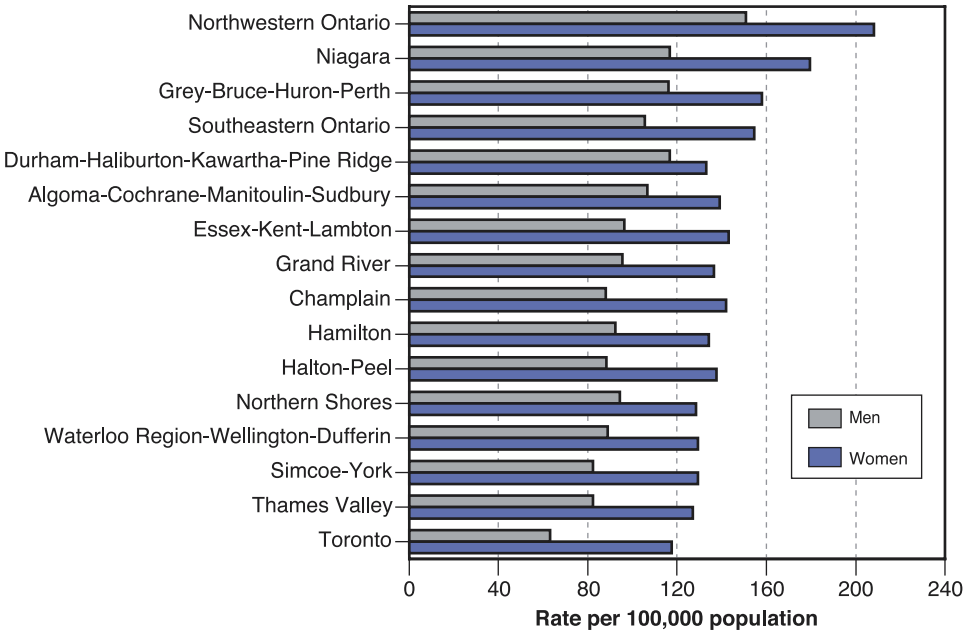
Data sources: Canadian Institute for Health Information; Statistics Canada

District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

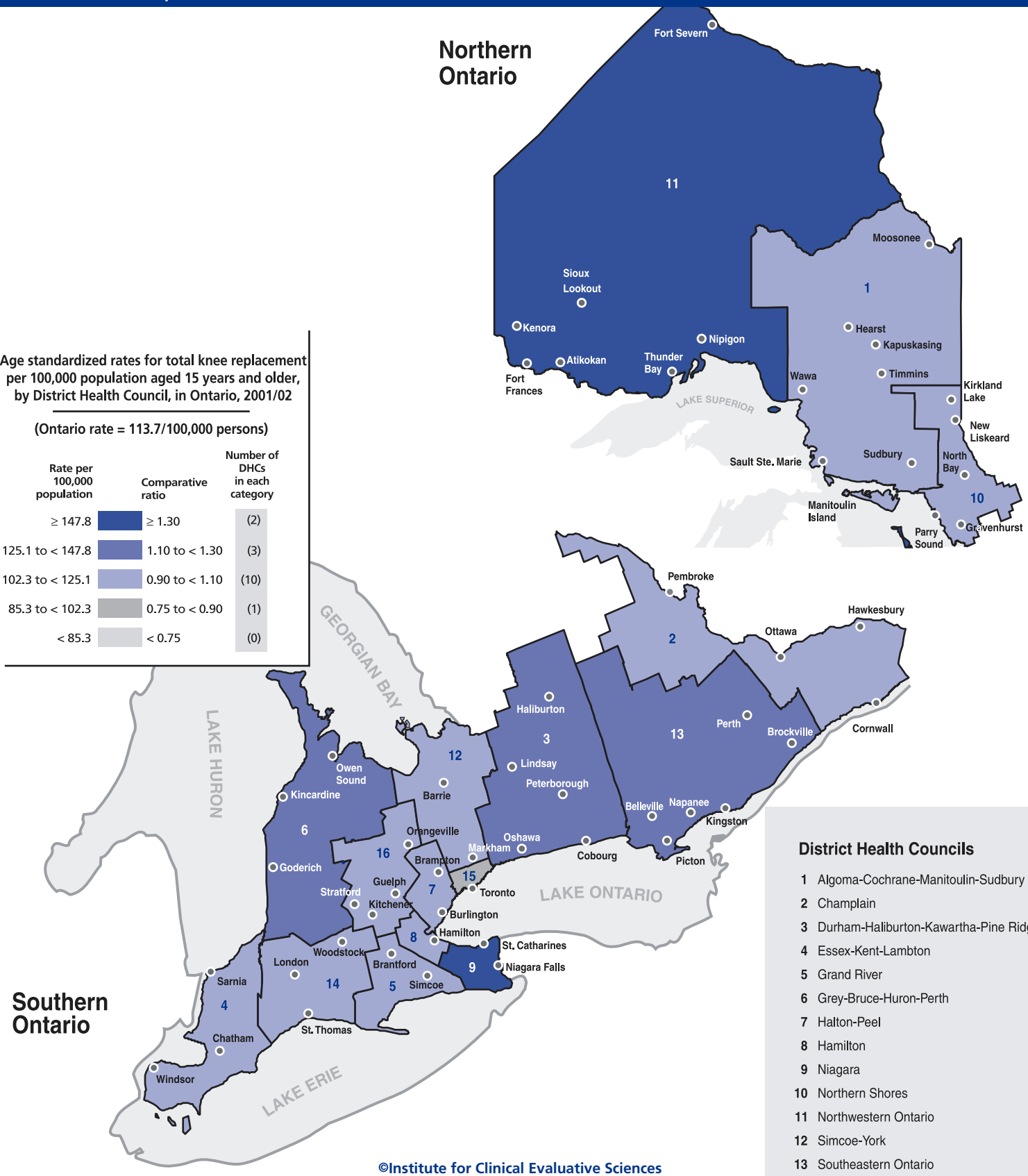
6.14 Rates for total knee replacement by sex and District Health Council, per 100,000 population aged 15 years and older, in Ontario, 2001/02

Variations in TKR by DHC of residence and sex are shown here (see also map in Exhibit 6.15). There is a two-fold variation between the high and low rates for TKR (180.2 for Northwestern Ontario and 90.9 for Toronto). Again, there were some changes in the rankings of the DHCs over the past five years. The DHCs of Niagara and Northwestern Ontario had marked increases in the ranking for TKR rates in Ontario.



Data sources: Canadian Institute for Health Information; Statistics Canada

6.15 Age standardized rates for total knee replacement per 100,000 population aged 15 years and older, by District Health Council, in Ontario, 2001/02



District Health Councils

1 Algoma-Cochrane-Manitoulin-Sudbury
2 Champlain
3 Durham-Haliburton-Kawartha-Pine Ridge
4 Essex-Kent-Lambton
5 Grand River
6 Grey-Bruce-Huron-Perth
7 Halton-Peel
8 Hamilton
9 Niagara
10 Northern Shores
11 Northwestern Ontario
12 Simcoe-York
13 Southeastern Ontario
14 Thames Valley
15 Toronto
16 Waterloo Region-Wellington-Dufferin

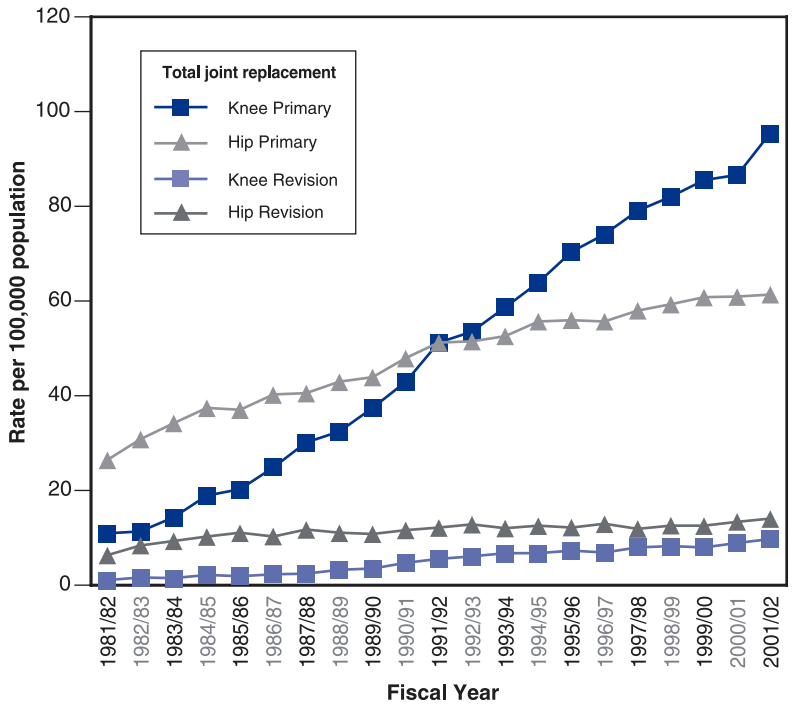
Data sources: Canadian Institute for Health Information; Statistics Canada

6.16 Rates for primary and revision total joint replacement, per 100,000 population aged 15 years and older, in Ontario, 1981/82 to 2001/02

Total joint replacements were separated into primary procedures and revisions. The updated trend lines are displayed here. About 18% of THRs and 10% of TKRs are revisions, and these percentages have not changed over the past decade. For more detailed information on the definition of revisions, please refer to Appendix 6.C. As noted in the 1998 Atlas, there are three possible explanations for higher percentages of revision surgeries for hips than for knees:

1. As 90% of prostheses survive at least ten years, the lag time between changes in primary rates and revision rates should be 10 to 15 years.
2. Knee patients are older than hip patients. The younger and more active patients have more wear and tear on their hips, which shortens the survival time of prostheses.
3. Moreover, older patients may have life expectancies shorter than the survival times of the prostheses.

Given the cumulative numbers of primary THR and primary TKR over the past twenty years, the number of revisions, if not the rates, should continue to increase for the foreseeable future.

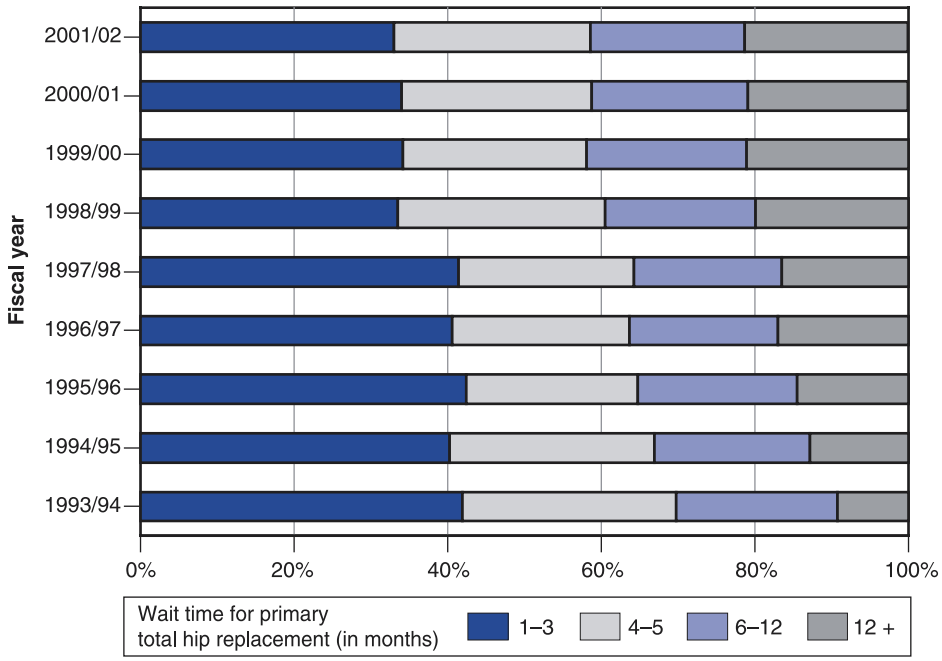


Data sources: Canadian Institute for Health Information; Statistics Canada

Wait times

6.17 Wait times for primary total hip replacement, per 100,000 population aged 15 years and older, by year, in Ontario, 1993/94 to 2001/02

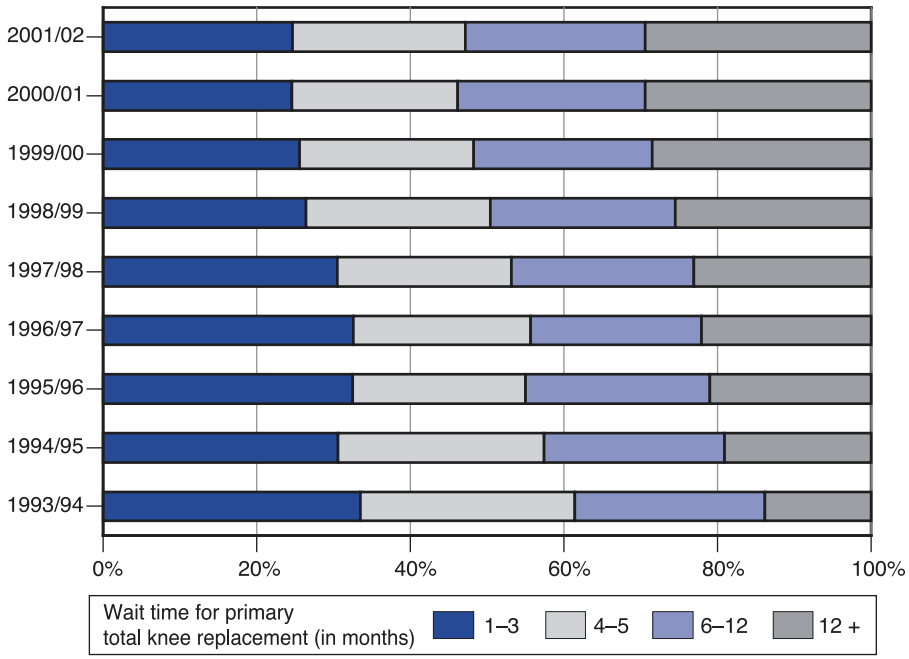
Over the past 10 years, wait times for THRs continued to increase. The median wait times increased from 16 weeks to 20 weeks for primary THRs from 1993/94 to 2001/02. There is general consensus that ideally the procedures should be performed within three months of the decision to have surgery and six months at the maximum. In 1993/94, more than two-thirds of patients receiving primary THR had surgery within six months of consultation. In 2001/02, 59% of primary THRs were performed within preferred wait times. One-fifth of THR patients waited more than 12 months.



Data sources: Canadian Institute for Health Information; Ontario Health Insurance Plan

6.18 Wait times for primary total knee replacement, per 100,000 population aged 15 years and older, by year, in Ontario, 1993/94 to 2001/02

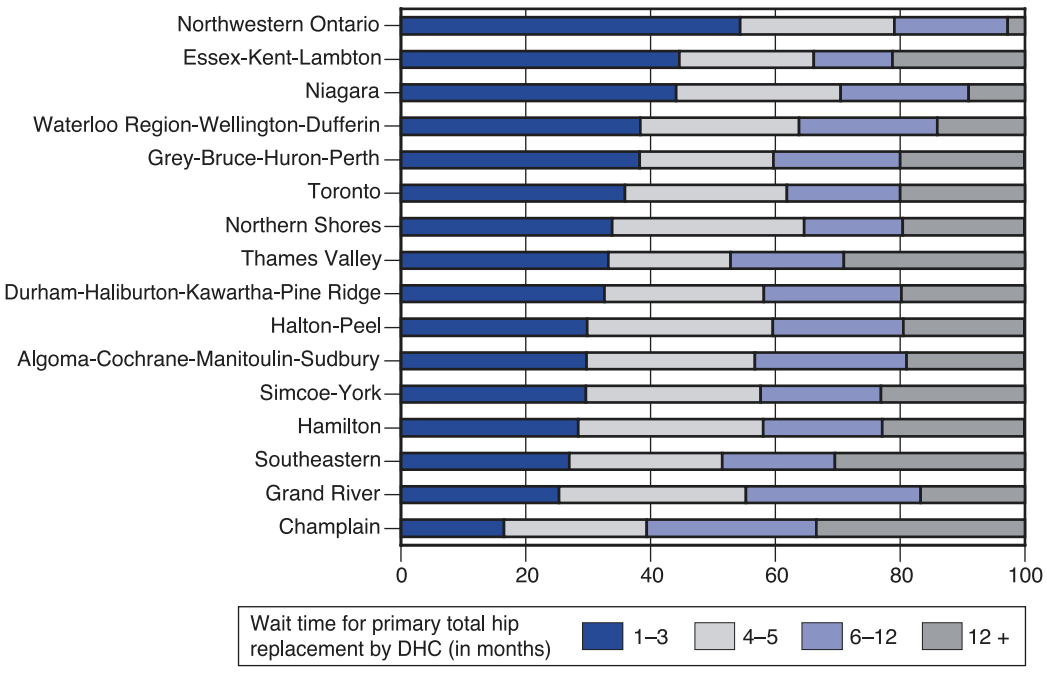
Over the past ten years, wait times for TKRs continued to increase. From 1993/94 to 2001/02, the median wait times increased from 20 weeks to 29 weeks for primary TKR. Like THR, there is general consensus that ideally the procedures should be performed within three months of the decision to proceed with surgery, or within six months at the maximum. In 1993/94, 60% of those with primary TKR had surgery within 6 months of consultation (see also Exhibit 6.19). In 2001/02, 47% of primary TKR was performed within preferred wait times, while 29% of TKR patients waited more than 12 months.



Data sources: Canadian Institute for Health Information; Ontario Health Insurance Plan

6.19 Wait times for primary total hip replacement, per 100,000 population aged 15 years and older, by District Health Council, in Ontario, 2001/02

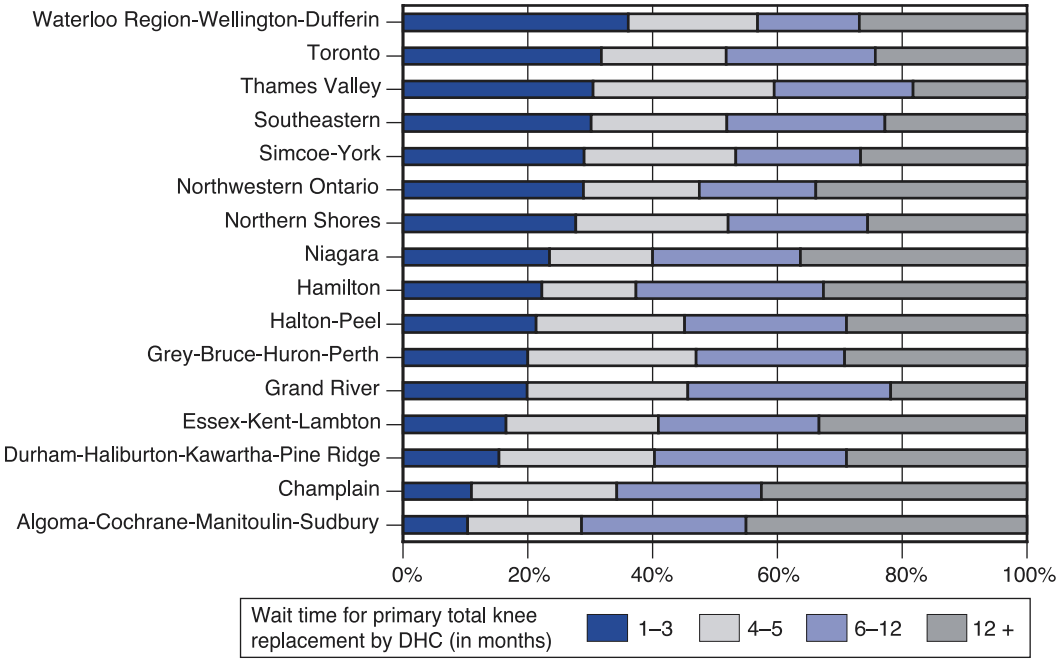
Wait times vary by DHC. In 2001/02, one-third of the primary THR and nearly half of the primary TKR in Champlain were performed after a 12-month wait (see also Exhibit 6.20). Conversely, one-half of primary THR in Northwestern Ontario and one-third of primary TKR in Essex-Kent-Lambton, occurred within the three-month wait time.



Data sources: Canadian Institute for Health Information; Ontario Health Insurance Plan

6.20 Wait times for primary total knee replacement, per 100,000 population aged 15 years and older, by District Health Council, in Ontario, 2001/02

While wait times might be expected to be related to the number of TJRs performed, as it turns out, they are not related. There is also no relationship between the rates of surgery across the DHCs and wait times in an area. Further, DHCs with long wait times for patients with THR also have long wait times for patients with TKR. Across the province, regardless of place of residence, individuals having primary TKR are more likely to wait six months or longer for procedures than are those having primary THR.



Data sources: Canadian Institute for Health Information; Ontario Health Insurance Plan

Conclusions

Surgery plays a major role in the management of arthritis. The prevalence of arthritis increases with age and, as indicated in Chapter 2 (Burden of Disease), with the large cohort of Canadians born during the post-war baby boom, the increasing number of older people with arthritis will continue over the next two decades. In Ontario, the number of individuals reporting arthritis has increased from 1.3 million in 1994, to 1.7 million in 2000. By 2026, it is projected that 2.8 million Canadians will have arthritis. (see Chapter 2). Much of this increase will represent people who will eventually be candidates for total joint replacement (TJR).

Arthroscopic knee surgery

Overall, arthroscopic knee surgery is the type of procedure most undertaken for arthritis and related conditions in Ontario. Indeed almost half of all arthritis-related surgical procedures are arthroscopy.[1] Most of these procedures are performed as same-day surgery, but, nevertheless, require the use of operating room and anesthesiology resources. The two most frequently used arthroscopic procedures were debridement and menisectomy with, and without, debridement. Taken together, the rates of use for these procedures have remained relatively stable over the past decade. The decline in other arthroscopic procedures, noted previously, may relate to increased use of MRI for diagnosis and other non-arthritis-related arthroscopic reconstructive procedures.

The lack of increase in arthroscopic menisectomy and debridement rates over time is somewhat surprising given the increasing prevalence of arthritis in the population. This may reflect uncertainty about the efficacy of these procedures for long-term management of knee osteoarthritis (OA). The role of these procedures in the management of knee arthritis is still unclear. These minimally invasive outpatient procedures have the potential to provide short-term improvement in pain and function, with minimal side effects and rapid recovery. A priority for research is to establish the potential of arthroscopy to defer more knee replacement procedures in individuals with mild to moderate arthritis, and if so, whether this is associated with savings in inpatient admissions, operating room time, rehabilitation, and post-operative morbidity.

The proportion of people having knee arthroscopies increased with age, likely due to the increased incidence of knee arthritis with age.[28] The decline in the proportion of knee arthroscopies in age groups greater than age 65 reflects the opinion that knee arthritis in this age group is most effectively managed by knee replacement surgery. Although arthritis is more common in women than men overall, knee arthritis occurs more frequently in men than women up to 45 years of age. After age 45, the reverse is true, with approximately twice as many women as men affected by knee arthritis.[28] Reflecting the gender breakdown in arthritis prevalence, arthroscopic knee procedures are more commonly performed on men in the younger age groups. However, in older groups the rates of arthroscopic procedures are similar for men and women, despite a higher prevalence of arthritis in women. In this context, the degree of under use of knee replacement surgery for women is more than 3 times than that for men.[26]

A number of economic factors favour the use of arthroscopic knee surgery over total knee replacement (TKR) for arthritis. In contrast to TKR, these are short procedures that are done on an outpatient day surgery basis which means that surgical volume can be higher for the surgeons. They do not require admission to hospital, and, therefore, require relatively few hospital resources. Complication rates following arthroscopic knee surgery are very low and post-operative recovery is rapid. In contrast, TJR requires an average acute care hospital stay of 7.4 days for TKR in Ontario, often followed by inpatient or home care rehabilitation services.[29] Complication rates following TJR are higher than arthroscopic surgery and it usually takes, on average, 12 weeks for patients to resume normal activities. Many hospitals impose an annual limit on the number of joint replacement procedures due to the considerable costs for prostheses, limited availability of operating room time, and the need for relatively long inpatient hospital stays.

With restrictions to available resources as well as cost advantges, orthopaedic surgeons often favour the use of arthroscopic knee procedures for management of knee OA. From the patient perspective of facing increasing wait times for TKR, arthroscopy offers the possibility of some short-term improvement in pain and disability. Nevertheless, given the uncertainty about the efficacy of arthroscopic surgery for arthritis of the knee, a reappraisal of the role of this intervention in the management of knee arthritis is in order, particularly as this is the most frequently performed type of arthritis-related surgery.

Total joint replacement

Of all procedures relevant to arthritis management, TJR has perhaps commanded the most attention at public and policy levels. These procedures have been shown to have a valuable place in the management of end-stage arthritis, and a number of studies have shown them to be cost effective.[17–19] Research also suggests that for many patients, TJR may also be cost-saving in improving quality adjusted life expectancy.[19] An adequate rate of provision of these procedures should therefore be a priority.

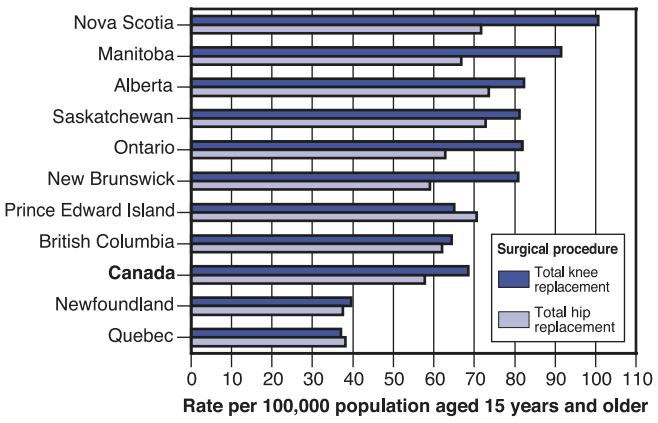
The overall rate of joint replacements has increased steadily since 1981, although the increase in THR appears to have leveled off somewhat. Data from the 1998 research atlas suggests that the increases in TJR provision were made largely through decreasing lengths of stay (LOS) in hospital, although provincial initiatives to fund prostheses may also have played a part.[22] However, by 2000, Ontario's LOS for TJR were the shortest in Canada. It has likely reached the stage where there is no further scope to increase capacity by manipulating LOS without wider system-level changes.[1] Data in this chapter show that there continue to be geographic variations

in access to these procedures in Ontario, and that wait times are lengthening. These issues raise the question as to whether the current rates of joint replacement surgery are adequate to meet needs.

Ontario TJR rates compared with other jurisdictions

It is unclear what the rates of TJR should be, but rates for other jurisdictions can be examined for guidance.

6.21 Provincial and national rates for total knee and total hip replacement, 1999/00



Data source: Canadian Institute for Health Information

The Canadian Institute for Health Information (CIHI) tracks TJRs as part of the Canadian Joint Replacement Registry.[30] It should be noted that rates from CIHI are age-standardized for the total population, while this chapter reports rates standardized for the population aged 15 years and older as few joint replacement procedures are performed on children and adolescents. This exhibit displays the provincial variation in total hip replacement (THR) and TKR rates for fiscal year 2000/01.

Nova Scotia and Manitoba have the highest TKR rates and are among the highest THR rates, while Newfoundland and Quebec have the lowest THR and TKR rates. In provinces with higher rates, TKR rates are markedly higher than THR rates. For provinces with lower rates, the differences in rates by joint type are relatively small. There is a two-fold variation in provincial rates for hips and a three-fold variation in provincial rates for knees.

As part of its Canadian Joint Replacement Project, CIHI is reviewing rates for industrialized countries.[30] The crude rates for primary THR and primary TKR for six countries are reported as follows:

	Crude Rates per 100,000 Population	
Country	Primary Hip Replacements	Primary Knee Replacements
Australia	74	81
New Zealand	119	75
Norway	124	35
Sweden	100	63
United States*	52	92
Canada	64	75

* Estimate from the Academy of Orthopaedic Surgeons

There are large variations in the rates across countries, with two-fold variation in primary THR rates and three-fold variation in primary TKR rates. Surprisingly, while Australia, Canada, Sweden, and the United States have higher rates for primary TKR than primary THR, the converse is true for Finland, New Zealand, and Sweden. The crude rates in Ontario in 2001 were 59 per 100,000 population for primary THR and 86 per 100,000 for primary TKR.

Orthopaedic surgeons working with the Swedish National Total Hip Arthroplasty Register estimate that the rate for primary THR will increase from 100 to 130 per 100,000 population to meet increasing needs and reduce wait times.[31] Surgeons working with the Swedish National Total Knee Arthroplasty Register estimate that the rates will have to increase by one-third to meet the growing demand for services.[32] If the projections for Sweden are correct, the numbers in Ontario are currently approaching the estimated rate for knee replacements and are too low for hip replacements. Despite this, evidence suggests considerable unmet need in Ontario for TJR that will increase with the aging of the population.

Unmet need for joint replacement surgery

The best evidence for unmet need for TJR in Ontario comes from a population-based study that surveyed all persons 55 years of age and older in an urban area with a low joint replacement rate (East York in Metropolitan Toronto) and a rural area with a high joint replacement rate (Oxford County).[26] After excluding persons who had surgery or were on a waiting list, it was estimated that 4.5% of the older women and 2.1% of older men had potential need for joint replacement, based on exceeding a threshold level of pain and disability. Using different criteria, a UK study also showed that 2% of the population aged 55 years and older should be considered for joint replacement.[33] The Ontario study also showed that the unmet need was not equally distributed among the population: women and individuals with less education and/or lower income were more likely to have potential unmet need.[26,27]

Another aspect contributing to utilization of TJR for consideration is willingness to have surgery. When presented with a statement of risks and benefits of surgery, only 13% and 9% of the potentially eligible women and men, respectively, were definitely willing to have the surgery.[26,27,34] In-depth interviews with a sample of individuals participating in the study suggested three assumptions that may constrain elderly individuals' willingness to have surgery.[35,36]

1. A view that osteoarthritis is a normal aging process, not a disease.
2. A belief that even if they were appropriate candidates for surgery, their pain and disability had to be significantly greater before surgery would be warranted.
3. An assumption that their physicians would advise surgery if they could benefit.

A health education strategy to correct these misperceptions could make an important contribution to decreasing the burden of

disability in the older population through increasing awareness of the availability of osteoarthritis treatments and indication for surgery. Even with a low percentage of individuals stating that they were willing to have surgery, there has been significant unmet need. Improved understanding may increase willingness to seek surgery and thus demand for TJR, and in doing do, further widen the gap between those in need and willing to have surgery and our current capacity to carry out joint replacement surgeries in a timely manner.

Over and above the current unmet need, increases in the number of people with arthritis are expected with the aging of the population. In Ontario, in 2001, there were 8,000 THRs and 11,000 TKRs. Over the 1990s, the age specific rates for THR and TKR increased sharply. The increase in TJRs in Ontario and other provinces is the feature of the increased use of hospital and physician services for arthritis conditions (see Chapter 3, Availability of Services).[1] The age composition of the population is changing; by multiplying projected increases in age-sex specific rates by expected numbers of seniors, it is estimated that there would be about 20,000 THRs and over 54,000 TKRs in 2016, assuming that age-specific rates are maintained. In addition to an aging population, there has been remarkable growth in TJR in the younger age population aged 45 to 54 years. The challenge is to increase the capacity to carry out TJR surgery in Ontario.

Reducing wait times and setting priorities

Two of the most talked about issues regarding access to joint replacement are how to manage wait times and how to ensure those with the greatest need receive priority care.

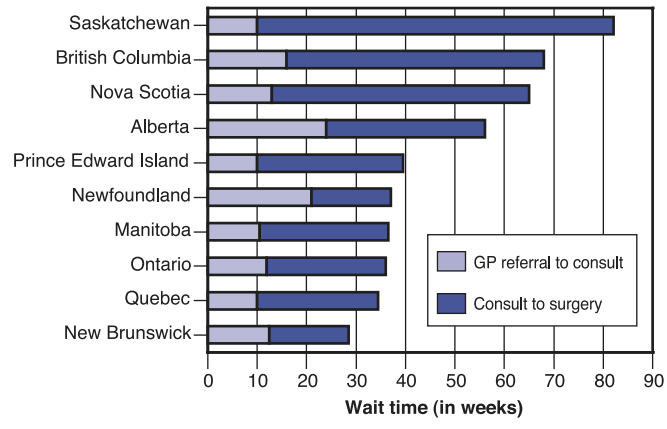
Two entitlements are embodied in the Canada Health Act: patients have the right to choose their physicians, and health professionals have the right to choose their patients. The issues of wait times are centred squarely, in the case of TJR, with orthopaedic surgeons. However, orthopaedic surgeons are constrained by the hospitals in which they practise. Hospital management decides the priority and resources allocated for orthopaedic surgery, in general, and TJR, in particular. Physicians work with hospital management to allocate beds and operating times to individual surgeons. Within the constraints of hospital and clinical policies, orthopaedic surgeons decide which procedures they will perform, and the patients whom they will book and admit for the procedures. However, urgent procedures may take precedence in operating room time over elective surgeries, such as TJR, intended to increase quality of life.

From the patient perspective, the waiting process can be divided into two parts. Patients may have to wait for the referral to the orthopaedic surgeon, or they may be referred to a rheumatologist first. The time from referral to orthopaedic surgery consultation is "Part 1" of the waiting process. "Part 2" is the time from the consultation with the orthopaedic surgeon to the date of surgery. Further, the orthopaedic surgeon or the patient may postpone or cancel a procedure for a variety of reasons. The tradition has been to take patients in the order of consultation without regard to levels of pain and disability.[37] Other waiting list management strategies include consideration of primary caregiver status, working status, impact on others, age and type of surgery (primary versus revision). Most reports of wait times have considered only Part 2, as defined here. Furthermore, due to constraints by the hospital scheduling systems on the orthopaedic surgeon's office regarding the maximum time prior to surgery for which a surgical booking may be made, measured wait times are likely underestimates of Part 2.

There are four strategies for tracking wait times in Canada, all of which have limitations.

1. Surveys of specialists, such as those at The Fraser Institute, can only give estimates on average booking times.
2. Using administrative data, similar to analyses presented in this chapter, to mark the time between specialist consult and hospital services does not take into account the visit at which the decision to have surgery was taken.
3. Published wait times for acute care services by hospitals via web sites are influenced by administrative policies and procedures with regard to booking of surgeries.
4. Integrated information systems for monitoring time to services, such as registries, are similarly dependent on how times are recorded and how patient data are captured.

6.22 Wait times for all joint replacements, per 100,000 population aged 15 years and older, GP referral to consult and consult to surgery, by province, 2003



Data source: The Fraser Institute

The Fraser Institute, which samples and surveys specialists yearly in each province, has published annual bulletins since 1990 on wait times for acute hospital services. In 2003, the report included responses from 1,097 specialists; the response rate was 33%.[39] Exhibit 6.22 shows the wait times from The Fraser Institute for orthopaedic surgeons across the provinces.[39] The median wait time from referral by GP to orthopaedic consultation (Part 1), 12 weeks, is for all services. The median wait time for consultation to treatment (Part 2) is for arthroplasties of the hip, knee, ankle, and shoulder.

THR and TKR account for most of the arthroplasties. The Fraser Institute reports a median wait time of 24 weeks from consultation to arthroplasties. Hence, the total wait time for arthroplasties of hip, knee, ankle, and shoulder is estimated at 36 weeks.

In this chapter, median wait times were examined by age and sex from 1993 to 2002. Generally, median wait times were found to decline with age, and to be equivalent for men and women. Patterns of wait times within the province vary from year to year. The following factors may have an impact on wait times:

- Patients can go out of district for procedures, though most have the procedures in hospitals within their own District Health Council.
- Orthopaedic surgeons move, or change patterns of practice in terms of procedures performed.
- Hospitals change policies and priorities for particular programs and services.

In the analysis of health administrative data for Ontario, median wait times from consultation date to surgery were found to be 29 weeks for TKR, and 20 weeks for THR, which are relatively close to the estimates from The Fraser Institute. Full-time academic physicians at Queen's University Kingston, (members of the Southeast Academic Medical Organization), do not report medical claims to the Ontario Health Insurance Plan, thus, wait times for the patients for whom they provide services could not be included. Medical records were abstracted for 22 common elective procedures from the two teaching hospitals in the academic health centre in Kingston for the years 1992 to 1999.[40] Reported mean wait times from consultation to surgery were 21.4 weeks for TKR, and 15.5 weeks for THR.

Due to differences in methods, the results cannot be directly compared with those reported here. However, in general terms, they seem comparable. Equity in wait times was also examined, using census data to classify the socioeconomic status (SES) of the 2,755 enumeration areas that corresponded to the postal codes of the patients.[40] Wait times were unrelated to the SES of areas where patients resided.

Five provinces now have web sites that show the wait times for elective and non-elective acute care services by hospital and specialist. British Columbia was the first province to go online in 1998; currently, Alberta, Saskatchewan, Manitoba, and Quebec have also gone online.[41–45] In addition to reporting wait times, the web sites' quarterly reports also indicate the numbers of patients waiting for services, information that places indirect pressure on physicians and hospitals to reduce the waits. To date, there is no information on whether this will provide incentives for governments to allocate resources necessary to reduce wait times for specific procedures.

The Western Canada Waiting List (WCWL) project was inaugurated in 1998 to develop and refine tools for prioritizing patients on scheduled waiting lists.[46,47] Clinical panels were established for five clinical areas—cataract surgery, general surgery procedures, hip and knee replacement, magnetic resonance imaging, and children's mental health. To date, the participating provinces have not implemented the tools they developed for managing wait times.

A number of policies have been suggested to address waiting list management, and guaranteed wait times.[48,49–51] Under the concept of guaranteed wait times, an appropriate candidate is booked for surgery, and is guaranteed immediate access to surgery in their province, or elsewhere, at no cost. A comparison of policies in 12 Organisation for Economic Co-operation and Development (OECD) countries found that England and Sweden abandoned guarantees on wait time after trial for a period of months.

Registries and other information systems are being developed to manage wait times. Rating urgency to set priorities for surgery is key to improvement. Radiological findings, clinical assessment of the joint, and reports of pain and function are commonly used in assessing the appropriateness of TJR. Assessment to determine which features are most associated with urgency is not straightforward. Surgical decisions are typically based on clinical presentation, radiology, pain, and disability. Additional consideration may be given to age, work, and family care responsibilities of the individual. While there is general agreement on the variables to be considered, there is less agreement on the criteria for scoring and weighting the information for decision-making.[52–54,24] Where criteria for appropriateness have been applied to reviews of medical records of TJR patients, the general conclusion is that most of the procedures performed were appropriate.[53,55–57]

The Ontario Expert Panel on Hip and Knee Arthroplasty provided ratings of urgency.[24,58] Wait times were defined as time in the surgical queue, which is the time from consultation to procedure.

The panel recommended a wait time of:

- 6 to 12 months for appropriate candidates for surgery, who are near normal in terms of functional status, have some functional impairment, and mild pain.
- 3 to 6 months for patients whose disease interferes with work or caregiving, or with severe pain on activity, and some pain at rest.
- 1 to 3 months if the patient is largely incapacitated, has severe pain on activity, and some pain at rest.
- Less than 1 month for patients largely incapacitated by pain, who also have moderate to severe pain at rest, provided they have a good prospect for improvement in functioning and/or reduction in pain.

The urgency ratings would serve to reduce the burden of pain and impairment, but the impact of the recommended times on long-term benefits is unknown.

In 1999, the Ministry of Health and Long-Term Care (MOHLTC) asked ICES to form a consensus group of key stakeholders to set forth recommendations regarding the severity and urgency of patients awaiting TJR and to recommend a system for evaluating the impact of wait times on the outcomes of patients following surgery. The Consensus Group recommended that all orthopaedic surgeons be required to participate and complete consultation notes on candidate patients for TJR.[59] To monitor outcomes, it was also recommended that patients complete a measure of pain and function, the WOMAC (Western Ontario-McMaster Index of Osteoarthritis), at the consultation visit and one year after surgery.[60]

Following the successful completion of a pilot project in Southwestern Ontario that started in 1998, the MOHLTC is funding and co-sponsoring the Ontario Joint Replacement Registry (OJRR) with the Ontario Orthopaedic Association. The registry is part of the Canadian Joint Replacement Registry (CJRR) sponsored by the Canadian Orthopaedic Association and managed by the Canadian Institute for Health Information.[61] Specifically, the OJRR has roles in waiting list management, evidence-based improvements in THR and TKR, and post-market surveillance of TKR and THR devices.

The goals of the registry are to provide timely access to surgery and to reduce revision rates by tracking and evaluating surgical techniques and implants. Orthopaedic surgeons enter data on patients and surgical management using handheld electronic personal data assistants. The data are uploaded to a secure web site and surgeons can review their data and compare them with the aggregated summaries of data from other surgeons. The registry is modeled after the Swedish Total Hip Replacement Registry, which has been tracking revision rates, by implant and surgical management, since 1977. With the encouragement and support of the MOHLTC, the project team agreed to add information for managing wait times for surgery.

These potential improvements to manage wait times and give priority care to patients most in need will most benefit those people with arthritis who are already known to the health care system as needing surgery. However, we need to take a wider system-level view if we are to ramp up the number of procedures performed to meet the needs of the increasing numbers of people with arthritis.

Increasing capacity for total joint replacements

There are a number of key elements that need to be in place to enhance provision of joint replacement surgery. Central to these is the supply of orthopaedic surgeons and their access to the resources needed to perform TJR, including the prostheses, operating rooms, anesthetists, nurses, hospital beds, and post-operative rehabilitation services. These resources are primarily under the control of hospitals, and ultimately government funding policies, and their availability are key to increasing capacity.

There is a shortage of orthopaedic surgeons in Ontario.[62] In 2000, there were 357 orthopaedic surgeons practising in Ontario (see Chapter 3, Availability of Services). Their mean age is almost 50 years, suggesting that current shortages are likely to be exacerbated with the aging of the profession. This level of orthopaedic provision per capita is less than half that recently recommended for the United States.[63] While further recruitment to the specialty is clearly important, this is a longer-term strategy that cannot address the immediate need to expand capacity for joint replacement surgery to meet population needs.

Currently Ontario orthopaedic surgeons spend about one-third of their time doing surgery. This is less than the 62% of time recommended for orthopaedic surgeons in the United States. They also carry an important clinical outpatient consultative load (see Chapter 4, Primary and Specialist Care), and were they to devote more time to surgery, alternative arrangements would be needed to cover this role. Further, TJR represents only one-third of the surgical procedures performed, and studies need to be carried out on the feasibility of increasing the proportion.

As indicated above, Ontario has likely reached the stage where there is no further scope to increase capacity by manipulation of LOS alone. The major focus of current debate on joint replacement surgery is on increasing the efficiency of the system through waiting list management and priority setting, and to succeed would be an important contribution. However, the current and future demand for this cost-effective surgery means it is imperative to increase capacity. One potential option to improve capacity includes increasing the supply of surgeons over the long-term. In the short-term, an option is to expand availability of operating room time, hospital, and rehabilitation resources for orthopaedic procedures and reappraise the types of surgery being performed. This, of course, is predicated on the availability of the associated infrastructure support, which is not a trivial consideration. However, joint replacement surgery is one of the relatively few major procedures that have been shown to be cost-effective, may even be cost-saving, and results for patients are often dramatic for relief of pain and disability. Increasing capacity has the potential to have a marked impact on the lives of people living with arthritis.

Management of arthritis and rheumatism presents only one set of challenges for the health care system. Every sector of the health industry has its own set of challenges. Access to joint replacement surgery is a major issue in arthritis care. The task for policy makers and health care providers is to ensure that we do not lose sight of key issues for arthritis and related conditions as choices are made.

Appendices

6.A How the research was done

Arthroscopic knee surgery

Data sources

Data were obtained from the Institute for Clinical Evaluative Sciences (ICES), which collects data from Ontario Health Insurance Plan (OHIP) physician claims database for fiscal years 1992/93 to 2001/02. OHIP is the provincial government-funded insurance plan that covers all Ontario residents for a variety of health care services including all necessary surgical procedures. The following are included in, or can be linked to, each claim: surgical procedure code, relevant diagnosis, date of procedure, age, sex, and postal code of the patient.

The OHIP database contains approximately 94% of all physician and surgeon visits in Ontario. A small minority of physicians and surgeons operate under alternate payment arrangements. Patients' residential postal codes were obtained from the Ontario Registered Persons Database (RPDB) and linked to OHIP data using the encrypted health number. Population denominators for rates were obtained from Statistics Canada census data.

Analyses

For every surgical procedure, institutions are required to submit a relevant medical condition for the patient. Only surgical procedures involving individuals with at least one arthritis and related diagnosis were included in the analysis (see Appendix 6.B).

All codes for arthroscopic knee procedures related to arthritis or internal structures of the joint were selected by a practising orthopaedic surgeon (see Appendix 6.B). Data on rates of total knee replacement (TKR) are presented for comparison. In cases where a procedure was performed bilaterally (both knees), only one procedure was included in the analysis.

Age and sex standardized rates were calculated for arthritis related arthroscopic knee procedures between 1992 and 2001. The rate of all arthroscopic knee procedures was calculated for each District Health Council in Ontario. Geographical analyses were performed using the postal code of residence for each surgical patient. Unless otherwise stated, these rates are age and sex standardized to the 1992 Ontario population (15 years of age and over).

Limitations

When interpreting the data presented in this chapter it should be remembered that only individuals coded as having an arthritis or related diagnosis by the surgeon were included. Therefore, surgeries carried out on patients with an associated diagnosis other than an arthritis or related condition would be excluded. In addition, variation in coding practices across the regions might explain a portion of the geographical variation.

In order to calculate population rates of arthroscopic procedures, OHIP claims were used as the numerator and Canada census counts as the denominator. There is a lack of routine updating of addresses in Ontario's health care registry and incomplete removal of deceased persons. As a result, the number of people in the health care registry is higher than that in the census. This variation is more pronounced in some regions than others, which may affect the accuracy of area-based population rates.

6.B Procedure and diagnosis codes

Arthroscopic knee surgery

Data was obtained from the OHIP physician claims database for fiscal years 1992/93 to 2001/02. To identify arthroscopic procedures, relevant OHIP fee codes were used.

Table 6.2 Relevant OHIP fee codes

Diagnostic Category	OHIP Fee Code
Removal of loose body or screw	R193
Resection of plica	R194
Lateral release	R195
Synovectomy: anterior, 1 compartment	R196
Synovectomy: anterior, > 1 compartment	R197
Synovectomy: total, anterior, and posterior	R198
Drilling of defect (included removal of loose body)	R199
Pinning of osteochondral fragment	R203
Debridement: 1 compartment	R204
Debridement: >1 compartment	R205
Abrasion arthroscopy	R206
Menisectomy	R207
Repair of medical or lateral meniscus	R208
Total knee replacement/both compartments	R441
Patellar arthroplasty	R509
Diagnostic arthroscopy (sole procedure)	Z218
Total replacement/both compartments	R441

Table 6.3 Procedure groupings

Group	OHIP Fee Code
Knee arthroscopic procedures	
Menisectomy with debridement	R207 plus R204 or R205
Menisectomy without debridement	R207 with or without any other knee arthroscopy code, but excluding R204 and R205
Debridement alone	R204 or R205 excluding R207
Other	Any knee arthroscopic code excluding R207, R204 OR R205
Knee replacement procedures	R441

To identify the arthroscopic procedures reported, procedures were grouped using OHIP fee codes.

Table 6.4 Arthritis and related ICD-9 based diagnosis codes

Diagnostic Category	ICD-9 Diagnosis Codes
Gout	274
Diffuse diseases of connective tissue	710
Arthropathy associated with infections	711
Rheumatoid arthritis and other inflammatory polyarthropathies	714
Osteoarthrosis and allied disorders	715
Other and unspecified arthropathies	716
Other derangement of joint	718
Ankylosing spondylitis and other inflammatory spondylopathies	720
Other disorders of soft tissues	729
Polyarteritis nodosa and allied health conditions	446
Disorders of muscle, ligament, and fascia	728
Other diseases of the MSK system and connective tissue	739

Only individuals with at least one arthritis and related condition, as identified by the arthritis and related ICD-9 based diagnosis codes in the OHIP data, were included in the analyses.

The following codes were excluded because they were not available in OHIP data: 713, 717, 719, 725, 726, 727.

6.C How the research was done

Total joint replacement

Data sources

Data were obtained from the Discharge Abstract Database (DAD), provided by the Canadian Institute of Health Information (CIHI) for the fiscal years 1981/82 to 1999/00. Data were also obtained from the OHIP billing claims for the fiscal years 1993/94 to 1999/00. Total hip replacements (THRs) and total knee replacements (TKRs) were identified by the Canadian Classification of Therapeutic, Diagnostic and Surgical Procedures (CCP) code in the health record.

CIHI records were selected for total hip replacement when any of the valid procedure fields had the Canadian Classification of Therapeutic, Diagnostic and Surgical Procedure (CCP) code of either 93.51 or 93.59. Total knee replacement records were identified if the CCP code of 93.41 was found in the procedure fields.

Primary TJRs were differentiated from revision TJRs. Total joint replacements for fractures and cancer were considered urgent and non-elective. Records were excluded if they had International Classification of Diseases, 9th edition (ICD-9), diagnostic codes for fractures (800.x through 899.x), non-medical causes of injury (E800-E869, E880-E928, and E950-E999), malignant neoplasms (140.x through 208.x), or neoplasms of uncertain behaviour (235.x through 239.x). Procedures were considered to be revisions of total joint arthroplasty when any one of 10 fields for ICD-9 diagnostic codes included osteomyelitis of joint (730.0 through 730.3, 730.8, and 730.9), mechanical complications of internal prosthetic device (996.4 and 996.7), dislocation of the joint (835.0 for hip and 836.3 and 836.4 for knee), or post-operative infections (996.6, 998.5 and 998.6). All remaining records were considered primary replacements of the hip and knee.

A coding addendum was added in 2000/01 to the CCP to capture revisions of total joint replacement. In addition to records selected above, 2000/01 CIHI records were considered revision hip replacements when any of the valid procedure fields had the CCP code 93.52, 93.53, 93.65, 93.66, 93.67 or 93.68. Also, 2000/01 CIHI records were considered revision knee replacements when any of the valid procedure fields had the CCP code 93.40.

Wait times for primary TJR procedures were estimated from fiscal year 1993/94. OHIP claims were matched with CIHI records on the unique identifying number encrypted by the Institute for Clinical Evaluative Sciences (ICES). OHIP claims with the suffix of "A" and fee codes for primary THR (R440 or R553), revision of THR (R241), primary TKR (R441 or R248), and revision of TKR (R244) were abstracted. Matching CIHI and OHIP records had to have the same unique identifying number, with the OHIP service date falling within admission and discharge dates on the CIHI records.

Analyses

Age and sex standardized rates were calculated for THRs and TKRs using the 1996 census data from Statistics Canada. The reported rates are for 100,000 persons aged 15 years and older. This differs from the 1998 research atlas in which the surgical rates were reported for 100,000 adults, aged 20 years and older. This change was made to ensure consistency among chapters. Regional variation in the utilization of THR and TKR was examined by DHC.

Wait times were estimated for primary TJR procedures from 1993/94 and by DHC for 2000/01. Wait time, or time in the queue, is defined as the time from the date of consultation with the orthopaedic surgeon to the date of surgery. Wait times were not standardized by age and sex. Wait time was divided into 4 categories: 1 to 2 months; 3 to 5 months; 6 months to 1 year; and greater than 1 year. The median wait times for men and women were calculated by age groupings for various years to determine if changes in wait times were related to sex and age.

References

1. Shipton D, Mahomed N, David K, Badley EM. Hospital services for arthritis. In: Badley E, DesMeules M, editors. Arthritis in Canada: an ongoing challenge. Ottawa: Health Canada; 2003.

2. Miller GK. Diagnostic and surgical arthroscopy. *Compr Ther* 1990; 16(4): 25–28.

3. Jackson RW, Marshall DJ, Fujisaa Y. The pathalogic medical shelf. *Orthop Clin North Am* 1982; 13(2):307–312.

4. Jackson RW. Arthroscopic surgery for osteoarthritis of the knee. *N England J Med* 2002; 347(21):1717–1719.

5. Hubbard MJ. Articular debridement versus washout for degeneration of the medical femoral condyle. A five year study. *J Bone Joint Surg Br* 1996; 78(2):217–219.

6. McGinley BJ, Cushner FD, Scott WN. Debridement arthroscopy. 10 year follow-up. *Clin Orthop* 1999; (367):190–194.

7. Moseley JB, O'Malley K, Peterson NJ, Menke TJ, Brody BA, Kuykendall D et al. A controlled trial of arthroscopic surgery for oesteoarthrits of the knee. *N England J Med* 2002; 347(2):81–88.

8. Gibson GN, White MD, Chapman VM, Strachen RK. Arthroscopic lavage and debridement for osteoarthritis of the knee. *J Bone Joint Surg* 1992; 74(4):534–537.

9. Harwin SF. Arthroscopic debridement for osteoarthritis of the knee: predictors of patient satisfaction. *Arthroscopy* 1999; 15(2):142–146.

10. Baumgaertner MR, Cannon W, Jr., Vittori JM, Schmidt ES, Maurer RC. Arthroscopic debridement of the arthritic knee. *Clin Orthop* 1990; (253): 197–202.

11. Jackson RW, Rouse DW. The results of partial arthroscopic meniscectomy in patient over 40 years of age. *J Bone Joint Surg Br* 1982; 64(4):481–485.

12. Livesley PJ, Doherty M, Needoff M, Moulton A. Arthroscopic lavage of osteoarthritic knees. *J Bone Joint Surg Br* 1991; 73(6):922–926.

13. Fond J, Rodin D, Ahmad S, Nirschl RP. Arthroscopic debridement for the treatment of osteoarthritis of the knee. *Arthroscopy* 2002; 18(8):829–834.

14. Bradley MP, Provencher MT, Nelson FR. Bilateral subchrondral cysts without arthroscopic evidence of articular cartilage degredation. *Arthroscopy* 2002; 18(8):E41.

15. Wai E, Kreder HJ, Williams JI. Arthroscopic debridement of the knee for osteoarthritis in patients fifty years of age or older: utilization and outcomes in the province of Ontario. *J Bone Joint Surg* 2002; 84-A(1):1722.

16. Chang RW, Falconer J, Stulberg SD, Arnold WJ, Manheim LM, Dyer AR. A randomized trial of arthroscopic surgery versus closed-needle joint lavage for patients with osteoarthritis of the knee. *Arthritis Rheum* 1993; 36(3): 289–296.

17. Bunker JP, Fraser HS, Mosteller F. Improving health: measuring effects of medical care. *Milbank Q* 1994; 72(2):225–258.

18. Hawker GA, Wright JI, Coyte PC, Paul J, Dittus R, Croxford R et al. Health-related quality of life after knee replacement: results of the knee replacement patients outcome study. *J Bone Joint Surg* 1998; 46(12): 3331–3339.

19. Chang RW, Pellisier JM, Hazen GB. A cost-effective analysis of total hip arthroplasty for osteoarthritis. *JAMA* 1996; 275:858–865.

20. Axcell T, DeBoer D, Kreder HJ, Williams JI. Surgical services for total hip and total knee replacements: times in the surgeon's queue for elective primary total hip and primary total knee replacements. In: Badley E, Williams J, editors. Arthritis and related conditions: patterns of health care in Ontario. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Services; 1998. 133–140.

21. Cohen ME, DeBoer D, Young W. Total knee replacement. In: Naylor CD, Anderson GM, Goel V, editors. Patterns of health care in Ontario. Ottawa: Canadian Medical Association; 1994. 72–76.

22. DeBoer D, Williams JI. Surgical services for total hip and total knee replacements: trends in hospital volumes and length of stay for total hip and total knee replacement. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis and related conditions: An ICES practice atlas. Toronto: Institute for Clinical Evaluative Services; 1998. 121–124.

23. DeBoer D, Williams JI. Surgical services for total hip and total knee replacements: overall trends in hip and knee replacements. In: Badley E, Williams J, editors. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Services; 1998. 111–121.

24. Naylor CD, DeBoer D. Total hip and total knee replacements. In: Goel V, Williams J, Anderson J, Blackstein-Hirsch P, Fooks K, et al, editors. Patterns of health care in Ontario: an ICES practice atlas. Toronto: Institute for Clinical Evaluative Services; 1996. 54–59.

25. Williams JI, Hawker GA, DeBoer D, Kreder HJ. Hip and knee replacement. Stewart D, Cheung A, Ferris L, Hyman I, Cohen M, Williams J, editors. Ontario Women's Health Status Report. Toronto: Women's Health Council; 2000. 121–137. Ref Type: Report

26. Hawker GA, Wright JG, Coyte PC, Williams JI, Harvey B, Glazier R et al. Differences between men and women in the rate of hip and knee arthroplasty. *N Engl J Med* 2000; 342(14):1016–1022.

27. Hawker GA, Wright JG, Coyte PC, Harvey B, Wikins A, Badley EM. The effort of education and income in need and willingness to undergo total joint arthroplasty. *Arthritis Rheum* 2002; 46(12):3331–3339.

28. Felson DT. Epidemiology of hip and knee osteoarthritis. *Epidemiol Rev* 1998; 10:1–28.

29. Canadian Institute for Health Information (CIHI). Canadian Joint Replacement Registry (CJRR) bulletin. Surgical and orthopedic implant information for total hip and total knee replacement procedures performed in Canada, May 2001–March 2002. Toronto: CIHI; 2002.

30. Canadian Joint Replacement Registry 2003 Report. Total hip and knee replacements in Canada. Ottawa: Canadian Institute for Health Information; 2003. Ref Type: Report

31. Herbets P, Malchau H. Long-term registration has improved the quality of hip replacement: a review of the Swedish THR Register comparing 160,000 cases. *Acta Orthop Scand* 2000; 72(2):111–121.

32. Robertson O, Dunbar MJ, Knutson K, Lidren L. Past incidence and future demand for knee arthroplasty in Sweden. *Acta Orthop Scand* 2003; 71(4):376–380.

33. Tennant A, Fear J, Pickering A, Hillman M, Cutts A, Chamberlain MA. Prevalence of knee problems in the population aged 55 years and over: identifying the need for knee arthroplasty. *BMJ* 1995; 310:1291–1293.

34. Hawker GA, Wright JG, Coyte PC, Williams JI, Harvey B, Glazier R et al. Determining the need for hip and knee arthroplasty: the role of clinical severity and patients' preferences. *Med Care* 2001; 39(3):206–216.

35. Hawker GA, Wright JG, Badley EM, Coyte PC. Perceptions of and willingness to consider, total joint arthroplasty in a population-based cohort of individuals with disabling hip and knee arthritis. *Arthritis Care Res* 2004; In Press.

36. Hudak PL, Clark JP, Hawker GA, Coyte PC, Mahomed NN, Kreder HJ et al. "You're perfect for the procedure! Why don't you want it?" Elderly arthritis patients' unwillingness to consider total joint arthroplasty: a qualitative study. *Med Decis Making* 2002; 22(2):272–278.

37. Williams JI, Llewellyn-Thomas H, Arshinoff R, Young N, Naylor CD. The burden for waiting for hip and knee replacements in Ontario. *J Eval Clin Pract* 1997; 3(1):59–68.

38. Esmail N, Walker M. Waiting your turn: hospital waiting lists in Canada (12th ed.). 2002. Fraser Institute Critical Issues Bulletin. Ref Type: Report

39. Esmail N, Walker M. Waiting your turn: hospital waiting lists in Canada (13th ed.). 2003. Fraser Institute Critical Issues Bulletin. Ref Type: Report

40. Short S, Shaw RA. Equity in Canadian health care: does socioeconomic status affect waiting times for elective surgery? *Can Med Assoc J* 2003; 168(4):413–416.

41. Alberta Health and Wellness. Alberta waitlist registry. www.health.gov.ab.ca. 2003. Ref Type: Electronic Citation

42. Saskatchewan Surgical Care Network. Surgery: what you need to know. www.sasksurgery.ca. 2003. Ref Type: Electronic Citation

43. Manitoba Health Services. Wait time information site. http://www.gov.mb.ca/health/waitlist/index.html. 2004. Ref Type: Electronic Citation

44. Sante et Services Sociaux Quebec. Listes d'attente sur le Web. www.msss.gouv.qc.ca. 2003. Ref Type: Electronic Citation

45. British Columbia Ministry of Health Services. Surgical wait times. www.hlth.gov.bc.ca. 2003. Ref Type: Electronic Citation

46. McGurran JJ, Noseworthy TW, and the steering committee of the Western Canada Waiting List Project. Improving the management of waiting lists for elective health care services: public perspectives in proposed solutions. *Hosp Q* 2002; Spring 5(3):28–32.

47. Noseworthy TW, McGurran JJ, Hadorn DC, and the Steering Commitee of the Western Canada Waiting List Project. Waiting for scheduled services in Canada: development of priority setting scoring systems. *J Eval Clin Pract* 2003; 9(1):23–31.

48. Sanmartin C, Short S, Barer ML, Sheps S, Lewis S, McDonald PW. Waiting for medical services in Canada: lots of heat, but little light. *Can Med Assoc J* 2000; 162(9):1305–1310.

49. Mazankowski D. A framework for reform: report of the Premier's Advisory Council on Health. http://www.premieradvisory.com/reform.html. 2003. Ref Type: Electronic Citation

50. Siciliani L, Hurst J. Tackling excessive waiting times for elective surgery: a comparison of policies in twelve OECD countries. OECD Health Working Papers No. 6. 2003. Paris, OECD. Ref Type: Report

51. Hurst J, Siciliani L. Explaining waiting times for variations for elective surgery across OECD countries. OECD Health Working Papers No. 7. Paris: OECD; 2003. Ref Type: Report

52. Quintana JM, Arostegui I, Azkarate J, Geonaga JI, Elexpe X, Letona J et al. Evaluation of explicit criteria for total hip joint replacement. *J Clin Epidemiol* 2000; 53(12):1200–1208.

53. Quintana JM, Arostegui I, Azkarate J, Goenaga JI, Guisasola I, Alfageme A et al. Evaluation of explicit criteria of the use of total hip joint replacement. *Rheumatol* 2000; 39(11):1234–1241.

54. Escobar A, Quintana JM, Azkarate J, Guenga J, Arenza JC. Development of explicit criteria for total knee replacement. *Int J Technol Assess Health Care* 2003; 19(1):57–70.

55. Quintana J, Arostegui I, Azkarate J, Goenga J, Tobio R, Aranburu J et al. Use of explicit criteria for total hip joint replacement techniques. Health Policy 2002; 60(1):1–16.

56. Wright CJ, Chambers GK, Robens-Paradise Y. Evaluations of indications for and outcomes for elective surgery. *Can Med Assoc J* 2002; 167(5):461–465.

57. Van Walren C, Paterson JM, Kapral M, Chan B, Bell M, Hawker G et al. Appropriateness of primary total hip and knee replacements in regions of Ontario with high and low utilization rates. *Can Med Assoc J* 1996; 155(6): 697–706.

58. Naylor CD, Williams JI. The Ontario Panel on Hip and Knee Arthroplasty. Primary hip and knee replacement surgery: the Ontario criteria for case selection and surgical priority. *Qual Health Care* 1996; 5:20–30.

59. Blackstein-Hirsch P, Golish JD, Hawker GA, Kreder H, Mahomed N, Williams JI. Information strategy: urgency rating, waiting list management, and patient outcomes monitoring for primary hip/knee joint replacement. Toronto: Institute for Clinical Evaluative Sciences; 2000. Ref Type: Report

60. Bellamy N, Buchanan WW, Goldsmith CH, Cambell J, Stitt LW. Validation study of WOMAC: a health status instrument for measuring clinically important patient-relevant outcomes following total hip or knee arthroplasty in osteoarthritis. *J Orthop Rheumatol* 1988; 1:95–108.

61. Ontario Joint Replacement Registry. http://ojrr.ca/ojrr/public/. 2001. Ref Type: Electronic Citation

62. Shipton D, Badley EM, Mahomed NN. Critical shortage of orthopaedic services in Ontario, Canada. *J Bone Joint Surg Am* 2003; 85-A(9):1710–1750.

63. Lee PP, Jackson CA, Relles DA. Demand-based assessment of workforce requirements for orthopaedic services. *J Bone Joint Surg* 1998; 80:313–326.

INSIDE

Chapter 7

Rehabilitation for Total Joint Replacement

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Key Messages

- From fiscal year 1995/96 to 2001/02, the percentage of patients with primary and revision total hip and knee replacements discharged to inpatient rehabilitation increased from approximately 30% to 40%. Less than 21% of patients received home care services following discharge from inpatient rehabilitation.
- Patients with primary total hip or knee replacements discharged to inpatient rehabilitation tended to have a shorter acute care length of stay (LOS) compared to patients discharged directly home.
- Older women with other health conditions were more likely to receive inpatient rehabilitation following total hip replacement and total knee replacement.
- In 13 of the 16 District Health Councils (DHCs), the percentage of patients receiving inpatient rehabilitation services increased. However, in 7 DHCs more than 75% of patients with total hip replacements, and 88% of patients with total knee replacements, were not transferred to inpatient rehabilitation. In almost one-half of the DHCs, more than 75% of patients were discharged to inpatient rehabilitation in the DHCs in which they resided.

Introduction

This chapter provides an update on previous findings regarding use of rehabilitation services following total joint replacement published in the 1998 ICES research atlas on *Patterns of Health Care in Ontario: Arthritis and Related Conditions*. Use of rehabilitation services by patients that received a primary or revision total hip replacement (THR) or total knee replacement (TKR) is examined for fiscal years 1995/96 to 2001/02. For the subgroup of patients that received home care services, type and intensity of services is also examined. Issues relating to accessibility and availability of services, as well as appropriate utilization of services, are covered in this chapter.

Background

After total joint replacement (TJR), rehabilitation is essential to minimizing disability.[1] A large majority of these patients receive rehabilitation following their acute care stay. Intense rehabilitation is required for total hip and knee replacements; therapy begins in the early post-operative period and continues in the post-acute care phase.[2] Based on available data, Ontario patients remain in the acute care setting for approximately one week before transfer to inpatient or home-based rehabilitation (home care). Without a standard approach to rehabilitation of these patients, existing services vary widely with respect to the setting and amount of services provided. Post-acute care rehabilitation settings include:

- Inpatient facility;
- Patient's home with home care rehabilitation;
- Patient's home with outpatient rehabilitation; and,
- Patient's home with independent exercise.

This chapter builds on information presented in the 1998 edition of *Patterns of Health Care in Ontario: Arthritis and Related Conditions* on the use of rehabilitation services for musculoskeletal patients, as well as work contributed by others.[3,4] In the previous research atlas, using discharge abstract data for fiscal years 1993/94 to 1995/96, it was noted that compared to other musculoskeletal conditions, patients with total joint replacement had relatively short inpatient rehabilitation stays.[3] Patients that required more home care services tended to be older women with higher levels of comorbidity, and also required longer inpatient stays in acute care and rehabilitation. Large variations were noted in the utilization of inpatient and home-based rehabilitation programs within Ontario for patients receiving a joint replacement.

More recent trends were examined in patient rehabilitation utilization in Ontario from 1995/96 to 1999/00.[4] Length of stay (LOS) for inpatient rehabilitation decreased over this period. In 1999/00, inpatient rehabilitation was provided to 33% of patients with THRs and 30% of patients with TKRs overall, but there was variation depending on where patients lived. Trends in home care services for this patient population were not examined as data were not available during preparation of this report.

Current literature shows little conclusive evidence to define an optimal post-operative course to achieve the best possible outcomes for recipients of TJRs. A recent review article of studies published between 1988 and 2002 on post-operative management of patients with total joint replacements, noted that the reason post-operative care for TJR is so different is that there is scarce literature on the effectiveness of various post-operative interventions.[5]

This chapter examines the utilization of rehabilitation services by Ontario patients that received a primary or revision total hip or knee replacement by:

- Type of post-acute care rehabilitation;
- Acute care length of stay;
- Inpatient rehabilitation length of stay;
- Age;
- Sex; and,
- Comorbidity.

Geographic variation by District Health Council was examined for the subgroup that received inpatient rehabilitation. For the subgroup that received home care services, type and intensity of services were also examined.

Findings and Discussion

Discharge destinations following total joint replacement

7.1 Patient discharge destinations by joint replacement procedure, in Ontario, 1995/96 and 2001/02

From 1995/96 to 2001/02, the number of total hip replacements (THRs) and total knee replacements (TKRs) performed in Ontario increased steadily. Following surgery, patients were discharged directly home from acute care or transferred to inpatient rehabilitation.

Overall, the percentage of patients with primary total hip and knee replacements discharged directly home from acute care decreased from approximately 68% in 1995/96 to about 57% in 2001/02. From 1999/00 to 2001/02, the percentage of patients discharged directly home following surgery decreased consistently for all procedures.

Patient discharge destination varied depending on the type of surgery. Compared to other types of procedures, a greater percentage of patients with revision THRs was discharged to inpatient rehabilitation rather than directly home following their acute care stay. In contrast, following revision TKRs, a greater percentage of patients was discharged directly home from acute care. It is hypothesized that the differences in discharge destinations could be due to more mobility restrictions (such as weight bearing) for patients with THR (e.g. weight bearing restrictions).

Surgical Procedure	Patient Discharge Destination			
	1995/96		2001/02	
	Inpatient Rehabilitation	Home From Acute Care	Inpatient Rehabilitation	Home From Acute Care
Primary Total Hip Replacement	1618 (31.6%)	3498 (68.4%)	2748 (43.5%)	3575 (56.5%)
Revision Total Hip Replacement	404 (39.1%)	629 (60.9%)	639 (46.7%)	729 (53.3%)
Primary Total Knee Replacement	2003 (31.1%)	4443 (68.9%)	4171 (42.4%)	5675 (57.6%)
Revision Total Knee Replacement	162 (25.3%)	478 (74.7%)	370 (38.0%)	603 (62.0%)

Data source: Canadian Institute for Health Information

Length of stay in acute care and inpatient rehabilitation following total joint replacement

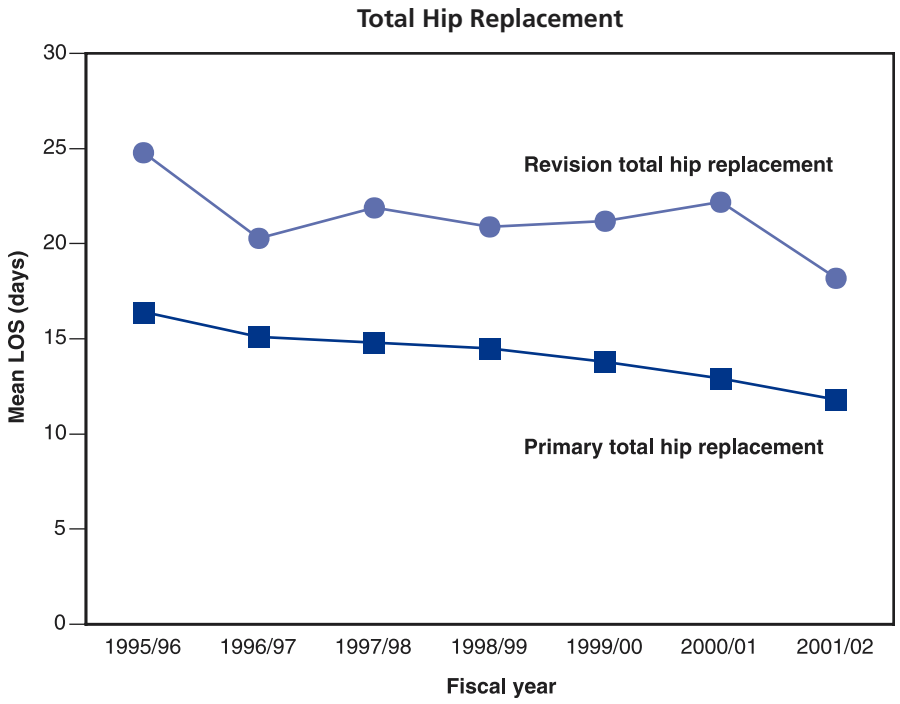
In Ontario, the mean acute care length of stay (LOS) decreased steadily from 1995/96 to 2001/02 for TKRs and THRs (both primary and revisions). This was most notable for primary TKR, where the mean acute care LOS decreased by 3.1 days, from 9.2 days in 1995/96 to 6.1 days in 2001/02. The median LOS decreased from 8 days to 6 days during this period.

Both the mean and median acute care LOS were longer for patients discharged directly home following primary THRs and primary TKRs compared to those who were transferred to inpatient rehabilitation. For example, in 2001/02 the mean acute care LOS was 6.4 days (median 6 days) for patients discharged directly home following primary TKR compared to 5.6 days (median 5 days) for patients transferred to inpatient rehabilitation. There were no differences in the median acute care LOS for patients discharged home or to inpatient rehabilitation following revision surgeries.

7.2 Inpatient rehabilitation length of stay for patients with total joint replacement, in Ontario, 1995/96 to 2001/02

The LOS in inpatient rehabilitation for primary THR decreased from a mean of 16.4 days (median 15 days) in 1995/96 to a mean of 11.8 days (median 10 days) in 2001/02. A similar trend was noted for primary TKR, for which the LOS in inpatient rehabilitation decreased from a mean of 17.3 days (median 15 days) to a mean of 11.0 days (median 9 days).

Overall, the mean rehabilitation LOS was shorter for primary surgeries compared to revision. It was also shorter for patients that received inpatient rehabilitation and home care services following discharge. For example, in 2001/02, the mean rehabilitation LOS was 8.3 days (median 7 days) for patients following primary TKR that also received home care services, compared to 11.5 days (median 10 days) for patients discharged from inpatient rehabilitation with no home care service provision.



Data source: Canadian Institute for Health Information

Characteristics of joint replacement patients by discharge destination

7.3 Age and sex of patients by joint replacement procedure and discharge destination, in Ontario, 2001/02

No substantial difference was observed in the mean age of individuals that received THRs and TKRs between the years of 1995/96 and 2001/02. Older individuals tended to receive inpatient rehabilitation following acute care hospitalization regardless of type of surgery. For example, in 2001/02, individuals that had inpatient rehabilitation following primary THRs were, on average, 68.6 years old compared to patients discharged directly home who had a mean age of 65.9 years.

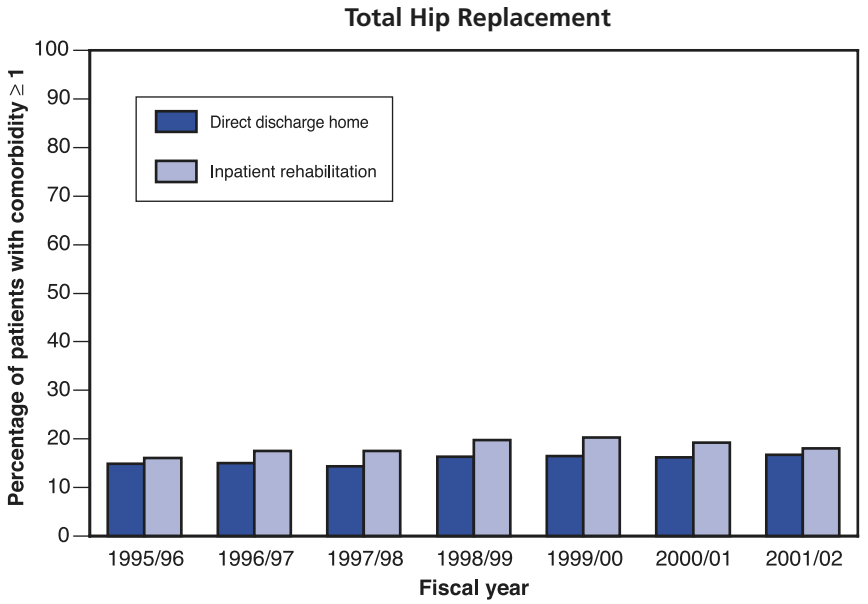
Overall, a higher percentage of women than men received THRs and TKRs. For example, in 2001/02, 61.5% of primary TKRs were performed on women. Of the patients transferred to inpatient rehabilitation following surgery, 64.9% were women. In contrast, only 59.0% of patients discharged directly home were women.

		Surgical Procedure			
Discharge Destination	Age and Gender	Primary Total Knee Replacement	Revision Total Knee Replacement	Primary Total Hip Replacement	Revision Total Hip Replacement
Home From Acute Care	Mean Age	68.4	69.4	65.9	66.6
	% Women	**59.0%**	**50.3%**	**54.3%**	**52.5%**
Inpatient Rehabilitation	Mean Age	69.3	70.7	68.6	70.6
	% Women	**64.9%**	**63.5%**	**62.1%**	**63.4%**

Data source: Canadian Institute for Health Information

7.4 Percentage of patients with primary total joint replacement and at least one comorbidity discharged home and transfered to inpatient rehabilitation in Ontario, 1995/96 to 2001/02

A higher percentage of patients that had inpatient rehabilitation following THR and TKR surgery had a Charlson comorbidity index equal to, or greater than, one (indicating presence of comorbidity), compared to patients discharged directly home. The percentage of patients transferred to inpatient rehabilitation with a Charlson comorbidity index of equal to, or greater than, one increased from 1995/96 (16.1%) to 1999/00 (20.3%) for primary THRs. A similar pattern was noted for primary TKRs. A higher percentage of patients with revision total hip and knee replacements had a Charlson comorbidity index equal to, or greater than, one, compared to patients with primary total hip and knee replacement surgeries. Overall, individuals that received inpatient rehabilitation following THR and TKR were more likely to be older women with comorbidity.



Data source: Canadian Institute for Health Information

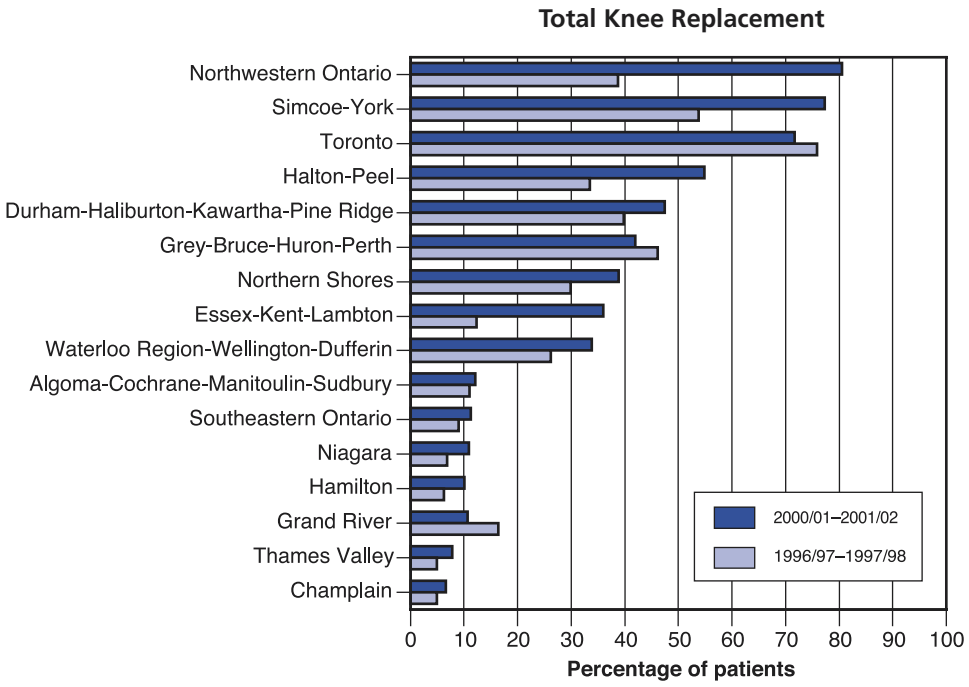
Geographic variation in utilization of rehabilitation services following total joint replacement

Primary and revision surgeries were combined for the analyses of geographic variation. Regional variation was evident in the utilization of inpatient rehabilitation services following THR and TKR.

7.5 Percentage of patients with total joint replacements transferred to inpatient rehabilitation by District Health Council, in Ontario, 1996/97 to 1997/98 and 2000/01 to 2001/02

There was variation by DHC in the percentage of patients with TKRs transferred to inpatient rehabilitation, and findings were similar for patients with THRs. The data illustrate practice changes over time in utilization of inpatient rehabilitation. During the study period, the percentage of patients that received inpatient rehabilitation services following THRs and TKRs increased in 13 of the 16 DHCs. However, in 7 DHCs, over 78% of patients with THRs and 88% of patients with TKRs were not transferred to inpatient rehabilitation during the years examined.

Practice patterns within DHCs also changed in the period. For example, in Northwestern Ontario the percentage of patients with TKRs transferred to inpatient rehabilitation doubled from 38.8% to 80.5%, while the percentage of patients with THRs receiving inpatient rehabilitation decreased from 66.3% to 55.6%. From these data, the reason for the change cannot be determined.

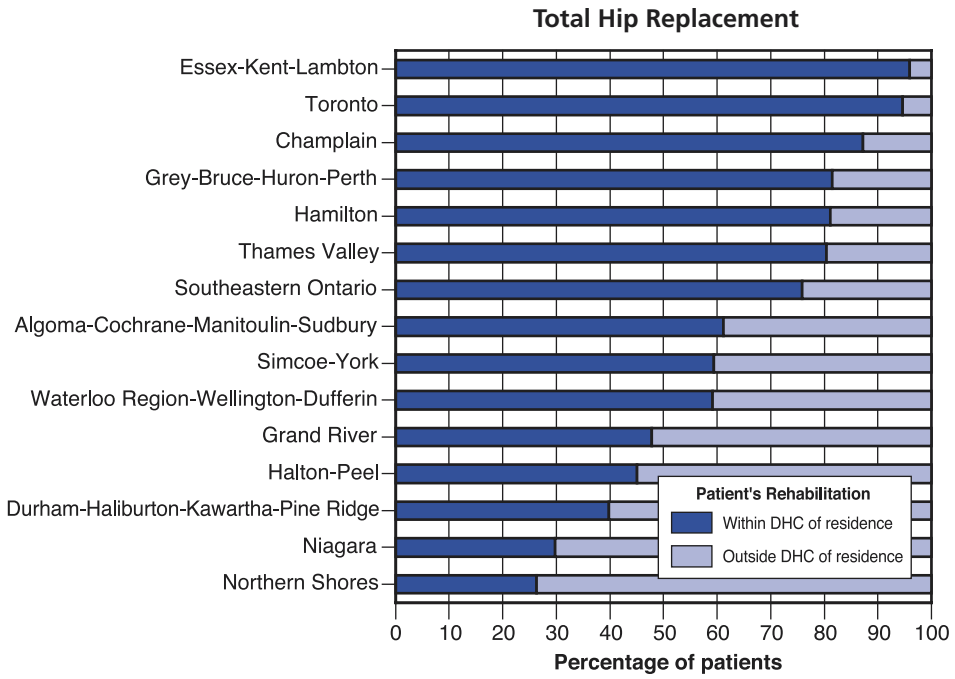


Data source: Canadian Institute for Health Information

7.6 Percentage of patients with total joint replacement that received inpatient rehabilitation in or outside their District Health Council of residence, in Ontario, 2000/01 to 2001/02

In total, more than 75% of patients with THRs and TKRs were discharged to inpatient rehabilitation within the DHCs of the acute care hospital in which they had surgery.

In 7 of the 16 DHCs more than 75% of patients with THRs were discharged to inpatient rehabilitation in their DHCs of residence. The highest percentages were in Northwestern Ontario (where data cannot be presented due to the small numbers of patients receiving rehabilitation outside the DHC of their residence), Essex-Kent-Lambton (95.9%) and Toronto (94.6%), compared to only 26.3% of patients in Northern Shores. Similar patterns were found for TKR.



Data source: Canadian Institute for Health Information

Home care utilization following total joint replacement

7.7 Percentage of patients with total joint replacement that received home care services, by discharge destination, in Ontario, 1995/96 and 2001/02

Home care services were available to patients discharged directly from acute care and patients that received inpatient rehabilitation. Patients were included in the analysis if they received one or more services from a home care program. Overall, a higher percentage of patients with primary and revision THRs received home care services compared to primary and revision TKRs.

Following all surgical procedures, patients were more likely to receive home care services if they were discharged directly home, compared to patients that had inpatient rehabilitation. Less than 21% of patients discharged from inpatient rehabilitation also received home care services. However, the percentage of patients that received home care services on discharge home from acute care decreased for primary THRs and primary TKRs from 1995/96 to 2001/02. This was most notable for patients with primary TKRs, where the percentage of patients receiving home care services decreased from 48.6% in 1995/96 to 30.5% in 2001/02. For all procedures from 2000/01 to 2001/02, there was an overall drop in the percentage of patients receiving home care services following discharge home and following inpatient rehabilitation.

Surgical Procedure	% of Patients that Received Home Care Services			
	1995/96		2001/02	
	Inpatient Rehabilitation	Home From Acute Care	Inpatient Rehabilitation	Home From Acute Care
Primary Total Hip Replacement	21.4%	57.1%	20.3%	45.8%
Revision Total Hip Replacement	11.6%	46.3%	9.5%	24.1%
Primary Total Knee Replacement	18.3%	48.6%	14.9%	30.5%
Revision Total Knee Replacement	16.0%	43.1%	8.4%	18.7%

Data source: Canadian Institute for Health Information

7.8 Standardized mean service intensity for patients with total joint replacement, in Ontario, 1996/97 to 1997/98 and 2000/01 to 2001/02

This exhibit illustrates the change in the standardized mean service intensity for THRs, including both primary and revision surgeries. The trend was similar for patients with TKRs. Patients discharged directly home with home care, or to inpatient rehabilitation followed by home care, received, on average, six to seven visits of rehabilitation therapy. The mean number of services increased for homemaking and nursing services and decreased slightly for rehabilitation services for patients discharged home following THRs and TKRs. In contrast, for patients that received inpatient rehabilitation, the mean number of services increased for rehabilitation and homemaking, but decreased for nursing services.

	Standardized Mean Service Intensity for Total Hip Replacements		
Discharge Destination	Home Care Service	1996/97 to 1997/98	2000/01 to 2001/02
Direct Discharge Home	Homemaking	10.6	12.4
	Nursing	6.3	7.6
	Rehabilitation	6.8	6.7
Inpatient Rehabilitation	Homemaking	11.6	14.0
	Nursing	10.0	8.3
	Rehabilitation	6.0	6.6

Data source: Canadian Institute for Health Information

Predictors of rehabilitation for patients with total joint replacement

The results from the analyses demonstrate that whether patients receive inpatient rehabilitation following total hip or knee replacement may depend on age, sex, Charlson comorbidity index, LOS, and type of surgery, as well as area of residence. Some of the variation in the outcome was between DHCs, and significant interactions were found among the variables. These factors must be considered together to understand which factors may predict the use of inpatient rehabilitation after TJR. Please refer to Appendix 7.A for further details of the analyses.

Conclusions

Service demand

With the anticipated growth in total joint replacement (TJR) surgeries, an associated increase in the demand for rehabilitation services is expected from 1995/96 to 2001/02. The proportion of patients with primary and revision total hip replacements (THRs) and total knee replacements (TKRs) discharged to inpatient rehabilitation increased from approximately 30% to 40% between 1995/96 and 2001/02. There are a number of factors that may contribute to these findings.

1. Under hospital restructuring plans there has been the phasing in of additional short-term rehabilitation beds for patients with musculoskeletal conditions, since 2000.
2. The acute care and inpatient rehabilitation length of stay (LOS) decreased among all patients with TJRs. Another study reported similar findings that the acute care LOS of patients following TKR has decreased markedly, while rates of discharge to rehabilitation facilities increased.[6]
3. There has been a decrease in the availability of publicly-funded outpatient rehabilitation services.
4. There have been changes to the organization of home care services with the introduction of Community Care Access Centres (CCAC) during this period.

Determinants of inpatient rehabilitation

In studies examining outcomes of rehabilitation options, three patient characteristics were consistently reported among those that had inpatient rehabilitation: older age, living alone and having more comorbidity.[7–9] The findings of this study are in agreement such that, patients that received inpatient rehabilitation following THR and TKR were more likely to be older and have some comorbidity. However, the data analysis showed significant geographic variation among the various discharge options. The percentage of patients that received inpatient rehabilitation services increased in 13 of the 16 DHCs. However, in 7 DHCs, more than three-quarters of patients with THRs and 88% of patients with TKRs were not transferred to inpatient rehabilitation during the years examined.

In almost one-half of the DHCs, more than 75% of patients discharged to inpatient rehabilitation received rehabilitation in their DHCs of residence. These findings suggest that if inpatient rehabilitation beds are available in a particular DHC then residents of that area are using them.

This study revealed that criteria for referral to inpatient rehabilitation may not be consistent across the province. Similarly, another study reported that revision surgery predicted worse physical function after knee replacement in a sample of patients in Indiana, but not in Western Pennsylvania.[10] This underscores the need to examine the variation reported in Ontario. Other factors, including professional practices, availability of resources, access to resources and patient preferences may also vary and contribute to inconsistencies across the province.

Outcomes following inpatient rehabilitation and home-based care

Studies that compare outcomes following inpatient rehabilitation to home-based care for patients recovering from TJR are limited. At present there are no published randomized controlled trials comparing the two rehabilitation settings. Results from several prospective studies conducted in the US indicate that patient outcomes did not differ by rehabilitation setting.[7–9] A retrospective cohort study conducted at a Toronto teaching hospital compared characteristics and outcomes in patients that received inpatient rehabilitation versus those that received home care.[11] Of the 146 records reviewed, 98 patients completed the follow-up questionnaires. No significant differences were found in patient outcomes between the groups. Overall, the group that received home care tended to be men with greater social supports, more knowledge about TJR and a preference to receive care at home.

In another study, the estimated average costs in Ontario associated with the total continuum of care following TJR for the fiscal years 1991/92 to 1994/95 ranged from $8,166 to $13,569 depending on the rehabilitation strategy used; inpatient rehabilitation followed by home care was the most costly.[12]

Variation in use of rehabilitation services

The results of this study show variation in discharge destination, though a major limitation in interpretation is a lack of detailed clinical information. The literature consistently reports that preoperative physical function is a predictor of post-operative outcome. Other factors include weight less than 70 kg, strong social support and higher educational level.[13–15] Age and comorbid conditions are also predictors, and were measured in this study. What is not clear in the literature is how much these factors influence amount, type and setting for rehabilitation services for recovery. It is also not apparent to what extent clinicians consider these factors when determining discharge destination.

There is clearly a subset of patients that require inpatient rehabilitation. In Edmonton, one of the admission criteria was that patients lack the ability to safely manage activities of daily living at home. Often these patients are unable to obtain home care services immediately after surgery or are in need of stabilization due to underlying medical, physical or social conditions.[7]

Depending on the surgical procedure, approximately 9%–20% of patients received home care services following discharge from inpatient rehabilitation in 2001/02. During the study period all patients received, on average, 6 to 7 home care visits for rehabilitation therapy, though there was no information on the appropriateness of therapy received or on the patient outcomes. Other studies have also reported uncertainty about the appropriate amount of rehabilitation, in acute care and post-discharge settings.[7,8] Another study compared typical post-operative management in 12 orthopaedic centres in US, UK and Australia.[16] Length of acute care stay ranged from 4 to 16 days, with the US having the shortest LOS and the UK the longest. Use of home physical therapy was significantly higher in the US (65%) than in the UK (5%) or Australia (6%), whereas the use of outpatient physical therapy was significantly greater in the latter two countries. Variation was strongly associated with the method of hospital reimbursement, which differs in all three countries.

In conclusion, these findings indicate that the utilization of inpatient rehabilitation rose and mean acute care and rehabilitation LOS fell for patients following TJR. There is geographic variation in use of rehabilitation services, and contributing factors may include professional practices, availability of resources, access to resources and patient preferences. Future work should examine admission and discharge criteria for rehabilitation for this population, and quantify the cost and outcomes of varying processes of care for patients with TJR. In addition, from a health care system perspective, there is a need to determine the optimal management for this population.

Appendices

7.A How the research was done

Data sources

The data for this chapter were obtained from two primary sources, the Discharge Abstract Database (DAD) of the Canadian Institute for Health Information (CIHI) and the Ontario Home Care Administrative System (OHCAS). The DAD contains data on hospital discharges (inpatient acute, chronic and rehabilitation) for a given fiscal year. Hospitals submit demographic, administrative and clinical data for hospital discharges and day surgeries to CIHI. Ontario patients that received total hip replacement (THR) and total knee replacement (TKR) surgeries, were identified in the DAD by the Canadian Classification of Diagnostic, Therapeutic, and Surgical Procedures (CCP) codes, procedural classification to be used in conjunction with International Statistical Classification of Diseases, Injuries, and Causes of Death, Ninth Revision (ICD-9). Codes were further analyzed to determine if the THR or TKR was a primary surgery or a revision. Please refer to Appendix 7.B for detailed information on diagnostic codes.

Patient records were categorized into two post-acute care discharge destinations: inpatient rehabilitation and home. A second hospitalization record in the DAD, in which the institution type was recorded as general or specialty rehabilitation, identified patients that received inpatient rehabilitation following acute care. If the hospital was not identified as rehabilitation, the record was checked to determine if the subsequent hospitalization was for inpatient rehabilitation as identified by select V-codes, a classification used in the DAD when circumstances other than disease or injury are recorded as diagnosis. Please refer to Table 7.1 for a list of the V-codes included in the analysis.

Table 7.1 V-codes used to determine rehabilitation activity

Diagnostic Category	V Codes
Orthopaedic aftercare NEC	V548
Orthopaedic aftercare NOS	V549
Physical therapy NEC	V571
Occupational/vocational therapy	V572
Rehabilitation proc NEC	V5789
Rehabilitation proc NOS	V579
Convalescence NEC	V665
Surgical convalescence	V660
Surgical follow-up	V670

Following discharge directly home from acute care or discharge from inpatient rehabilitation, patients may receive home care services. Linkages to the OHCAS using patients' unique identifying numbers were made to determine who received home care services. The OHCAS contains demographic, diagnostic and treatment information about patients of the Ontario Home Care Program.

Analyses

All patients in Ontario that had a procedure code indicating TKR or THR for fiscal years 1995/96 to 2001/02 were included in the analysis. Primary joint replacements and revisions were examined. Data were examined for trends over time. For each type of procedure, the percentages of patients discharged from acute care to inpatient rehabilitation and directly home were calculated. The mean and median acute care length of stay (LOS) was calculated for each procedure type relative to discharge destinations (home and inpatient rehabilitation). For all patients that received inpatient rehabilitation, the mean and median rehabilitation LOS was calculated for each procedure type.

Mean age of patients was calculated for each procedure and for each discharge destination. The percentages of women and men were also calculated for these groups. To assess comorbidity, the Charlson comorbidity index, which is based on the ICD-9 diagnosis codes and CCP codes in the DAD, was used. The percentage of patients that had a Charlson comorbidity index score of one or greater was calculated for each procedure and for each discharge destination. A Charlson comorbidity index of one or greater indicates the presence of at least one comorbid condition.

Utilization of inpatient rehabilitation by geographic location was determined through analysis of patient records for each Ontario District Health Councils (DHCs). The percentage of patients that received inpatient rehabilitation following acute care hospitalization was determined for each DHCs. Further, the data were examined to determine the distribution of patients that received rehabilitation at hospitals in or outside the DHCs in which they lived. The distribution of patients that had inpatient rehabilitation in the same DHCs in which they had their acute care hospitalization was also determined.

The percentage of clients that received one or more services from an Ontario home care program was calculated for patients that received home care services within 30 days of discharge from acute care hospitalization or inpatient rehabilitation. The percentage of home care clients that utilized specific services, including nursing, rehabilitation (physiotherapy and occupational

therapy), homemaking and other professionals (e.g. social work, speech language pathology), was calculated. The standardized mean service intensity was determined by calculation of the mean number of specific services received by home care clients. Direct standardization was used to adjust post-acute care home care rates to account for regional variation in age and sex composition.

Multivariate logistic regression was performed to examine predictors of inpatient rehabilitation after THR and TKR. A one-way ANOVA with random effects was used to test the significance of the variation in DHCs. Factors that may predict the use of inpatient rehabilitation after THR and TKR were examined by various statistical techniques, including multilevel modelling.

Limitations

Limitations in the data should be considered when interpreting the results.

V-codes were examined to capture rehabilitation activity that occurred in acute care beds. Although this method captured some rehabilitation activity that occurred in acute care, it is possible that some of these data were not coded appropriately, and consequently, the results may underestimate the true utilization of inpatient rehabilitation activity in the province.

Only data for patients that received rehabilitation care through home care services following acute care hospital stay were analyzed. Data for patients that received rehabilitation services from other sources (e.g. The Arthritis Society, publicly-funded outpatient rehabilitation services and private outpatient clinics) following inpatient rehabilitation are not captured in the data sources used. Therefore, the results underestimate the amount of rehabilitation occurring with patients after discharge from their inpatient hospitalization. As an increasing amount of rehabilitation occurs in non-publicly funded settings, the collection of reliable data on rehabilitation activity in the community is a significant challenge.

A unique identifying number was used to link the patients from their inpatient hospitalization to home care services. Any coding errors in the database may have resulted in some recipients not being identified. This would have resulted in an underestimate of home care service utilization. It was also possible that patients were receiving home care services before surgery. If continued, it was possible that this service provision was unrelated to the surgery and resulted in an overestimate of home care service utilization.

7.B Diagnostic codes

Records were selected from the CIHI DAD when the following CCP codes were identified in the procedure fields: 93.51 and 93.59 for THRs, and 93.41 for TKRs. Records were excluded if the patient did not live in Ontario, had invalid residence codes, was missing a unique identifying number, died in the hospital, was under 20 years of age, or had a diagnosis of cancer or fracture. The diagnoses of cancer were excluded using the ICD-9 diagnostic codes 140.x through 208.x (malignant neoplasms) and 235.x through 239.x (neoplasms of uncertain behaviour). Fractures were excluded using the ICD9 codes 800.x through 899.x and the following E-codes (non-medical causes of injury) were also excluded: E800-E869, E880-E928 and E950-E999.

Primary and revision TJRs were differentiated using diagnostic codes. Any of the following ICD-9 codes indicated a revision replacement: osteomyelitis of joint (730.0 through 730.3, 730.8, and 730.9), mechanical complications of internal prosthetic device (996.4 and 996.7), dislocation of the joint (835.0 for hip and 836.3 and 836.5 for knee), or post-operative infections (996.6, 998.5 and 998.6). The remaining records were considered to be primary THRs and TKRs. A coding addendum was added in 2000/01 to the CCP to capture revisions of TJR. In addition to records selected above, any 2000/01 records were considered revision hip replacements if any of the valid procedure fields had the CCP code 93.52, 93.53, 93.65, 93.66, 93.67 or 93.68. Also 2000/01 CIHI records were considered revision knee replacements when any of the valid procedure fields had the CCP code 93.40.

References

1. Munin MC, Rudy TE, Glynn NW, Crossett LS, Rubash HE. Early inpatient rehabilitation after elective hip and knee arthroplasty. *J Am Med Assoc* 1998; 279:847–852.

2. Brander VC, Stulberg D, Chang RW. Rehabilitation following hip and knee arthroplasty. *Phys Med and Rehabil Clin of N Am* 1994; 5(4):815–836.

3. Coyte P, Axcell T. The use of and regional variations in post-acute rehabilitation services for musculoskeletal patients. In: Badley EM, Williams JI, editors. Patterns of health care in Ontario: arthritis and related conditions. An ICES practice atlas. Toronto: Institute for Clinical Evaluative Sciences; 1998.

4. Jagal S, Walker J, Markel F, Naglie G, Steele C, et al. Epidemiological variables and utilization in rehabilitation in Ontario. Final Report, 2002. Ontario Neurotrauma Foundation and Ontario Ministry of Health and Long-Term Care. Ref Type: Report.

5. Roos E. Effectiveness and practice variation of rehabilitation after joint replacement (rehabilitation medicine in rheumatic diseases). *Curr Opin Rheumatol* 2003; 15(2):160–162.

6. Oldmeadow LB, McBurney H, Robertson VJ. Hospital stay and discharge outcomes after knee arthroplasty: implications for physiotherapy practice. *Aust J Physiother* 2002; 48:117.

7. Kelly KD, Malone B, Hempel P, Voaklander DC. Orthopaedic subacute rehabilitation-predictors of functional income and resource utilization. *Int J Rehabil Health* 2000; 5(3):165–176.

8. Munin MC, Kwoh CK, Glynn N, Crosset L, Rubash HE. Predicting discharge outcome after elective hip and knee arthroplasty. *Am J Phys Med Rehabil* 1995; 74(4):294–301.

9. Jones CA, Voaklander DC, Johnston WC, Suarez-Almazor ME. The effects of age on pain, function, and quality of life after total hip and knee arthroplasty. *Arch Intern Med* 2001; 161:454–460.

10. Hawker GA, Wright JG, Coyte P, Paul J, Dittus R, Croxford R et al. Health related quality of life after knee replacement: results of the knee replacement patient outcomes research study team. *J Bone Joint Surg Am* 1998; 80-A(2):163–173.

11. Mahomed NN, Koo Seen Lin MJ, Levesque J, Ian S, Bogoch ER. Determinants and outcomes of inpatient versus home-based rehabilitation following elective hip and knee replacement. *J Rheumatol* 2000; 27:1753–1758.

12. Coyte PC, Young W, Croxford R. Costs and outcomes associated with alternative discharge strategies following joint replacement surgery: analysis of an observational study using a propensity score. *J Health Econ* 2000; 19(6):907–929.

13. Young NL, Cheah D, Waddel JP, Wright JG. Patient characteristics that affect the outcome of total hip arthroplasty: a review. *Can J Surg* 1998; 41(3):188–195.

14. Fortin PR, Clarke AE, Joseph L, Liang MH, Tanzer M, Ferland D et al. Outcomes of total hip and knee replacement; preoperative functional status predicts outcomes at six months after surgery. *Arthritis Rheum* 1999; 42(8):1722–1728.

15. MacWilliam CH, Yood MU, Verner JJ, McCarthy BD, Ward RE. Patient related risk factors that predict poor outcome after total hip replacement. *Health Serv Res* 1996; 31(5):623–638.

16. Linguard EA, Bervan S, Katz J, and the Klinemax Outcomes Group. Management and care of patients undergoing total knee arthroplasty: variations across different health settings. *Arthritis Care Res* 2000; 13(3):129–136.