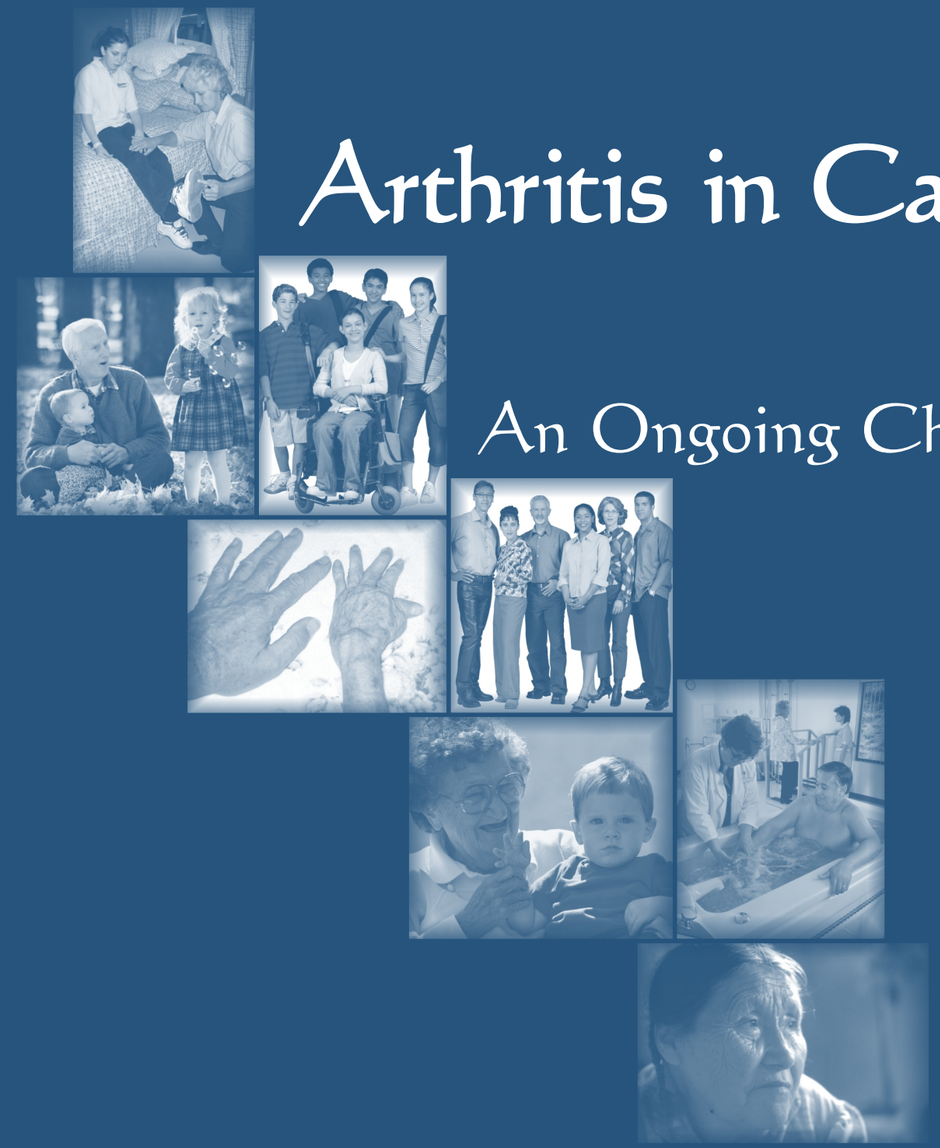
Arthritis in Canada – An Ongoing Challenge

Arthritis in Canada

An Ongoing Challenge



Statistics Canada Statistique Canada

Canadian Institute for Health Information
Institut canadien d'information sur la santé

CRA CANADIAN RHEUMATOLOGY ASSOCIATION
SOCIÉTÉ CANADIENNE DE RHUMATOLOGIE SCR

ACREU
Arthritis Community Research & Evaluation Unit

Health Canada Santé Canada

The Arthritis Society | La Société d'arthrite

CANADIAN ARTHRITIS NETWORK | LE RÉSEAU CANADIEN DE L'ARTHRITE

Suggested Citation: Health Canada. *Arthritis in Canada. An ongoing challenge*. Ottawa: Health Canada, 2003 (Cat. # H39-4/14-2003E)

Cat. # H39-4/14-2003E
ISBN 0-662-35008-1

Arthritis in Canada

An Ongoing Challenge

Acknowledgements

Scientific Editors

Elizabeth Badley
Director, Arthritis Community Research and Evaluation Unit, Toronto
Head, Division of Outcomes and Population Health, Toronto Western Research Institute, University Health Network, Toronto
Professor, Department of Public Health Sciences, University of Toronto

Marie DesMeules
Chief, Population Health Assessment Section
Surveillance and Risk Assessment Division
Centre for Chronic Disease Prevention and Control, Health Canada

Technical Working Group

Chair: Elizabeth Badley

- Winanne Downey, Saskatchewan Health
- Jun Guan, Arthritis Community Research and Evaluation Unit, Toronto
- Naomi Kasman, Arthritis Community Research and Evaluation Unit, Toronto
- George Kephart and Alison James, Population Health Research Unit, Dalhousie University, Halifax
- Erich Kliewer and Wendy Fonsecaholt, Cancer Care Manitoba
- Jacek Kopec, Arthritis Research Centre of Canada, Vancouver
- Claudia Lagacé, Centre for Chronic Disease Prevention and Control, Health Canada
- Anthony Perruccio, Arthritis Community Research and Evaluation Unit, Toronto
- J. Denise Power, Arthritis Community Research and Evaluation Unit, Toronto
- Elham Rhame and Martin Ladouceur, Montreal General Hospital, McGill University, Montreal
- Deborah Shipton, Arthritis Community Research and Evaluation Unit, Toronto
- Larry Svenson, Alberta Health

Scientific Advisory Board

Chair: Elizabeth Badley

- Ann Clarke, Montreal General Hospital, McGill University, Montreal, Canada
- Gillian Hawker, Division of Rheumatology, Sunnybrook & Women's College Health Sciences Centre, Toronto, Canada
- Chad Helmick, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, GA, USA
- Rosemarie Hirsh, National Center for Health Statistics, Centers for Disease Control and Prevention, MD, USA

- Arminee Kazandjian, University of British Columbia, Vancouver, Canada
- Jacek Kopec, Arthritis Research Centre of Canada, Vancouver, Canada
- Reva Lawrence, National Institute of Arthritis and Musculoskeletal and Skin Diseases, Bethesda, MD, USA
- Doug Manuel, The Institute for Clinical and Evaluative Studies, Toronto, Canada
- Mark McNeil, Consumer, Arthritis Society, Canada
- Deborah Symmons, Arthritis Research Campaign Epidemiology Unit, Manchester University, Manchester, UK
- Linda Turner, Canadian Institute for Health Information, Ottawa, Canada
- Jack Williams, Toronto Rehabilitation Institute, Toronto, Canada

Stakeholders Board

Chair: Denis Morrice, Arthritis Society

- Canadian Arthritis Network, Canadian Orthopaedic Association, Canadian Rheumatology Association, Canadian Arthritis Patient Alliance, Canadian Joint Replacement Registry, College of Family Physicians of Canada, Arthritis Society Manitoba Division, Canadian Pharmacists Association, Cochrane Musculoskeletal Group, Institute of Musculoskeletal Health and Arthritis CIHR, Canadian Orthopaedic Foundation, Industry Government Relations Group, Arthritis Health Professionals Association, and Canadian Institute for Health Information.

Reviewers

- Lorna Bailie, Statistics Canada
- Ann Clarke, McGill University Health Centre
- Winanne Downey, Saskatchewan Health
- Paul Fortin, Toronto Western Research Institute
- Rick Glazier, Inner City Health Research Unit, St. Michael's Hospital
- Gillian Hawker, Division of Rheumatology, Sunnybrook & Women's College Health Sciences Centre
- Chad Helmick, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, USA
- Rosemarie Hirsh, National Center for Health Statistics, Centers for Disease Control and Prevention, MD, USA
- Helen Klassen, Canadian Arthritis Patient Alliance
- Jacek Kopec, Arthritis Research Centre of Canada
- Kira Leeb, Canadian Institute for Health Information
- Elham Rahme, McGill University Health Centre
- Larry Svenson, Alberta Health
- Deborah Symmons, Arthritis Research Campaign Epidemiology Unit, Manchester University, Manchester, UK
- Linda Turner, Canadian Institute for Health Information
- Jack Williams, Toronto Rehabilitation Institute

Production

Data

- We would like to thank the following organizations (in alphabetical order) for providing data: Alberta Health, Arthritis Research Centre of Canada (Vancouver, BC), Canadian Institute for Health Information, Cancer Care Manitoba, Health Canada, The Institute for Clinical and Evaluative Studies (Ontario), Montreal General Hospital (McGill University, Montreal), Population Health Research Unit, Dalhousie University (Nova Scotia), and Saskatchewan Health.
- We would also like to thank the following individuals for providing technical assistance: Zhenyuan Cao, Paul Fortin, and Muhammad Mamdani.

Editing and layout

- Paul Sales, Douglas Consulting; Scientific Publication and Multimedia Services, Population and Public Health Branch, Health Canada

Administrative assistance

- Olga Manuk, Arthritis Community Research and Evaluation Unit

Scientific Coordination

- Claudia Lagacé, J Denise Power

In recognition of the Bone and Joint Decade

Executive Summary

Arthritis and related conditions make up a large group of disorders affecting the joints, ligaments, tendons, bones and other components of the musculoskeletal system. Arthritis is a leading cause of pain, physical disability and health care utilization in Canada. To date, however, arthritis surveillance activities have been minimal.

Arthritis in Canada is the first report to paint a comprehensive picture of the impact of arthritis in Canada. It brings together data from national population health surveys, provincial physician billing and drug databases, data on hospital admissions and day surgery procedures, as well as mortality data. This is also the first national report to aggregate data from provincial health service databases for surveillance purposes.

The key findings of the report are summarized below and are followed by their implications for manpower and training, access to care, and improvements in data for surveillance.

Key Findings

The Impact of Arthritis on Canadians

- According to the 2000 Canadian Community Health Survey (CCHS), arthritis and other rheumatic conditions affected nearly 4 million Canadians aged 15 years and older – approximately 1 in 6 people. Two-thirds of those with arthritis were women, and nearly 3 of every 5 people with arthritis were younger than 65 years of age.
- By the year 2026, it is estimated that over 6 million Canadians 15 years of age and older will have arthritis.
- Compared with people with other chronic conditions, those with arthritis experienced more pain, activity restrictions and long-term disability, were more likely to need help with daily activities, reported worse self-rated health and more disrupted sleep and depression, and more frequently reported contact with health care professionals in the previous year.
- Overall, 19% of Aboriginal people reported having arthritis – equivalent to 27% if the Aboriginal population had the same age composition as the overall Canadian population.

The Burden of Arthritis in Canada: Mortality, Life Expectancy and Health-Adjusted Life Expectancy (HALE), Economic Burden

- In 1998, arthritis or related conditions were reported as the underlying cause in 2.4 deaths per 100,000 in Canada, making arthritis a more common underlying cause of death than melanoma, asthma or HIV/AIDS, especially among women.
- The mortality burden of arthritis and related conditions has been underestimated, because contributing causes of death (such as complications of arthritis treatment) are not available. People with arthritis are the most frequent users of non-steroidal

anti-inflammatory drugs (NSAIDs), which can cause gastrointestinal (GI) bleeding. Deaths due to GI bleeding were responsible for 1,322 deaths in 1998.

- Eliminating arthritis would achieve an overall gain in the health-adjusted life expectancy (HALE) of 1.5 years for each female and nearly 1 year for each male in the Canadian population, with an overall increase in life expectancy of 0.16 years for males and 0.35 years for females.
- In 1998, estimates placed the economic burden of arthritis to Canadian society at $4.4 billion. This figure likely underestimates the total costs, however, because data for some expenditures (such as costs related to health professionals other than physicians and to over-the-counter medications) are unavailable. In addition, the estimate uses only a subset of the arthritis conditions used elsewhere in this report.
- Long-term disability accounted for almost 80% of the economic costs of arthritis in 1998, at nearly $3.4 billion; the 35-64 year age group incurred 70% of these costs.
- The economic burden of musculoskeletal conditions in Canada accounted for 10.3% of the total economic burden of all illnesses but only 1.3% of health science research.

Ambulatory Care Services

- Approximately 160 in every 1,000 people over the age of 15 years made a visit to a physician in 1998/1999 for arthritis and related conditions – an estimated total of 8.8 million visits in Canada. More women than men made arthritis-related visits; the rate of consultation was highest among older people of both sexes.
- Eighty-two percent of patients who made visits for arthritis and related conditions made at least one of these to a primary care physician. Overall, 18.5% of people with arthritis-related visits saw a surgical specialist at least once, and 13.7% saw a medical specialist at least once.
- Visit rates varied by province, ranging from 146 to 207 per 1,000 people aged 15+ years. Differences in the provincial physician billing databases may account for some of this variation. Differences in the availability of physicians, especially specialists, may also be a contributing factor.
- There appears to be a trade-off provincially between seeing a rheumatologist and seeing an internist for arthritis and related conditions, particularly rheumatoid arthritis.

Arthritis-related Prescription Medications

- The percentage of people with prescriptions for disease-modifying anti-rheumatic drugs (DMARDs), which are effective in treating rheumatoid arthritis, has increased steadily over time. Nevertheless, the overall rate of provision of these drugs falls short of the estimated prevalence of the disease.
- The prescription of conventional NSAIDs has shown a notable decline since 1998 for individuals over the age of 65. The release of COX-2 inhibitors onto the Canadian market in 1999 has likely contributed to this trend.

- Some of the increases/decreases in prescriptions may be a result of changes in the provincial drug plan formularies over time.
- Prescribing patterns of arthritis-related drugs varied among the provinces. This variation may be related in part to the availability of drugs on provincial formularies.

Hospital Services

- The number of arthritis-related orthopedic procedures per capita has remained remarkably static since 1994.
- Medical admissions per capita for arthritis and related conditions declined somewhat from 1994 to 2000, although this decline was somewhat less than that for all other admissions.
- The only procedures whose rates increased significantly were hip and knee replacements.
- The number of outpatient procedures has increased, likely as a result of the increased use of arthroscopic (keyhole) surgery.
- The higher prevalence of arthritis among women is only partially reflected in the rates of orthopedic procedures; the slightly higher rate of hip and knee replacement procedures among women does not wholly reflect their greater need.
- The rate of orthopedic procedures reached a plateau in older age groups, but the rate of medical admissions continued to climb.
- Considerable provincial variation in both orthopedic procedures and medical admissions was apparent, even after adjustment for differences in the age and sex composition of the provincial populations.

Implications

- Approximately 1 in 6 Canadians aged 15 years and over reported having arthritis as a long-term health condition. Within a decade, 1 million more Canadians are expected to have arthritis or related conditions. The need to understand the tremendous burden of arthritis on both individuals and society as a whole is, therefore, urgent.
- Surveillance for arthritis can be developed and maintained by integrating national and provincial data from population surveys, provincial physician billing databases, hospital separation and surgical data, data on medications and drugs, and mortality databases.
- Future surveillance efforts could include initiatives to collect data about arthritis in children and about rehabilitation and community support services for people with arthritis and related conditions of all ages.

Manpower and Training

- Manpower issues, such as shortages of both rheumatologists and orthopedic surgeons, are a concern that could be addressed through more recruitment and training of specialists in these fields.

- Primary care physicians play a central role in the management of arthritis, yet gaps in musculoskeletal education have been documented in undergraduate medical education and postgraduate training. When setting curricula, medical educators may wish to draw on information regarding the amount of illness, disability and health care utilization that these conditions cause in the population.
- Since a considerable amount of arthritis care is provided by internists (for rheumatoid arthritis) and orthopedic surgeons (non-surgical care of osteoarthritis) these specialty groups might wish to consider further training and continuing education with respect to arthritis.

Access to Care

- Barriers that limit access to specialty services (such as rheumatology), including lack of locally available services and low rates of referral by primary care physicians, need investigation.
- Access to arthritis medications that have proven to be effective in preventing joint damage is a key issue. This includes access to DMARDs as well as the newly developed biologic drugs.
- Provincial variations in the provision of arthritis-related drugs have been identified.
- In spite of the increasing prevalence of arthritis in Canada, the static trend in rates of orthopedic procedures suggests that the system may be operating at capacity, and there may be potential problems with the capacity of the system to respond to the projected increases in the number of people with arthritis.
- The causes of provincial variations in rates of surgery for arthritis and related conditions and in their impact, both at the individual and population levels, need to be determined.
- The decline in rates of surgery at older ages and sex differences in surgery rates raise issues of inequities in access to care that need to be investigated.
- Although increasing, the rate of hip and knee replacements is insufficient to meet current and future needs. This is reflected in long waiting times for these procedures.
- Currently, the published data on arthroscopic knee surgery for osteoarthritis are unclear on the procedure's effectiveness. More research is required in this area to properly define the appropriate indications for these procedures.

Improvements in Data for Surveillance

- Future national surveys should include more detailed diagnostic questions about arthritis. Physical measures for arthritis (such as assessment of physical function) could also be considered for inclusion in future surveys.
- The 2000 CCHS asked respondents about arthritis and rheumatism "diagnosed by a health professional." This question fails to capture many people with arthritis/chronic joint symptoms who do not see a doctor for their symptoms and whose condition consequently remains undiagnosed. Including a question on "chronic joint symptoms" would help provide a more complete picture of the burden of arthritis in Canada.

- In order to accurately describe the impact of arthritis, surveys could collect health status and health care utilization data that are directly attributable to arthritis.
- In order to accurately describe the full impact of arthritis on mortality for surveillance purposes, contributing causes of death should be made available.
- The continued development of national and provincial registries related to hip and knee replacement would help ensure complete coverage. If appropriate in scope, such registries could allow tracking of waiting times, patient-based indicators of need, complications after surgery and failure rates of prostheses.
- Strong surveillance efforts depend on both standardized definitions of common terms and their consistent use in different settings. A consensus on definitions would allow coordinated and constant surveillance across Canada. If provinces wish to pursue this matter, they could consider the following options:
    - Using the same diagnostic codes for billing purposes would be a major step toward standardizing provincial physician billing data. Allowing physicians to enter three diagnostic codes for each claim, as currently practised in Alberta and Nova Scotia, would also provide a more accurate representation of the reasons for each visit.
    - Physicians' specialties could be determined in the same manner in each provincial health insurance database and this information actively updated to reflect changes in specialty and subspecialty training.
    - Diagnostic codes in physician claims data need to be validated. Algorithms using specified numbers of visits in a time period for a specific diagnosis need further exploration and validation, building on earlier work for rheumatoid arthritis and diabetes.
- Future surveillance of arthritis and related conditions could include the following:
    - Monitoring changes in health status (including mortality and HALE) and health care utilization that may be related to drug therapy and other new treatments.
    - Monitoring direct costs of arthritis in relation to indirect costs (such as increased drug costs leading to decreased long-term disability costs).
    - Linking prescription data to patient diagnoses to enable better examination of prescribing patterns for arthritis and related conditions.
    - Linking hospitalization data to provincial physician billing data to facilitate better understanding of the processes of arthritis care and the outcomes of surgery.

Table of Contents

List of Figures

List of Tables

Chapter 1

Introduction

Elizabeth Badley, Marie DesMeules

Arthritis and related conditions make up a large group of disorders affecting the joints, ligaments, tendons, bones and other components of the musculoskeletal system. Arthritis is one of Canada's most common chronic conditions and is a leading cause of pain, physical disability and use of health care services.[1-7] Such adverse health outcomes not only have significant impact on individuals with the disease but inevitably affect their families and have major consequences at the population level as well. Among many aspects of life, arthritis disability has an impact on leisure, and social and labour force participation at all ages.[4,8] Arthritis is also one of the most costly illnesses from an economic standpoint.[9] However, since it is not usually life-threatening, physicians – and even those who have the condition – often dismiss it as "just aches and pains" and an inevitable part of aging.[10] As a result of this viewpoint, individuals with arthritis fail to receive the appropriate and adequate help that they require, and services aimed at helping them are not generally regarded as a priority. The scarcity of available information on the impact of arthritis on Canadians has added to this difficulty.

This lack of vital Canadian information has inspired *Arthritis in Canada.* This is the first comprehensive report to document the impact of the condition in Canada. Its purpose is to provide an overview of the current situation in Canada for health care professionals, policymakers and members of the interested public, particularly individuals with arthritis.

Specifically, the goals of *Arthritis in Canada* are to

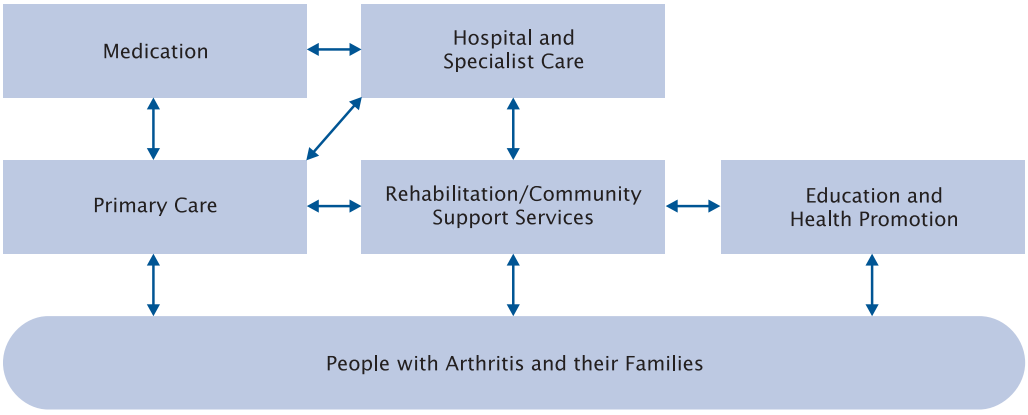
- provide an overview of the magnitude of the impact of arthritis on the Canadian population, including health and social outcomes and the use of health care services;
- identify strategies that might reduce the adverse consequences of arthritis and enhance access to care and services; and
- explore approaches to arthritis surveillance in Canada.

Acquiring national information in order to document the impact of arthritis in Canada presents a number of challenges. First, the term "arthritis" covers a range of different conditions, the best known of which are described in Table 1-1. While every effort has been made to maintain a consistent definition through the chapters in this report, the use of a variety of data sources has necessitated some variation in the range of arthritis conditions included. Where considered relevant, these variations are noted. Second, arthritis is not always recorded as the underlying diagnosis in administrative databases such as those related to hospital admissions or death, creating a challenge for surveillance.

Arthritis in Canada is the first national report to create a picture of the impact of a specific type of disease by bringing together data from provincial physician billing databases and drug plans. It also brings together information about the impact of arthritis on individuals from national population surveys and evaluates the economic costs associated with this condition.

All forms of arthritis share such symptoms as pain, swelling or stiffness in or around the joints. If left untreated, they can affect the structure and functioning of the joints, leading to increased pain, disability and difficulty in performing everyday activities.[11,12] Although there is no known cure for arthritis at the present time, appropriate treatment has been shown to prevent disability, maintain function and reduce pain.[11,13] While the exact nature of medical treatment will vary according to the type of arthritis, general management and rehabilitation strategies are similar for all types. Typically, once started, arthritis lasts for the rest of one's life and has a course that fluctuates between exacerbations and remissions. Care must be available, therefore, over the full course of the disease. Figure 1-1 outlines the components of a comprehensive care approach for managing arthritis.

Figure 1-1 Components of a Comprehensive Care Approach for the Management of Arthritis and Related Conditions



A comprehensive care approach for managing the impact of arthritis and related conditions incorporates several components, including primary care services, medication, hospital and specialist care, rehabilitation and community support services, and education and health promotion. The ultimate goal of care is to improve the quality of life for individuals with arthritis and their families.

The components of a comprehensive care approach may be viewed as sub-components of the already existing health care system. Even with most services in place, however, issues of adequacy, availability and accessibility for people with arthritis and related conditions may lead to less than optimal results. Coordination of the components within the health care system also has a great impact on overall success in achieving integrated care. Coordination of care includes the manner of triaging and referring patients, the comprehensiveness and continuity of services, and the appropriateness of care to the stage of disease.

Chapter 2, *Arthritis in Canada*, begins by documenting the impact of arthritis on Canadians as reported by Canadians themselves, then compares this impact to that of other chronic conditions. Chapter 2 uses data from national health surveys – the Canadian Community Health Survey (CCHS) and the National Population Health Survey (NPHS) – to examine various health outcomes such as pain, disability, self-rated health, labour force participation, and the use of medications and health care services. Projections of the number of people who will have arthritis in Canada within the next two decades are also presented.

Chapter 3 documents arthritis-associated mortality in Canada and considers the impact of arthritis on both average life expectancy and average health-adjusted life expectancy (HALE). HALE sheds more meaning on longer life by determining whether an increase in the average lifespan is accompanied by better quality of life. Finally, the chapter presents the economic burden of arthritis in Canada, in terms of both its total costs and its direct and indirect components. Direct costs include hospital, physician and medication costs; indirect costs include short- and long-term disability.

Arthritis and related conditions are among the most frequent reasons for visits to primary care physicians.[14] 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. Visits to primary care physicians and specialists, particularly rheumatologists, internists and orthopedic surgeons, are examined in Chapter 4 using provincial physician billing data. 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 and rheumatoid arthritis.

The most frequent type of treatment for arthritis and related conditions is the use of medications. Chapter 5 examines the use of medications commonly prescribed for these conditions, including both conventional non-steroidal anti-inflammatory drugs (NSAIDs) and the newly developed COX-2 inhibitors, as well as corticosteroids and disease-modifying anti-rheumatic drugs (DMARDs). The data in Chapter 5 were compiled from provincial drug claims. Data on the newly developed biologic response modifiers, a new category of medications for treating inflammatory conditions such as rheumatoid arthritis, were not yet available for inclusion in this chapter.

Although most people with arthritis are treated on an outpatient basis, some require admission to a hospital and/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. Orthopedic surgery presents a viable alternative for individuals for whom attempts at non-surgical management have failed to adequately prevent joint pain or damage. Chapter 6 examines hospital services for arthritis and related conditions, including rates of medical admissions and surgical procedures.

Although this report provides a comprehensive examination of arthritis in Canada, some relevant areas could not be included because of the current lack of data in those areas. While arthritis is more common in older age groups, children are also affected. However, data on arthritis in children are generally lacking. The new Participation and Activity Limitations Survey (2001) will include arthritis in its section on health conditions causing

Table 1-1 Major types of arthritis

	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 involve 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 lupus up to 10 times more often than men.	AS affects as many as *1% of 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, previous joint injury	Sex hormones, heredity, 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 anti-rheumatic 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

disability in children. This survey, soon to be released, should provide essential information on children living with arthritis and its impact on their lives.

Rehabilitation, including physical and occupational therapy, serves to prevent the loss of physical function and to restore function after surgery or severe episodes of inflammatory arthritis.[15,16] Systematic information about rehabilitation for people with arthritis and related conditions is not currently available. In addition, there are no routine sources of information about other community support services for people with arthritis: these range from social work services to community exercise and pool programs.

Education and health promotion are important and essential components of a comprehensive approach to the management of arthritis and related conditions. Many types of arthritis and related conditions are minor and self-limiting and, therefore, do not require medical intervention. Education for managing and preventing the complications of these disorders should provide information not only on the use of over-the-counter medication and the appropriate use of simple physical remedies (such as ice, heat or mechanical support) but also on when medical care should be sought. Research shows patient educational interventions to be 20% to 30% as effective as pharmaceutical treatments in reducing pain and 40% as effective in improving disability, thereby leading to fewer physician consultations.[17] 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.[18-20] Surveillance data in these areas are currently unavailable.

Arthritis and related conditions create a large burden of morbidity and disability in the population and, consequently, high costs to society. The Canadian 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 diseases such as arthritis and related conditions. With the aging of the population, this burden can only be expected to increase. This report takes the first steps towards a national surveillance system for arthritis in Canada and provides a foundation for the development of ways to reduce the impact of arthritis on the Canadian population.

References

1. Badley EM. *The effect of osteoarthritis on disability and health care use in Canada*. J Rheumatol 1995;22(suppl 43):19-22.
2. Badley EM, Wang PP. *Arthritis and the aging population: projections of arthritis prevalence in Canada 1991 to 2031*. J Rheumatol 1998;25:138-44.
3. Badley EM, Rothman LM, Wang PP. *Modeling physical dependence in arthritis: the relative contribution of specific disabilities and environmental factors*. Arthritis Care and Research 1998;11:335-45.
4. Badley EM, Wang PP. *The contribution of arthritis and arthritis disability to nonparticipation in the labor force: a Canadian example*. J Rheumatol 2001;28(5):1077-82.
5. Raina P, Dukeshire S, Lindsay J, Chambers LW. *Chronic conditions and disabilities among seniors: an analysis of population-based health and activity limitation surveys*. Ann Epidemiol 1998;8(6):402-09.
6. Coyte P, Wang PP, Hawker G, Wright JG. *The relationship between variations in knee replacement utilization rates and the reported prevalence of arthritis in Ontario, Canada*. J Rheumatol 1997;24:2403-12.
7. Clarke AE, Zowall H, Levinton C, Assimakopoulos H, Sibley JT, Haga M, et al. *Direct and indirect medical costs incurred by Canadian patients with rheumatoid arthritis: a 12 year study*. J Rheumatol 1997;24:1051-60.
8. Badley EM. *The impact of disabling arthritis*. Arthritis Care and Research 1995;8:221-8.

9. Health Canada. *Economic Burden of Illness in Canada, 1998*. Ottawa: Public Works and Government Services Canada; 2002 (Catalogue # H21-136/1998E).
10. Verbrugge LM. *Women, men and osteoarthritis*. Arthritis Care and Research 1995;8(4):212-20.
11. 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;23:1824-38.
12. 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 Mar; 56(3):M167-M0175.
13. Schiff M. *Emerging treatments for rheumatoid arthritis*. Am J Med 1997;102(suppl 1A):11S-15S.
14. 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 Rheumatol 1994;21:505-14.
15. Guccione AA. *Physical therapy for musculoskeletal conditions*. Rheum Dis Clin North Am 1996;22:551-62.
16. Helewa A. *Physical therapy management of patients with rheumatoid arthritis and other inflammatory conditions*. In: Walker JM, Helewa A, editors. *Physical therapy in arthritis*. Philadelphia: Saunders; 1996. p. 245-63.
17. Superio-Cabuslay E, Ward MM, Lorig K. *Patient education interventions in osteoarthritis and rheumatoid arthritis: a meta-analytic comparison with nonsteroidal anti-inflammatory drug treatment*. Arthritis Care and Research 1996;9:292-301.
18. Minor MA, Hewett JE, Webel RR, Anderson SK, Kay DR. *Efficacy of physical conditioning exercise in patients with rheumatoid arthritis and osteoarthritis*. Arthritis Care and Research 1989;32:1396-1405.
19. McKeag DB. *The relationship of osteoarthritis and exercise*. Clinical Sports Medicine 1991;11:471-87.
20. US Department of Health and Human Services. *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.

CHAPTER 2

The Impact of Arthritis* on Canadians

Claudia Lagacé, Anthony Perruccio, Marie DesMeules, Elizabeth Badley

Introduction

Arthritis is one of the most prevalent chronic health conditions in Canada and a major cause of morbidity, disability and health care utilization.[1-3] It poses a major economic and health burden to our society. This chapter provides information on arthritis in Canada, and its impact on the population as a whole and on the lives of individuals. The chapter develops a profile of arthritis: who has it; its impact on daily life; and the self-reported use of health services and medications. Chapter 2 also presents data on the Aboriginal community living off-reserve, as arthritis is one of the most prevalent chronic diseases in this population.[4-6] Implications for surveillance activities and health policies are addressed at the end of the chapter.

A description of the data sources used and the methodological aspects employed for this chapter† is found in the Appendix at the chapter's end. The Appendix includes definitions of variables/indicators used within the chapter along with the methods employed for grouping/categorizing them. The symbol "(m)" on graphs indicates that high sampling variability was associated with the reported estimate. Also, if sub-sample populations (such as age-sex groups) were too small, then no estimate is shown.

Overview of Arthritis and Rheumatism in Canada

How Common is Arthritis?

Individuals with arthritis will often live with the disease for life. The Canadian Community Health Survey (CCHS) asked respondents about the presence of any chronic conditions. "Arthritis/ rheumatism" was included in a list of health conditions presented in conjunction with the question, "Do you have any of the following long-term conditions that have been diagnosed by a health professional?" Long-term was defined as having lasted or expected to last six months or longer.

* In Chapter 2, the term "arthritis" refers to arthritis/rheumatism, in keeping with the survey question on the Canadian Community Health Survey (CCHS), 2000.

† The analysis is based on the Statistics Canada microdata tape Canadian Community Health Survey, 2000. All computations on these microdata were done by Health Canada, and the responsibility for the use and interpretation of these data is entirely that of the author(s).

In 2000, arthritis and rheumatism affected nearly 4 million Canadians aged 15 years and older, representing 16% of this population. Arthritis was the second and third most common chronic condition reported by women and men respectively (Figure 2-1).

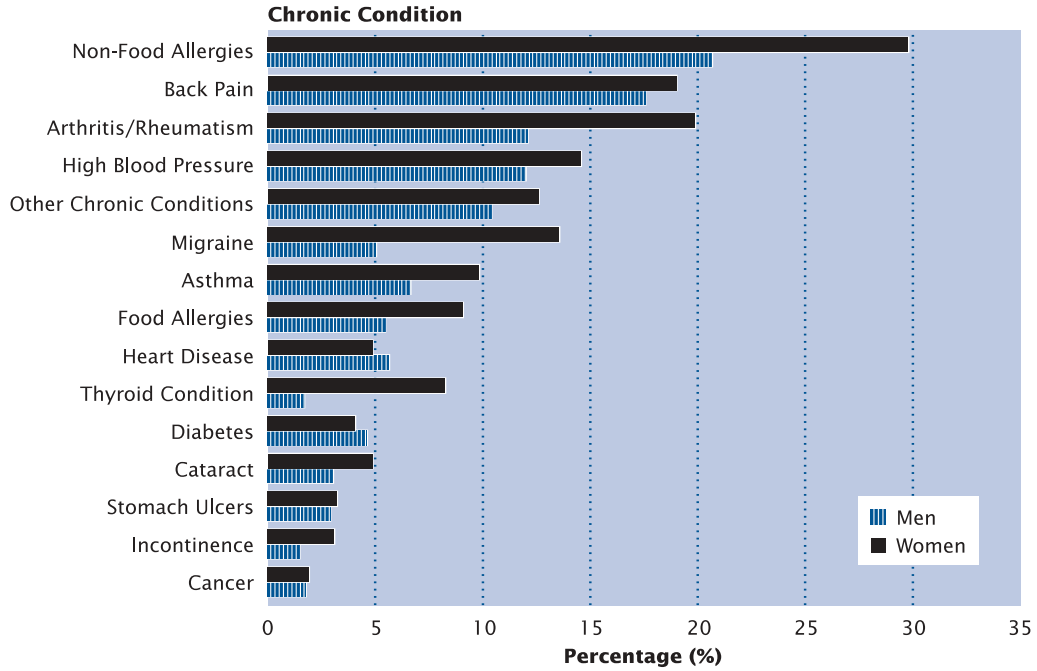
According to the 2000 CCHS, the prevalence of arthritis/rheumatism increased with increasing age. Women aged 35 years and over reported statistically higher rates than men (Figure 2-2). As a result of the influence of Canada's large "baby boomer" generation, most people with arthritis were aged between 45 and 75 years. Two-thirds of those affected with arthritis were women, whose prevalence was almost twice that of men (19% versus 11% respectively).

While arthritis is commonly perceived as a disease of the aged, in reality nearly 3 of 5 people who reported having arthritis/rheumatism in 2000 were younger than 65 years of age (Figure 2-3). This ratio holds for both men and women.

The crude prevalence of arthritis/rheumatism varied considerably across Canada (Figure 2-4). Residents of Nova Scotia reported most frequently arthritis/rheumatism (23%), followed by Saskatchewan and Prince-Edward Island at nearly 20%. Residents in the Territories reported arthritis/rheumatism the least often (11.6%).

Figure 2-4 also displays the age-sex standardized prevalence estimates in parentheses. These estimates serve to remove the effect of any differences in the age-sex compositions of the respective provinces/territories and permit direct comparison with the overall

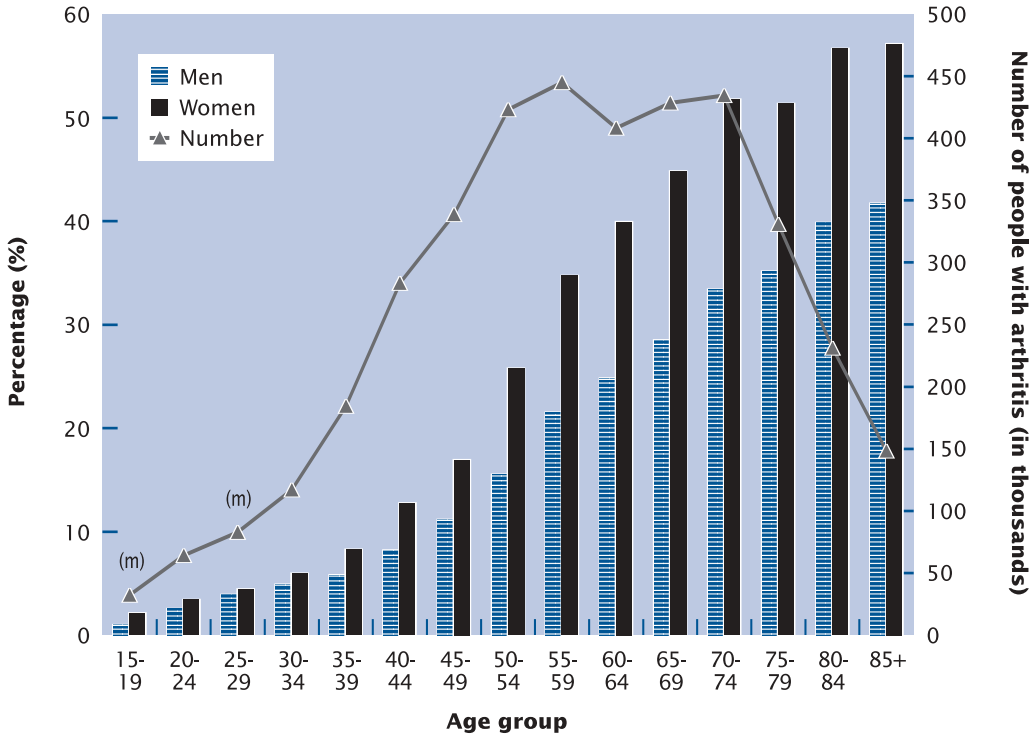
Figure 2-1 Self-reported prevalence of specific chronic conditions, by sex, household population aged 15 years and over, Canada, 2000



Data source: Canadian Community Health Survey 2000, Statistics Canada

Canadian prevalence. Standardized prevalence estimates for Nova Scotia, Saskatchewan and Prince Edward Island were significantly higher than the national prevalence, and Quebec's prevalence was significantly lower.

Figure 2-2 **Self-reported prevalence and number of individuals with arthritis/rheumatism, by age and sex, household population aged 15 years and over, Canada, 2000**

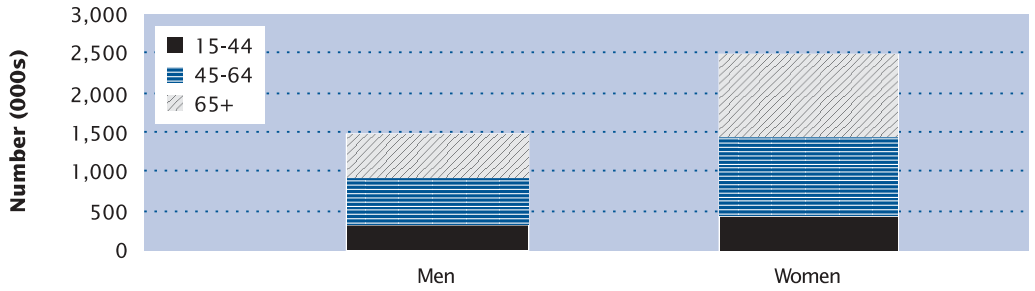


Note: All values for women are significantly higher than values for men at $p < 0.05$, except for age groups 20-24, 25-29, and 30-34.

(m) indicates that the coefficient of variation is between 16.6% and 33.3%.

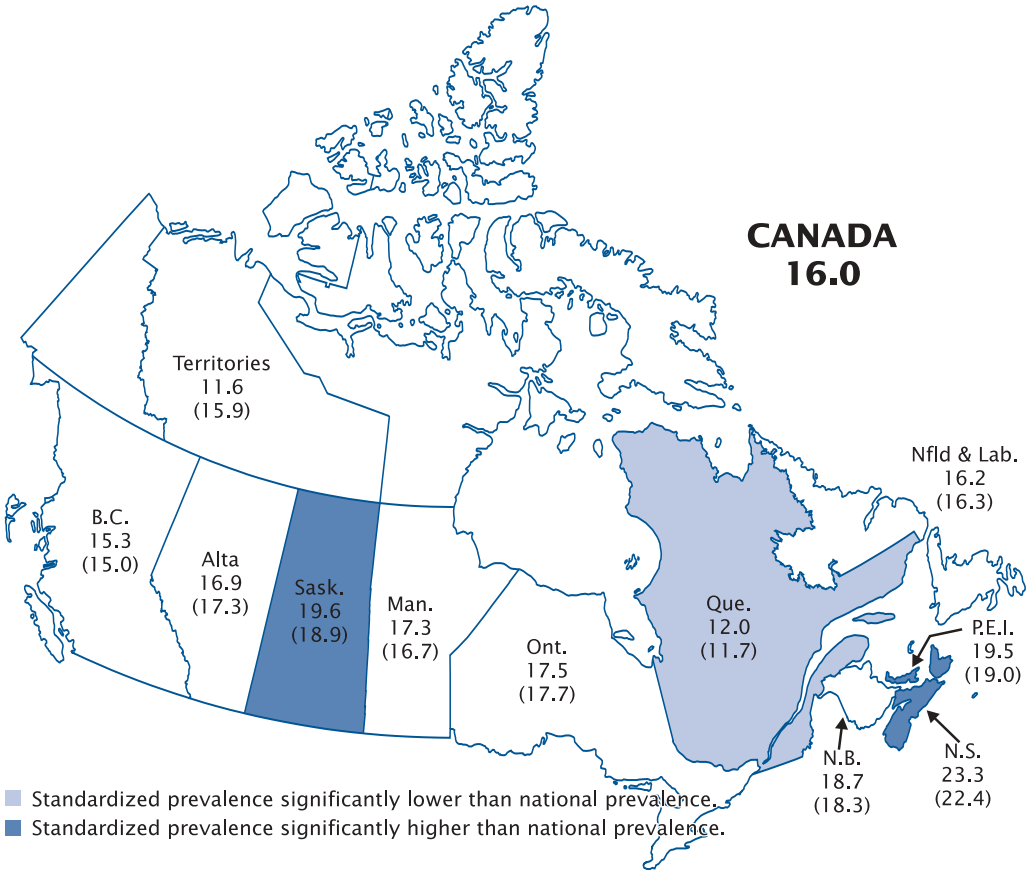
Data source: Canadian Community Health Survey 2000, Statistics Canada

Figure 2-3 **Number of individuals with arthritis/rheumatism, by age and sex, household population aged 15 years and over, Canada, 2000**



Data source: Canadian Community Health Survey 2000, Statistics Canada

Figure 2-4 **Crude (age-sex standardized) prevalence of arthritis/rheumatism, by province/territory, household population aged 15 years and over, Canada, 2000**



Data source: Canadian Community Health Survey 2000, Statistics Canada

Projections

The prevalence of arthritis/rheumatism increases sharply with age (Figure 2-2). As a result, the overall age structure of the population will have great implications for the prevalence and number of people with arthritis. Population projections from Statistics Canada[7] for the years 2001 to 2026 provide the means to estimate the number of people with arthritis and the prevalence of arthritis for the next 20 years. Projections are based on the age- and sex-specific arthritis prevalence estimates from the 2000/01 CCHS, with the presumption that they will remain constant over time.

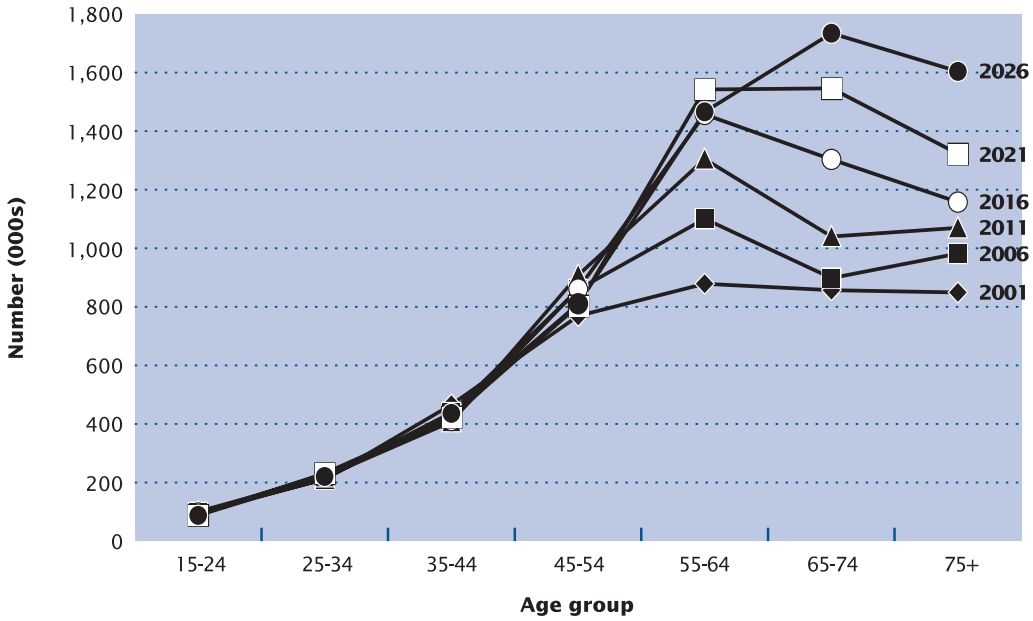
The prevalence of arthritis among Canadians 15 years of age and older is projected to increase by almost 1% every five years, with a projected prevalence of more than 20% by the year 2026 (Table 2-1). This represents an increase of 54% in the number of people with arthritis. It is estimated that within 25 years, 6.4 million Canadians 15 years of age and older will have the disease, the largest increases occurring among adults aged 55 years and older (Figure 2-5).

Table 2-1 **Projected number of individuals aged 15 years and over with arthritis/rheumatism and prevalence of the condition, by sex, Canada, 2001-2026**

	Men		Women		Total	
Year	Number with Arthritis	Prevalence	Number with Arthritis	Prevalence	Number with Arthritis	Prevalence
2001	1,510,000	12.2%	2,620,000	20.4%	4,130,000	16.4%
2006	1,680,000	12.8%	2,910,000	21.4%	4,590,000	17.2%
2011	1,850,000	13.4%	3,190,000	22.3%	5,050,000	18.0%
2016	2,030,000	14.2%	3,480,000	23.5%	5,510,000	18.9%
2021	2,210,000	14.9%	3,750,000	24.6%	5,960,000	19.8%
2026	2,370,000	15.6%	3,990,000	25.5%	6,360,000	20.6%

Note: Figures represent the medium-growth projection and are based on 2000 population estimates.
Data source: Canadian Community Health Survey 2000, Statistics Canada; Population projections 2001-2026, Statistics Canada

Figure 2-5 **Number of individuals projected to have arthritis/rheumatism, by year and age group, household population aged 15 years and over, Canada, 2001-2026**



Data source: Canadian Community Health Survey 2000, Statistics Canada; Population projections 2001-2026, Statistics Canada

Characteristics of People Living with Arthritis/Rheumatism

Compared with people without arthritis, people living with arthritis/rheumatism were more likely to be widowed/separated/divorced (Table 2-2), and to have lower formal education (Figure 2-6) and lower incomes (Figure 2-7). The differences in marital status were likely due to the fact that people with arthritis were older.

Being overweight (defined as a body mass index [BMI] ≥ 27 according to the Canadian standards) is a contributing factor to the development of arthritis, particularly arthritis of the knee.[8] Moreover, people who are overweight are more likely to have a diagnosis

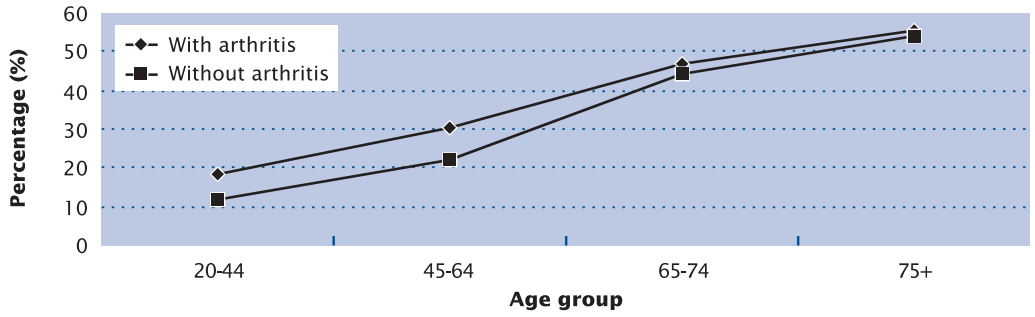
Table 2-2 Marital status of individuals with and without arthritis/rheumatism, by sex, household population aged 15 years and over, Canada, 2000

	With Arthritis, %		Without Arthritis, %	
Marital Status	Men	Women	Men	Women
Married/Common law	74.3	58.5	60.8	59.1
Single	12.1	8.6	32.0	27.4
Widowed/Separated/Divorced	13.5	32.8	7.1	13.4

Note: Differences between people with and without arthritis are statistically significant at $p < 0.05$ except for married women.

Data source: Canadian Community Health Survey 2000, Statistics Canada

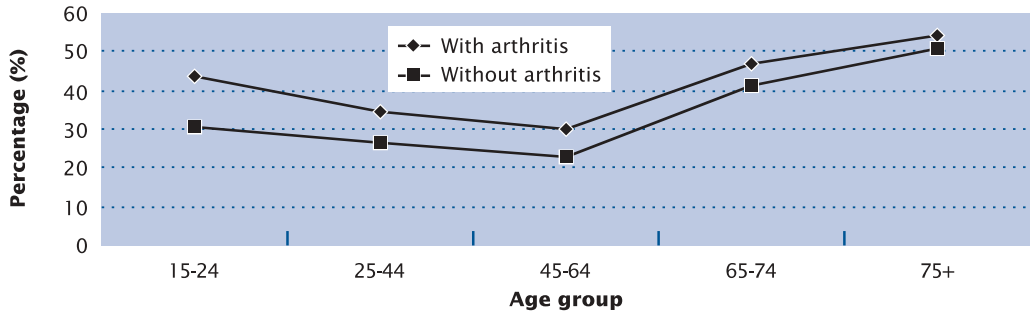
Figure 2-6 Proportion of individuals with and without arthritis/rheumatism with less than secondary school education, by age, household population aged 15 years and over, Canada, 2000



Note: Differences between people with and without arthritis are statistically significant at $p < 0.05$ except for people aged 65-74 and 75 and over.

Data source: Canadian Community Health Survey 2000, Statistics Canada

Figure 2-7 Proportion of individuals with and without arthritis/rheumatism within the lowest/lower-middle income category, by age, household population aged 15 years and over, Canada, 2000

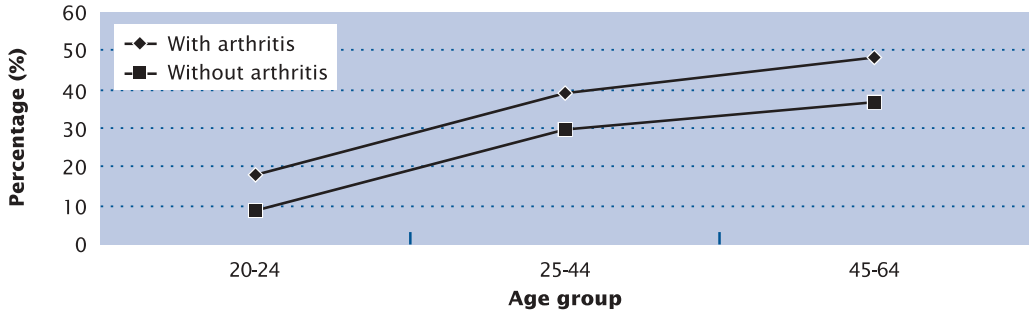


Note: Differences between people with and without arthritis are statistically significant at $p < 0.05$ except for people aged 75 and over.

Data source: Canadian Community Health Survey 2000, Statistics Canada

of arthritis.[9] The CCHS calculated BMI only for individuals 64 years of age and under, excluding pregnant women. In all age groups, the proportion of people with arthritis who were overweight exceeded 18% (Figure 2-8), which was consistently and significantly higher than among people without arthritis.

Figure 2-8 Proportion of individuals aged 20 to 64 years who were overweight*, by age, household population, Canada, 2000

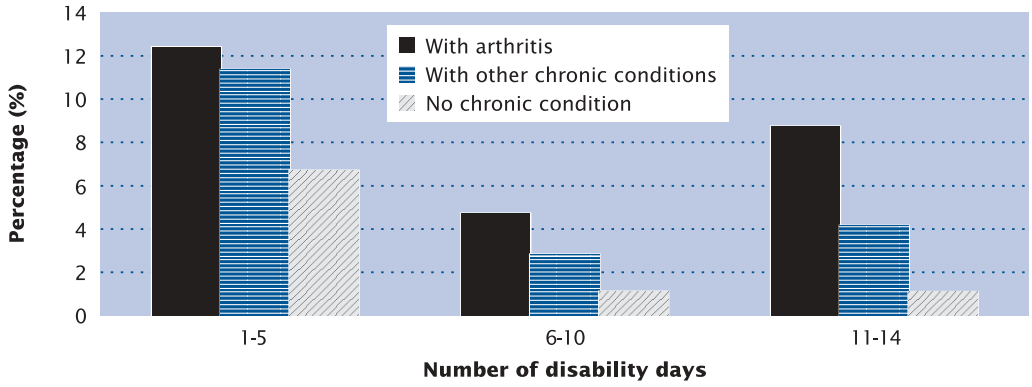


Note: Values for people with arthritis are significantly higher than values for people without arthritis at $p < 0.05$.
*BMI ≥ 27.0
Data source: Canadian Community Health Survey 2000, Statistics Canada

Quality of Life of Individuals with Arthritis

The prolonged course of arthritis may result in extended pain and suffering and reduced quality of life.[10] In comparison to people with other chronic conditions and no chronic conditions, greater proportions of people with arthritis reported having to stay in bed or reduce activities in the two weeks before being surveyed (Figure 2-9). The proportion of people with arthritis reporting 11 to 14 disability days was more than twice that of people with other chronic conditions.

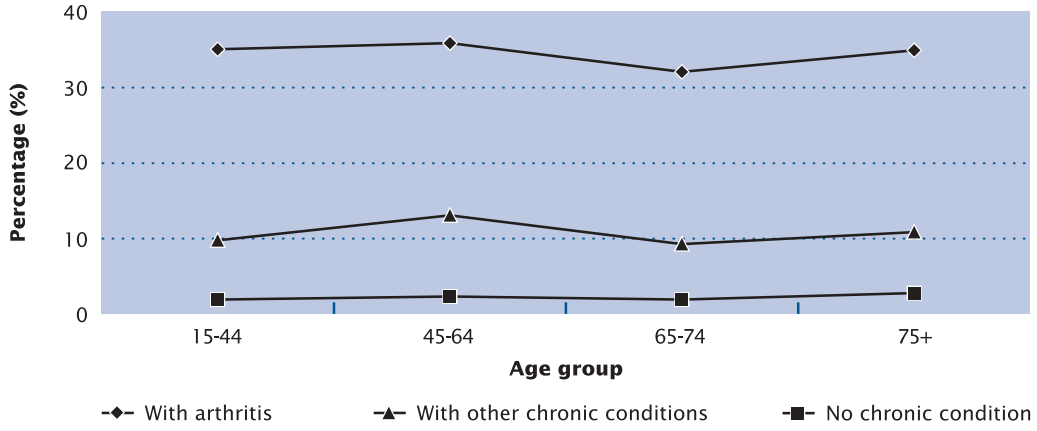
Figure 2-9 Proportion of individuals reporting any disability days in the previous 14 days, household population aged 15 years and over, Canada, 2000



Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$.
Data source: Canadian Community Health Survey 2000, Statistics Canada

The proportion of individuals with arthritis who reported experiencing moderate to severe pain was 3 times as high as the proportion of individuals with other chronic conditions. This pattern did not vary markedly with age (Figure 2-10).

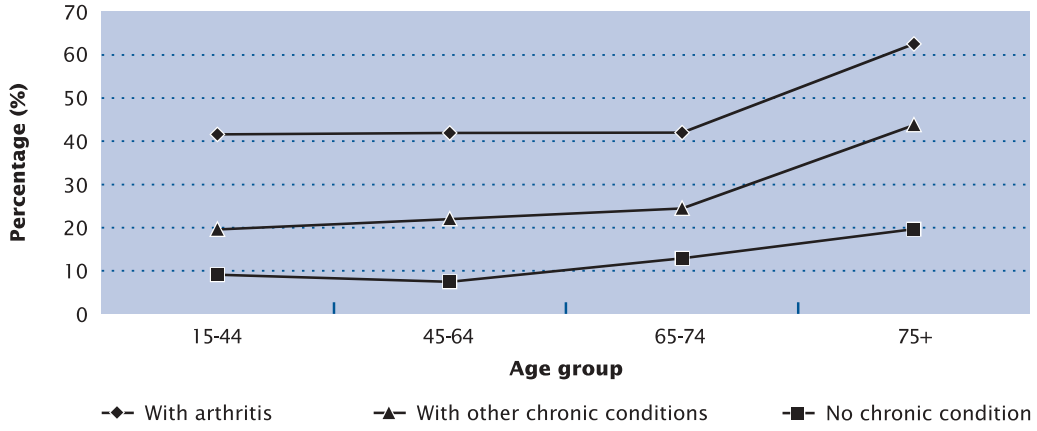
Figure 2-10 Proportion of people reporting moderate to severe pain, by age, household population aged 15 years and over, Canada, 2000



Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$.
Data source: Canadian Community Health Survey 2000, Statistics Canada

The Health Utility Index (HUI) is a generic health measure designed to assess quantitative and qualitative aspects of life.[11] It consists of items that describe functional states including, but not limited to, mobility, dexterity, pain and discomfort. A score of less than 0.83 indicates disability. On the basis of this measure, approximately 40% of people with arthritis in the youngest age group had disability, increasing to nearly two-thirds among those aged 75 years and over (Figure 2-11). Of people with other chronic conditions

Figure 2-11 Proportion of individuals with an HUI* indicative of disability, by age, household population aged 15 years and over, Canada, 2000

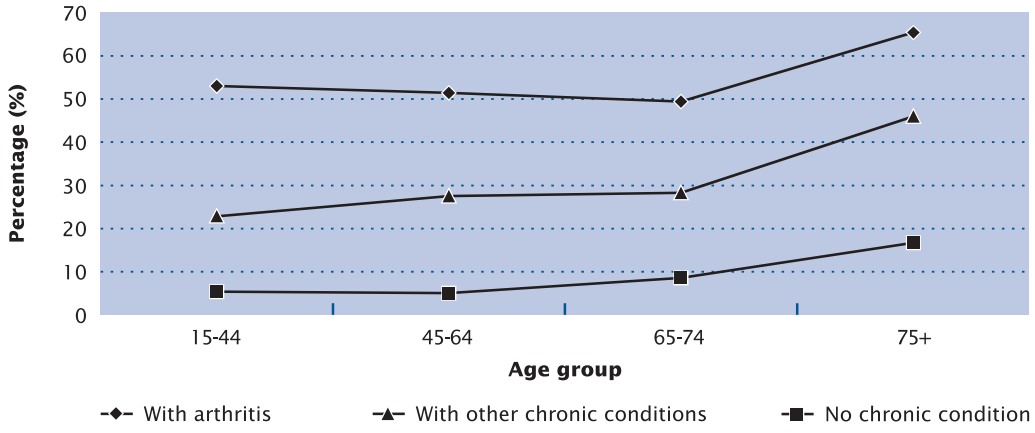


Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$.
*HUI= Health Utility Index
Data source: Canadian Community Health Survey 2000, Statistics Canada

or no chronic condition, the proportions with disability were much lower. The largest differences were observed in the youngest age group, in which the rate of disability for people with arthritis was 2 to 4 times higher than that of people with other or no chronic conditions.

The CCHS asked respondents whether their daily activities at home, work, school or other settings were restricted by a long-term physical or mental condition. In all age groups, the largest proportion that reported activity limitations was among individuals with arthritis (Figure 2-12). In the youngest age group, just over half of those with arthritis reported activity limitations. The proportion increased to two-thirds among those aged 75 years and over who were living with arthritis. Their rates were substantially higher than rates among people with either other or no chronic conditions. Overall, the proportion of people with arthritis who reported activity limitations was between 2 and 10 times higher than the proportion among those with other chronic conditions and no chronic conditions.

Figure 2-12 Proportion of individuals reporting activity limitations, by age, household population aged 15 years and over, Canada, 2000



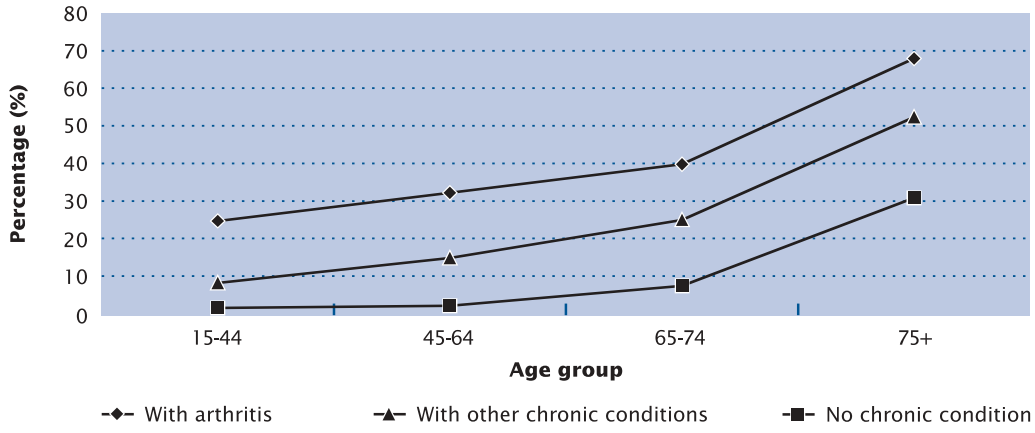
Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$.

Data source: Canadian Community Health Survey 2000, Statistics Canada

Respondents were asked whether, because of a health condition, they required help in preparing meals, shopping for groceries, doing everyday housework, doing heavy household chores, maintaining personal care or moving about in the house. Overall, the need for help with daily activities increased with increasing age for all comparison groups, with a sharp increase at the age of 75 years (Figure 2-13). In all age groups, the highest proportions of people who required help were those with arthritis, and in this category the proportion increased from 25% in the youngest age group to nearly 70% in the oldest. In comparison, the proportion ranged from less than 10% to slightly over 50% among individuals with other chronic conditions.

An individual's perception and evaluation of his/her health also yields information about the impact of illness and disease. The CCHS asked respondents to rate their health as

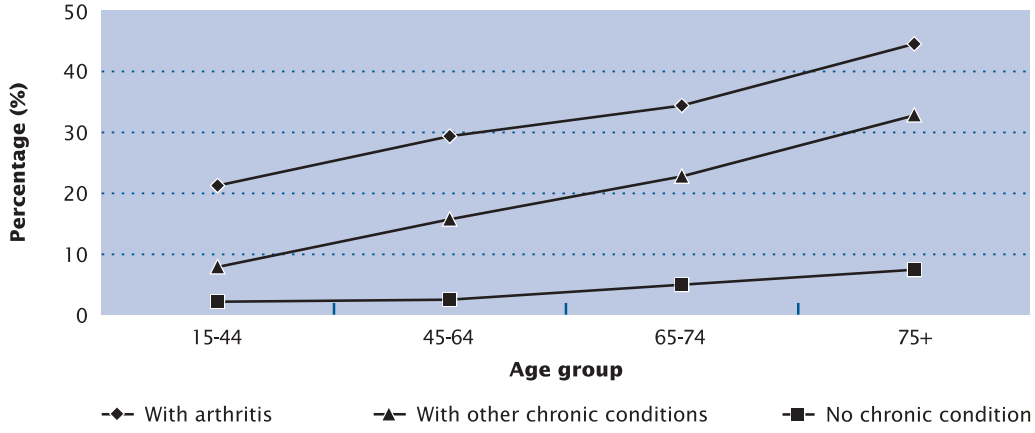
Figure 2-13 Proportion of individuals requiring help with daily activities, by age, household population aged 15 years and over, Canada, 2000



Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$.
Data source: Canadian Community Health Survey 2000, Statistics Canada

excellent, very good, good, fair or poor. Overall, the proportion of individuals who reported fair or poor health increased with increasing age and was greatest among people living with arthritis (Figure 2-14).

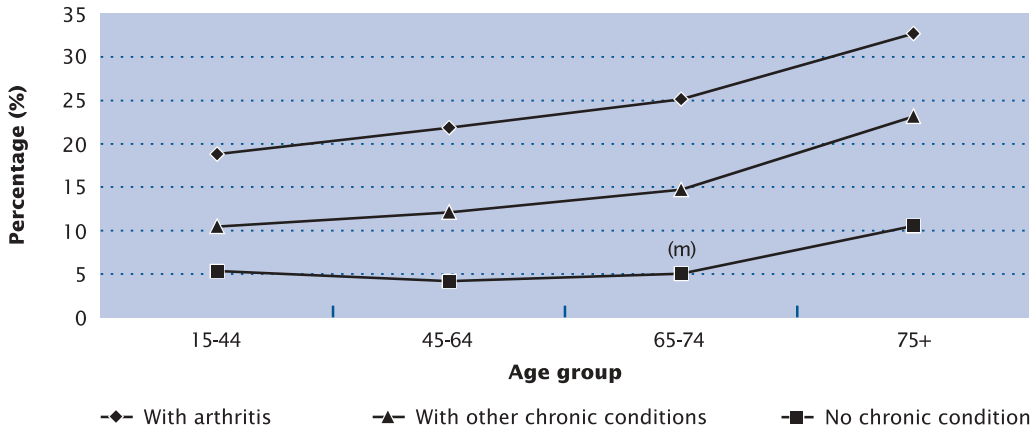
Figure 2-14 Proportion of individuals who rated their health as fair or poor, by age, household population aged 15 years and over, Canada, 2000



Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$.
Data source: Canadian Community Health Survey 2000, Statistics Canada

The CCHS also asked respondents to rate their health compared with one year earlier. The proportion of individuals who reported that their health was worse than a year earlier increased with increasing age among all three comparison groups (Figure 2-15). In all age groups, however, the proportion of people with arthritis who reported that their health was worse than one year earlier was significantly greater than the proportion of those with other and no chronic conditions.

Figure 2-15 Proportion of individuals who rated their health as worse than a year earlier, by age, household population aged 15 years and over, Canada, 2000

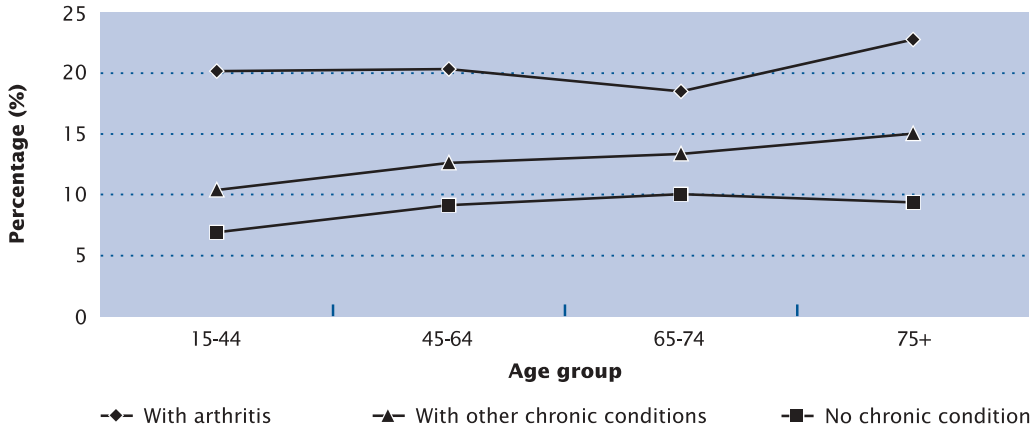


Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$.
(m) indicates that the coefficient of variation is between 16.6% and 33.3%.
Data source: Canadian Community Health Survey 2000, Statistics Canada

While arthritis is commonly associated with pain and fatigue, it can also disrupt sleep.[12] In all age groups, a greater proportion of people with arthritis reported sleeping for less than 6 hours per night (Figure 2-16). The largest difference between people with arthritis and those with other chronic conditions was in the youngest age group (15-44 years): the proportion here was twice as high as among those with other conditions. Until the age of 74 years, the proportion of people with arthritis who reported less than 6 hours of sleep was relatively similar across the age groups.

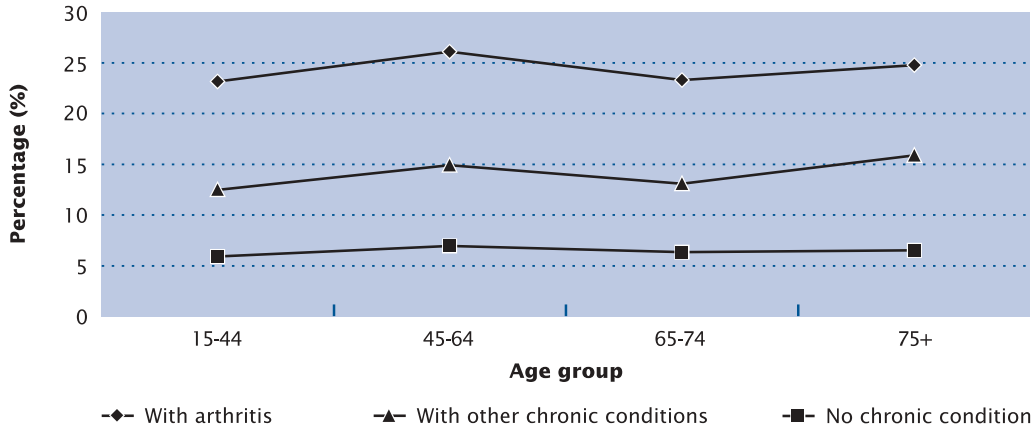
People with arthritis reported the highest rates of sleeping problems "most of the time" (Figure 2-17). There was no significant difference between age groups. A greater

Figure 2-16 Proportion of people reporting less than 6 hours of sleep per night, by age, household population aged 15 years and over, Canada, 2000



Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$.
Data source: Canadian Community Health Survey 2000, Statistics Canada

Figure 2-17 Proportion of individuals reporting sleeping problems most of the time, by age, household population aged 15 years and over, Canada, 2000



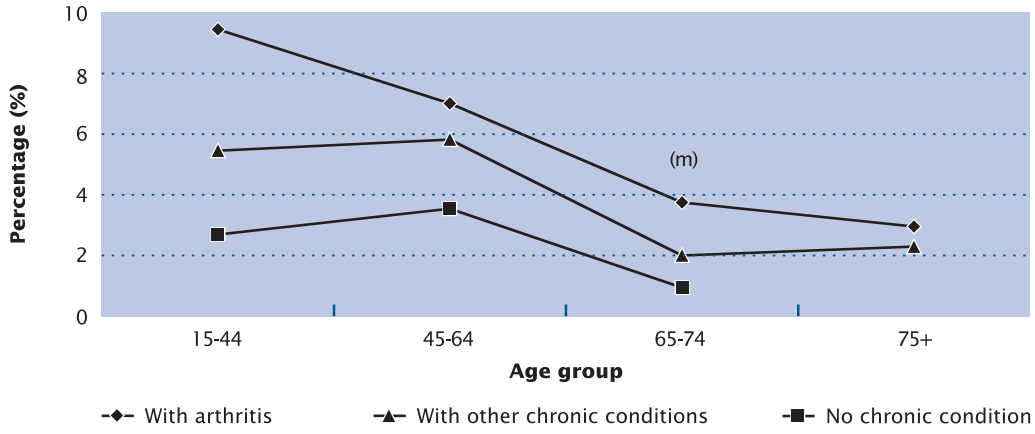
Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$.

Data source: Canadian Community Health Survey 2000, Statistics Canada

proportion of people with arthritis also reported that they did not find sleep refreshing and, as a result, had difficulty staying awake at other times (data not presented).

The perceived amount of stress experienced on a daily basis can be a consequence of illness or disease. The only significant differences in the level of perceived stress between people with arthritis and individuals with other chronic conditions were in the youngest age group (15-44) and in those aged 65 to 74 (Figure 2-18). The proportion in each of these age groups who reported finding life extremely stressful was nearly twice as high for people with arthritis as it was among those living with other chronic conditions.

Figure 2-18 Proportion of individuals reporting life to be extremely stressful, by age, household population aged 15 years and over, Canada, 2000



Notes: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$ except for those aged 45-64 and 75 and over.

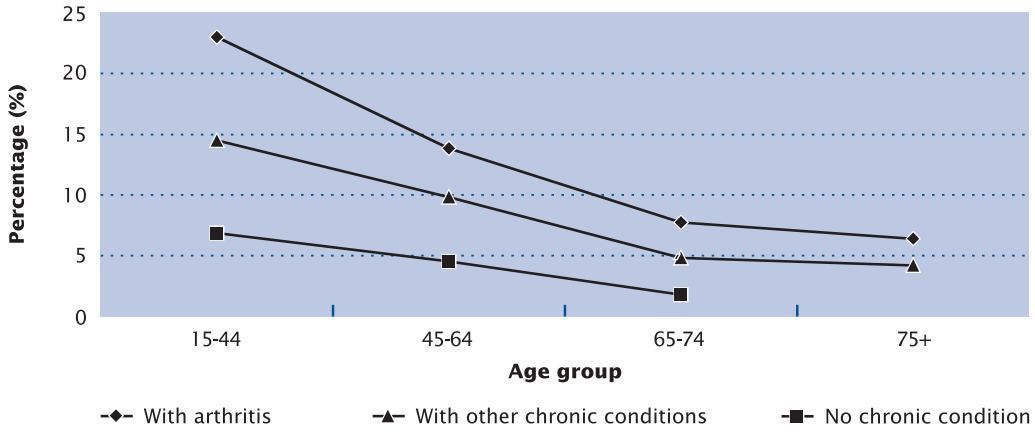
(m) indicates that the coefficient of variation is between 16.6% and 33.3%.

Because of the small sample size, data for people aged 75+ years in the "no chronic condition" group cannot be released.

Data source: Canadian Community Health Survey 2000, Statistics Canada

Figure 2-19 displays the proportions of people with indications of case depression (see Appendix). Overall, the proportions declined with age. They were significantly higher for people with arthritis across all ages, the largest differences being found among those aged 15 to 44.

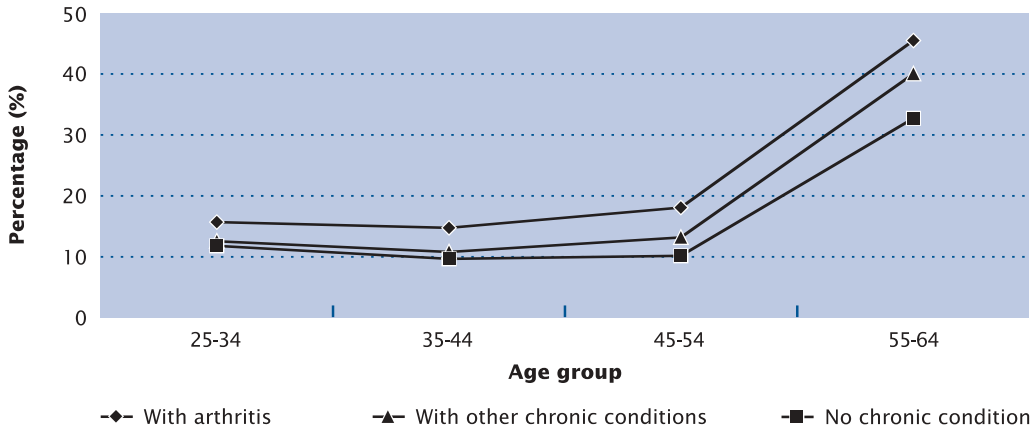
Figure 2-19 Proportion of individuals with case depression, by age, household population aged 15 years and over, Canada, 2000



Notes: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$.
Because of the small sample size, data for people aged 75+ years in the "no chronic condition" group cannot be released.
Data source: Canadian Community Health Survey 2000, Statistics Canada

According to the CCHS, arthritis also influences an individual's participation in the labour force. Over 1 in 10 individuals of working age reported having arthritis. The proportion of people not working was highest among those with arthritis in comparison to those with other or no chronic conditions. The proportion increased with increasing age, especially after 55 years (Figure 2-20). Early retirement, as well as departures from the labour force due to ill health, likely accounted for some of this increase.

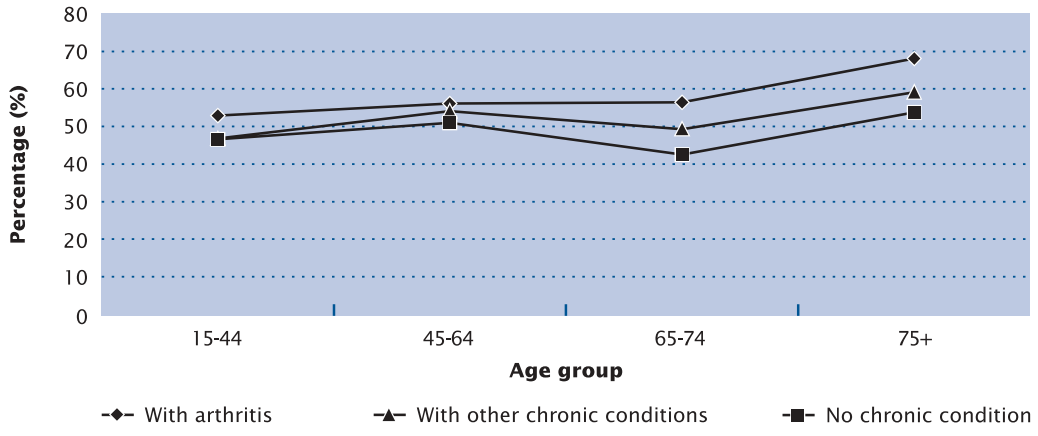
Figure 2-20 Proportion of individuals not in the labour force, by age, household population aged 25 years and over, Canada, 2000



Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$ except for those aged 15-44 years old.
Data source: Canadian Community Health Survey 2000, Statistics Canada

Being physically active has the potential to prevent arthritis and ease the pain associated with the disease.[13,14] For many individuals, physical activity is also an important component of recreational activities. According to the CCHS, a very high proportion of Canadians were physically inactive in 2000 (Figure 2-21). Among people with arthritis, over 50% in all age groups were physically inactive – a proportion higher than among individuals with either no or other chronic conditions.

Figure 2-21 Proportion of individuals who reported being physically inactive, by age, household population aged 15 years and over, Canada, 2000



Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$ except for those aged 45 to 64 years old.
Data source: Canadian Community Health Survey 2000, Statistics Canada

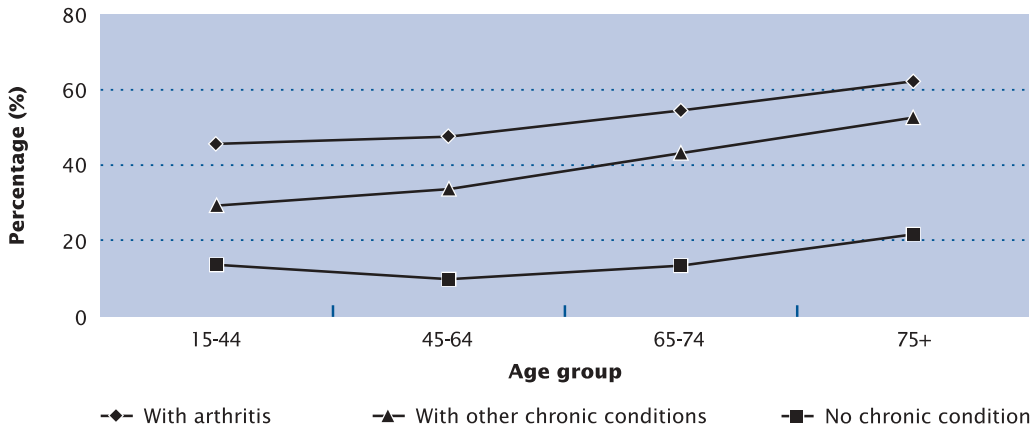
Visits to Care Providers and Use of Medication

Health Services Utilization

Access to health care services is vital to the management of arthritis and other chronic conditions. A higher proportion of people with arthritis compared with those with other chronic conditions reported that they had used health care services in the previous year. Specifically, they sought the services of a primary care physician, a specialist (including surgeons, allergists, orthopedists, and psychiatrists), a nurse, a physiotherapist, other health care provider or an alternative care provider (including massage therapists, chiropractors and acupuncturists).

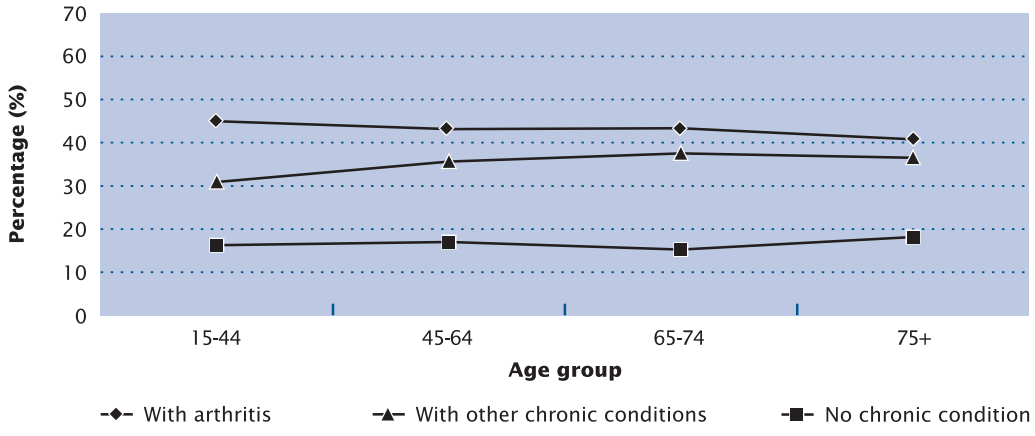
Over half of people with arthritis had consulted primary care physicians (general practitioners or family physicians) at least four times in the previous year, compared with 33% of people with other chronic conditions. Similarly, 43% of people with arthritis reported seeing a specialist at least once, compared with 33% and 16% of individuals with other chronic conditions or no chronic conditions respectively. Compared with those with other chronic conditions, a higher proportion of both men and women with arthritis consulted either a primary care physician or a specialist. This pattern was consistent in every age group (Figures 2-22 and 2-23). Overall, women reported greater use of physicians' and specialists' services than men (data not shown).

Figure 2-22 Proportion of individuals who consulted a primary care physician at least four times in previous year, by age, household population aged 15 years and over, Canada, 2000



Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$.
Data source: Canadian Community Health Survey 2000, Statistics Canada

Figure 2-23 Proportion of individuals who consulted a specialist at least once in the previous year, by age, household population aged 15 years and over, Canada, 2000

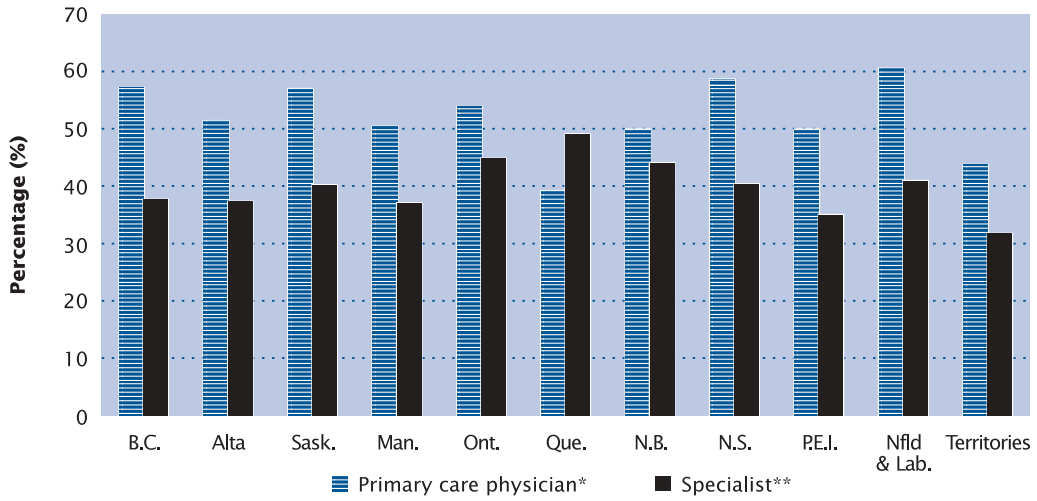


Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$ except for those aged 75 and over.
Data source: Canadian Community Health Survey 2000, Statistics Canada

The proportion of people with arthritis who visited primary care physicians and specialists varied by province/territory. In all provinces/territories, the proportion of individuals with arthritis who reported seeing either a primary care physician at least four times or a medical specialist at least once in the previous year was greater than the corresponding proportions of people with either other or no chronic conditions (data not shown). The greatest proportion of people with arthritis who visited their general practitioner or family physician (GP/FP) at least four times in the previous year was in Newfoundland (61%), followed closely by Nova Scotia, British Columbia and Saskatchewan (Figure 2-24). The lowest proportion was found in Quebec (40%).

The proportion of people with arthritis who visited a medical specialist did not vary as much as the proportion who visited a GP/FP. However, the greatest proportion of people with arthritis who visited a medical specialist was in Quebec, at just under 50%, followed by Ontario and New Brunswick (Figure 2-24). The lowest proportion was found in Prince Edward Island (35%).

Figure 2-24 Proportion of individuals with arthritis who consulted a primary care physician* or a specialist, by province/territory, household population aged 15 years and over, Canada, 2000**



*at least 4 visits in the previous year
**at least 1 visit in the previous year
Data source: Canadian Community Health Survey 2000, Statistics Canada

In 2000, only 13% of people with arthritis reported seeing a nurse for care or advice about their physical, emotional or mental health; 16% saw a physiotherapist (Table 2-3). Compared with people with other chronic conditions, a greater proportion of people with arthritis in all age groups reported consulting either a nurse or physiotherapist. Overall, patterns of use of chiropractic services and consultations with psychologists, social workers and counsellors were similar among people with arthritis and those with

Table 2-3 Proportion of individuals who consulted a specified health care provider at least once, household population aged 15 years and over, Canada, 2000

	With Arthritis	With Other Chronic Conditions	With No Chronic Conditions
Nurses	13.2%	11.5%	6.5%
Physiotherapists	15.9%	10.5%	5.5%
Chiropractors	13.4%	13.5%	7.4%
Psychologists, Social Workers, Counsellors	7.9%	9.0%	4.7%
Alternative Care Providers	12.8%	13.3%	7.1%

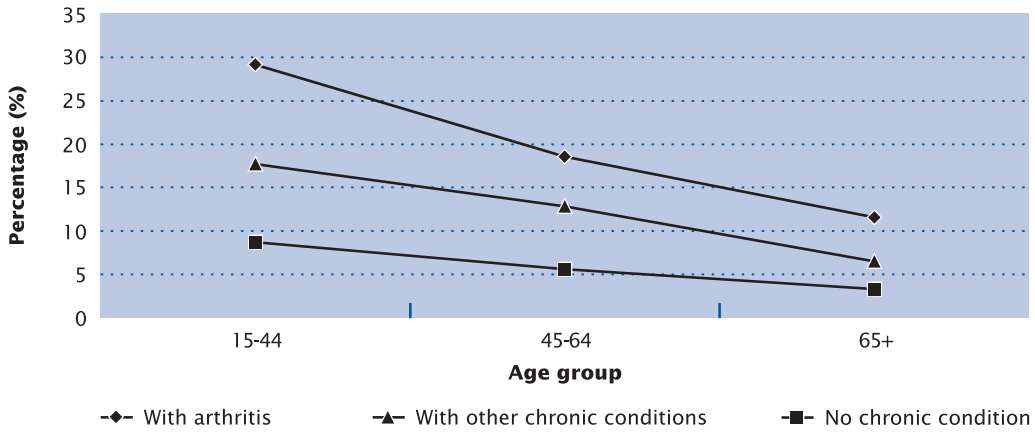
Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$ except for chiropractors and alternative providers.
Data source: Canadian Community Health Survey 2000, Statistics Canada

other chronic conditions (Table 2-3). The proportions of individuals with arthritis making such consultations were nearly double those of people with no chronic conditions. The proportion of people with arthritis who consulted alternative care providers in the previous year was not significantly different from that of individuals living with other chronic conditions. Massage therapists were the most common type of alternative care provider consulted, followed by acupuncturists (data not shown). Age patterns were similar among individuals with arthritis and those with other chronic conditions who consulted alternative care providers.

Access to Health Care

In all age groups, the proportion of people who felt that they had not received the health care they needed during the previous 12 months was greatest for people with arthritis compared with people with other and no chronic conditions (Figure 2-25). Overall, 18% of people with arthritis reported that they did not receive health care when needed: 10% reported that care was either unavailable in their area, unavailable when required or required too long a wait. The comparable proportion for people with other chronic conditions was only 7%. The highest proportion of individuals who reported these limitations in access was among those between 15 and 44 years of age – indeed, nearly one-third of the people with arthritis in this age group reported that they had not received necessary care.

Figure 2-25 Proportion of individuals who indicated that they required but did not receive health care in the previous year, by age, household population aged 15 years and over, Canada, 2000



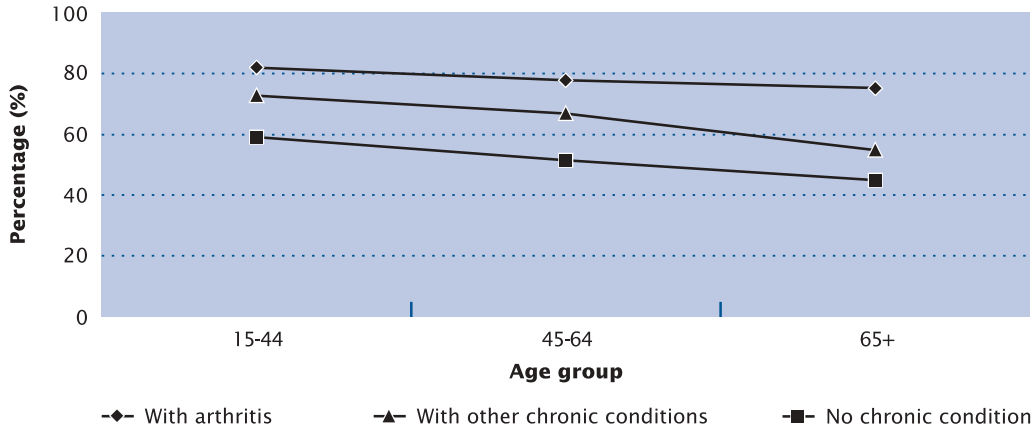
Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$.
Data source: Canadian Community Health Survey 2000, Statistics Canada

Medication Use

According to the 1998/1999 National Population Health Survey (NPHS), approximately 80% of individuals with arthritis in all age groups reported taking pain relievers such as acetaminophen (including arthritis medicine and anti-inflammatories) in the previous month (Figure 2-26). In all age groups, the proportion who took pain relievers was

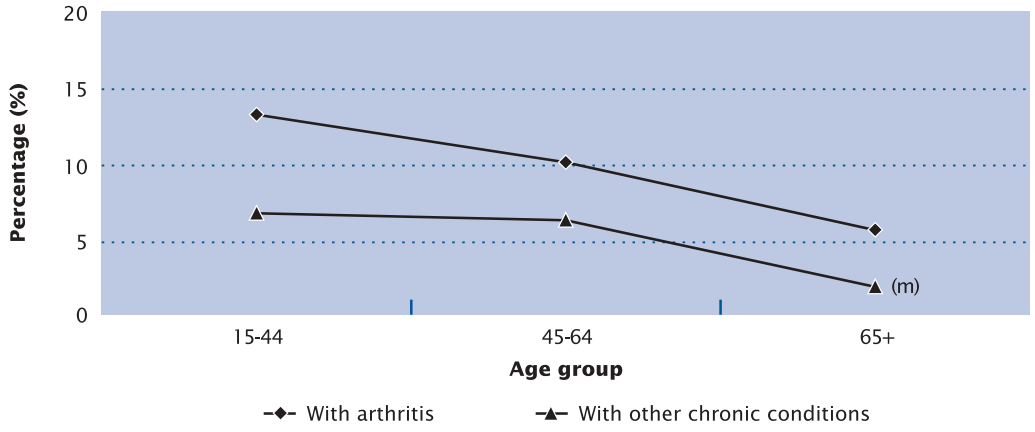
higher in individuals with arthritis than those with other chronic conditions. This was also the case for reported narcotic pain medication or antidepressants taken in the previous month, and the highest use was in the youngest age group (15-44) (Figures 2-27, 2-28).

Figure 2-26 Proportion of individuals who had taken pain relievers (including arthritis medicine and anti-inflammatories) in the previous month, by age, household population aged 15 years and over, Canada, 1998/99



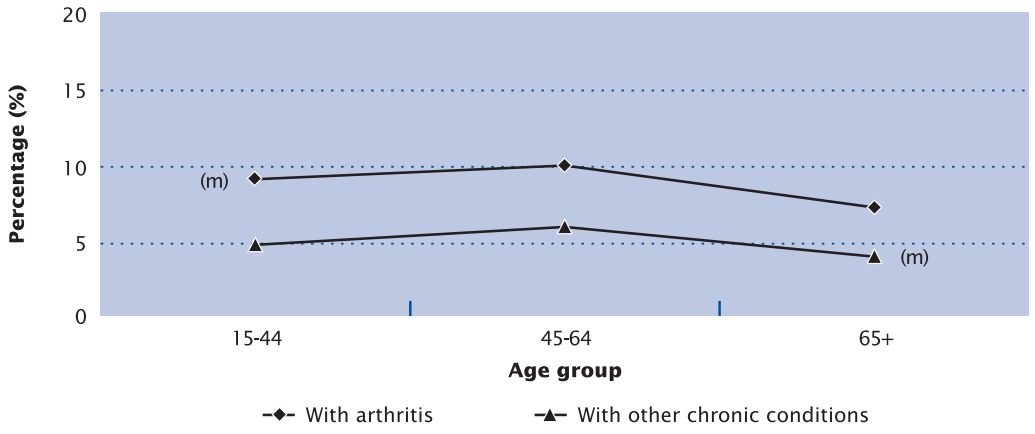
Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$.
Data source: National Population Health Survey 1998/99, Statistics Canada

Figure 2-27 Proportion of individuals who had taken narcotic pain medication in the previous month, by age, household population aged 15 years and over, Canada, 1998/99



Notes: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$.
(m) indicates that the coefficient of variation is between 16.6% and 33.3%.
Because of the small sample size, data for the "no chronic condition" group cannot be released.
Data source: National Population Health Survey 1998/99, Statistics Canada

Figure 2-28 Proportion of individuals who had taken antidepressants in the previous month, by age, household population aged 15 years and over, Canada, 1998/99



Note: Values for people with arthritis are significantly higher than values for people with other and no chronic conditions at $p < 0.05$ except for those aged 65 and over.
(m) indicates that the coefficient of variation is between 16.6% and 33.3%.
Because of the small sample size, data for "no chronic condition" group cannot be released.
Data source: National Population Health Survey 1998/99, Statistics Canada

Aboriginal People Living Off-Reserve

Background

In 2001, Aboriginal peoples (including First Nations, Inuit and Métis) accounted for approximately 3% of the total Canadian population. The Aboriginal population is much younger than the general population. According to the 2001 Census, one-third were less than 15 years of age, and approximately 4% were over the age of 65 years.[15] Geographically, Aboriginal people were disproportionately located in the northern, western and rural parts of the country. About 29% lived on a reserve/settlement. Slightly more than half (51%) lived in an urban area, either a Census Metropolitan Area (CMA) or a non-CMA urban area (29% and 22% respectively). The remainder (49%) resided in a rural area.[15]

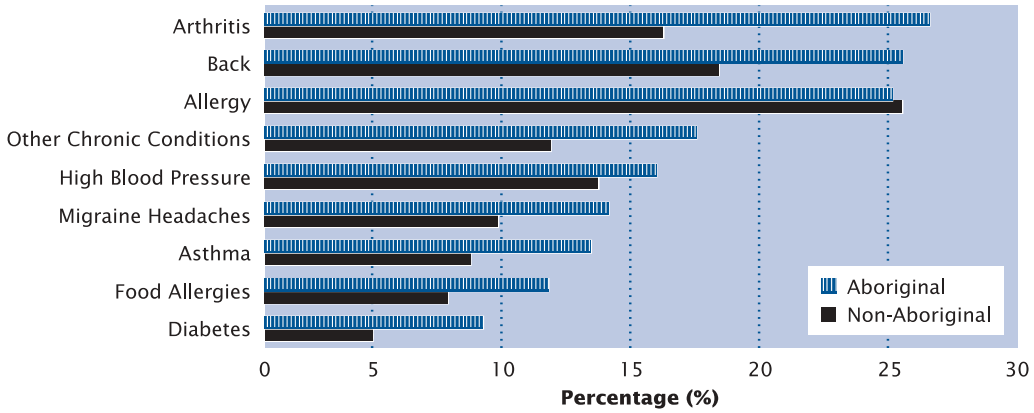
Aboriginal people are undergoing a health transition marked by an increasing burden of chronic diseases and injuries.[16,17] They tend to bear a disproportionate burden of illness, an outcome that has been linked to their economic and social conditions.[18,19] Only limited data are available on Canada's Aboriginal peoples, and few studies have compared them with the non-Aboriginal population.[4-6] Moreover, Canadian Aboriginal people reported arthritis as one of the five most important health problems in their communities.[6]

Prevalence of Arthritis among Aboriginal People Living Off-reserve and Non-Aboriginal people

Crude prevalence estimates (not adjusted for differing age distributions) of arthritis among Aboriginal and non-Aboriginal people are 19% and 16% respectively (data not shown). When age-standardized, the prevalence of arthritis in the Aboriginal population was 27%, as compared with 16% in the non-Aboriginal population, and arthritis was the most prevalent chronic condition in the Aboriginal population (Figure 2-29).

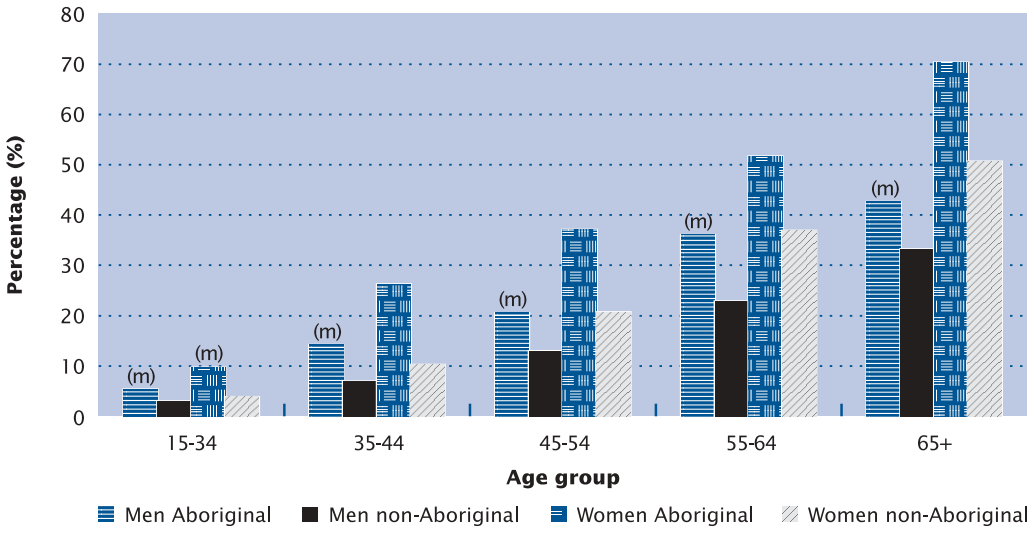
As with the non-Aboriginal population, the prevalence of arthritis in the Aboriginal population increased with increasing age, with estimates higher among females than males in every age group (Figure 2-30).

Figure 2-29 Standardized prevalence rates of specific chronic conditions among Aboriginal people living off-reserve and non-Aboriginal people aged 15 years and over, household population, Canada, 2000



Note: Differences between Aboriginals and non-Aboriginals are statistically significant at $p < 0.05$ except for allergy and high blood pressure.
Data source: Canadian Community Health Survey 2000, Statistics Canada

Figure 2-30 Self-reported prevalence of arthritis among Aboriginal people living off-reserve and non-Aboriginals, by age and sex, household population aged 15 years and over, Canada, 2000

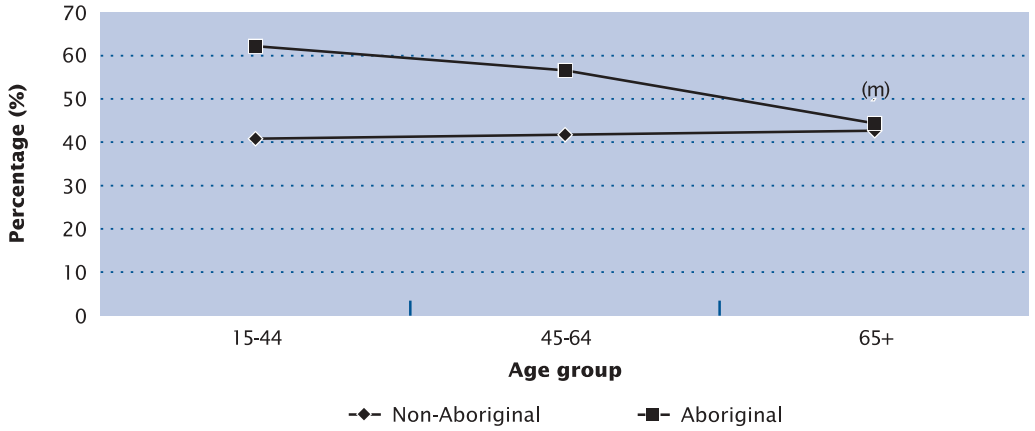


Note: Differences between Aboriginals living off-reserve and non-Aboriginals are statistically significant at $p < 0.05$ for females of all age groups and for males aged 35 to 44.
(m) indicates that the coefficient of variation is between 16.6% and 33.3%.
Data source: Canadian Community Health Survey 2000, Statistics Canada

Quality Of Life Of Aboriginal People with Arthritis Living Off-Reserve and Non-Aboriginal People with Arthritis

Based on the Health Utility Index (HUI) (see Glossary), Aboriginal people with arthritis had higher rates of disability than non-Aboriginals with arthritis. Rates in the Aboriginal population living off-reserve decreased with increasing age up to the age of 65 years and over, when rates became similar to those of the non-Aboriginal population (Figure 2-31).

Figure 2-31 Proportion of individuals with arthritis who reported an HUI* score indicative of disability, by age, Aboriginal people living off-reserve and non-Aboriginal people, household population aged 15 years and over, Canada, 2000



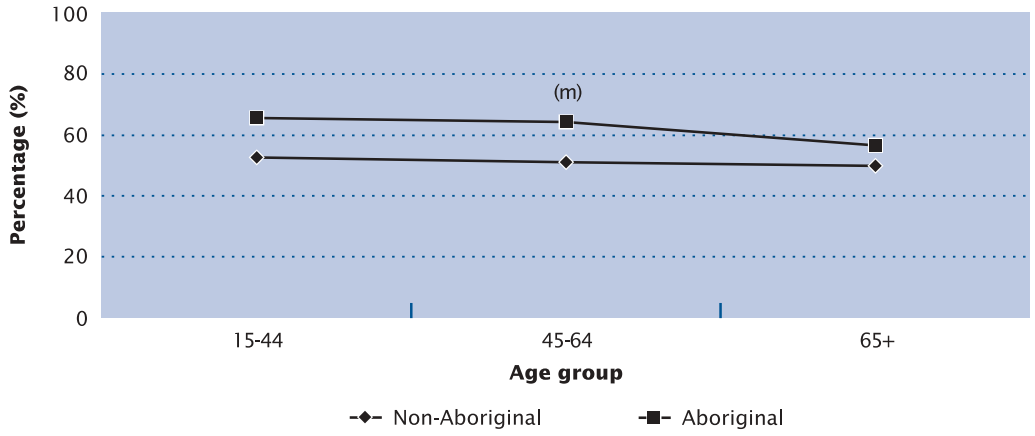
Note: Differences between Aboriginals living off-reserve and non-Aboriginals are statistically significant at $p < 0.05$ except for people aged 65 years and over.
(m) indicates that the coefficient of variation is between 16.6% and 33.3%.
*HUI = Health Utility Index
Data source: Canadian Community Health Survey 2000, Statistics Canada

In all age groups, compared with non-Aboriginals with arthritis, a larger proportion of Aboriginal people with arthritis living off-reserve reported that they needed to limit either the kind or amount of their activities at home, at work, at school or in their leisure time. The largest differences between the two populations were found in the youngest age group, in which more than 65% of young Aboriginal people with arthritis reported the need to limit their activities compared with 53% of non-Aboriginals (Figure 2-32).

Discussion

This chapter confirms that arthritis is a major cause of morbidity, disability and health care utilization in Canada. In 2000, 16% of Canadians (nearly 4 million) aged 15 years and over reported arthritis as a long-term health condition. It ranked second and third among the most commonly reported chronic conditions in women and men respectively. Arthritis affected twice as many women as men. Of those with arthritis, 60% were of working age (< 65 years old). With the aging of the "baby boomer" population, by 2026 the number of Canadians with arthritis/rheumatism is expected to increase to more than 6 million, or 1 in 5 Canadians. Individuals 55 years of age and older will account for most of this increase.

Figure 2-32 Proportion of individuals with arthritis reporting activity limitations, by age, Aboriginal people living off-reserve and non-Aboriginal people, household population aged 15 years and over, Canada, 2000



Note: Differences between Aboriginals living off-reserve and non-Aboriginals are statistically significant at $p < 0.05$ except for people aged 65 years and over.
(m) indicates that the coefficient of variation is between 16.6% and 33.3%.
Data source: Canadian Community Health Survey 2000, Statistics Canada

Compared with people with other chronic conditions, greater proportions of people with arthritis reported having low income, and they were more likely to be overweight. People with arthritis in all age groups consistently rated their health as worse than did people with other chronic diseases. Across all age groups, a greater proportion of people with arthritis reported recent days of reduced activity because of ill health, severe pain and activity limitation; the need for help with daily activities; and problems with sleep. They were also more likely to report their overall health as only fair or poor, and worse than a year earlier. More individuals with arthritis tended to be out of the labour force and physically inactive. They were also more likely than people with other chronic conditions to have visited a primary care physician at least four times in the previous year and to have seen a specialist or physical therapist.

Although these findings cannot be directly attributed to arthritis, they may indicate the differential impact that arthritis has over and above 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 people with arthritis also present with other chronic conditions (co-morbidities), which can include allergies.

Although the prevalence of arthritis increased with age, its impact in terms of pain and activity limitation was much the same in all age groups. The health gap between people with arthritis and individuals with other chronic diseases was widest in the younger age groups, and this gap narrowed with increasing age. These differences among younger individuals highlight the impact of arthritis on young Canadians. The narrowing of the health gap with increasing age may be associated with the increasing number of health problems among older individuals in general.

A greater proportion of Aboriginal people living off-reserve than non-Aboriginals reported that they had arthritis (19% versus 16%). However, if the off-reserve Aboriginal population

had the same age composition as the overall Canadian population, it was estimated that the prevalence of arthritis in the off-reserve Aboriginal population would be 26.5%. A greater proportion of the off-reserve Aboriginal population with arthritis reported activity limitations and disability (as measured by the HUI) compared with their non-Aboriginal counterparts. The extent to which this is directly attributable to arthritis or to other chronic conditions that are also more frequently reported by the Aboriginal population is unclear. It may be a result of a higher prevalence of specific types of arthritis, such as rheumatoid arthritis and ankylosing spondylitis, among Aboriginal people.[5,6]

Since data from the CCHS are cross-sectional, temporal or causal relationships among the different indicators presented in this chapter cannot be assumed.

Implications

The prevalence of arthritis in Canada currently stands at 16%. On the basis of current projections, 1 million more Canadians will have arthritis within 10 years. In 20 years, the prevalence may reach 1 in 5 Canadians. In the past, Canadian population-based research on the burden of arthritis has been minimal, leaving the public health implications of the condition inadequately understood. Individuals with arthritis tend to make contact with health care service providers in greater proportions than people with other chronic health conditions. The implications are an increased economic burden placed on the health care system and increased need for health care providers who can offer adequate services to this growing population.

Currently, Canada has limited surveillance activities related to arthritis. *Arthritis in Canada* represents the first publication on arthritis that focuses on the national level. However, Chapter 2 provides a snapshot of the burden of this disease. Monitoring the disease over time would permit the examination of changes in prevalence and incidence, and of the effectiveness of public health and other interventions.

The incidence, severity, processes of care and outcomes associated with arthritis differ among racial or ethnic groups.[20] The reasons for these disparities are largely unknown. Surveillance activities for arthritis and related conditions should include the Aboriginal population living on-reserve as well as populations of other ethnic background. Given the increasing ethnic diversity of the Canadian population and the aging of the immigrant population, differences in the experience of arthritis among people in different ethnic groups are likely to become of even greater concern in the future.

While the prevalence of self-reported arthritis/rheumatism is substantial in Canada, it is believed that the prevalence reported here underestimates, in fact, the true prevalence. The CCHS asked respondents about arthritis and rheumatism "diagnosed by a health professional". This question fails to capture many people with arthritis/chronic joint symptoms who do not see a physician for their symptoms and whose condition remains undiagnosed. Therefore, the inclusion of a question on "chronic joint symptoms" would help in providing a more complete picture of the burden of arthritis in Canada.

More detailed diagnostic questions for arthritis, such as those currently used in the Behavioral Risk Factor Surveillance System (BRFSS) surveys in the United States, could

be included in future national surveys. Consideration could also be given to including physical measures of arthritis, such as assessment of physical function in the general population, as part of future surveys.

Current population surveys lack questions with sufficient detail either to enable differentiation between types of arthritis or to describe the nature of activity limitations. As a result, the impact of arthritis on mobility, independence, work, and leisure and family activities remains largely unknown. More data on these issues would not only help to document the economic and social consequences of arthritis for the Canadian population but would also provide a sound basis for assessing the need for other interventions. Accurately describing the impact of arthritis will require data that are directly attributable to the condition. This also applies to data on health care utilization. The Participation and Activity Limitations Survey (PALS) 2001 will provide detailed data that will better describe the nature of activity limitations of people living with arthritis.

References

1. Badley E. *The effect of osteoarthritis on disability and health care use in Canada*. J Rheumatol Suppl 1995;43:19-22.
2. Badley E, Wang P. *Arthritis and the aging population: projections of arthritis prevalence in Canada 1991 to 2031*. J Rheumatol 1998;25:138-44.
3. Badley E, Rothman L, Wang P. *Modeling physical dependence in arthritis: the relative contribution of specific disabilities and environmental factors*. Arthritis Care Res 1998;11:335-45.
4. 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.
5. Peschken CA, Esdaile J. *Rheumatic diseases in North America's indigenous people*. Sem Arthritis Rheumatism 1999;28(6):368-91.
6. Newbold KB. *Problems in search of solutions: health and Canadian aboriginals*. J Community Health 1998;23(1):59-73.
7. Statistics Canada. *Population projections for Canada, 2001-2026*. CANSIM II, table 052-0001. Ottawa: Statistics Canada, 2002.
8. Felson DT, Lawrence RC, Dieppe PA, Hirsch R, Helmick CG, Jordan JM, et al. *Osteoarthritis: new insights. Part 1*. Ann Intern Med 2000;133(8):635-46.
9. Gilmore J. *Body mass index and health*. Health Rep 1999;11(1);31-43.
10. Centre for Disease Prevention and Control. *Factors associated with prevalent self-reported arthritis and other rheumatic conditions – United States, 1989-1991*. MMWR 1996;45(23):487-91.
11. Statistics Canada. *Canadian Community Health Survey (CCHS), Cycle 1.1, derived variable (DV) specifications.* Ottawa, Ontario: Statistics Canada, Health Statistics Division, 2002.
12. Jordan JM, Bernard SL, Callahan LF, Kincade JE, Konrad TR, DeFriese GH. *Self-reported arthritis-related disruptions in sleep and daily life and the use of medical, complementary, and self-care strategies for arthritis: The National Survey of Self-care and Aging*. Arch Family Med 2000;9:143-9.
13. Centers for Disease Control and Prevention. *National Arthritis Action Plan: a public health strategy.* Atlanta: Georgia, 1999.
14. Centre for Disease Prevention and Control. *Prevalence and impact of arthritis by race and ethnicity – United States, 1989-1991*. MMWR 1996;45(18):373-9.
15. Statistics Canada. *Aboriginal peoples of Canada: a demographic profile*. Ottawa: Statistics Canada, 2001. Catalogue no. 96F0030XIE2001007
16. Wilson K, Rosenberg M. *Exploring the determinants of health for First Nations peoples in Canada: Can existing frameworks accommodate traditional activities?* Soc Sci Med 2002;55(11):2017-31.

17. First Nations and Inuit Regional Health Survey National Steering Committee. *First Nations and Inuit Regional Health Survey.* Ottawa: First Nations and Inuit Health Branch, Health Canada; 1997.

18. Ng E. *Disability among Canada's Aboriginal peoples in 1991*. Health Rep 1996;8(1):25-31.

19. Tjepkema M. *The health of the off-reserve Aboriginal population*. Health Rep 2002;13:1-16.

20. Jordan JM, Lawrence R, Kington R, Fraser P, Karlson E, Lorig K, et al. *Ethnic health disparities in arthritis and musculoskeletal diseases. Report of a scientific conference*. Arthritis & Rheum 2002;46(9):2280-6.

Chapter 2
Methodological Appendix

Canadian Community Health Survey Cycle 1.1, 2000-2001

The Canadian Community Health Survey (CCHS) is a cross-sectional general population health survey that collects information related to health status, health care utilization and health determinants for the Canadian population. The CCHS (Cycle 1.1) has a large sample and was designed to provide reliable estimates down to the health region level. A brief description of the survey is presented below, and a more detailed version is available from Statistics Canada.[1]

The target population of the CCHS was people aged 12 years or older who were living in private dwellings in the 10 provinces and three territories. People living on Indian Reserves or Crown lands, clientele of institutions, full-time members of the Canadian Armed Forces and residents of certain remote regions were excluded. The overall response rate was 84.7%; 130,827 individuals participated. Data for people aged 15 years and over were included in this chapter.

All analyses performed on the CCHS data were weighted to ensure that derived estimates were meaningful or representative of the entire targeted Canadian population 15 years of age and older. If high sampling variability (coefficient of variation between 16.6% and 33.3%) was associated with any of the reported estimates, an indication by "(m)" was made. If cell sample sizes were less than 30, estimates were not released in accordance with Statistics Canada release guidelines. To minimize sample size problems, the Northwest Territories, the Yukon and Nunavut were combined under the category "Territories". In order to determine the statistical significance of differences between ratios (i.e. differences in proportions between those with arthritis, other and no chronic conditions), the bootstrap method recommended by Statistics Canada[1-3] was employed.

Variables

Variable/ Indicator	Definition/Description
Chronic Conditions	For the chronic conditions presented in Figure 2-1, the respondent was asked about specified chronic health conditions*, defined as long-term conditions that had lasted or were expected to last 6 months or more and that had been diagnosed by a health professional. In order to assess the differential impact of arthritis, the comparison groups used in the chapter are as follows: 1. With arthritis - individuals who reported having arthritis/rheumatism with or without other chronic conditions. 2. Other chronic conditions - individuals who reported not having arthritis/rheumatism but reported having at least one chronic condition other than arthritis, and 3. No chronic condition - individuals who did not report any chronic conditions. * Chronic health conditions: Food allergies, any other allergies, asthma, fibromyalgia, arthritis or rheumatism (excluding fibromyalgia), back problems (excluding fibromyalgia and arthritis), high blood pressure, migraine headaches, chronic bronchitis, emphysema or chronic obstructive pulmonary disease (asked of those aged 30+), diabetes, epilepsy, heart disease, cancer, stomach or intestinal ulcers, effects of a stroke, urinary incontinence, bowel disorder such as Crohn's disease or colitis, Alzheimer's disease or any other dementia (asked of those aged 18+), cataracts (asked of those aged 18+), glaucoma (asked of those aged 18+), thyroid condition, Parkinson's disease, multiple sclerosis, chronic fatigue syndrome, multiple chemical sensitivities, any other long-term condition.

Variable/ Indicator	Definition/Description
Income	A 5-level total household income variable designated by Statistics Canada was grouped into two categories. The lowest/lower middle/middle income category was defined as a household income of ≤ $29,999, ≤ $39,999 or ≤ $59,999 if there were 1-2, 3 or 4, or 5+ people in the household respectively. Otherwise, the household income was categorized as upper middle/highest income.
Education	Highest level of education attained, coded as less than secondary school graduation, secondary school graduation, some post-secondary or post-secondary graduation.
Body Mass Index (BMI) and Overweight	BMI is calculated as weight in kg divided by height in m^2. BMI was recoded as not overweight (BMI < 27) or overweight (BMI ≥ 27). The index was calculated for those aged 20-64 only excluding pregnant women and people less than 3 ft. (0.914 m) or greater than 6 ft.11 in. (2.108 m) in height. The BMI cut-offs used here were the accepted Canadian standards at time of analysis. Since then, however, Health Canada has revised its standards with a BMI of ≥ 25 indicating overweight.
Disability Days	The number of days in the last 14 days in which the respondent had to spend all or part of the day in bed or had to reduce activities normally performed during the day because of illness or injury. Three categories were used: 1-5 days, 6-10 days, and 11-14 days.
Pain	Respondents were asked to identify which of the following four categories best described their situation with respect to pain: no pain or discomfort, mild pain, moderate pain, or severe pain. Moderate and severe pain were grouped
Health Utilities Index (HUI)	A generic health status measure designed to assess both quantitative and qualitative aspects of life, with scores ranging from 0.0 (worst health state, death) to 1.0 (best state, full health). HUI provides a description of an individual's overall functional health based on eight attributes: vision, hearing, speech, mobility (ability to get around), dexterity (use of hands and fingers), cognition (memory and thinking), emotion (feelings), pain and discomfort. The responses are weighted, and the derived score describes the individual's overall functional health status: a score < 0.830 was taken to indicate disability.[4]
Activity Limitations	Respondents were asked, "Because of a long-term physical or mental condition or a health problem, are you limited in the kind or amount of activity you can do: at home? at school? at work? in other activities?" (Yes/No).
Help with Daily Activities	Recoded as needing help with at least one domestic activity (preparing meals and/or shopping for groceries and/or other necessities and/or housework), personal care (washing, dressing or eating and/or moving about in the house) or heavy household chores, versus needing no help.
Physical Activity Index	The energy expenditure (EE) in leisure activities** was estimated using the frequency and time per session of the physical activity as well as its MET value, a value of metabolic energy cost expressed as a multiple of the resting metabolic rate. The index was recoded with EE < 1.5 identified as "inactive" versus all other levels. ** Walking for exercise, gardening or yard work, swimming, bicycling, popular or social dance, home exercises, ice hockey, ice skating, in-line skating or rollerblading, jogging or running, golfing, exercise class or aerobics, downhill skiing or snowboarding, bowling, baseball or softball, tennis, weight-training, fishing, volleyball, basketball and other.
Sleep Problems	a) The time spent sleeping each night was recoded as ≤ 6 hours vs. > 6 hours. b) How often do you have trouble going to sleep or staying asleep? This variable was recoded as problems sleeping most of the time versus all others.
Depression	A subset of items from the Composite International Diagnostic Interview (CIDI) that measure major depressive episode, where the score is translated in a probability of "caseness" of depression.[5] A score ≥ 0.25 is considered to be indicative of a case depression.
Stress	The perceived amount of stress in daily life (not at all stressful, not very stressful, a bit stressful, quite a bit stressful, and extremely stressful).
Self-rated Health	Rated as either "excellent", "very good", "good", "fair" or "poor". The first three and the last two categories were grouped. Respondents were also asked to rate their health as compared with one year earlier (better, same, or worse).

Variable/ Indicator	Definition/Description
Health Care Provider Visits	The number of times in the previous 12 months that the respondent had seen or talked on the telephone about physical, emotional or mental health with: ▪ A family doctor or general practitioner; ▪ Any other medical doctor (such as a surgeon, allergist, orthopedist, gynecologist or psychiatrist) (referred to as specialist); ▪ A nurse for care or advice; ▪ A chiropractor, a physiotherapist; ▪ A social worker or counsellor; or ▪ A psychologist. Social worker, counsellor and psychologist were grouped. Data are presented as at least four visits for family doctors and at least one visit for all others.
Alternative or Complementary Medicine	Respondents were asked whether in the previous 12 months they had seen or talked to an alternative health care provider such as ▪ An acupuncturist; ▪ A homeopath; or ▪ A massage therapist about physical, emotional or mental health. (Yes/No).
Self-perceived Unmet Health Care Needs	Respondents were asked "During the past 12 months, have you felt that health care was needed but not received?" (Yes/No).
Medication Use	Information on medication use was taken from the National Population Health Survey (NPHS) 1998/99.[6] The target population for the NPHS included all household residents in each Canadian province excluding populations on Indian reserves, Canadian Forces Bases and some remote areas. Analyses and results are based on individuals 15 years of age and older, with weighted estimates representative of the general household population aged 15+. The NPHS used a survey methodology similar to the CCHS. The NPHS had a sample size of 14,682 respondents and a response rate of 98.5%. Data are presented for people who reported taking in the past month: a) pain relievers such as Aspirin or Tylenol (including arthritis medicine and anti-inflammatories); b) antidepressants; and c) codeine, Demerol or morphine.

Aboriginal People Living Off-Reserve

The CCHS used the following question to define the Aboriginal population in Canada: "People living in Canada come from many different cultural and racial backgrounds. Are you … Aboriginal People of North America?" CCHS data do not include Aboriginal people living on reserves and settlements. Analyses were carried out comparing those with arthritis in both the off-reserve Aboriginal and non-Aboriginal populations.

References

1. Statistics Canada. *Canadian Community Health Survey (CCHS), Cycle 1.1, Public Use Microdata File Documentation.* Ottawa, Ontario: Statistics Canada, Health Statistics Division, 2002.
2. St-Pierre M, Béland Y. *Imputation of Proxy Respondents in the Canadian Community Health Survey.* 2002 Proceedings of the Survey Methods Section, Statistical Society of Canada. In press, 2002.
3. Yeo D, Mantel H, Liu T-P. *Bootstrap Variance Estimation for the National Population Health Survey.* American Statistics Association Conference. Ottawa, Ontario: Douglas Yeo, Statistics Canada (douglas.yeo@statcan.ca), 1999.
4. Kopec J, Williams J, To T, Austin PC. *Cross-cultural comparisons of health status in Canada using the Health Utilities Index*. Ethn Health 2001;6(1):41-50.
5. 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;7:171-85.
6. Statistics Canada. *National Population Health Survey (NPHS) 1998/1999, Public Use Microdata File Documentation.* Ottawa, Ontario: Statistics Canada, Health Statistics Division, 2000.

CHAPTER 3

The Burden of Arthritis in Canada

Chapter 3 presents three overall indications of the impact of arthritis on the population: mortality*, life expectancy and health-adjusted life expectancy (HALE), and economic costs.

Mortality

Marie DesMeules, Claudia Lagacé, J. Denise Power

Introduction

Since arthritis and related conditions are not seen as life threatening, little research has focused on the impact of arthritis on mortality; of the research that there is, most relates solely to the mortality of individuals with rheumatoid arthritis.[1-8] Rheumatoid arthritis is associated with a significant increase in mortality because of both the disease itself and other co-morbid or co-existing conditions such as cardiovascular disease, infections and renal disease.[5,7,9] Although deaths for which arthritis is indicated as an underlying cause are relatively rare, arthritis actually causes more deaths than many other conditions that are traditionally viewed as greater health threats.

Methods

Mortality rates were calculated using the Canadian annual mortality data for the period of 1985-1998, with the 1991 Canadian population as a standard. All deaths for which the underlying cause was recorded as arthritis and related conditions, as described in Table 3A-1 in the Methodological Appendix at the end of the chapter, were included in the analyses.

Results

The results that follow represent only a fraction of deaths related to arthritis, since only deaths with arthritis as an underlying cause could be included. The mortality database does not currently provide data on secondary, or contributing, causes of death. Arthritis is more commonly seen as a contributing cause of death, either as a result of complications

* Mortality data were provided to Health Canada from the Canadian Vital Statistics databases at Statistics Canada. The cooperation of the provincial and territorial vital statistics registries that supply the data to Statistics Canada is gratefully acknowledged.

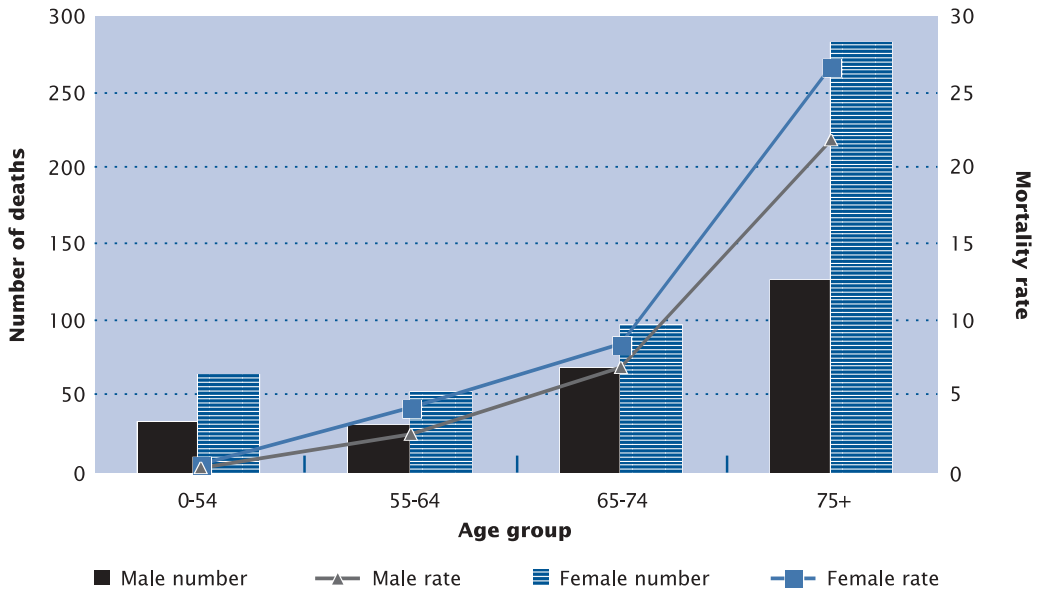
from treatment (such as gastrointestinal [GI] bleeding related to anti-inflammatory drug use) or as one of its long-term complications (such as cardiovascular disease).[5-7,9-11] To more fully describe the impact of arthritis on mortality, deaths due to GI bleeding were also examined.

Mortality from Arthritis by Age and Sex

In 1998, 497 men and 257 women in Canada died with arthritis and related conditions identified as the underlying cause. Mortality rates increased with age for both sexes. Among men, rates ranged from 2 deaths for every million men aged 54 years or less to 219 deaths per million in those 75 years and older. Among women in the same age groups, rates ranged from 5 deaths per million to 267 per million. Overall, mortality rates for arthritis and related conditions were higher among women than men in every age group, with approximately 4 female deaths for every 3 male deaths (Figure 3-1).

Mortality by Type of Arthritis

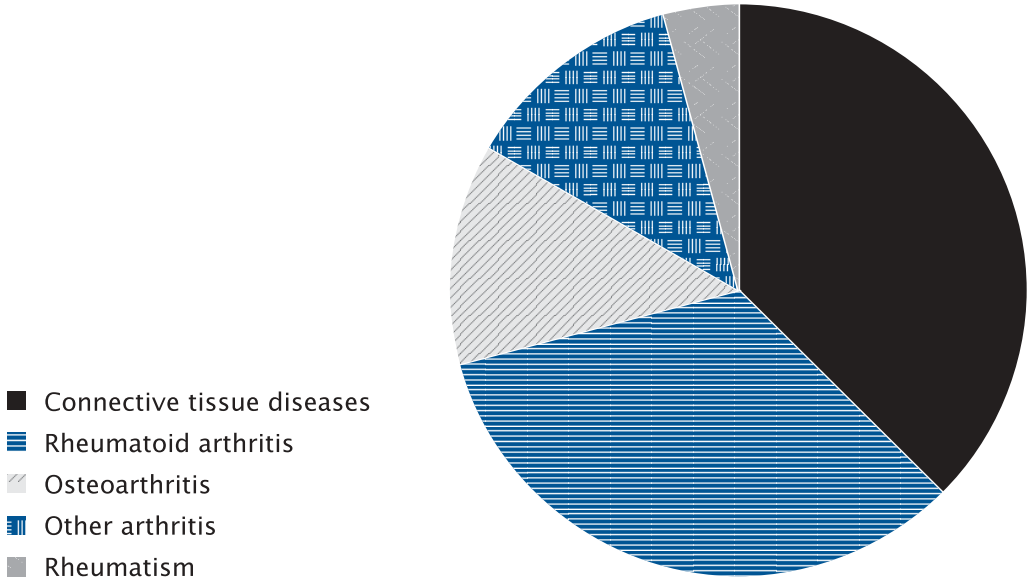
Figure 3-1 Number of deaths and mortality rates (deaths per 100,000) attributed to arthritis and related conditions, by age and sex, Canada, 1998



Source: Canadian Mortality Database 1998, Statistics Canada

Between 1985 and 1998, the risk of mortality from arthritis varied greatly by type of arthritis: risk of death from connective tissue diseases (such as lupus) was approximately 3 times higher than from osteoarthritis (Figure 3-2). The number of deaths with rheumatoid arthritis as an underlying cause was twice the number with osteoarthritis as an underlying cause. Mortality rates ranged from approximately 2 deaths per million for rheumatism to approximately 12 deaths per million for connective tissue diseases.

Figure 3-2 **Standardized mortality rates (deaths per 100,000) for all ages, by type of arthritis, Canada, 1985-1998**

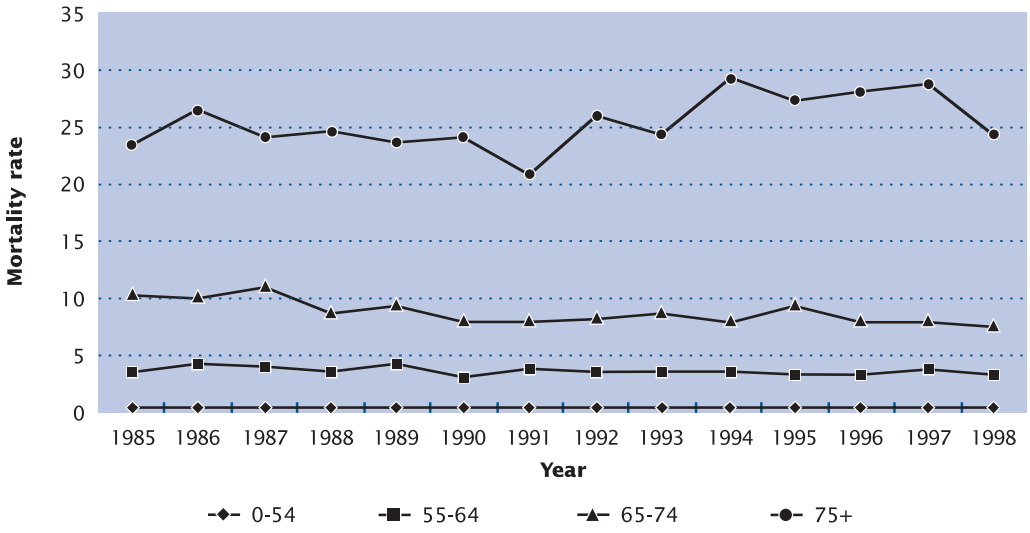


Source: Canadian Mortality Database 1985-1998, Statistics Canada

Trends in Mortality Over Time and Provincial/territorial Comparisons

Mortality rates for arthritis and related conditions for each age group remained relatively stable from 1985 to 1998 (Figure 3-3).

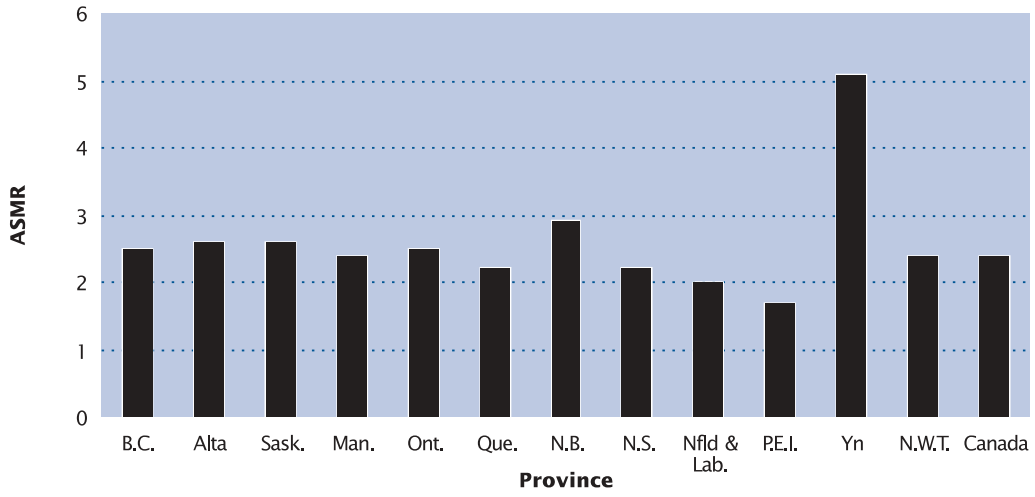
Figure 3-3 **Mortality rates (deaths per 100,000) for arthritis and related conditions, by year and age group, 1985-1998, Canada**



Source: Canadian Mortality Database 1985-1998, Statistics Canada

Overall, age- and sex-standardized mortality rates by province/territory for arthritis and related conditions reflected the national rate of 2.4 per 100,000 (Figure 3-4). The Yukon recorded the highest mortality rate (5.1 deaths per 100,000). New Brunswick had the second highest (2.9 per 100,000). The Yukon's relatively high rate was due to higher mortality rates for osteoarthritis (2.3 per 100,000) and connective tissue diseases (1.7 per 100,000). Mortality rates in Newfoundland and Labrador and Prince Edward Island were below the national rate, at 2.0 per 100,000 and 1.7 per 100,000 respectively.

Figure 3-4 **Age- and sex-standardized mortality rates (ASMR) (deaths per 100,000) for arthritis and related conditions, by province/territory, Canada, 1985-1998**



Source: Canadian Mortality Database 1985-1998, Statistics Canada

Comparisons with Mortality from Other Causes

Table 3-1 compares the number of deaths and the mortality rate for arthritis and related conditions with other conditions commonly presumed to be more serious and life threatening. In 1998, arthritis was a more common underlying cause of death in Canada than melanoma, asthma or HIV/AIDS, especially among women.

Table 3-1 **Number (*N*) of deaths and mortality rate (deaths per 100,000) for all ages, by underlying cause, Canada, 1998**

	Males		Females		Total	
Cause	***N***	**Rate**	***N***	**Rate**	***N***	**Rate**
Arthritis and Related Conditions	257	1.87	497	2.54	754	2.20
Melanoma	405	2.79	267	1.49	672	2.05
Asthma	172	1.28	283	1.43	455	1.35
HIV/AIDS	415	2.63	70	0.45	485	1.54

Source: Canadian Mortality Database 1998, Statistics Canada

Mortality from Treatment Complications – Gastrointestinal (GI) Bleeding

Patients with arthritis are among the most frequent users of non-steroidal anti-inflammatory drugs (NSAIDs),[12] although these drugs are also used for other painful and inflammatory disorders. GI complications are the most common type of adverse drug reaction that may occur with the use of NSAID therapy.[12] Approximately 107,000 hospitalizations and 16,500 deaths occur each year in the United States as a result of NSAID use.[13] The estimated mortality rate due to GI toxicity from NSAID use by arthritis patients is about 2 deaths per 1,000 people with arthritis per year.[14,15]

In 1998, 1,322 Canadians died from GI bleeding (Table 3-2). The number of deaths and the mortality rate from GI bleeding increased with age, and each was higher among men than women. Since data on contributing (secondary) causes of death for the whole country are unavailable, GI bleeding mortality rates specifically due to the treatment of arthritis cannot be determined. However, since people with arthritis are the most frequent users of NSAIDS, these data indicate that mortality from arthritis presented earlier in this chapter has likely been underestimated.

Table 3-2 Number (*N*) of deaths and mortality rates (deaths per 100,000) for gastrointestinal (GI) bleeding, by age and sex, Canada, 1998

	Males		Females		Total	
Age Group	***N***	**Rate**	***N***	**Rate**	***N***	**Rate**
0-54	40	0.28	22	0.15	62	0.22
55-64	54	4.21	30	2.29	84	3.24
65-74	160	16.05	80	6.79	240	11.04
75-84	229	47.72	199	26.40	428	34.76
85+	181	160.93	327	125.02	508	135.82
Total	**664**	**5.04**	**658**	**3.01**	**1,322**	**3.84**

Source: Canadian Mortality Database 1998, Statistics Canada

Discussion

Although relatively rare, arthritis is a more common underlying cause of death in Canada than melanoma, HIV/AIDS or asthma. This chapter has underestimated the mortality burden of arthritis in Canada because the data do not include deaths for which arthritis was a contributing cause as a result of complications from treatment (such as GI bleeding from NSAID use). Data on contributing causes of death for the whole country are currently unavailable. Statistics Canada plans to provide this information by 2005. The introduction of new families of anti-inflammatory drugs, such as COX-2 inhibitors, which are believed to lower the risk of adverse effects on the GI tract, is expected to lead to a decrease in mortality associated with arthritis.

Life Expectancy and Health-Adjusted Life Expectancy (HALE)

Doug Manuel, Claudia Lagacé, Marie DesMeules, Robert Cho, J. Denise Power

Introduction

Mortality and life expectancy are often used to describe the health status of a population, according to the assumption that greater life expectancy implies better health.[16] Although arthritis is usually not a fatal condition, it causes more deaths than many other well-known diseases, such as melanoma. As one of the most prevalent chronic conditions in Canada, arthritis is also a leading cause of disability. As a result, when conditions such as arthritis are examined, measures of both mortality and morbidity (overall health status) need to be considered. These two measures can provide contrasting views of a disease or condition.

In the effort to provide measures of population health that take into account both mortality and morbidity, summary measures, such as health-adjusted life expectancy (HALE), have been developed.[17] HALE adjusts overall life expectancy, or life years lived, according to the amount of time spent in less-than-perfect health or with disability.[17] It sheds more meaning on longer life by determining whether an increase in the average lifespan is accompanied by better quality of life.[16]

This section considers both life expectancy and HALE in describing the influence of arthritis on the quality of life of Canadians. (Details regarding the calculation of these measures can be found in Table 3A-2 in the Methodological Appendix at the end of this chapter.) Data from the CCHS and Canadian annual mortality data were used to calculate these measures.

The Impact of Eliminating Arthritis on Life Expectancy and HALE

Currently, life expectancies for Canadian women and men at birth are 81.2 and 75.6 years respectively (Table 3-3). If arthritis were eliminated, overall average life expectancy would increase by 0.35 years for all females and 0.16 years for all males in the population.

HALE is estimated to be 69.8 years for women and 66.5 years for men (Table 3-4). If arthritis were eliminated, Canadian females would gain 1.5 years in HALE and males would gain almost 1 year. Therefore, eliminating arthritis would result in a gain of more than 1 year of good health for females and close to 1 year for males, combined with a small overall gain in life expectancy.

Discussion

Disease-specific life expectancy has no direct policy implications without consideration of the prevalence of the condition in the population, its adverse consequences and the

Table 3-3 Effect of eliminating arthritis on life expectancy at birth, Canada, 1997 (1996-1998)

	Life Expectancy	Life Expectancy after Eliminating Arthritis	Gain in Life Expectancy after Eliminating Arthritis
Males	75.6	75.8	0.16
Females	81.2	81.6	0.35
Combined	78.4	78.7	0.27
Females – Males (Difference)	5.6	5.8	0.19

Source: Canadian Community Health Survey 2000; Canadian Mortality Database 1994-1998, Statistics Canada

Table 3-4 Effect of eliminating arthritis on health-adjusted life expectancy (HALE) at birth, Canada, 1997 (1996-1998)

	Health-adjusted Life Expectancy	Health-adjusted Life Expectancy after Eliminating Arthritis	Gain in Health-adjusted Life Expectancy after Eliminating Arthritis
Males	66.5	67.2	0.70
Females	69.8	71.4	1.51
Combined	68.2	69.2	1.07
Females – Males (Difference)	3.4	4.2	0.81

Source: Canadian Community Health Survey 2000; Canadian Mortality Database 1994-1998, Statistics Canada

potential for eliminating either the disease or its consequences.[16,18] Success in the battle against arthritis, one of the leading chronic health problems in Canada, could considerably increase HALE within the population, particularly in the case of women. Eliminating this rarely fatal disease, however, would contribute less to extending average life expectancy. Most people with a diagnosis of arthritis will be recommended for treatment and monitoring. Clearly, improvements in arthritis treatment hold great potential for increasing the number of "healthy" years lived by Canadians.

Economic Burden

Julie Stokes, Sylvie Desjardins, Anthony Perruccio

Introduction

Establishing the costs associated with arthritis from any single source presents a dual challenge. First, different sources present different cost components related to arthritis and often under the banner of musculoskeletal conditions. Second, different sources use slightly different definitions of arthritis and rheumatism: some include particular sub-types of arthritis and related conditions whereas others do not.

This chapter presents the most recent (1998) cost values available from the Population and Public Health Branch of Health Canada.[19] All values presented are in 1998 dollars.

Total costs associated with arthritis include both direct and indirect costs:

> Direct costs are defined as the value of goods and services for which payment was made and resources used in treatment, care and rehabilitation.[19] These include hospital care expenditures, drug expenditures, physician care expenditures and additional direct health care expenditures.
>
> Indirect costs refer to the dollar value of lost production due to illness, injury, disability or premature death. Disability measures the value of activity days lost due to short-term and long-term disability (morbidity due to short-term and long-term disability), and premature death measures the value of years of life lost due to premature death (mortality costs).

The Cost of Musculoskeletal Diseases

In 1986, the economic burden of musculoskeletal diseases (ICD-9 710-739) in Canada was estimated to be $11.4 billion,[20] which made it the fourth most costly disease group. Seven years later, estimates ranked this group second, at $19.0 billion.[21] This ranking was maintained in 1998, when the total economic burden was estimated at $16.4 billion. Indirect costs accounted for more than 5 times the direct costs ($13.7 billion and $2.6 billion respectively).[19]

Hospital care expenditures accounted for more than one-half of the direct costs of musculoskeletal disease ($1.4 billion) in 1998, and drug and physician care expenditures were estimated to be 23% ($614.3 million) and 22% ($578.2 million) of direct costs respectively. Long-term disability ($12.6 billion) represented over 90% of indirect costs.

Musculoskeletal diseases represented the most costly disease group for women in Canada in 1998 ($8.2 billion) and the third most costly disease group for men ($8.1 billion). All direct cost components were slightly higher for women than for men. Among indirect cost

components, however, men's costs for morbidity due to long- and short-term disability were higher than women's.

Costs Attributed to Arthritis

In 1998, estimates placed the economic burden of arthritis (ICD-9 714-716, 721) in Canada at approximately $4.4 billion (Table 3-5), representing just over one-quarter of the total cost of musculoskeletal diseases. Arthritis accounts for nearly one-third of hospital care expenditures for musculoskeletal disease, over 40% of drug expenditures, and more than one-quarter of both musculoskeletal mortality costs and morbidity due to long-term disability.

Table 3-5 Economic burden of arthritis, by cost component, Canada, 1998

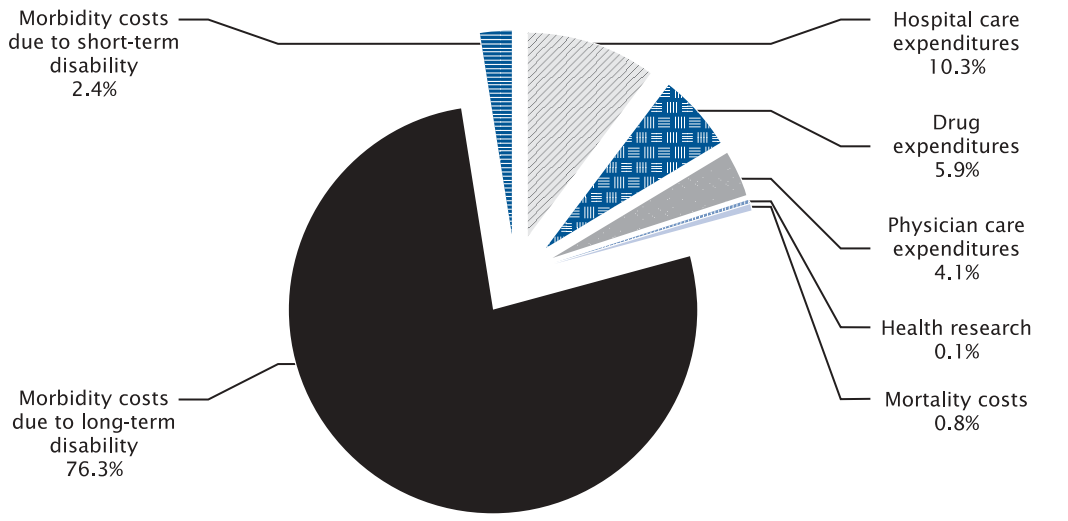
Type of Cost	Component	Arthritis Expenditures ($ 000,000s)	Proportion of Musculoskeletal Disease Expenditures (%)
Direct Costs	Hospital Care Expenditures	$457.5	31.7
	Drug Expenditures	$262.7	42.8
	Physician Care Expenditures[a,b]	$183.5	31.7
	Health Research[b]	$5.2	36.4
	Total Direct[c]	$908.9	34.3
Indirect Costs	Mortality Costs	$33.7	26.8
	Morbidity Costs Due to Long-term Disability	$3,375.5	26.8
	Morbidity Costs Due to Short-term Disability	$105.3	10.4
	Total Indirect	$3,514.5	25.6
Total Costs[c]		**$4,423.4**	**27.0**

a Values are calculated as a proportion of musculoskeletal expenditures for specified component.
b Custom tabulation by the Economic Research Analysis Section, Strategic Policy Directorate, Population and Public Health Branch, Health Canada
c Expenditures for care in other institutions, other professionals and additional direct health expenditures not included because of unavailability.

Of the total arthritis expenditures in 1998, $908.9 million (20%) were direct costs and $3.5 billion were indirect costs (80%). Figure 3-5 shows the relative magnitude of the cost components for arthritis. Morbidity costs due to long-term disability accounted for 76.3% of arthritis costs, by far the largest cost component of the arthritis burden at nearly $3.4 billion. The largest direct costs were hospital care expenditures at $458 million and drug expenditures at $263 million, representing 10.3% and 5.9% of total costs respectively.

In terms of breakdown by sex, women incurred greater costs related to arthritis than men. They accounted for approximately 60% of hospital care expenditures, prescription drug expenditures, and mortality costs, and one-half of morbidity costs due to long-term disability.

Figure 3-5 Economic burden of arthritis, by cost component, Canada, 1998



Source: Economic Burden of Illness in Canada, 1998 and custom tabulation by the Economic Research Analysis Section, Strategic Policy Directorate, Population and Public Health Branch, Health Canada

Seniors (aged 65 years and over) accounted for most of the direct costs associated with arthritis: 70% of hospital care expenditures and nearly one-half of total expenditures on prescription drugs. They accounted for less than one-quarter of the arthritis morbidity costs due to long-term disability. Nearly 70% of this cost was incurred by the 35-64 year age group.

The economic burden of musculoskeletal conditions in Canada accounted for 10.3% of the total economic burden of all illnesses but only 1.3% of health science research.

Discussion

In constant dollars, the economic burden of musculoskeletal diseases appears to have decreased in Canada since 1993.[19] The majority of the decrease is due to a reduction in disability costs: in 1993, morbidity costs due to disability totalled $16.3 billion (in 1998 $), and in 1998 disability costs were $13.6 billion. Decreases in both long-term and short-term disability costs have also been noted for other chronic diseases, such as cardiovascular diseases, respiratory diseases and nervous system/sense organ diseases.

The estimates presented here, as well as those for arthritis, are based on principal diagnosis only; secondary and subsequent diagnoses were not captured. As a result, the cost estimates are considered to be conservative. Musculoskeletal diseases are often a contributing cause of cardiovascular or digestive disease and are not captured in the estimates.[22-26]

The costs for arthritis presented here are less than the costs estimated by Coyte,[27] at $6.2 billion (baseline estimate, converted to 1998 $), assuming that expenditure values remained unchanged since 1994. The subset of arthritis conditions (ICD-9 714-716, 721) used by Health Canada in their analyses was a different and more restricted set than that employed by Coyte. Coyte's definition of arthritis (ICD-9 098.5, 099.3, 274,

696.0, 710-720, 725-729, v78.4, v43.6) closely mirrored the definition of arthritis and related conditions used in the other chapters of this publication. From the frequency of these diagnoses, it is assumed that the definition used by Health Canada represents nearly 60% of the cases in the broader definition. If this is so, then inflating the Health Canada figure to include the broader definition of arthritis narrows the gap between the estimates. Nonetheless, both sources demonstrated a similar proportional breakdown of direct and indirect costs.

The costs presented in this chapter exclude expenditures for care in institutions other than hospitals, costs related to health professionals other than physicians (such as rehabilitation professionals) and direct health expenditures (such as for over-the-counter medications, assistive devices and informal care giving). As well, the value of time lost from work and leisure activities by family members or friends who care for the patient are not included. As a result, these data likely underestimate the total cost of arthritis. In addition, the drug expenditures presented here pre-date the availability of new arthritis medications such as COX-2 inhibitors and biologic disease-modifying anti-rheumatic drugs (DMARDs), which are costly.

While arthritis affects predominantly women and older people, Canadians between the ages of 35 and 64 years incur nearly 70% of long-term disability costs due to arthritis. Using earnings to establish the value of lost production places more emphasis on diseases prevalent among people with high incomes, many of whom are men, than on diseases suffered by the poor, the elderly and women.[27] Therefore, the estimate of $4.4 billion should be viewed as the lower end of the range of the true costs of arthritis and related conditions. Furthermore, no economic analyses can calculate the intangible personal costs such as arthritis-related pain, suffering and loss of opportunity.

Even though the cost estimates for musculoskeletal diseases, including arthritis, should be interpreted in the context of the methods, assumptions and limitations from which they were calculated,[19] they still provide a sense of the magnitude of the economic burden of this disease group in Canada. Arthritis represents an important economic burden, especially for women and those in the 35-64 year age group. The cost component that contributes the most to this burden is morbidity due to long-term disability.

Implications

The impact of arthritis is greater in terms of health and disability than in terms of mortality. Arthritis control approaches need to focus on improving health and reducing disability.

Reducing arthritis-related disability has the potential to reduce indirect costs and increase HALE for the population as a whole.

Projections indicate that people aged 55 years and over will account for the greater part of the increase in the number of people affected with arthritis. Research also indicates that a greater proportion of people with arthritis than people with other chronic conditions are not in the labour force. As a result, long-term disability expenditures for arthritis and related conditions are expected to increase substantially in the near future.

Future cost studies of arthritis could adopt a more inclusive definition of arthritis and aim to use the full range of available data, such as those presented in this publication. As well, initiating new partnerships among those involved with arthritis and building on existing relationships will be necessary to clarify what information is currently available and what is missing.

An imbalance between the proportion of expenditures in health science research directed towards musculoskeletal diseases and the proportion of their contribution to the total economic burden of disease has been noted.

With the advent of new treatments, the surveillance of changes in direct costs in relation to indirect costs is essential. By helping to establish the best courses of action when making decisions about the treatment of arthritis, surveillance has the potential to reduce morbidity and decrease costs in the long run.

New treatments for arthritis and related conditions also require that surveillance for this condition include monitoring of changes in mortality and HALE. Making available contributing causes of death data would lead to a more accurate description of the full impact of arthritis on mortality.

Chapter 3
Methodological Appendix

Table 3A-1 Arthritis and gastrointestinal bleeding mortality codes

Disease Group	ICD-9 Codes
Connective Tissue Diseases	446, 710
Rheumatoid Arthritis	714
Osteoarthritis and Allied Disorders	715
Other Arthritis	098.5, 099.3, 274, 696, 711-713, 716-721
Rheumatism	725-729
Arthritis and Related Conditions	All of the above
Gastrointestinal Bleeding	531-531.6, 532-532.6 , 533-533.6, 534-534.6, 535.0, 578.0, 578.1, 578.9

Table 3A-2 Methods for calculating life expectancy and health-adjusted life expectancy (HALE) for people with arthritis

Variable Definition

The Health Utilities Index

The Health Utilities Index (HUI3) was used to calculate health-adjusted life expectancy (HALE).[28] The HUI3 is a utility-based, multi-attribute health classification system that estimates a summary value of individual health where 0.0 = "dead" and 1.0 = "perfect health" (states worse than death are also possible), based on preference scores for different health states.[29] Each respondent in the CCHS 2000/01 answered questions pertaining to eight attributes of functional health: vision, hearing, speech, mobility, dexterity, emotional state, cognition and level of pain and discomfort. Each attribute has from 5 to 6 possible levels, ranging from unrestricted to a highly disabled state (see Torrance et al.[30] for a description of health states). The eight attributes were then combined using preference scores from the HUI mark III version and the following multi-attribute utility function:[31]

$$u = 1.371\ (u_1 * u_2 * u_3 * u_4 * u_5 * u_6 * u_7 * u_8) - 0.371$$

Analysis Methods

Arthritis-deleted Mortality Rate and HUI3 Estimates

Arthritis-deleted mortality rates and HUI3 estimates were calculated by subtracting the mortality rate for people with arthritis from the overall mortality rate for each age-sex group. Arthritis mortality for 1994-98 was used to reduce the variability of age-specific mortality rates. Arthritis-deleted HUI3 was calculated in a similar manner by removing all people with arthritis from the CCHS sample and recalculating the mean HUI3 for each age-sex group.

Life Table Analysis

Period life tables for 1996-98 for men and women were calculated using an adaptation of Chiang's method[32] and 20 standard age groups (< 1,1-4, 5-9,.., 90+ years), except for an adaptation for the final age group.[33] Arthritis-deleted life expectancy was calculated by substituting the arthritis-deleted mortality rates for the overall mortality rates in the life table.[34]

HALE was calculated using a modified Sullivan method.[35] Sullivan used a period life table and the prevalence of disability to estimate the number of life years lived free of disability. After calculation of life tables for each group, HALE was estimated by weighting the years of life lived according to the mean HUI3 values by age and sex for each population. The arthritis-deleted mean HUI3 values were used to calculate arthritis-deleted HALE.

References

1. Callahan LF, Pincus T. *Mortality in the rheumatic diseases*. Arthritis Care Res 1995;8(4):229-41.
2. Wolfe F, Mitchell DM, Sibley JT, Fries JF, Bloch DA, Williams CA, et al. *The mortality of rheumatoid arthritis*. Arthritis Rheum 1994;37(4):481-94.
3. Doran MF, Pond GR, Crowson CS, O'Fallon WM, Gabriel SE. *Trends in incidence and mortality in rheumatoid arthritis in Rochester, Minnesota, over a forty-year period*. Arthritis Rheum 2002;46(3):625-31.
4. Wong JB, Ramey DR, Singh G. *Long-term morbidity, mortality, and economics of rheumatoid arthritis*. Arthritis Rheum 2001;44(12):2746-9.
5. Monson RR, Hall AP. *Mortality among arthritics*. J Chron Dis 1976;29:459-67.
6. Vandenbroucke JP, Hazevoet HM, Cats A. *Survival and cause of death in rheumatoid arthritis: a 25-year prospective follow-up*. J Rheumatol 1984;11(2):158-61.
7. Mutru O, Laakso M, Isomaki H, Koota K. *Ten year mortality and causes of death in patients with rheumatoid arthritis*. Br Med J (Clin Res Ed) 1985;290(6484):1797-9.
8. Myllykangas-Luosujarvi RA, Aho K, Isomaki HA. *Mortality in rheumatoid arthritis*. Sem Arthritis Rheum 1995;25(3):193-202.
9. Nurmohamed MT, van Halm VP, Dijkmans BA. *Cardiovascular risk profile of antirheumatic agents in patients with osteoarthritis and rheumatoid arthritis*. Drugs 2002;62(11):1599-609.
10. Brandt KD. *The role of analgesics in the management of osteoarthritis pain*. Am J Ther 2000;7(2):75-90.
11. Gabriel SE. *The epidemiology of rheumatoid arthriti*s. Rheum Dis Clin North Am 2000;27(2):269-81.
12. Singh G, Triadafilopoulos G. *Epidemiology of NSAID induced gastrointestinal complications*. J Rheumatol 1999;26(Suppl 56):18-24.
13. Goldstein JL. *Who needs prophylaxis of nonsteroidal anti-inflammatory drug-induced ulcers and what is optimal prophylaxis?* Eur J Gastroenterol Hepatol 2000;12(Suppl 1):S11-S15.
14. Wolfe MM, Lichtenstein DR, Singh G. *Gastrointestinal toxicity of nonsteroidal anti-inflammatory drugs*. N Engl J Med 1999;340:984-91.
15. Singh G, Ramey DR, Morfeld D. *Gastrointestinal tract complications of nonsteroidal anti-inflammatory drug treatment in rheumatoid arthritis. A prospective observational cohort study*. Arch Intern Med 1996;156:1530-6.
16. Bélanger A, Martel L, Berthelot, JM., Wilkins R. *Gender differences in disability-free life expectancy for selected risk factors and chronic conditions in Canada*. J Women Aging 2000;14(1/2):61-83.
17. Manuel DG, Schultz SE, Kopec JA. *Measuring the health burden of chronic disease and injury using health adjusted life expectancy and the Health Utilities Index*. J Epidemiol Community Health 2002;56:843-50.
18. Crimmins EM, Kim JK, Hagedorn A. *Life with and without disease: Women experience more of both*. J Women Aging 2002;14(1/2):47-59.
19. Health Canada. *Economic Burden of Illness in Canada, 1998*. Ottawa: Public Works and Government Services Canada, 2002. (Catalogue # H21-136/1998E)
20. Wigle DT, Mao Y, Wong T, Lane R. *Economic burden of illness in Canada, 1986*. Chron Dis Can 1991;12(Suppl 3).
21. Moore R, Mao Y, Zhang J, Clarke K. *Economic Burden of Illness in Canada, 1993*. Ottawa: Canadian Public Health Association, 1997.
22. Vandenbroucke JP, Hazevoet HM, Cats A. *Survival and cause of death in rheumatoid arthritis: a 25-year prospective follow up*. J Rheumatol 1984;11(2):158-61.
23. Mutru O, Laakso M, Isomaki H, Koota K. *Ten year mortality and causes of death in patients with rheumatoid arthritis*. Br Med J (Clin Res Ed) 1985;290(6484):1797-9.
24. Myllykangas-Luosujarvi RA, Aho K, Isomaki HA. *Mortality in rheumatoid arthritis*. Sem Arthritis Rheum 1995;25(3):193-202.
25. Nurmohamed MT, van Halm VP, Dijkmans BA. *Cardiovascular risk profile of antirheumatic agents in patients with osteoarthritis and rheumatoid arthritis*. Drugs 2002;62(11):1599-609.
26. Brandt KD. *The role of analgesics in the management of osteoarthritis pain*. Am J Ther 2000;7(2):75-90.

27. Coyte P, Asche C, Croxford R, Chan B. *The economic cost of arthritis and rheumatism in Canada*. In: Williams JI, Badley EM, editors. *Patterns of Health Care in Ontario: Arthritis and Related Conditions.* Toronto: Institute for Clinical Evaluative Sciences, 1998; 11-26.

28. Feeny D, Torrance G, Furlong W. *Health utilities index*. In: Spilder B, editor. *Quality of Life and Pharmacoeconomics in Clinical Trials.* Philadelphia: Lippincott-Raven, 1996; chapter 26.

29. Feeny D, Furlong W, Boyle M, Torrance GW. *Multi-attribute health status classification systems. Health Utilities Index*. Pharmacoeconomics 1995;7(6):490-502.

30. Torrance G, Furlong W, Feeny D, Boyle M. *Multi-attribute preference functions - Health Utilities Index*. Pharmacoeconomics 1995;7(6):503-20.

31. Furlong W, Feeny D, Torrance G, Barr R. *The Health Utilities Index (HUI) System for Assessing Health-Related Quality of Life in Clinical Studies.* #01-02. 2001. Health Economics and Policy Analysis Research Working Paper.

32. Chiang CL. *The Life Table and Its Applications*. Malabar, Florida: Robert E. Krieger Publ. Co., 1984.

33. Hsieh J. *A general theory of life table construction and a precise abridged life table method*. Biomed J 1991;2:143-62.

34. Newman SC. *Formulae for cause-deleted life tables*. Stat Med 1987;6(4):527-8.

35. Sullivan DF. *A single index of mortality and morbidity*. HSMHA Health Reports 1971;86(4):347-54.

CHAPTER 4

Ambulatory Care Services

J. Denise Power, Elizabeth Badley

Introduction

The majority of arthritis care in Canada occurs in an ambulatory, or outpatient, setting with a primary care physician as the first line of care. These physicians may serve not only as the main providers of arthritis care but also as gatekeepers to other services, such as consultations with specialists and rehabilitation professionals. The role of the primary care physician is particularly significant in rural and remote areas of Canada where access to specialist care is not readily available. Specialists, particularly rheumatologists and orthopedic surgeons, also often play important roles in arthritis treatment.

Examining the patterns of primary and specialist care for arthritis and related conditions is an important step in the process of assessing the impact of arthritis on the Canadian population, and planning and evaluating health services for those affected. Chapter 4 uses physician billing data from April 1998 to March 1999 from seven participating Canadian provinces* to examine rates of consultation with various physician specialties for different types of arthritis. It focuses on the grouping of all arthritis and related conditions in general, and specifically on osteoarthritis and rheumatoid arthritis.

Osteoarthritis, the most common type of arthritis, is estimated to affect 10% to 12% of the adult population.[1,2] Rheumatoid arthritis, a serious autoimmune disease that affects up to 1% of the adult population, may involve multiple organ systems. It is also associated with a significant increase in mortality.[2] There is a growing body of evidence about the importance of rheumatological care in the management of rheumatoid arthritis.[3-8] Joint replacement surgery is recognized as a highly cost-effective procedure for the treatment of advanced osteoarthritis and joints destroyed by rheumatoid arthritis.[9-11]

Physician Billing Data

Most Canadian physicians operate on a fee-for-service basis, requiring them to submit a claim to their provincial health insurance plan for each patient encounter. Each claim provides a diagnostic code specifying the reason for the visit. In most provinces, only one diagnosis per visit is recorded on the physician claim. As a result, if a person sees a physician for more than one reason, some diagnoses are missed. Each province has a classification scheme of diagnoses based on the International Classification of Diseases

* British Columbia (BC), Alberta (AB), Saskatchewan (SK), Manitoba (MB), Ontario (ON), Quebec (QC), and Nova Scotia (NS)

(ICD). Table 4A-1 in the Methodological Appendix at the end of this chapter lists the diagnoses for arthritis and related conditions included in the data presented. Contributors from each of the participating provinces analyzed physician claims with a diagnosis of arthritis and related conditions.

Physician Visits Among Adults†

In 1998/99, approximately 163 of every 1,000 Canadians aged 15 years and older made at least one visit to a physician for arthritis and related conditions (referred to as the "person-visit rate") (Table 4-1). On average, each of these individuals made 2.3 visits during the year. More women than men consulted a physician about arthritis and related conditions. The total number of arthritis-related visits in Canada was estimated to be 8.8 million. Only a minority of visits were billed to specific types of arthritis, the majority being attributed to "other arthritis and related conditions", which refers mainly to arthritis symptoms such as synovitis and bursitis. Visits for arthritis and related conditions in Ontario and Alberta accounted for 4.8% of all physician visits in these provinces (data not shown).

Table 4-1 Visits to all physicians for arthritis and related conditions among adults aged 15 years and over, Canada, 1998/99

Condition	Persons Visiting per 1,000 Population	Sex Ratio (Women:Men)	Estimated Total Number of Visits*	Average Number of Visits per Person
Arthritis and Related Conditions	**162.7**	**1.3:1**	**8,800,000**	**2.3**
Osteoarthritis	40.7	1.6:1	2,000,000	2.1
Rheumatoid Arthritis	7.4	2.4:1	540,000	3.1
Connective Tissue Disorders (e.g. lupus)	1.9	3.1:1	110,000	2.5
Ankylosing Spondylitis	1.1	1.0:1	40,000	1.8
Gout	5.2	0.3:1	200,000	1.6

* A Canadian rate was calculated using data from the participating provinces, and visits for non-participating provinces were estimated by applying this rate to the respective 1998 provincial populations.

Source: provincial physician billing data (BC, AB, SK, MB, ON, QC, NS)

Approximately 4% of the population made at least one physician visit with a recorded diagnosis of osteoarthritis, representing just under 23% of all arthritis visits. This is significantly less than epidemiological estimates of osteoarthritis, which suggest a prevalence of 10% to12% in the adult population.[1,2] Not everyone with osteoarthritis, however, and especially not those with early or mild osteoarthritis, will consult a physician in the course of a year. Additionally, some osteoarthritis visits were likely missed, either because they were coded more generally as "musculoskeletal symptoms" or because the visits may have been coded for other, unrelated conditions.

† For a discussion of data quality issues surrounding the use of physician billing data, see Methodological Appendix at end of chapter.

Slightly less than 1% of the population visited a physician for rheumatoid arthritis, visiting on average about 3 times during the year. These data support epidemiological prevalence estimates.[1,2,12] Women visited a physician for rheumatoid arthritis 2.4 times as often as men. Person-visit rates for other selected types of arthritis also agree with epidemiological prevalence estimates.[1,2,12]

Rates of consultation with physicians for arthritis and related conditions varied by province, ranging from 146 to 207 persons per 1,000 population (Table 4-2). Provincial differences in person-visit rates for arthritis and related conditions were still present after adjusting for differences in the age and sex composition of the provincial populations. This variation may be due, at least in part, to provincial differences in the coding of visit diagnoses.

Table 4-2 Person-visit rates to all physicians for arthritis and related conditions among adults aged 15 years and over, by province*, Canada, 1998/99

	Persons Visiting per 1,000 Population**						
Condition	**BC**	**AB**	**SK**	**MB**	**ON**	**QC**	**NS**
Arthritis and Related Conditions	**162.8 (161.1)**	**167.7 (174.3)**	**170.3 (171.2)**	**207.3 (207.3)**	**145.5 (147.3)**	**152.2 (152.7)**	**181.4 (181.1)**
Osteoarthritis	32.3	35.8	30.5	36.1	53.1	29.9	36.2
Rheumatoid Arthritis	9.1	7.5	4.9	5.5	8.7	5.1	7.4
Connective Tissue Disorders	3.0	2.0	1.6	1.9	1.8	1.5	1.9
Ankylosing Spondylitis	0.9	1.4	1.5	1.3	0.9	1.0	2.1
Gout	5.8	6.1	8.4	7.0	5.5	3.5	6.8

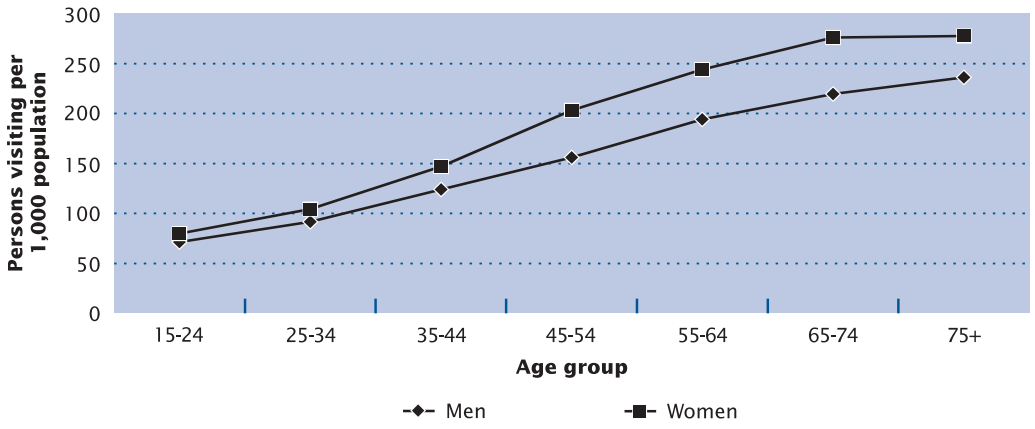
* Provincial rates may vary because of differences in the coding of visit diagnoses. See Methodological Appendix at end of chapter.

** Age/sex standardized rates in parentheses.

Source: provincial physician billing data

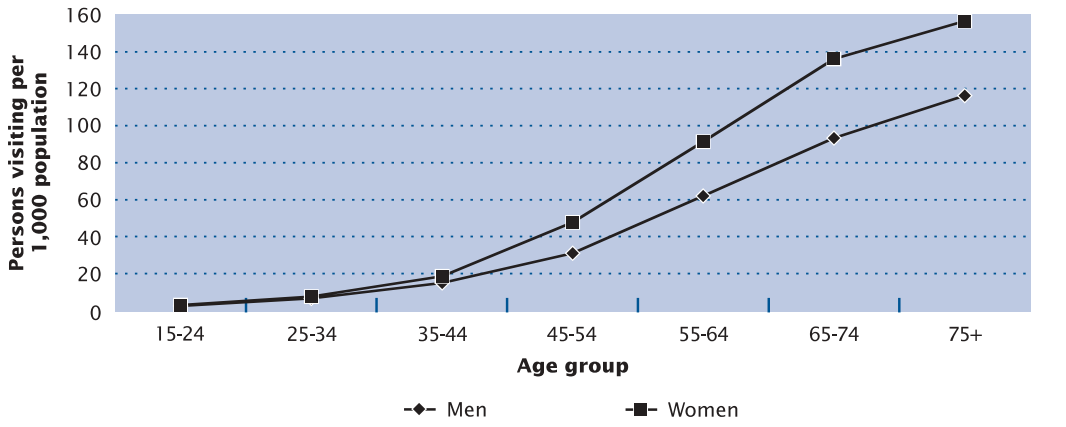
Person-visit rates for all arthritis and related conditions, osteoarthritis and rheumatoid arthritis increased with age. In all age groups, rates among women were greater than among men (Figures 4-1, 4-2 and 4-3). These patterns support the findings of epidemiological studies.[1,2,12]

Figure 4-1 Person-visit rates to all physicians for arthritis and related conditions, by age, Canada, 1998/99



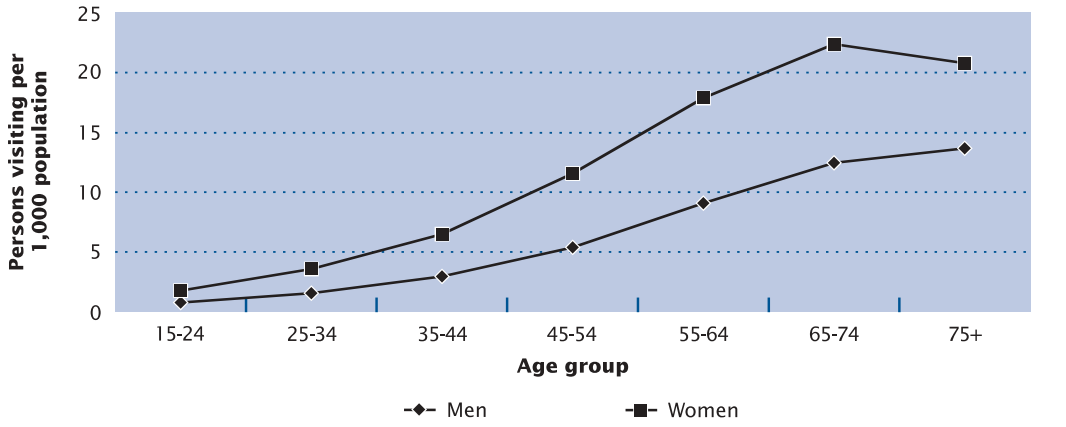
Source: provincial physician billing data (BC, AB, SK, MB, ON, QC, NS)

Figure 4-2 Person-visit rates to all physicians for osteoarthritis, by age, Canada, 1998/99



Source: provincial physician billing data (BC, AB, SK, MB, ON, QC, NS)

Figure 4-3 Person-visit rates to all physicians for rheumatoid arthritis, by age, Canada, 1998/99



Source: provincial physician billing data (BC, AB, SK, MB, ON, QC, NS)

Overall, 82% of Canadians who visited a physician for any type of arthritis and related condition in 1998/99 saw a primary care physician at least once (Table 4-3). Nearly 1 in 5 (18.5%) saw a surgical specialist and 13.7% saw a medical specialist at least once. Orthopedic surgeons were the most commonly consulted specialist, particularly for osteoarthritis. A higher proportion of individuals with inflammatory types of arthritis, such as rheumatoid arthritis, connective tissue disorders or ankylosing spondylitis, saw medical specialists compared with the proportion of those consulting for other types of arthritis. In turn, people who saw a physician for rheumatoid arthritis, connective tissue disorders or ankylosing spondylitis were less likely to see primary care physicians. Over one-quarter (26.4%) of patients whose visits were related to rheumatoid arthritis saw a rheumatologist and 17.5% saw an internist at least once.

The percentage of patients who saw medical and surgical specialists – orthopedic surgeons, rheumatologists and internists – for all arthritis and related conditions, and for

Table 4-3 Distribution of type of physician seen by adults aged 15 years and over for arthritis and related conditions, Canada, 1998/99

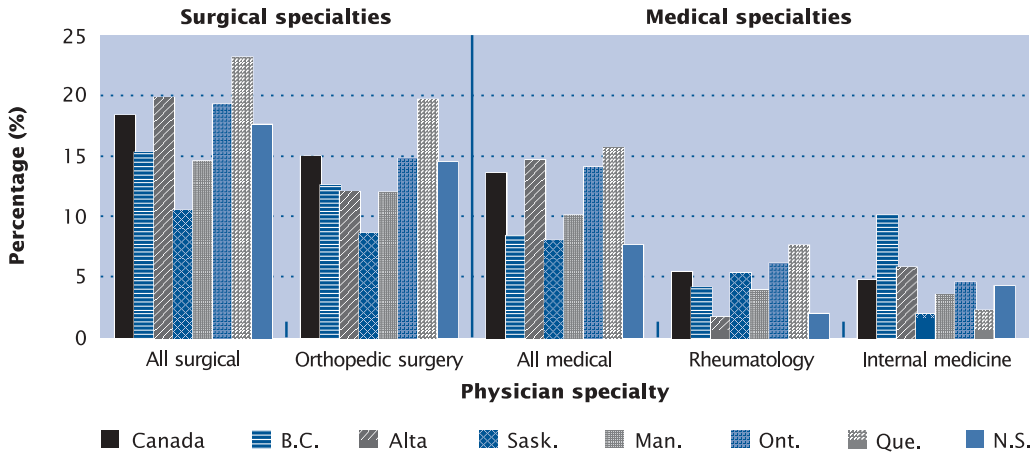
Condition	Type of Physician*					
		Surgical Specialists		Medical Specialists		
	Primary Care (%)	All (%)	Orthopedic Surgeons (%)	All (%)	Rheumatologists (%)	Internists (%)
Arthritis and Related Conditions	**82.0**	**18.5**	**15.1**	**13.7**	**5.5**	**4.8**
Osteoarthritis	83.8	19.1	18.1	11.8	5.5	4.8
Rheumatoid Arthritis	70.6	7.5	4.4	44.3	26.4	17.5
Connective Tissue Disorders	42.4	8.0	0.7	62.2	34.6	23.2
Ankylosing Spondylitis	55.3	8.6	7.1	47.0	30.6	13.0
Gout	97.1	1.6	0.6	9.7	4.9	3.7

* Row percentages do not add to 100% because an individual can visit more than one type of physician in a year.
Source: provincial physician billing data (BC, AB, SK, MB, ON, QC, NS)

osteoarthritis and rheumatoid arthritis specifically, varied by province in 1998/99 (Figures 4-4, 4-5 and 4-6). These differences may in part reflect differences in assignment of physician specialty on claim forms, however, and should be interpreted with caution. Percentages of individuals with arthritis who visited "all medical specialists" and "all surgical specialists" are more likely to be comparable provincially.

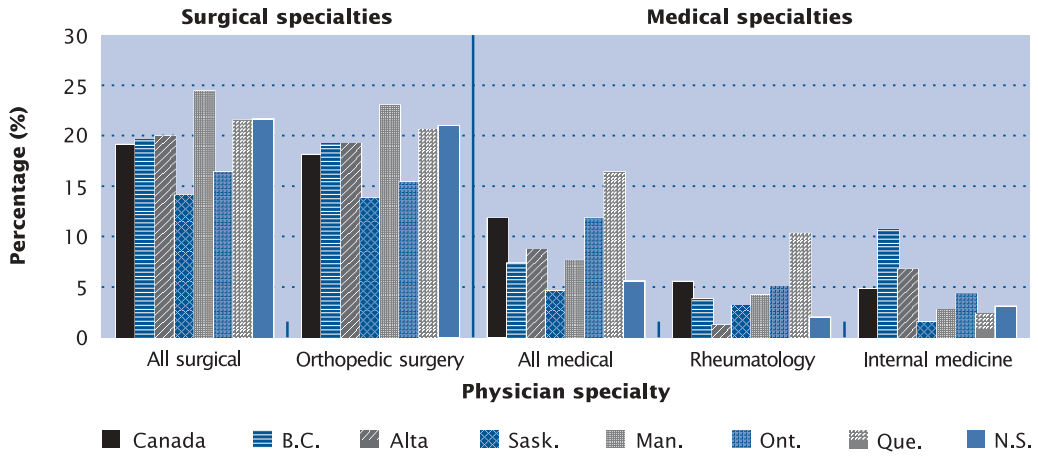
Among participating provinces, Quebec had the highest percentage of individuals who made at least one visit to a physician for arthritis and related conditions and who saw surgical or medical specialists (Figure 4-4). The second highest percentages were in Alberta. In most provinces, there appeared to be a trade-off between seeing a rheumatologist and seeing an internist for arthritis and related conditions, particularly for rheumatoid arthritis (Figure 4-6): provinces with higher percentages of patients who saw a rheumatologist at

Figure 4-4 Percentage of adults aged 15 years and over with arthritis and related conditions who saw surgical and medical specialists, Canada, 1998/99



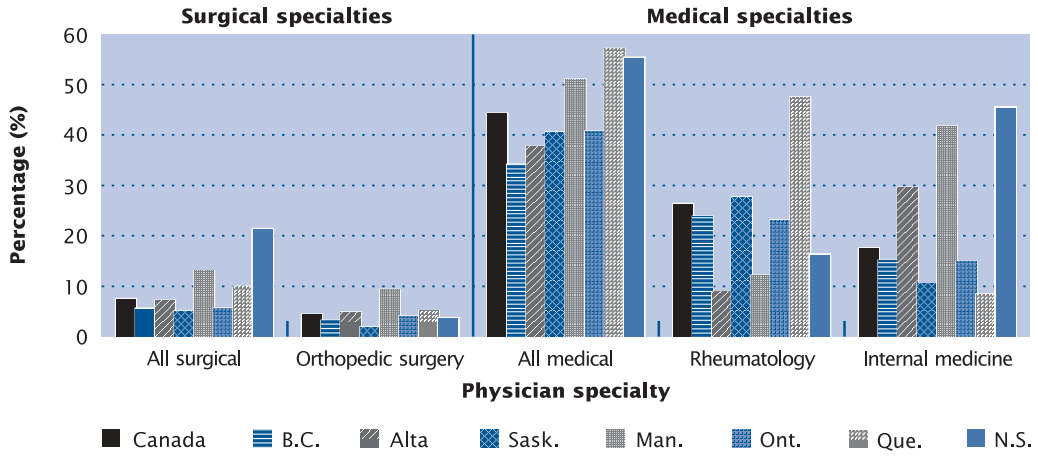
Source: provincial physician billing data

Figure 4-5 **Percentage of adults aged 15 years and over with osteoarthritis who saw surgical and medical specialists, Canada, 1998/99**



Source: provincial physician billing data

Figure 4-6 **Percentage of adults aged 15 years and over with rheumatoid arthritis who saw surgical and medical specialists, Canada, 1998/99**

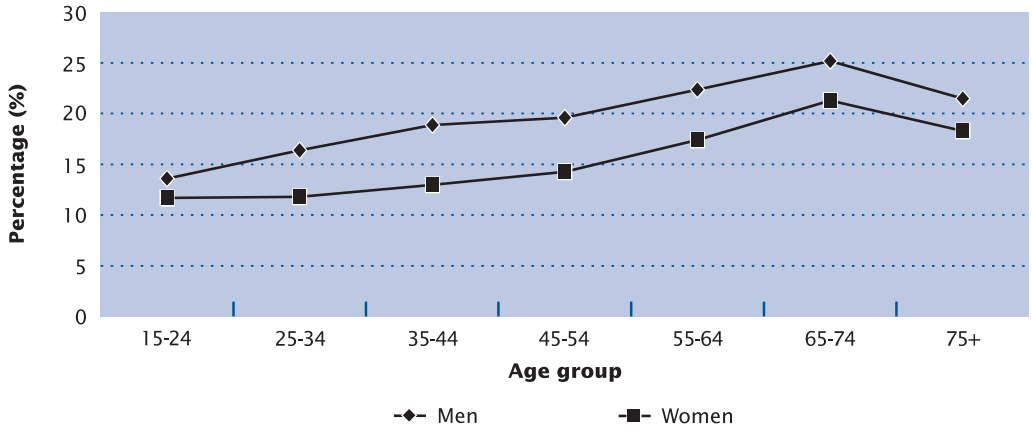


Source: provincial physician billing data

least once had lower percentages of patients who saw an internist, and vice versa. A number of factors may explain this pattern, including the number of rheumatologists available provincially, their practice locations and the referral patterns of primary care physicians. Once again, the manner in which physician specialty was assigned might have contributed to provincial differences.

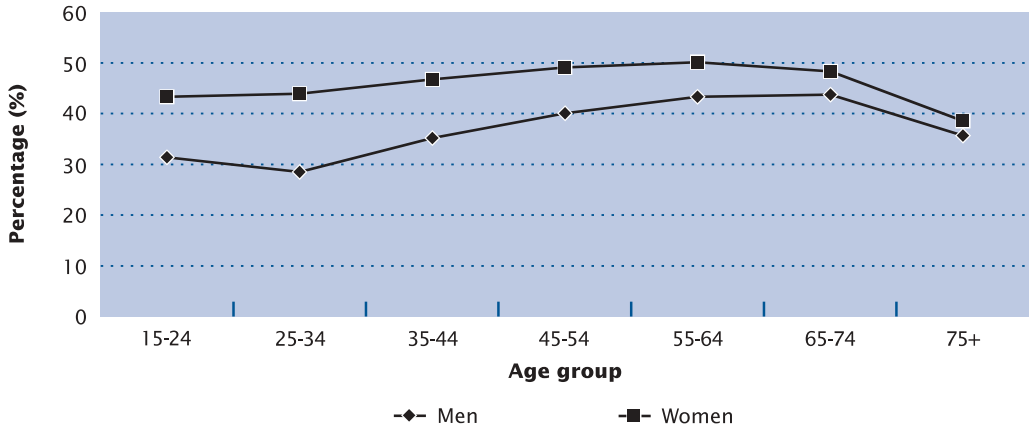
In 1998/99, the percentage of patients with an osteoarthritis-related physician visit who saw a surgical specialist at least once was higher for men than women in every age group (Figure 4-7). Percentages increased with age for both sexes and then declined in the oldest age group. A similar pattern was seen among patients with a rheumatoid arthritis-related physician visit who saw a medical specialist at least once (Figure 4-8). The percentages of rheumatoid arthritis patients seeing medical specialists were higher for women than men.

Figure 4-7 Percentage of adults aged 15 years and over with osteoarthritis who saw a surgical specialist, by age, Canada, 1998/99



Source: provincial physician billing data

Figure 4-8 Percentage of adults aged 15 years and over with rheumatoid arthritis who saw a medical specialist, by age, Canada, 1998/99



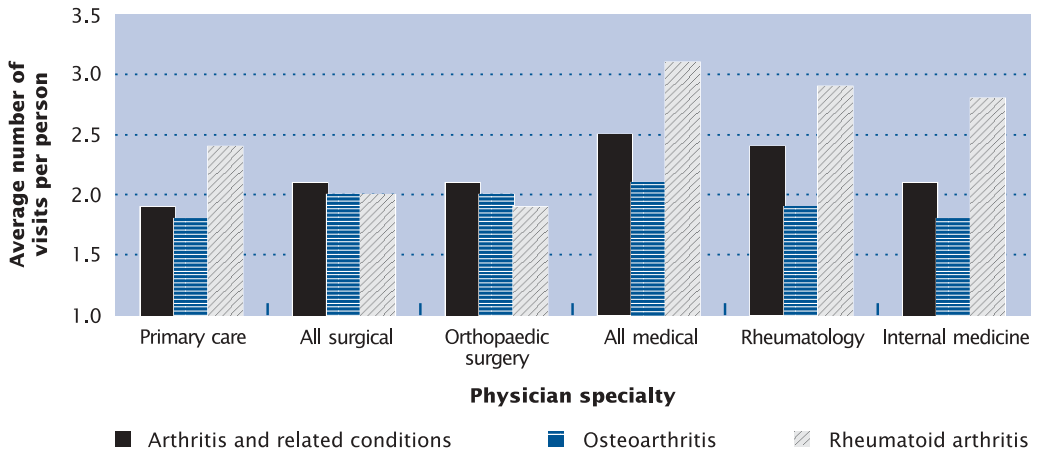
Source: provincial physician billing data

The average number of visits for arthritis and related conditions varied somewhat by type of physician (Figure 4-9): averages were higher for visits to medical specialists than for visits to primary care physicians or surgical specialists. This difference was greater among patients with rheumatoid arthritis than among those with osteoarthritis and reflects the nature of care provided. Medical specialists provide ongoing care for arthritis, particularly for inflammatory types of arthritis like rheumatoid arthritis, and surgical specialists focus on a specific event – surgery.

Discussion

A large number of Canadians (163 in every 1,000 people over the age of 15 years) visited a physician in 1998/99 for arthritis and related conditions. On average, each person made about two visits, for an estimated total of 8.8 million visits for all of Canada. In

Figure 4-9 Average number of visits for arthritis and related conditions, osteoarthritis and rheumatoid arthritis by adults aged 15 years and over, by type of physician, Canada, 1998/99



Source: provincial physician billing data (BC, AB, SK, MB, ON, QC, NS)

Ontario and Alberta, arthritis-related visits accounted for 4.8% of all physician visits. More women than men made arthritis-related visits, and older people of both sexes consulted at the highest rates.

Provincially, person-visit rates to all physicians for arthritis and related conditions ranged from 146 to 207 persons per 1,000 population. Provincial differences in person-visit rates were not due solely to differences in the age/sex composition of the provincial populations but may have been due in part to differences in the provinces' physician billing databases. Provincial differences in the availability of physicians, especially specialists, may also contribute to these variations.

Primary care physicians provided the vast majority of care for people in Canada with arthritis and related conditions in 1998/99. Four out of five patients (82%) who sought medical advice because of arthritis and related conditions made at least one visit to a primary care physician. Surgical specialists were most often consulted for osteoarthritis, and individuals with rheumatoid arthritis, connective tissue disorders and ankylosing spondylitis more often sought the help of medical specialists. There appears to be a trade-off provincially between seeing a rheumatologist and seeing an internist for arthritis and related conditions, particularly for rheumatoid arthritis.

Despite the limitations in the data, this chapter presents reasonable agreement with population estimates for arthritis. Provincial self-reported estimates of arthritis and rheumatism range from 12.0% to 23.3% in the CCHS (see Chapter 2). In the data presented here, 15% to 21% of the provincial populations made at least one physician visit for arthritis and related conditions. Further, person-visit rates to all physicians for rheumatoid arthritis agreed with published estimates, as did female-to-male sex ratios for this condition.[1,2,12]

The information presented in this chapter was based on administrative physician billing data, and this raises issues of validity. Further, because of provincial differences in data collection methods, issues of provincial comparability need to be considered. Refer to the Methodological Appendix at the end of this chapter for a discussion of these issues.

It is unknown to what extent the findings presented in this chapter on specialist care for arthritis and related conditions have been influenced by the availability of specialists. However, to ensure adequate ambulatory care for arthritis and related conditions in Canada, manpower issues should be addressed. Rheumatologists and orthopedic surgeons are the major providers of arthritis specialty care, and shortages of both of these types of specialists are a concern. The Canadian Council of Academic Rheumatologists[13] predicts that Canada will require a rheumatology manpower increase of 64% by the year 2026 to meet recently recommended targets for provision. The same organization has also stated that the current rate of recruitment of rheumatologists is insufficient to maintain the current manpower level, let alone meet future needs. The current level of provision of orthopedic services in Ontario is less than half the estimated requirement and a similar, if not greater, shortage likely exists in the other provinces.[14]

Implications

Arthritis and related conditions place a significant burden on Canada's ambulatory health care system. With the aging of the population, this burden is expected to increase. Current estimates suggest that by 2020 the number of people with arthritis will double.[15] Service providers and funding agencies will have to plan carefully to ensure that those affected have access to appropriate primary and specialist care. Manpower issues, such as shortages of both rheumatologists and orthopedic surgeons, are a concern that could be addressed through more recruitment and training of specialists in these fields.

While primary care physicians play a central role in managing arthritis, gaps in musculoskeletal education in undergraduate medical education and postgraduate training have been documented.[16-19] When setting curricula, medical educators may wish to draw on information regarding the amount of illness, disability and health care utilization that these conditions cause in the population. For physicians already in practice, continuing education that focuses on hands-on learning may be more effective than traditional continuing education approaches.[20]

Barriers that limit access to specialty services such as rheumatology need further investigation. In addition to the number of specialists available provincially and their practice locations, the referral patterns of primary care physicians should be further explored. Since a considerable amount of arthritis care is provided by internists (particularly rheumatoid arthritis) and orthopedic surgeons (non-surgical care for osteoarthritis) these specialty groups might wish to consider further training and continuing education with respect to arthritis. Processes and outcomes of care for people treated by these specialists, as compared with rheumatologists, should also be examined.

Strong surveillance efforts depend on both standardized definitions of common terms and their consistent use in different settings. A consensus on definitions would allow

coordinated and constant surveillance across Canada. If provinces wish to pursue this matter, they could consider the following:

- Using the same diagnostic codes for billing purposes would be a major step toward standardizing provincial physician billing data. Allowing physicians to enter three diagnostic codes for each claim, as currently practised in Alberta and Nova Scotia, would also provide a more accurate representation of the reasons for each visit.
- Physicians' specialties could be determined in the same manner in each provincial health insurance database, and this information actively updated to reflect changes in specialty and sub-specialty training.
- Diagnostic codes in physician claims data need to be validated. Algorithms using specified numbers of visits in a time period for a specific diagnosis need further exploration and validation, building on earlier work for rheumatoid arthritis and diabetes.[21]

Chapter 4
Methodological Appendix

Table 4A-1 Arthritis and related conditions diagnostic codes

Disease Category	Condition	Diagnostic Categories	Diagnostic Code(s)
Arthritis and Related Conditions	Osteoarthritis	Osteoarthritis	715
	Rheumatoid Arthritis	Rheumatoid arthritis, Still's disease	714
	Connective Tissue Disorders	Disseminated lupus erythematosus, generalized scleroderma; polyarteritis nodosa, temporal arteritis	710; 446
	Ankylosing Spondylitis	Ankylosing spondylitis	720
	Gout	Gout	274
	Other Arthritis and Related Conditions	Traumatic arthritis; pyogenic arthritis; joint derangement, recurrent dislocation, ankylosis; Dupuytren's contracture; arthropathy associated with other disorders classified elsewhere; internal derangement of the knee; other and unspecified disorder of the joint; polymyalgia rheumatica; peripheral enthesopathies and allied syndromes; synovitis, tenosynovitis, bursitis, bunion, ganglion; fibrositis, myositis, muscular rheumatism; other diseases of the musculoskeletal system and connective tissue	716; 711; 718; 728; 713[+#]; 717[#]; 719[#]; 725[#]; 726[#]; 727; 729; 739[+]

\+ Diagnostic code not used in Saskatchewan
\# Diagnostic code not used in Ontario

Data Limitations

The extent to which the data on people visiting physicians for arthritis and related conditions capture the full spectrum of people with arthritis in Canada is unknown. The data presented in Chapter 4 cover only the fiscal year 1998/99, and since not all people with arthritis see a physician in the course of a year the data do not account for any potential patients not visiting in that time period.

Diagnostic codes provided in physician claims were not validated. Further, many types of visit, such as visits to discuss negative test results and visits for non-specific conditions, may have been difficult to code by diagnosis. Individual physicians may have used a small subset of codes as a matter of routine or convenience. On the other hand, infrequently used codes, such as for rheumatoid arthritis, may have been more likely to be used appropriately, particularly in a primary care setting where the physician may have had to look up the proper code.

In this chapter, individuals were included in the data and analyses for a particular condition if they made at least one visit to any type of physician for which the diagnostic code

corresponded to that condition. As a result, this may have included patients with only tentative diagnoses. When initially investigating a patient's condition, physicians may have entered on the claim form a diagnosis that was later ruled out by test results or further examination.

While the diagnostic codes used by the provinces were all based on the International Classification of Diseases (ICD), each province has modified this classification to some degree. Some used 3-digit diagnostic codes (Saskatchewan, Manitoba, Ontario, Nova Scotia) and others used 4-digit codes (British Columbia, Alberta, Quebec). Some provinces were missing codes, and the conditions associated with each code varied somewhat among provinces. If a code was not available for a particular arthritis condition, it is likely that the physician used another arthritis-related code instead. Missing arthritis codes may have been replaced by more general musculoskeletal diagnostic codes or coded in a less predictable manner. Such coding differences may explain at least some of the provincial variations in rates presented in this chapter. Large provincial differences in coding some conditions, such as fibrositis, prohibited the presentation of data on these conditions. As a result they were grouped as "other arthritis and related conditions" (Table 4A-1). Data were not presented on this grouping because of the heterogeneity of the conditions included.

Physicians in all the participating provinces, except Alberta and Nova Scotia, were allowed to enter only one diagnosis for each visit. While physicians in Alberta and Nova Scotia were able to provide three diagnoses per visit, only the first diagnosis was included in the data to achieve comparability with the other provinces. Using only a single diagnostic code means that if a patient had more than one reason for visiting, some diagnoses were missed. Since arthritis is often seen as a co-morbid condition, a physician may have been less likely to provide an arthritis code than that of another disease.

Provincial health insurance claims typically include only fee-for-service claims, so that physicians and patients enrolled in alternative payment plans are not usually included. However, some of these physicians submit "shadow bills" to the provincial health insurance plan with diagnostic information. If submitted, these claims were included in the data presented for Ontario, Saskatchewan and Nova Scotia. Data missing from alternative payment plans are not likely to have had a major effect on data validity in this chapter, as only a small minority of Canadians are enrolled in such plans. However, omission of those covered by alternative payment plans means that the findings in this report are likely to be underestimates of ambulatory care for arthritis.

An additional limitation to consider is that physician specialty was determined solely by registered specialty in all of the provinces, with the exception of Ontario and Nova Scotia, where billing specialty was also considered. Registered specialties may not have been accurate if physicians did not update the provincial health insurance plan once specialty and subspecialty training, such as internal medicine and rheumatology, was completed. The presented groupings of "all medical specialists" and "all surgical specialists" are therefore more likely than separately grouped "internal medicine" and "rheumatology" or "orthopedic surgery" to be accurate and comparable provincially.

References

1. Lawrence RC, Helmick CG, Arnett FC, Deyo RA, Felson DT, Giannini EH. *Estimates of the prevalence of arthritis and selected musculoskeletal disorders in the United States*. Arthritis Rheum 1998;41:778-99.
2. Hawker G. *Epidemiology of arthritis and osteoporosis*. In: Williams J, Badley EM, editors. *Patterns of Health Care in Ontario: Arthritis and Related Conditions*. Toronto, Ontario: Institute for Clinical Evaluative Sciences, 1998; 1-10.
3. 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;24:2283-90.
4. Newman J, Silman AJ. *A comparison of disease status in rheumatoid arthritis patients attending and not attending a specialist clinic*. Br J Rheumatol 1996;35:1169-71.
5. MacLean CH, Louie R, Leake B, et al. *Quality of care for patients with rheumatoid arthritis*. JAMA 2000;284:984-92.
6. Ward MM, Leigh JP, Fries JF. *Progression of functional disability in patients with rheumatoid arthritis*. Arch Intern Med 1993;153:2229-37.
7. Ward MM. *Rheumatology visit frequency and changes in functional disability and pain in patients with rheumatoid arthritis*. J Rheumatol 1997;24:35-42.
8. 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;36:513-22.
9. Chang RW, Pellissier JM, Hazen GB. *A cost-effectiveness analysis of total hip arthroplasty for osteoarthritis of the hip*. JAMA 1996;275:858-65.
10. Laupacis A, Bourne R, Rorabeck C, Feeny D, Wong C, Tugwell P, et al. *Costs of elective total hip arthroplasty during the first year. Cemented versus noncemented*. J Arthroplasty 1994;481-7.
11. Lavernia CJ, Guzman JF, Gachupin-Garcia A. *Cost effectiveness and quality of life in knee arthroplasty*. Clin Orthop 1997;345:134-139.
12. Silman AJ, Hochberg MC. *Epidemiology of the Rheumatic Diseases*. 2nd ed. New York: Oxford University Press; 2001.
13. Hanly JG. *Manpower in Canadian academic rheumatology units: current status and future trends*. J Rheumatol 2001;28(9):1944-51.
14. Shipton D, Badley EM, Mahomed NN. *Critical shortage of orthopaedic services in Ontario, Canada*. J Bone Joint Surg Am (in press).
15. Badley EM, Wang PP. *Arthritis and the aging population: Projections of arthritis prevalence in Canada 1991 to 2031*. J Rheumatol 1998;24:138-44.
16. Pinney SJ, Regan WD. *Educating medical students about musculoskeletal problems. Are community needs reflected in the curricula of Canadian medical schools?* J Bone Joint Surg Am 2001;83-A:1317-20.
17. DiCaprio MR, Covey A, Bernstein J. *Curricular requirements for musculoskeletal medicine in American medical schools*. J Bone Joint Surg Am 2003;85:565-7.
18. Renner BR, DeVellis BM, Ennett ST, Friedman CP, Hoyle RH, Crowell WM, et al. *Clinical rheumatology training of primary care physicians: the resident prospective*. J Rheumatol 1990;17:666-72.
19. Badley EM, Lee J. *The consultant's role in continuing medical education of general practitioners: the case of rheumatology*. Br Med J 1987;294(6564):100-3.
20. Davis D, O'Brien MA, Freemantle N, Wolf FM, Mazmanian P, Taylor-Vaisey A. *Impact of continuing medical education: Do conferences, workshops, rounds, and other traditional continuing education activities change physician behaviour or health care outcomes?* JAMA 1999;282:867-74.

21. Hux J, Ivis F, Flintoft V, Bica A . *Diabetes in Ontario: Determination of prevalence and incidence using a validated administrative data algorithm*. Diabetes Care 2002;25(3):512-6.

Chapter 5

Arthritis-Related Prescription Medications

Naomi Kasman, Elizabeth Badley

Introduction

Arthritis is a complex disease with no known cure. As a result, treatment involves a wide variety of medications aimed at relieving pain, preserving joint function and limiting progression of the disease.[1,2] Without effective treatment, arthritis can lead to joint destruction, often resulting in long-term disability. Current medications for treating arthritis include non-steroidal anti-inflammatory drugs, low-dose corticosteroids, disease-modifying anti-rheumatic drugs, and the newly available biologic response modifiers.[2]

Types of Arthritis-related Medications

For patients with arthritis and related conditions, *non-steroidal anti-inflammatory drugs* (NSAIDs) form the basic component of care.[2-4] There are two categories of NSAIDs: conventional, and the more recently developed *COX-2 inhibitors*. Conventional NSAIDs effectively treat the pain and inflammation caused by arthritis,[5] but with long-term use they may lead to a variety of toxic side effects, including gastrointestinal, liver or renal injury, heart failure and adverse reproductive outcomes.[3,6-8] COX-2 inhibitors minimize the risk of stomach ulcers that occur with conventional NSAIDs.[9] Two COX-2 inhibitors were released onto the Canadian market in 1999 – celecoxib (Celebrex™) and rofecoxib (Vioxx®), and these drugs have proven as effective as conventional NSAIDs in decreasing pain and inflammation but without the same degree of toxic side effects. Their toxicity profile is still far from benign, however, and is undergoing further research.

For nearly 50 years, *corticosteroids* have successfully treated rheumatic diseases.[10] Orally administered corticosteroids help to temporarily reduce pain and inflammation in joints, and they may help to increase joint mobility and function.[2] When other treatment methods do not work quickly or effectively enough, injecting corticosteroids directly into an affected joint can reduce severe, persistent inflammation. Corticosteroid injections result in few adverse effects when the number of injections per joint is limited to four or fewer per year.[11]

Disease-modifying anti-rheumatic drugs (DMARDs) are used primarily to prevent the progression of rheumatoid arthritis rather than merely treat the symptoms of the disease.[1] Early treatment of rheumatoid arthritis with DMARDs has proven to be very effective in preventing lasting bone and joint damage, which, if left untreated, may result in loss of function.[1,12] DMARD therapy is recommended as the primary treatment for rheumatoid arthritis, although severe side effects continue to concern clinicians.

Biologic response modifiers (biologics) are a new category of medication for treating inflammatory conditions such as rheumatoid arthritis and for preventing disease progression. Biologics work much more quickly than DMARDs: patients may begin to notice an improvement in their arthritis within a few days to a week. Three biologics are currently available in Canada - etanercept (Enbrel™), infliximab (Remicade™) and anakinra (Kineret™). However, treatment with these drugs is very expensive. Annual drug costs per patient treated with 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.[13] As these drugs have only recently been released onto the market, the relevant data are not yet available for inclusion in this report.

Although all of the above drugs are used in the treatment of arthritis and related conditions, many treat other conditions as well. For example, cyclosporine was originally used to prevent rejection following organ transplantation, chloroquine can be used to treat malaria, and methotrexate was designed as a cancer treatment.

Methods

Arthritis-associated medications – namely the major categories of NSAIDs, corticosteroids and DMARDs – were identified through a review of the literature and in consultation with both a rheumatologist and pharmacologist. For the list of drug names and categories that were included in all analyses see Table 5A-1 in the Appendix at the end of this chapter. While simple analgesics such as acetaminophen (Tylenol®) and acetylsalicylic acid (Aspirin®) are used for a wide range of musculoskeletal conditions, they are also used for other, non-rheumatic conditions, and their purchase does not require a prescription. As a result, they have not been included in this report.

Drug Identification Numbers (DINs)

Health Canada's Therapeutic Products Directorate assigns a unique Drug Identification Number (DIN) to every drug product that it approves for use in Canada. Using Health Canada's Drug Product Database (DPD), the DINs for all arthritis-related prescription medications were determined. In addition to the DIN, the DPD provides product information, including brand name, company name, ingredients, route of administration, pharmaceutical form, therapeutic classification and packaging information. The DPD is updated weekly.

The DINs from the DPD were organized into four drug categories: conventional NSAIDs, COX-2 inhibitors, corticosteroids, and DMARDs. Participating provinces used this set of DINs to obtain the number of individuals who had received prescriptions for these drugs. For this report, the number of total prescriptions was included regardless of the associated diagnosis, for which data were not available.

Provincial Drug Plans

Provincial drugs plans differ in a number of ways, including the portion of the population that is covered and the drugs that are included in their formularies. Generally, all plans cover provincial residents over the age of 65, low-income individuals (such as beneficiaries

of social assistance/welfare) and residents of long-term care facilities. Further details of the various plans are available in Table 5A-2 in the Appendix at the end of this chapter.

When considering provincial variation in the proportion of individuals with prescriptions, the differences between the various provincial drug plans must be taken into account. For example, the very low percentage of prescriptions for COX-2 inhibitors in British Columbia may reflect the strict regulations of the province's drug plan.

Provincial drug plans differ in other notable ways as well. Two provinces, Alberta and Ontario, report data only for individuals over the age of 65 years. While Alberta Health & Wellness has plans for groups other than seniors, only seniors' data are presented here since they represent the entire population of seniors. Other plans in the Alberta program are not population-based. Ontario's drug plan generally covers only individuals over the age of 65, and data were available only for this age group.

Data from Quebec included only prescriptions for individuals with a diagnosis of a musculoskeletal condition given during the previous year. For this reason, Quebec data are presented in a separate table since the other provinces provided data for their entire populations.

Results

Provincial Time Trends for Arthritis-associated Prescription Drugs

Charts displaying the provincial time trends for arthritis-associated prescriptions are displayed separately for those under the age of 65 and for those 65 and over. Data were available from the majority of provinces for the years 1994 to 2000. However, Alberta was unable to provide drug data prior to 1996, since Alberta Blue Cross, its drug plan administrator, did not have a unique patient identifier on its system prior to this time.

Despite many differences between the provincial drug programs and subsequent differences in the actual number of prescriptions dispensed, the prescribing patterns for arthritis-associated medications over time remained fairly similar across the country.

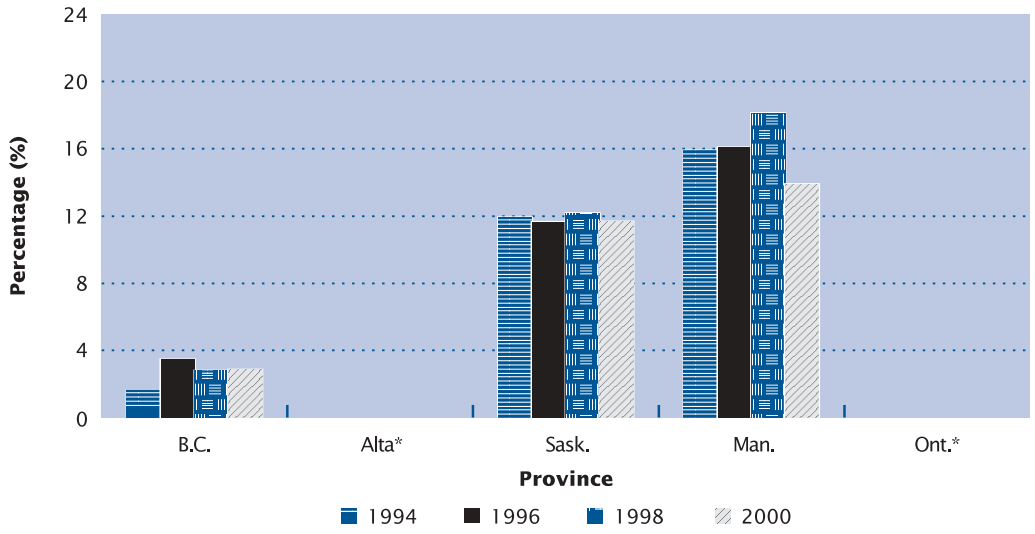
Non-steroidal anti-inflammatory drugs

Provinces showed similar patterns over time in the percentage of individuals with prescriptions for conventional NSAIDs. The pattern consisted of either a plateau or slight decline from 1994 to 1998 followed by a larger drop between 1998 and 2000 (Figures 5-1 and 5-2). This more recent decrease likely reflects the release of COX-2 inhibitors onto the Canadian market in 1999. The decline in the percentage of individuals with NSAID prescriptions before 1998 may be associated with the availability of certain NSAIDs without a prescription as of 1996.

Once COX-2 inhibitors were released onto the Canadian market in 1999, prescriptions written for these medications increased quickly. The percentage of individuals with prescriptions for COX-2 inhibitors varied widely by province in 2000 (Figure 5-3). The extremely low rate of COX-2 inhibitor prescriptions in British Columbia and the minimal

decline in its conventional NSAID prescriptions between 1998 and 2000 (Figure 5-2) attest to the policy of the province's drug plan to cover COX-2 inhibitors only under exceptional circumstances. In these "exceptional circumstances", COX-2 inhibitors are only available through special authority to patients who fail to benefit from or who have adverse drug reactions to acetaminophen, enteric-coated Aspirin, naproxen, ibuprofen and at least three other funded NSAIDs.

Figure 5-1 Percentage of individuals aged 15 to 64 years with prescriptions for conventional NSAIDs in five provinces, Canada, 1994-2000



* Not covered by drug formulary.

Figure 5-2 Percentage of individuals aged 65 years and over with prescriptions for conventional NSAIDs in five provinces, Canada, 1994-2000

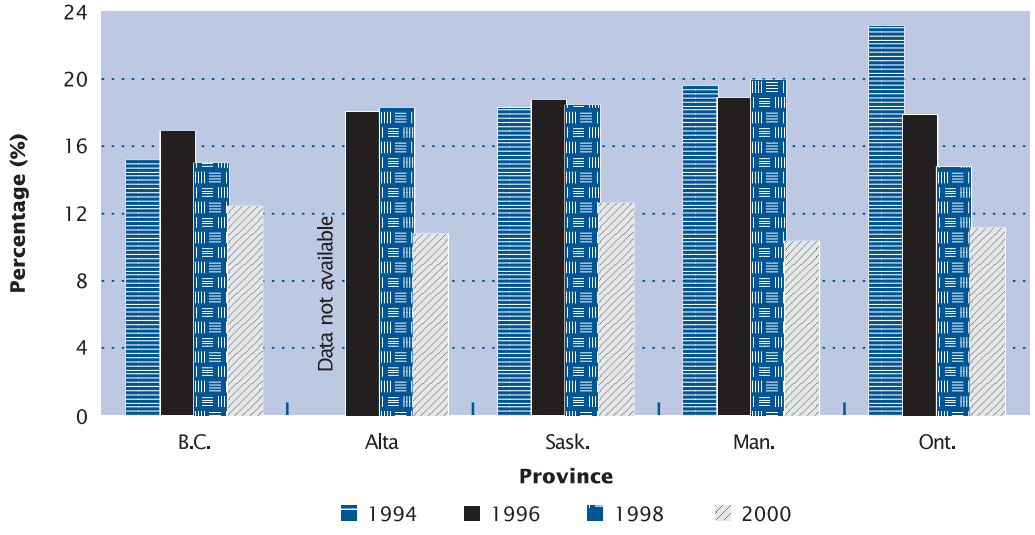
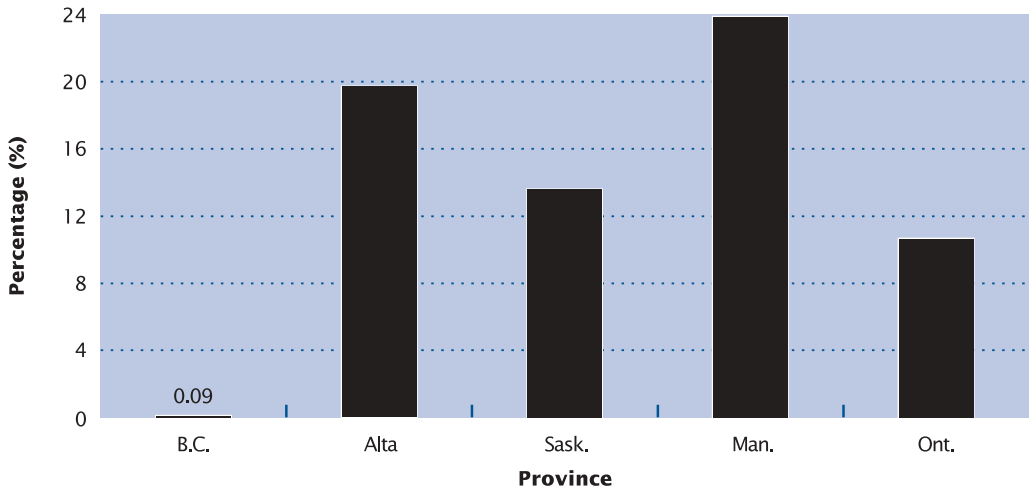


Figure 5-3 Percentage of individuals aged 65 years and over with prescriptions for COX-2 inhibitors in five provinces, Canada, 2000

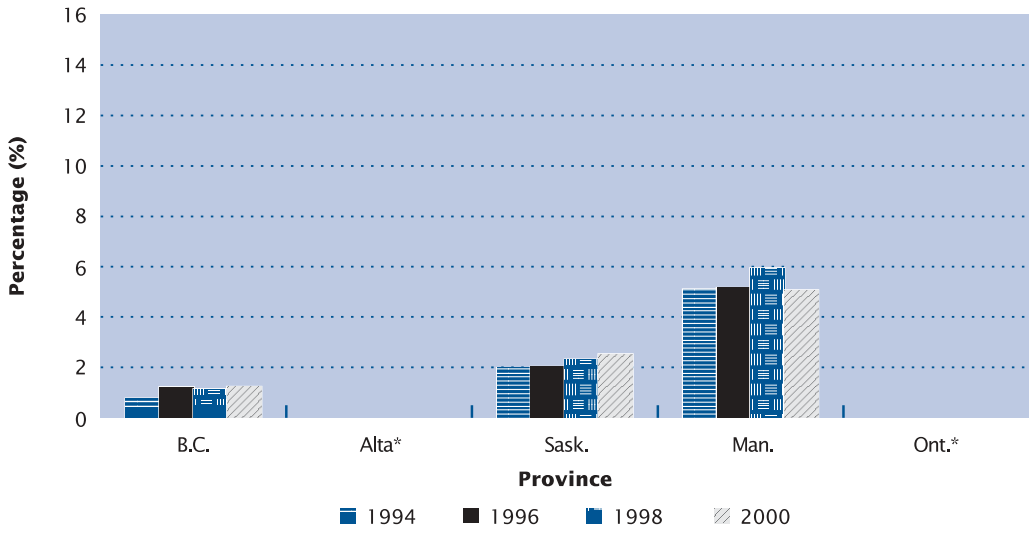


In Saskatchewan as well, unrestricted coverage of COX-2 inhibitors began only in mid-2000. Before this, individuals could receive COX-2 inhibitors only if coverage was requested by a physician and approved by the provincial drug plan.

Corticosteroids

The percentage of individuals under the age of 65 with prescriptions for corticosteroids showed very little change between 1994 and 2000 (Figure 5-4). With the exception of British Columbia, the percentage of those over the age of 65 showed a slight increase

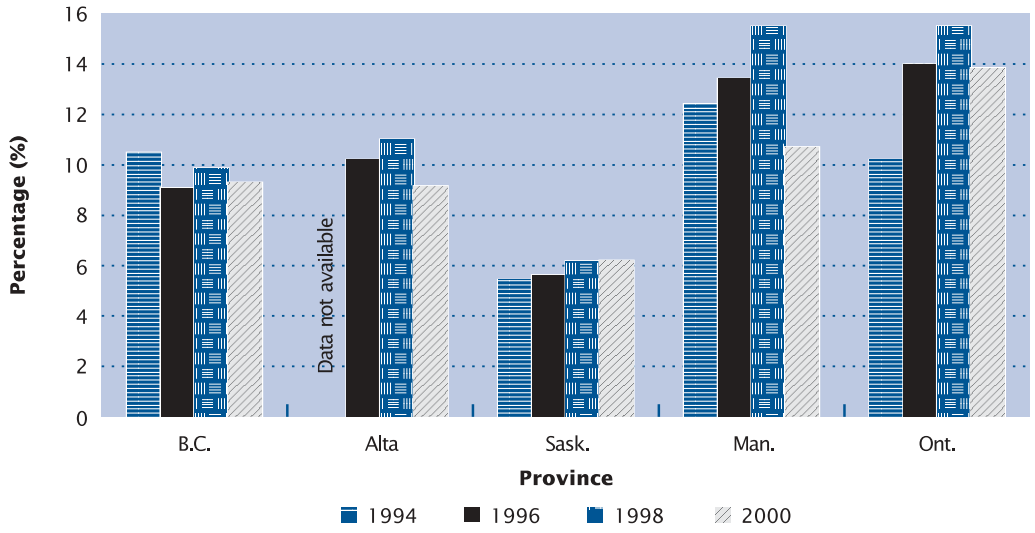
Figure 5-4 Percentage of individuals aged 15 to 64 years with prescriptions for corticosteroids in five provinces, Canada, 1994-2000



* Not covered by drug formulary.

between 1994 and 1998 (Figure 5-5). Between 1998 and 2000, all provinces showed a decrease or remained relatively constant.

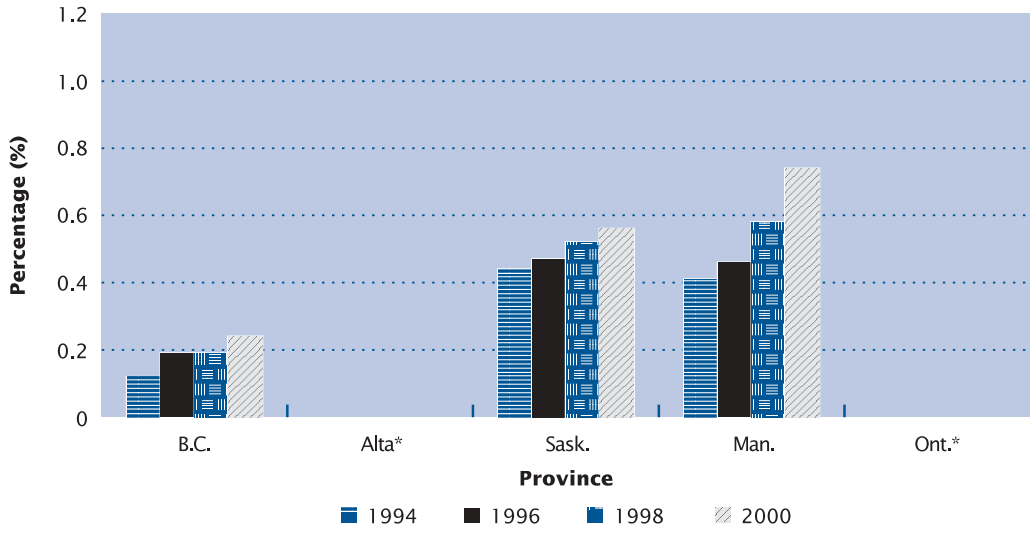
Figure 5-5 Percentage of individuals 65 years and over with prescriptions for corticosteroids in five provinces, Canada, 1994-2000



Disease-modifying anti-rheumatic drugs

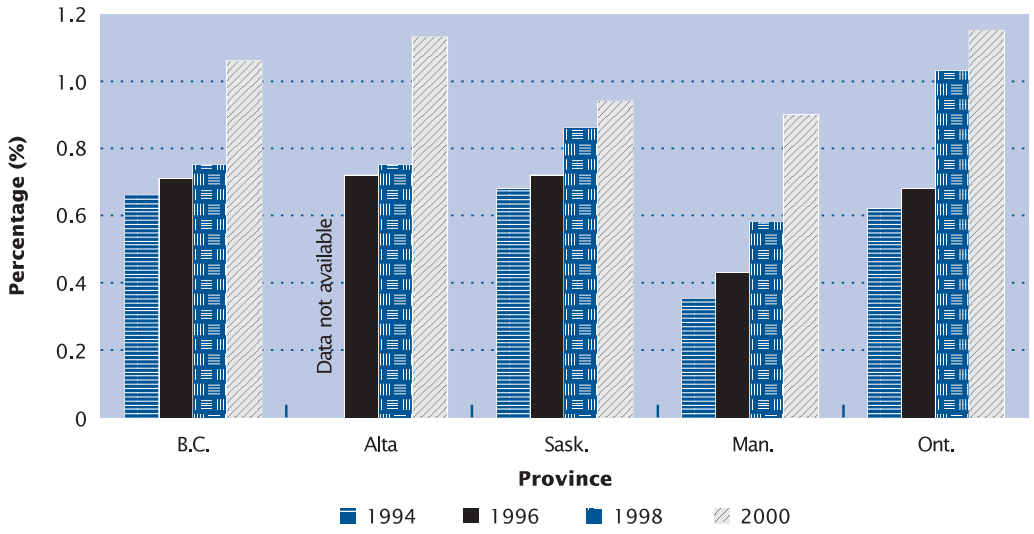
Despite differences among the various provinces' drug plans, the pattern of prescriptions for DMARDs has followed a remarkably similar pattern across the country over time. Between 1994 and 2000, in all age groups, the percentage of individuals who received prescriptions for any DMARD rose consistently (Figures 5-6 and 5-7). The fairly

Figure 5-6 Percentage of individuals aged 15 to 64 years with prescriptions for DMARDs in five provinces, Canada, 1994-2000



* Not covered by drug formulary.

Figure 5-7 **Percentage of individuals 65 years and over with prescriptions for DMARDs in five provinces, Canada, 1994-2000**



large increase in Ontario rates between 1996 and 1998 may in part reflect the inclusion of the commonly prescribed medication Methotrexate in that province's drug benefit formulary in 1997.

Table 5-1 **Number and percentage of NSAID, corticosteroid, and DMARD prescriptions for individuals with at least one musculoskeletal (MSK) diagnosis during the previous year, Quebec, 1998**

	Number of Prescriptions Written for Individuals with a Diagnosis of an MSK Condition During the Previous Year	Percentage of Prescriptions Written for Individuals with Specific MSK Conditions		
		Osteo-arthritis	Rheumatoid Arthritis	Any Other Arthritis
NSAIDs	220,020	23.4	4.5	50.5
Corticosteroids	123,382	29.8	8.2	45.7
DMARDs	10,711	16.9	58.5	17.3

Source: drug claims data from Regié de l'assurance du Québec (RAMQ)

Prescriptions and Associated Diagnoses

Unlike the other provinces, Quebec provided prescription data only for individuals who had had a diagnosis of a musculoskeletal (MSK) condition during the previous year.

In 1998, over 220,000 prescriptions for NSAIDs were written in Quebec for individuals who had been given an MSK diagnosis during the previous year. Conventional NSAIDs, which include the commonly prescribed drug ibuprofen, are used to treat a wide variety of painful joint conditions such as fibrositis, synovitis and traumatic arthritis, many of which are included under the "any other arthritis" category. Corticosteroids are also fairly widely used to treat painful joints, and over 46,000 individuals (38%) in Quebec who had an osteoarthritis or a rheumatoid arthritis diagnosis also were given prescriptions

for these medications. Of the 10,711 prescriptions for DMARDs that were written for individuals with a musculoskeletal diagnosis in Quebec, over three-quarters were prescribed to those with osteoarthritis (16.9%) or rheumatoid arthritis (58.5%).

Discussion

Since arthritis has no known cure, current drug therapies aim to minimize pain, preserve joint function and limit disease progression by reducing inflammation. Chapter 5 has discussed three of the four main categories of drugs for treating arthritis: NSAIDs (conventional and COX-2 inhibitors), corticosteroids and DMARDs. The fourth, biologics, is the newest category of arthritis drugs. According to early research, biologics show promise for halting the progression of rheumatoid arthritis and other forms of inflammatory arthritis.

New drugs for osteoarthritis, including drugs to prevent progression in the early stage of the disease and disease modifying drugs for established osteoarthritis, are currently on the horizon. The availability of these drugs will increase the pool of people for whom drug treatment is appropriate. Currently, only a small proportion of people with osteoarthritis have prescription medication recommended as a first line treatment.

Chapter 5 has presented data on prescribing patterns of arthritis-related medications in five Canadian provinces. These patterns have varied across both time and provincial jurisdiction. Some of the increases and decreases in prescriptions may be the result of changes in the provincial drug plan formularies over time. These provincial differences raise concerns about inequities in access, in terms of both age and availability of drugs. Results from this chapter have been obtained only from the analysis of provincial drug program databases. Many individuals may have private coverage provided by their employers. As well, individuals may be prescribed any medication and pay for it themselves.

The percentage of people with prescriptions for DMARDs, the primary therapy recommended for rheumatoid arthritis, has increased consistently over time.[14] Nevertheless, the overall rate of provision of these drugs falls well short of the estimated prevalence of rheumatoid arthritis. In each of the provinces examined, the percentage of the population aged 65 years and older that had a DMARD prescription in 2000 was approximately half the estimated prevalence of rheumatoid arthritis for this age group.[15]

In recent years, the efficacy of new prescription medications used to treat arthritis, such as the biologics, has greatly increased. This increase has been accompanied by an even larger increase in the cost of such medications. In Ontario, for example, arthritis-related prescription medications cost more than $70 million in 2000, almost double the 1999 cost of approximately $37 million. The new biologics will further increase this.

In 1998, the total economic burden of arthritis and rheumatism in Canada was estimated to be $4.4 billion. The direct economic costs (such as hospitalization and medications) were far less than the indirect costs of lost wages and lost productivity due to disability.[13,16] In fact, the total cost of drugs, including management of the effects of drug toxicity,

constituted only 15% to 20% of the direct costs of arthritis.[13,16] Given the considerable economic burden of arthritis, drug therapy has the potential for significant economic benefit,[16,17] especially if such therapy can be shown to reduce the costs associated with disability, loss of productivity and premature mortality.

This report demonstrates that regardless of provincial differences, changes in the management of arthritis through medication have occurred over the past decade. At the time of this report, data are not available on the recently developed biologic response modifiers, which were designed specifically for the treatment of arthritis.

Implications

Provincial variations in the provision of arthritis-related drugs have been identified in this chapter.

Access to arthritis medications that have proven to be effective in preventing joint damage is a key issue. This includes access to DMARDs as well as the newly developed biologic drugs.

Drugs have the potential to reduce long-term economic and social costs of arthritis-related disability. Ensuring effectiveness through pharmaco-economic analysis of new arthritis drugs would help ensure that this potential is realized.

Surveillance of arthritis and related conditions should include the monitoring of changes in health status or health care utilization that may be related to drug therapy. Monitoring should consider both adverse effects and potential benefits, such as changes in mortality or hospitalization for gastrointestinal bleeding since the introduction of COX-2 drugs.

For future surveillance purposes, linking prescription data to patient diagnoses would result in better examination of prescribing patterns for arthritis and related conditions.

Chapter 5
Methodological Appendix

Table 5A-1 Drug categories

Drug Category	Drugs Included in Each Category	
NSAIDs		
Conventional	Diclofenac	Mefenamic Acid
	Diflunisol	Nabumetone
	Etodolac	Naproxen
	Fenoprofen	Oxaprozin
	Flurbiprofen	Piroxicam
	Ibuprofen	Sulindac
	Indomethacin	Tenoxicam
	Ketoprofen	Tiaprofenic Acid
	Ketorolac	Tolmetin
COX-2 Inhibitors	Celecoxib	Rofecoxib
Corticosteroids	Betamethasone	Methylprednisolone
	Cortisone	Prednisone
	Dexamethasone	Prednisolone
	Hydrocortisone	Triamcinolone
DMARDs	Auranofin	Leflunomide
	Aurothioglucose	Methotrexate
	Azathioprine	Sodium Aurothiomalate
	Chloroquine	D-Penicillamine
	Cyclosporine	Sulfasalazine
	Hydroxychloroquine Sulfate	

N.B. The above listed drugs may have different coverage status in different provinces

Table 5A-2 Details of provincial drug plans as of January 2003

Provinces	Who is Covered
British Columbia	People 65 years of age and older Residents of licensed long-term care facilities Residents eligible for British Columbia benefits (i.e. social assistance) Chronic disease patients (e.g. registered with a provincial Cystic Fibrosis Clinic) Low-income families Residents of the province under the age of 65 registered under the Medical Services Plan of British Columbia (once a deductible has been reached) Children eligible for medical or full benefits through the At Home Program of the Ministry for Children and Family Development Clients eligible for benefits through mental health centres Seniors have maximum contribution limits of $200-$275 depending on their incomes, while all other families are insured against "catastrophic" drug bills of over $2,000 per year.
Alberta	Alberta residents aged 65 and older All recipients aged 55-64 of the Alberta Widows' Pension and their dependents Subscribers are responsible for paying 30% of the cost, to a maximum of $25 for each prescription drug (some exceptions do exist for low income individuals).
Saskatchewan	All Saskatchewan residents are eligible for coverage under the Saskatchewan Prescription Drug Plan with the exception of those whose drug costs are covered by the federal government (e.g. Registered Indians).
Manitoba	Any Manitoban, regardless of age, whose income is seriously affected by high prescription drug costs; coverage is based on both total family income and the amount paid for eligible prescription drugs.

Ontario	People 65 years of age and over Residents of long-term care facilities Residents of Homes for Special Care People receiving professional services under the Home Care Program Social assistance recipients (General Welfare or Family Benefits Assistance)
Quebec	People 65 years of age and over People under 65 years who are not covered by a group plan and are not recipients of employment assistance (welfare)

References

1. Russell 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*. Clinical Therapeutics 2001;23(11):1824-38.
2. Schiff M. *Emerging treatments for rheumatoid arthritis*. Am J Med 1997;102(suppl 1A):11S-15S.
3. 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*. JAMA 2000;284(10):1247-55.
4. Osiri M, Moreland LW. *Specific cyclooxygenase 2 inhibitors: a new choice of nonsteroidal anti-inflammatory drug therapy*. Arthritis Care Res 1999;12(5):351-62.
5. 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;19:331-43.
6. FitzGerald GA, Patrono C. *The Coxibs, selective inhibitors of Cyclooxygenase-2*. N Engl J Med 2001;345(6):433-42.
7. Hernandez-Diaz S, Garcia-Rodriquez LA. *Epidemiological assessment of the safety of conventional nonsteroidal anti-inflammatory drugs*. Am J Med 2001;110(3A):20S-27S.
8. Lisse J, Espinoza L, Zhao SA, Dedhiya SD, Osterhaur JT. *Functional status and health-related quality of life of elderly osteoarthritic patients treated with Celecoxib*. J Gerontol 2001;56A(3):M167-M175.
9. Cannon GW, Breedveld FC. *Efficacy of cyclooxygenase-2-specific inhibitors*. Am J Med 2001;110(3A):6S-12S.
10. Neeck G. *Fifty years of experience with cortisone therapy in the study and treatment of rheumatoid arthritis*. Ann N Y Acad Sci 2002;966:28-38.
11. Caldwell JR. *Intra-articular corticosteroids. Guide to selection and indication for use*. Drugs 1996;52(4):507-14.
12. Quinn MA, Conaghan PG, Emery P. *The therapeutic approach of early intervention for rheumatoid arthritis: What is the evidence?* Rheumatology 2001;40:1211-20.
13. Maetzel A, Strand V, Tugwell P, Wells G, Bombardier C. *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(6):655-61.
14. American College of Rheumatology Ad Hoc Committee on Clinical Guidelines. *Guidelines for the management of rheumatoid arthritis*. Arthritis Rheum 1996;39:713-22.
15. Lawrence RC, Helmick CG, Arnett FC, Deyo RA, Felson DT, Giannini EH, et al. *Estimates of the prevalence of arthritis and selected musculoskeletal disorders in the United States*. Arthritis Rheum 1998;41(5):778-99.
16. Tugwell P. *Pharmacoeconomics of drug therapy for rheumatoid arthritis*. Rheumatology 2000;39(Suppl 1):43-47.
17. Callahan LF. *The burden of rheumatoid arthritis: facts and figures*. J Rheumatol 1998;25(Suppl 53):8.

CHAPTER 6

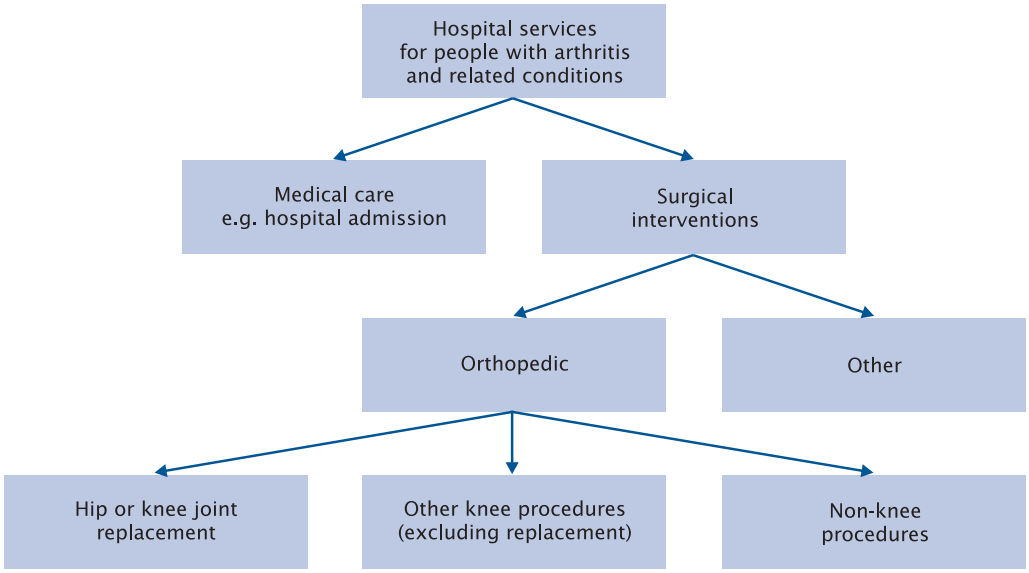
Hospital Services for Arthritis

Deborah Shipton, Nizar Mohammed, Kinga David, Elizabeth Badley

Introduction

While most individuals with arthritis and related conditions are treated in an ambulatory care setting, some will require admission to a hospital and/or surgical intervention (Figure 6-1).

Figure 6-1 Hospital services for people with arthritis and related conditions



Hospital Care

People with arthritis are admitted to hospital more frequently than individuals without arthritis[1-3] for either surgical or non-surgical reasons. Non-surgical admissions to hospital, referred to as medical admissions, may be required to manage the non-joint related consequences of arthritis, arthritis-related pain and disability, or the side effects of drugs used to treat arthritis, such as gastrointestinal complications. Data on long-term care facilities, which are often used for rehabilitation after surgery, were not available for this chapter.

Surgical Interventions

Orthopedic surgery is the most common type of surgical intervention for arthritis. It presents a viable alternative when attempts at non-surgical management have failed to prevent joint pain or damage. Nearly all surgical procedures discussed in this chapter are elective, or performed under non-emergency conditions. This chapter does not address additional surgical procedures that individuals with arthritis require as a result of other co-morbid conditions.

Arthritis-related orthopedic procedures

Orthopedic interventions for joint disorders range from fusion of wrist joints to total replacement of the knee joint. A comprehensive list of over 100 arthritis-related orthopedic procedures has been categorized into the following three groups, based on the frequency of the procedures:

Joint Replacement – Primary and Revision

Replacement of the joint can improve function and reduce pain in individuals with advanced arthritis. The hip and knee joints are most commonly replaced, but shoulder, elbow and finger joints can also be replaced surgically. This category includes revisions to previously replaced joints.

Knee Procedures (Excluding Knee Replacement)

Knee procedures include all arthritis-relevant orthopedic procedures performed on the knee to reduce pain or restore function, excluding knee replacement. Many of the knee procedures are performed on individuals with early arthritis or knee injuries in order to prevent further damage and eventual disability. Knee procedures include both outpatient and inpatient procedures. The vast majority of outpatient surgeries consist of *arthroscopic procedures,* which, as the name implies, are performed arthroscopically or "as through a key hole". Inpatient surgeries, or *other knee procedures*, usually involve open surgery. Although many knee procedures can be performed by either means, the arthroscopic approach has increased in favour because it has fewer complications, requires less rehabilitation time and can often be performed as an outpatient procedure.

Non-knee Procedures

Non-knee procedures include spinal surgery and other non-knee procedures. *Spinal surgery* procedures are used to treat arthritis-related degeneration of the spine. *Other non-knee procedures* include the remaining arthritis-related orthopedic procedures, such as fusion of various unstable joints (arthrodesis), removal of a wedge of bone to correct limb alignment (osteotomy), diagnostic arthroscopy, synovectomy and excision of joints other than the knee. Many of these procedures can be performed arthroscopically.

Data sources

Data for this chapter were obtained from the Canadian Institute for Health Information (CIHI). While complete information on medical admissions and inpatient surgical procedures was available from all provinces from 1994 onward, data on outpatient surgical procedures have not been consistently available at the national level. Therefore, it has been possible to use only data from selected provinces. The Canadian Joint Replacement Registry Report team at CIHI analyzed the data on hip and knee replacement surgery.

Arthritis and Related Diagnoses

For most provinces, up to 16 relevant medical conditions per patient are recorded. Only admissions or procedures involving individuals with at least one arthritis or related diagnosis were included in this chapter. (See list in Table 6A-1 in the Methodological Appendix at the end of the chapter.)

Arthritis and Related Orthopedic Procedures

Only arthritis-relevant orthopedic procedures were considered in this chapter (Table 6A-2 in Methodological Appendix), and these were grouped according to the frequency of their occurrence.

Results

Admissions

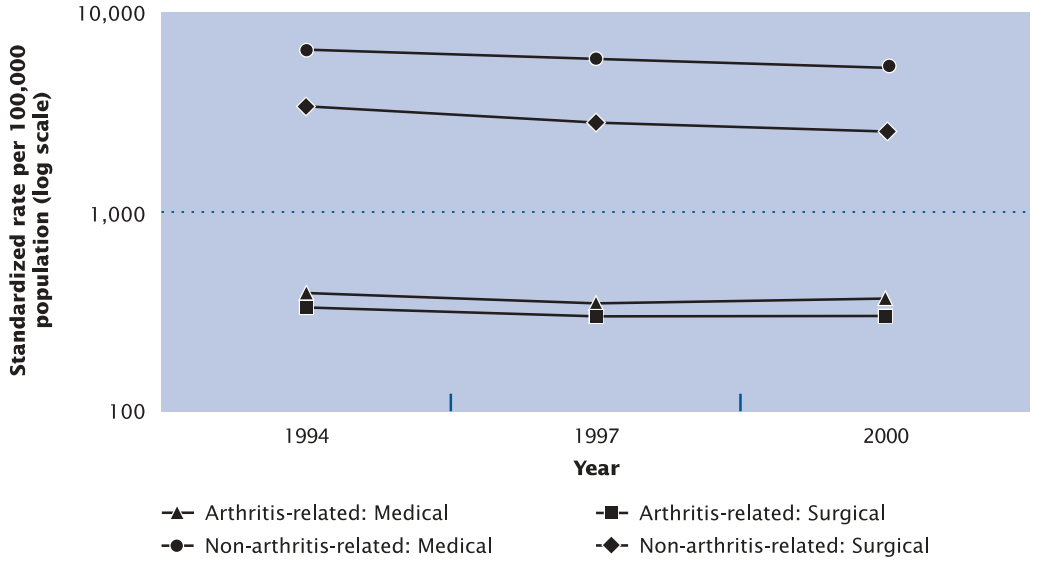
Of the 2.3 million hospital admissions of people 15 years and older in Canada in 2000, there were 200,000 (9%) associated with arthritis or related conditions. Seven percent of 1.5 million medical admissions and 11% of the 800,000 surgical admissions included arthritis as one of the 16 diagnoses associated with admission.

Between 1994 and 2000, the rate of medical and surgical admissions for both arthritis-related and non-arthritis-related admissions decreased. Non-arthritis-related admissions showed a greater decrease than arthritis-related admissions (20% versus 8% respectively) (Figure 6-2). This pattern likely reflects changes in the delivery of care over the last 10 years,[4] as outpatient care has replaced inpatient care as a result of attempts to reduce costs. Improvements in pharmacological and surgical treatments for arthritis may also explain some of the decrease in hospitalization for its medical consequences.

The rate of admissions among those with arthritis or related conditions increased with age, rising much more sharply in the oldest age group for medical admissions than for surgical admissions (Figure 6-3); the rate was slightly higher among women than men.

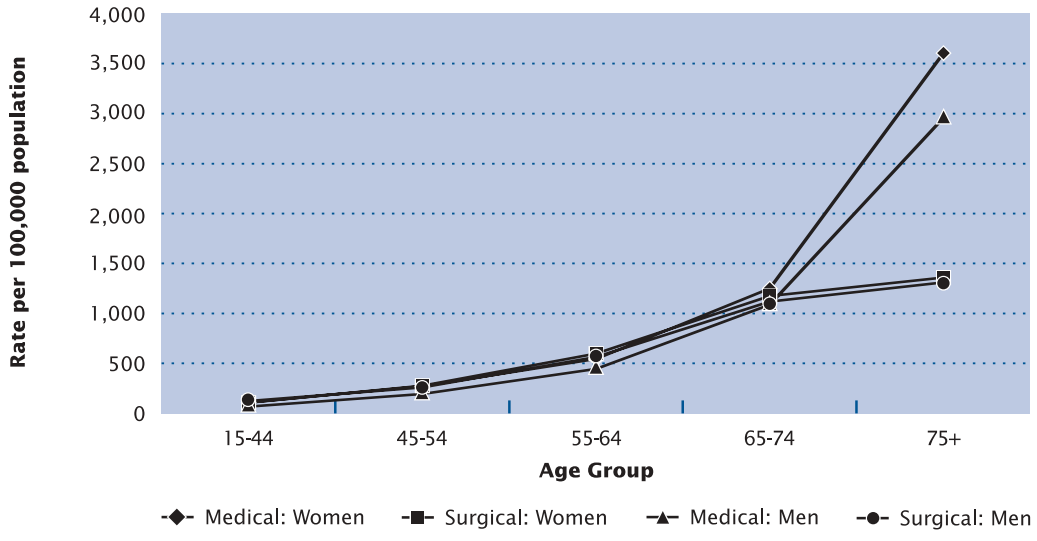
The rate of medical admissions among people with arthritis and related conditions varied substantially by province in 2000 (Figure 6-4). Alberta had the highest rate and British Columbia the lowest. Although in all of Canada the rate of medical admissions decreased between 1994 and 2000, rates increased in New Brunswick, Quebec and Saskatchewan, and rates in the other provinces either remained stable or decreased. The rates of surgical admissions also varied among the provinces, although the pattern differed from that of medical admissions.

Figure 6-2 **Age- and sex-standardized rate of hospital admissions, by diagnosis, Canada, 1994-2000**



Source: Canadian Institute for Health Information (CIHI)/Hospital Morbidly Database (HMDB)

Figure 6-3 **Rate of arthritis-related hospital admissions per 100,000 population, by age and sex, Canada, 2000**

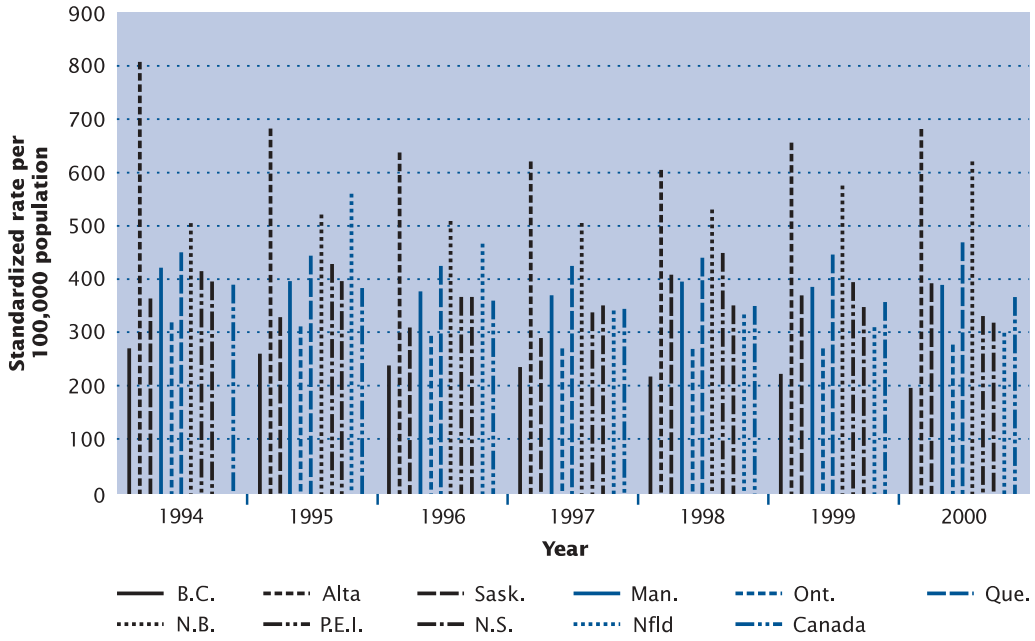


Source: Canadian Institute for Health Information (CIHI)/Hospital Morbidly Database (HMDB)

Orthopedic Procedures

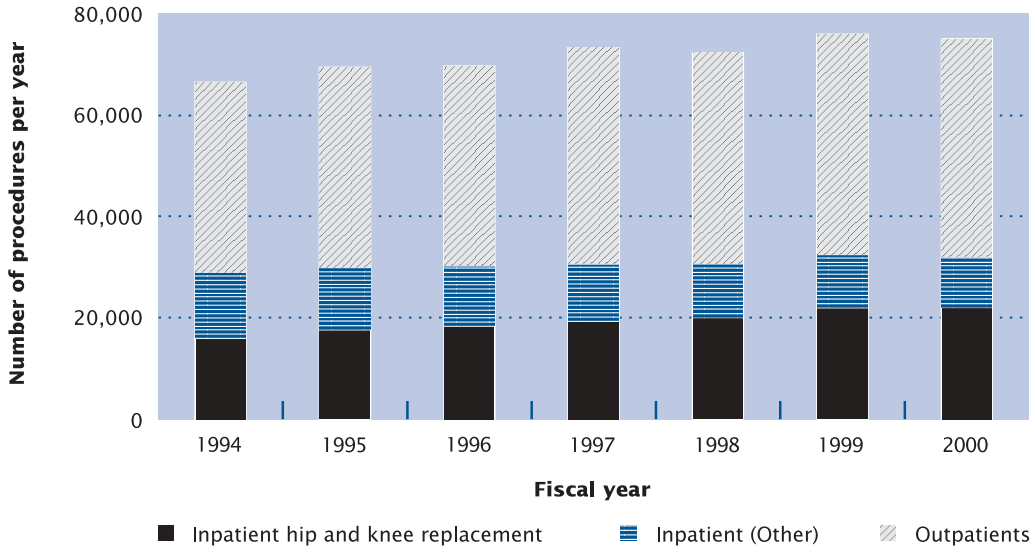
Since 1994, the rate of selected orthopedic procedures for arthritis and related conditions has remained under 500 per 100,000 adult population in Canada. The static rate per capita of orthopedic procedures in the intervening years conceals a 13% increase in the absolute number of procedures performed, with increases in both inpatient and outpatient procedures (Figure 6-5).

Figure 6-4 **Age- and sex-standardized rate of medical admissions per 100,000 population for people with an arthritis-related condition, by province, Canada, 1994-2000**



Source: Canadian Institute for Health Information (CIHI)/Hospital Morbidly Database (HMDB)

Figure 6-5 **Number of inpatient and outpatient arthritis-related orthopedic procedures in selected provinces*, Canada, 1994-2000**

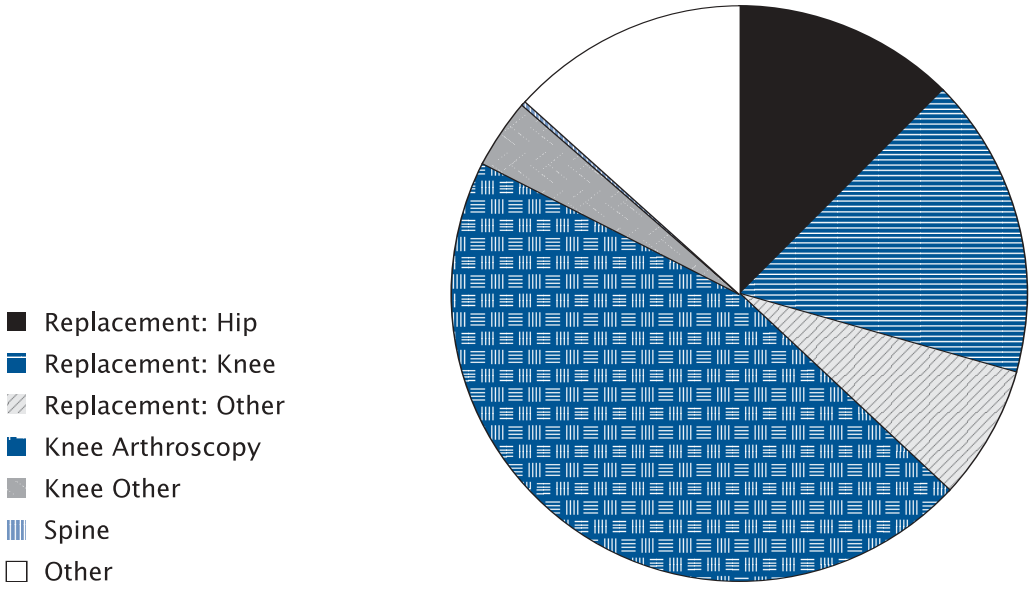


NB, ON & BC only
Source: Canadian Institute for Health Information (CIHI)/Discharge Abstract Database (DAD)

The number of inpatient hip and knee replacements increased markedly. Since this was partially offset by a decrease in the number of all other inpatient procedures, the total number of all inpatient procedures increased by only a modest 10%. The number of outpatient procedures also increased by just over 10%, which may be accounted for by the increase in less invasive arthroscopy for many procedures, such as excision. Use of arthroscopic surgery, where appropriate, rather than open surgery reduces not only the patient's recovery time but also the medical institution's costs associated with post-operative care.

In 2000, the most frequent arthritis-relevant procedures in Canada were knee arthroscopy, followed by knee and hip replacements (Figure 6-6).

Figure 6-6 Number of arthritis-relevant orthopedic procedures in selected provinces*, Canada, 2000



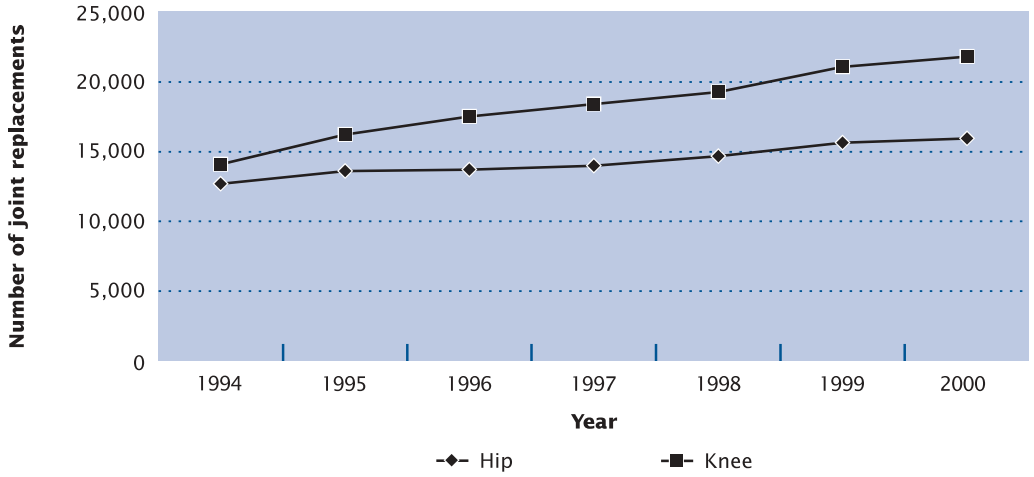
* All provinces excluding AB, MB & PQ
Source: Canadian Institute for Health Information (CIHI)/Discharge Abstract Database (DAD)

Hip and knee replacements

Since 1994, both the number and rate of hip and knee replacements performed on individuals with arthritis and related conditions have shown a marked increase. The rate of knee replacements increased by 36% (from 47 to 65 per 100,000 population); the rate of hip replacements increased by 10% (from 43 to 47 per 100,000) (Figures 6-7 and 6-8).

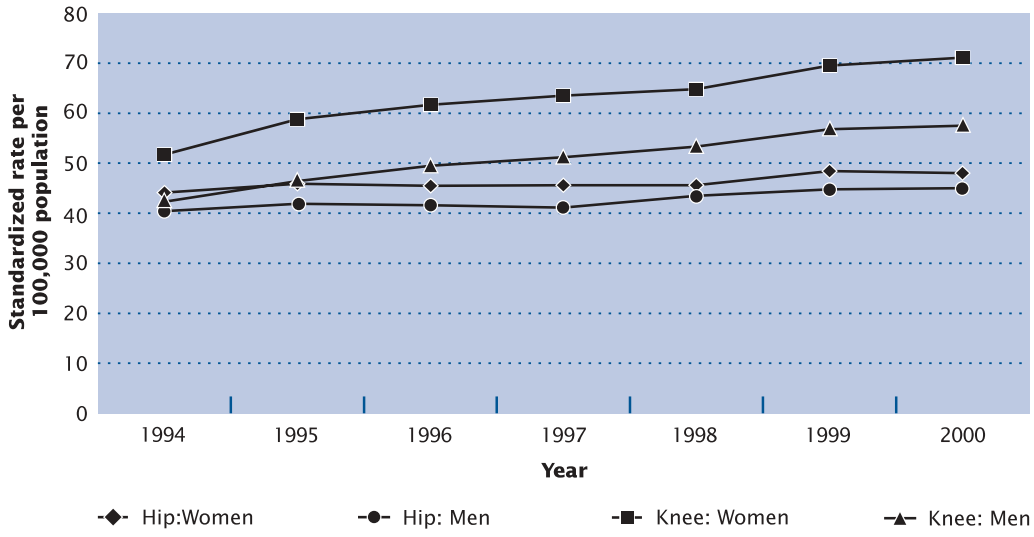
In 2000, the rate of arthritis-related hip and knee replacement procedures was higher among women than men, particularly for knee replacements. The rate of increase of these procedures among both sexes has been similar since 1994, however.

Figure 6-7 Number of total hip and knee replacements per 100,000 population, Canada, 1994-2000



Source: Canadian Institute for Health Information (CIHI)/Canadian Joint Replacement Registry (CJRR)

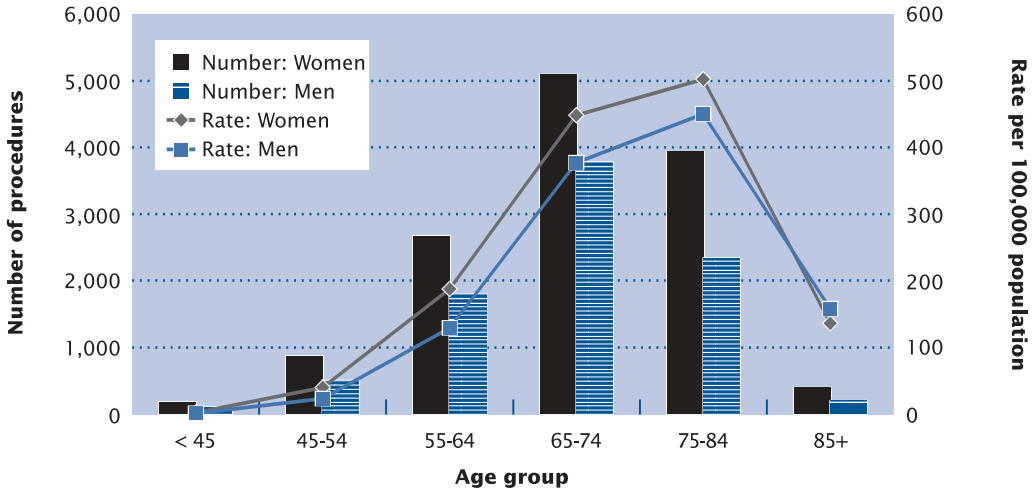
Figure 6-8 Age-standardized rate of total hip or knee replacement per 100,000 population, by sex, Canada, 1994-2000



Source: Canadian Institute for Health Information (CIHI)/Canadian Joint Replacement Registry (CJRR)

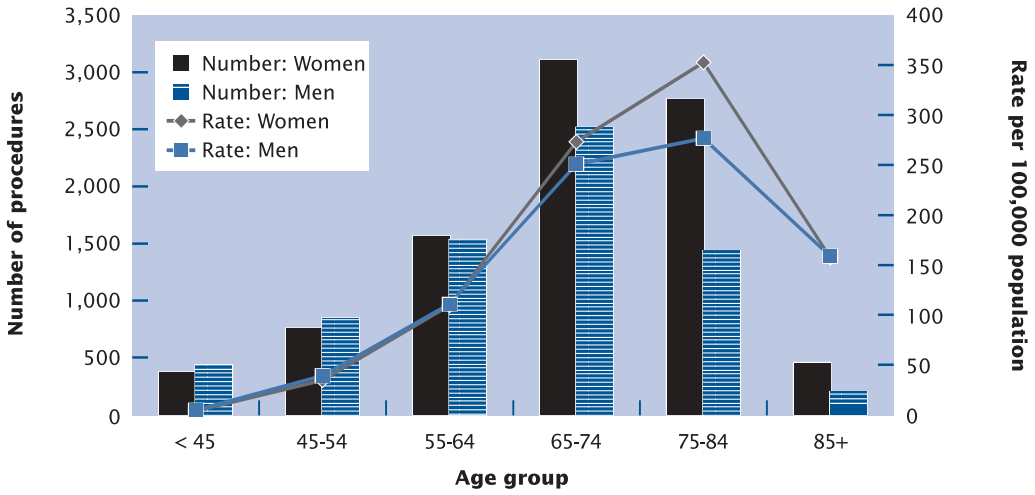
The rate of hip and knee replacements in Canada increased with age in 2000, peaking in the 75-84 year age group (Figures 6-9 and 6-10). Because of the age structure of the Canadian population, adults aged between 65 and 74 years had the largest number of hip and knee replacements.

Figure 6-9 Number and crude rate of total knee replacements per 100,000 population, by age, Canada, 2000



Source: Canadian Institute for Health Information (CIHI)/Canadian Joint Replacement Registry (CJRR)

Figure 6-10 Number and crude rate of total hip replacements per 100,000 population, by age, Canada, 2000



Source: Canadian Institute for Health Information (CIHI)/Canadian Joint Replacement Registry (CJRR)

The rates of hip and knee replacements varied considerably by province in 1994 and 2000 (Table 6-1). Alberta and Saskatchewan consistently reported rates that were among the highest in Canada, and the Quebec and Newfoundland rates were among the lowest. The rates in Manitoba showed the most noticeable increase between the two years.

The average length of hospital stay for hip replacements was slightly longer than for knee replacements, likely reflecting the more routine nature of knee replacements. The average length of hospital stay for women was higher than for men for both hip and

Table 6-1 Age-standardized rates of total hip and knee replacement per 100,000 population, by province, Canada, 1994 and 2000

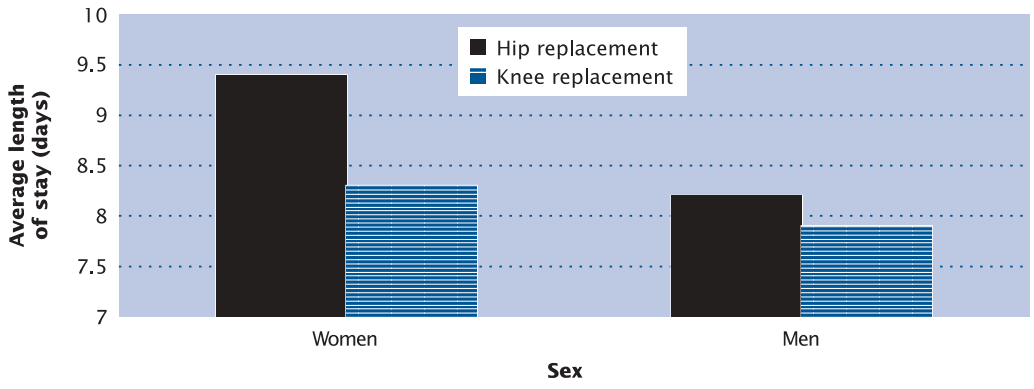
	Hip Replacements				Knee Replacements			
	Men		Women		Men		Women	
Province	**1994**	**2000**	**1994**	**2000**	**1994**	**2000**	**1994**	**2000**
Newfoundland and Labrador	28	24	37	34	30	29	36	43
Prince Edward Island	54	58	50	50	56	63	60	60
Nova Scotia	49	49	59	60	61	86	68	99
New Brunswick	41	37	40	48	40	69	49	76
Quebec	26	29	25	29	21	29	32	41
Ontario	45	49	50	54	53	68	61	85
Manitoba	43	54	46	53	39	77	48	94
Saskatchewan	51	57	56	63	55	66	73	87
Alberta	56	61	68	67	56	70	74	86
British Columbia	42	47	51	51	42	56	47	65
CANADA	**40**	**45**	**44**	**48**	**42**	**58**	**52**	**71**

Source: Canadian Institute for Health Information (CIHI)/Canadian Joint Replacement Registry (CJRR)

knee replacements (Figure 6-11). Previous findings have shown that women are more disabled at the time of replacement and require more assistance with daily activities, largely because they are more likely to be living alone. These findings may explain the longer length of hospital stay for women as compared with men.

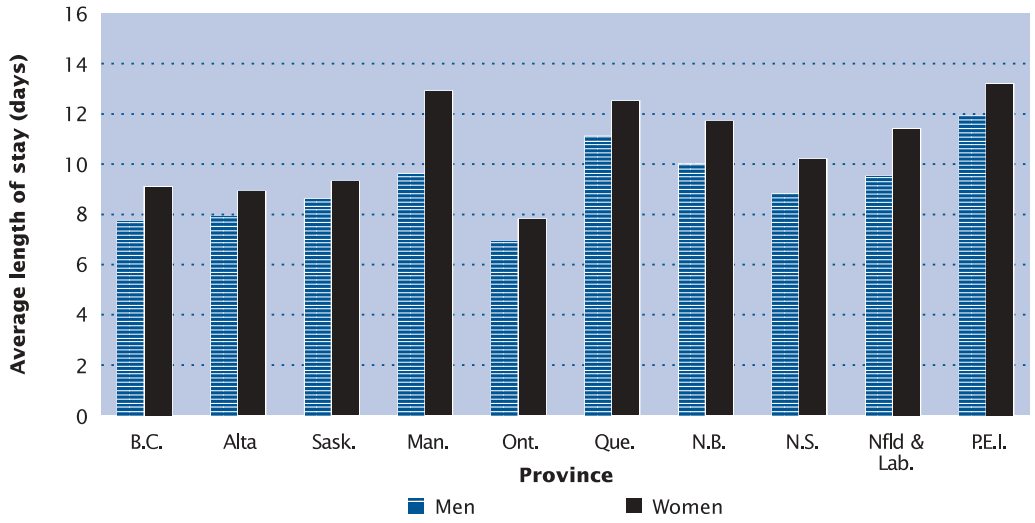
The average length of stay in hospital for a total hip or knee replacement varied considerably by province in 2000 (Figures 6-12 and 6-13). Provinces performing the higher rates of hip and knee replacements per capita tended to have the lower average lengths of stay.

Figure 6-11 Average length of stay for patients with arthritis or a related condition undergoing total hip or knee replacement, by sex, Canada, 2000



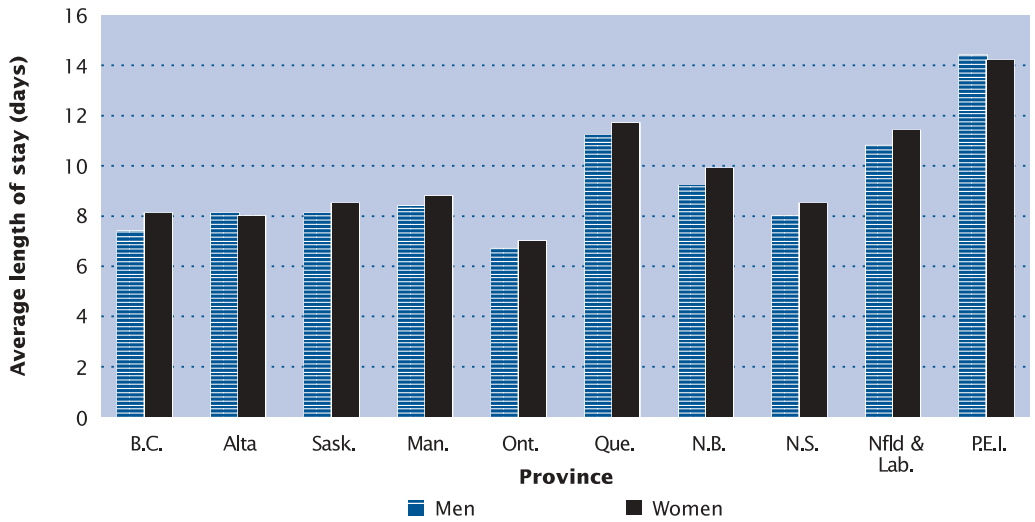
Source: Canadian Institute for Health Information (CIHI)/Canadian Joint Replacement Registry (CJRR)

Figure 6-12 Average length of stay for patients with arthritis or a related condition undergoing total hip replacement surgery, by sex and province, Canada, 2000



Source: Canadian Institute for Health Information (CIHI)/Canadian Joint Replacement Registry (CJRR)

Figure 6-13 Average length of stay for patients with arthritis or a related condition undergoing total knee replacement surgery, by sex and province, Canada, 2000

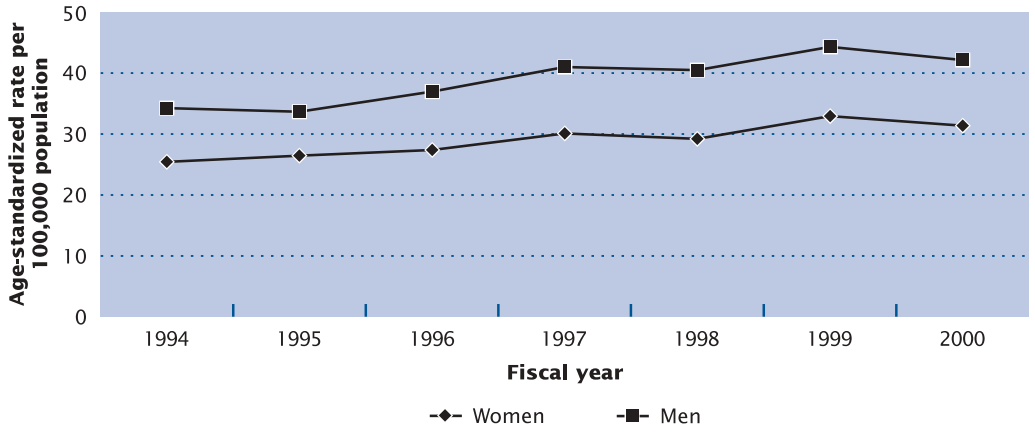


Source: Canadian Institute for Health Information (CIHI)/Canadian Joint Replacement Registry (CJRR)

Other orthopedic procedures

Replacement of other joints was less frequent than that of the hip or knee, probably reflecting the higher prevalence of hip and knee arthritis. Unlike hip and knee replacements, the rate of replacement of other joints was higher among men than women (Figure 6-14). The rate overall increased by more than 20% over time.

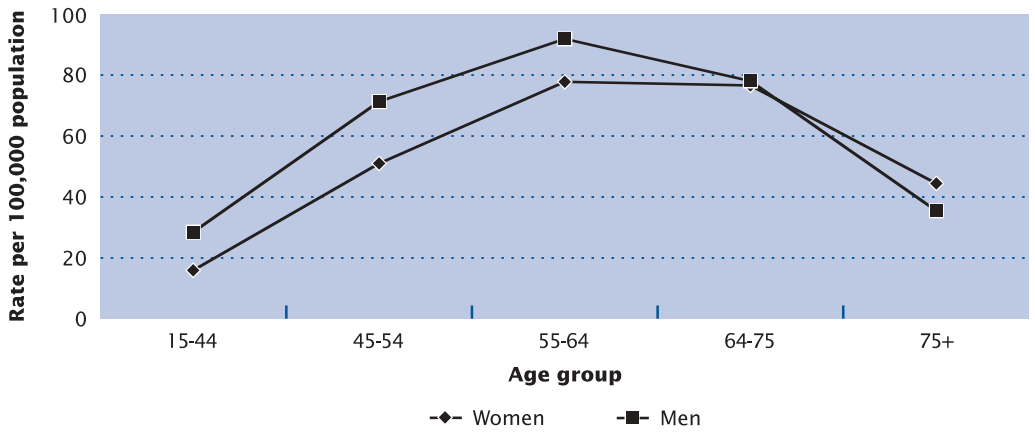
Figure 6-14 Age-standardized rates of other replacements per 100,000 population for selected provinces*, Canada, 1994-2000



* BC, ON & NB only
Source: Canadian Institute for Health Information (CIHI)/Discharge Abstract Database (DAD)

The rate of replacement of joints other than the hip or knee increased with age, peaking in the 55-64 age group. Replacement of other joints was more common in men than in women under 65 years of age but more common in women over 74 years of age (Figure 6-15).

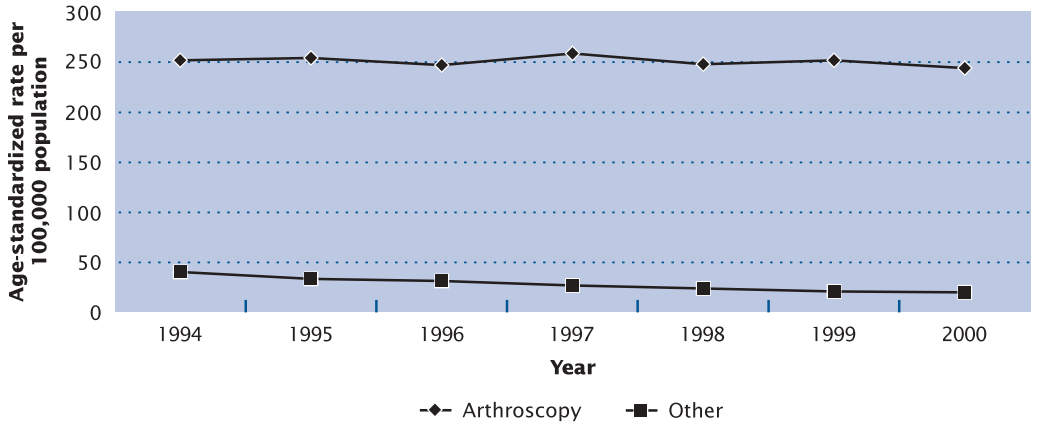
Figure 6-15 Rates of other replacements per 100,000 population for selected provinces*, by age and sex, Canada, 1994-2000



* BC, ON & NB only
Source: Canadian Institute for Health Information (CIHI)/Discharge Abstract Database (DAD)

Between 1994 and 2000, the vast majority of knee procedures, with the exclusion of knee replacements, were performed arthroscopically (Figure 6-16). The rate of arthroscopic procedures remained fairly stable, and the rate of the other knee procedures (inpatient procedures) decreased by one-half.

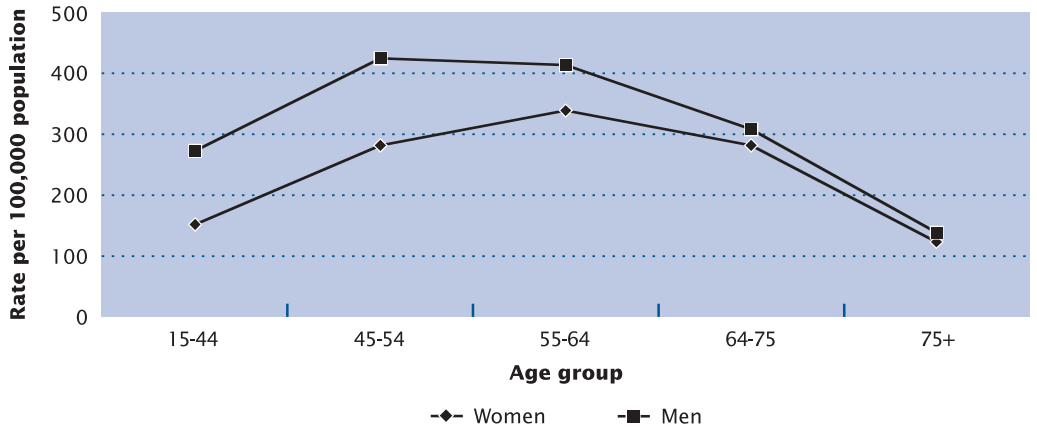
Figure 6-16 Age- and sex-standardized rates of knee procedures (excluding total knee replacements) for selected provinces* per 100,000 population, Canada, 1994-2000



* BC, ON, NB only
Source: Canadian Institute for Health Information (CIHI)/Discharge Abstract Database (DAD)

In 2000, the rate of arthroscopic knee procedures varied with age, peaking in the 55-64 year age group among women and in the 45-54 year age group among men (Figure 6-17). These procedures are often used as surgical management of early arthritis,[5] explaining the high use of these procedures in the younger age groups relative to the other relevant procedures presented. Unlike joint replacements, the rates for arthroscopic knee procedures were greater among men with arthritis and related conditions than women, especially in the younger age groups. The difference between the sexes in the use of these procedures may reflect the greater exposure of males to injury from physically demanding jobs or sports, which is a risk factor for the development of osteoarthritis.

Figure 6-17 Rate of knee arthroscopy per 100,000 population in selected provinces*, by age and sex, Canada, 2000

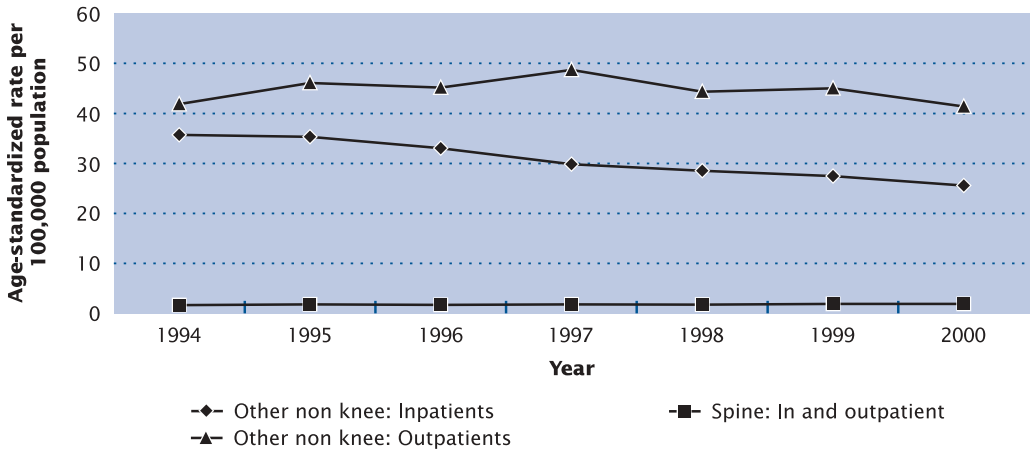


* BC, ON & NB only
Source: Canadian Institute for Health Information (CIHI)/Discharge Abstract Database (DAD)

The rates of arthritis-related spine and other non-knee procedures were much lower than rates of replacement and arthroscopy procedures (Figure 6-18). Rates of spine and other non-knee procedures varied with age, with a general decline in the oldest age groups (Figure 6-19). In most age groups, women recorded higher rates of spine and other non- knee procedures than men.

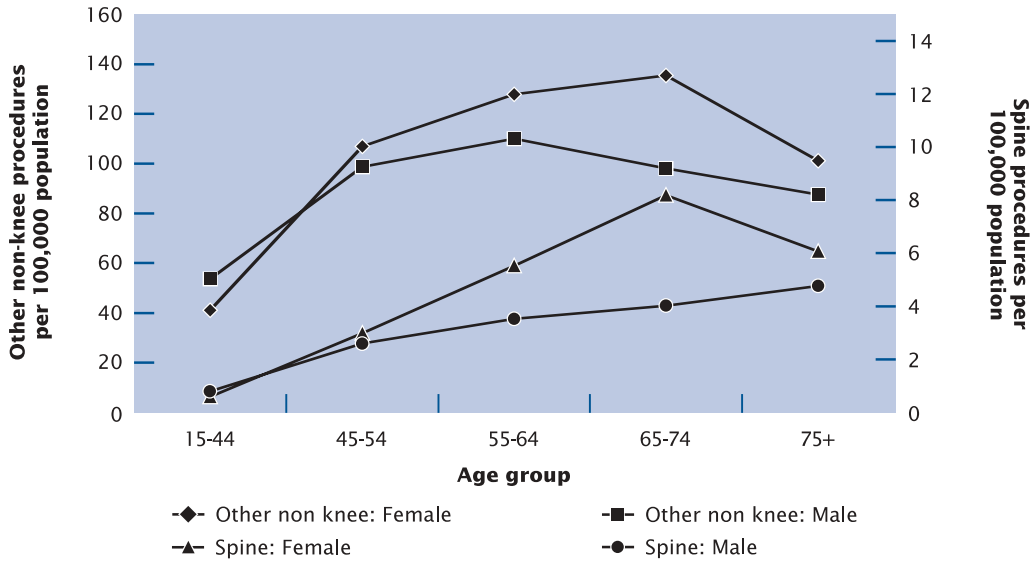
The rates of all procedures varied dramatically by province. Prince Edward Island, New Brunswick and Saskatchewan reported the highest rates of knee arthroscopy, and

Figure 6-18 Age- and sex-standardized rates of spine and other non-knee procedures per 100,000 population for selected provinces*, Canada, 1994-2000



* BC, ON, NB only
Source: Canadian Institute for Health Information (CIHI)/Discharge Abstract Database (DAD)

Figure 6-19 Rate of spine and other non-knee procedures per 100,000 population in selected provinces*, by age and sex, Canada, 2000



* BC, ON, NB only
Source: Canadian Institute for Health Information (CIHI)/Discharge Abstract Database (DAD)

Saskatchewan reported the highest rate of other knee procedures. New Brunswick and Nova Scotia reported the highest rates of non-knee procedures, followed by Saskatchewan and Ontario (Table 6-2).

Across the provinces, other knee procedures varied the most (coefficient of variation = 0.8), and non-knee procedures varied the least (coefficient of variation = 0.3).

Table 6-2 Variation in the age- and sex-standardized rate of selected arthritis relevant procedures performed, by province*, Canada, 2000

Province	Other Replacement (per 100,000)	Knee: Arthroscopy (per 100,000)	Knee: Other (per 100,000)	Spine (per 1 million)	Non-knee: Other (per 30,000)
B.C.	33	255	17	0.76	54
Sask.	66	339	49	0.00	68
Ont.	37	231	21	1.99	70
N.B.	55	377	16	0.81	93
N.S.	53	248	9	0.00	89
Nfld	12	122	2	0.00	57
P.E.I.	0	424	0	0.00	46
Canada*	37	244	20	1.88	67
Coefficient of Variation**	**0.6**	**0.4**	**0.8**	**0.4**	**0.3**

* Excluding AB, MB and QC
** Higher coefficient of variation represents greater variation from the mean.
Source: Canadian Institute for Health Information (CIHI)/Discharge Abstract Database (DAD)

The data regarding all orthopedic procedures covered in this chapter reveal the dramatic variation among the provinces in 2000. No single province had consistently high or low rates across all procedures. The smaller provinces showed the largest deviation from national rates as a result of the small numbers of procedures in these jurisdictions.

Discussion

Between 1994 and 2000, the per capita rate of medical admissions associated with arthritis showed an overall decrease, although this was comparatively less than that of all other admissions. The decrease likely reflects the change in patterns of delivery of care over the last 10 years,[4] which saw the increasing substitution of outpatient for inpatient care for cost containment reasons. In addition, improvements in pharmacological and surgical treatments for arthritis may also explain some of the decrease in hospitalization for its medical consequences.

The number of arthritis-related orthopedic procedures per capita has remained remarkably static since 1994, despite increases in the national prevalence of arthritis (see Chapter 2), the main indication for these procedures.[6] Nevertheless, the total number of both inpatient and outpatient procedures has increased since 1994. The number of inpatient procedures increased modestly (approximately 10%) as a result of a dramatic increase in the number of hip and knee replacements. The number of outpatient procedures increased by just

over 10% and is likely the result of the increased use of the less invasive arthroscopy (key hole surgery) to perform many procedures.

A number of new technologies are emerging in the surgical treatment of arthritis and related disorders. These include new materials technology for the bearing surfaces of hip and knee replacements (cross-linked polyethylene, ceramics and metal bearings). These new bearing surfaces should prolong the service life of joint replacements to beyond 15 years. Additional trends include minimally invasive techniques for knee and hip replacement surgery. In the near future, computer-assisted joint replacement surgery will allow surgeons to implant artificial joints with greater precision and accuracy. The emergence of these and other improved surgical tools for the treatment of arthritis will likely increase the demand for surgery.

In the future, access to surgical procedures may be limited by the availability of resources, including surgeons, anaesthetists, nurses, and operating room space, dissemination of techniques and restrictions on procedure volumes by hospital administrations. Special initiatives aimed at expanding the use of hip and knee replacements in various provinces have had partial success in increasing availability. Nevertheless, long waiting times[7] and unmet need[8] stand as proof that the current level of access does not match demand.

With the exception of hip and knee replacement, there is little consensus about the clinical criteria for the surgical procedures examined in this chapter.[9-11] As a result, it is difficult to assess the appropriateness of either current rates or changes over time. This is particularly relevant for knee arthroscopy, given the particularly high rates in Canada.

The length of waiting times for surgical procedures can provide an indication of excess demand. Several provincial and regional collaborations are developing methods to assist in the management of waiting lists for various types of surgery, although as yet waiting times for any of the orthopedic procedures are not tracked nationally. The Canadian Joint Replacement Registry team at CIHI is developing a pilot study for the collection of waiting times for hip and knee replacement surgery at the national level.

Although hip and knee replacement procedures are slightly more commonly performed on women than men, this does not wholly reflect the greater need among women.[8] The higher prevalence of arthritis among women is only partially reflected in the rates of orthopedic procedures. While the higher rates of joint injury requiring repair among younger men may partially explain this difference for some of the procedures (particularly knee arthroscopy), it does raise the question of gender equity in the use of these services. The higher rate of arthritis-associated medical admissions among women reflected the higher rate of arthritis.

The use of all arthritis and related care increased markedly with age, mirroring the increase in the prevalence of arthritis with age. While the rate of medical admissions continued to climb, however, the rate of orthopedic procedures reached a plateau in the older age groups.

Variation among the provinces in both orthopedic procedures and medical admissions was considerable, even after adjusting for differing age and sex compositions. Variations in the need for surgery are unlikely to account for the large disparity in rates. Many fac-

tors, such as province-specific health service provision and funding, manpower levels,[12] physician reimbursement methods,[13] physician attitudes[14] and expertise, as well as lack of guidelines for the appropriate use of surgical procedures all play a role in the large disparity in rates.

Implications

Despite an increase in the prevalence of arthritis in Canada, overall rates of orthopedic procedures have remained steady. This suggests that the system may be operating at capacity and may not be able to respond to increases in the number of people with arthritis.

Although the rate of hip and knee replacements is increasing, the long waiting times for these procedures indicate that the capacity is insufficient to meet either current or future needs.

The continued development of national and provincial registries related to hip and knee replacement would help ensure complete coverage. If appropriate in scope, such registries could enable tracking of waiting times, patient-based indicators of need, complications after surgery and failure rates of prostheses.

The large provincial variations in rates of surgery for arthritis and related conditions, which are unlikely to be accounted for by differences in factors such as prevalence, suggest unequal access to orthopedic surgery across Canada. The causes of provincial variations and their impact at both the individual and population levels need to be determined.

Currently, the published data on arthroscopic knee surgery for osteoarthritis are unclear on its effectiveness. More research is required in this area to properly define the appropriate indications for these procedures.

The decline in rates of surgery at older ages and sex differences in surgery rates raise issues of inequities in access to care that need to be investigated.

Linking hospitalization data with provincial physician billing data would facilitate better understanding of the processes of arthritis care and the outcomes of surgery.

Chapter 6
Methodological Appendix

Table 6A-1 Arthritis and related diagnoses

ICD-9 Diagnosis Code	
274	Gout
446	Polyarteritis nodosa and allied health conditions
710	Diffuse diseases of connective tissue
711	Arthroplasty associated with infections
713	Arthropathies associated with other disorders classified elsewhere
714	Rheumatoid arthritis and other inflammatory polyarthropathies
715	Osteoarthrosis and allied disorders
716	Other and unspecified arthropathies
717	Internal derangement of the knee
718	Other derangement of joint
719	Other and unspecified disorders of the joint
720	Ankylosing spondylitis and other inflammatory spondylopathies
725	Polymyalgia rheumatica
726	Peripheral enthesopathies and allied syndromes
727	Other disorders of synovium, tendon and bursa
728	Disorders of muscle, ligament and fascia
729	Other disorders of soft tissues
739	Other diseases of the MSK system and connective tissue

Table 6A-2 Arthritis relevant orthopedic surgical procedure CCP codes

CCP Code	Procedure	CCP Code	Procedure
Joint Replacement (Primary and Revision)			
Hip Replacements			
9359	Total hip replacement	9353	Revision of hip replacement
9351	Total hip replacement w. methyl methacrylate	9359	Revision of hip replacement
9352	Revision of hip replacement		
Knee Replacements			
9340	Revision of total knee replacement	9341	Total knee replacement
Other Joint Replacements			
9348	Total ankle replacement	9387	Arthroplasty of carpals without synthetic prosthesis
9331	Arthoplasty of foot & toe w. synthetic prosthesis	9381	Total shoulder replacement
9339	Other arthroplasty of foot and toe	9384	Arthroplasty of elbow with synthetic prosthesis

Table 6A-2 Arthritis relevant orthopedic surgical procedure CCP codes

CCP Code	Procedure	CCP Code	Procedure
9371	Arthroplasty of hand/finger w. synthetic prosthesis	9385	Other repair of elbow
9386	Arthroplasty of carpals with synthetic prosthesis		
Knee Procedures[I]			
9245	Synovectomy	9322	Arthrodesis of knee
9285	Arthroscopy	9205	Arthrotomy for removal of prosthesis
8925	Wedge osteotomy	9215	Other arthrotomy
9225	Division of joint capsule, ligament, or cartilage	9232	Excision of semilunar cartilage of knee
9265	Other excision of joint		
Spine Procedures			
9301	Atlas-axis spinal fusion	9307	Lumbosacral spinal fusion
9302	Other cervical spinal fusion	9308	Refusion of spine
9305	Other dorsolumbar spine fusion	9309	Other spine fusion
Other Joint Procedures[II]			
8920	Wedge osteotomy – scap/clav/thor	9204	Arthrotomy/removal of prosthetic hip
8921	Wedge osteotomy – humerus	9206	Fusion/arthrodesis – interphalangeal fusion
8922	Wedge osteotomy – radius and ulna	9214	Other arthrotomy – hip
8923	Wedge osteotomy – carpal/metacarp	9224	Division of joint various – hip
8926	Wedge osteotomy – tibia/fibula	9240	Synovectomy of shoulder
8927	Wedge osteotomy – tarsus/metatarsus	9241	Synovectomy of elbow
8928	Wedge osteotomy – tarsus/metatarsus	9242	Synovectomy of wrist
8929	Wedge osteotomy of unspecific site	9243	Synovectomy of hand/finger
9200	Arthrotomy for removal of prosthesis in shoulder	9244	Synovectomy of hip
9201	Arthrotomy for removal of prosthesis elbow	9246	Synovectomy of ankle
9202	Arthrotomy for removal of prosthesis wrist	9247	Synovectomy of foot/toe
9203	Arthrotomy for removal of prosthesis hand/finger	9248	Synovectomy of other site
9207	Arthrotomy for removal of prosthesis of foot/toe	9249	Synovectomy of unspecific site
9208	Arthrotomy – prosthesis removal, site non-specific	9264	Other excision – hip
9209	Arthrotomy – prosthesis removal, site non-specific	9280	Arthroscopy of shoulder
9210	Other arthrotomy – shoulder	9281	Arthroscopy of elbow
9211	Other arthrotomy – elbow	9282	Arthroscopy of wrist
9212	Other arthrotomy – wrist	9283	Arthroscopy of hand/finger
9213	Other arthrotomy – wrist	9284	Arthroscopy – hip
9216	Other arthrotomy – ankle	9286	Arthroscopy of ankle
9217	Other arthrotomy – foot/toe	9287	Arthroscopy of foot/toe
9218	Other arthrotomy – other spec site	9288	Arthroscopy of other specific site

Table 6A-2 Arthritis relevant orthopedic surgical procedure CCP codes

CCP Code	Procedure	CCP Code	Procedure
9219	Other arthrotomy in an unspecific site	9289	Arthroscopy of unspecific site
9220	Division of joint various – shoulder	9311	Ankle fusion
9221	Division of joint various – elbow	9312	Fusion/arthrodesis – triple
9222	Division of joint various – wrist	9313	Fusion/arthrodesis – subtalar fusion
9223	Division of joint various – hand/finger	9314	Fusion/arthrodesis – midtarsal fusion
9226	Division of joint various – ankle	9315	Fusion/arthrodesis – tarsometatarsal fusion
9227	Division of joint various – foot/toe	9316	Fusion/arthrodesis – metatarsophalangeal fusion
9228	Division of joint various – other specific site	9317	Fusion/arthrodesis – other fusion of the foot
9229	Division of joint various – unspecific joint	9318	Fusion/arthrodesis – other fusion of the toe
9260	Other excision – shoulder	9321	Arthrodesis – hip
9261	Other excision – elbow	9323	Fusion/arthrodesis – shoulder
9262	Other excision – wrist	9324	Fusion/arthrodesis – elbow
9263	Other excision – hand/finger	9325	Fusion/arthrodesis – carporadial fusion
9266	Other excision – ankle	9326	Fusion/arthrodesis – metacarpal fusion
9267	Other excision – foot/toe	9327	Fusion/arthrodesis – metacarpophalangeal fusion
9268	Other excision – other specific site	9328	Fusion/arthrodesis – interphalageal fusion
9269	Other excision – unspecific joint	9329	Fusion/arthrodesis – unspecified joints
9392	Injection – substance into joint or ligament		
8924	Wedge osteotomy – femur		

I Excludes if coded with hip or knee replacement codes
II Excludes if coded with any knee procedure codes or any hip replacement codes

Data Quality Issues

Systematic differences in coding practices among provinces may limit the interpretation of provincial variations in hospital admissions and surgical procedures for arthritis and related conditions. Detailed coding of diagnosis by some provinces would overestimate the rate of arthritis and related admissions/surgeries in comparison to provinces that systematically record fewer diagnoses. Systematic variation in coding practices by province may also be the result of provincial differences in remuneration practices (such as the use of complexity scores for reimbursement purposes). In addition, coding practices may change over time. For example, as the non-articular manifestations of arthritis or its treatment are increasingly recognized, arthritis is more likely to be coded as a contributing diagnosis for medical admissions. The abstracting system (system of recording data from hospitals) in Manitoba and Quebec differs from that of other provinces. As a result, moderate interprovincial comparisons involving these two provinces must be interpreted with caution.

Provincial differences involving infrequently performed procedures in the smaller provinces should also be interpreted with caution, since small coding errors or minor changes in

practices could result in large differences in rates. Trends in surgical procedures draw only on available data from Ontario, British Columbia and New Brunswick and may not, therefore, reflect all of Canada.

Technical Methods

Data Sources: Information was extracted from both the CIHI* Discharge Abstract Database (DAD) and Hospital Morbidity Database (HMDB), and the Canadian Joint Replacement Registry.

Arthritis and Related Orthopedic Surgical Procedures: A list of approximately 130 ICD-9-CM arthritis-related orthopedic procedures was devised in consultation with a practising orthopedic surgeon (NNM). These procedures were categorized into three groups based on the frequency of the procedure and the joint involved (see Table 6A-1).

Arthritis and Related Diagnosis: Only individuals with an ICD-9 based diagnosis for arthritis or a related condition (see Table 6A-2) in any one of the available diagnosis fields were included in the analysis.

Surgical Procedures: The patient's sex, year of birth, province of residence, discharge date, ICD-9 based diagnoses, up to 10 surgical procedure codes (CCP) and patient facility (inpatient or outpatient) were extracted from DAD for fiscal years 1994/95 to 2000/01 for episodes that involved at least one arthritis-related orthopedic surgical procedure.

Hospital Admissions: The patient's sex, year of birth, province of residence, discharge date, ICD-based diagnoses and surgical procedure flag [ccp-proc-code1-12] were extracted from HMDB for fiscal years 1994/95 to 2000/01. All admissions for obstetric deliveries were excluded (using the ICD-9 diagnostic codes 650,651,652,653,654,655, 656,657,658,659 in any of the 16 diagnosis fields).

Exclusions: All analysis in this chapter excluded the following: non-acute care cases, individuals under the age of 15 years (except for total hip and knee replacement data, which included all ages), entries with serious coding errors, newborn cases, cases with invalid health card numbers and admissions to international institutions. For data by province, age or sex, cases with no known province of residence, age or sex respectively were excluded. For surgical procedures other than hip and knee replacement, cases were excluded if the procedure was cancelled, or if it was coded as occurring before admission or in another hospital.

Analysis: Data from both DAD and HMDB were stratified by province, fiscal year, age (groups: 15-44 [< 45 for hip and knee replacements], 45-54, 55-64, 64-74, and 75+ years) and sex. Surgical procedures were further stratified by procedure group. Geographical location was determined using patient residence, except for length-of-stay data that used the location where the procedure took place.

* Parts of this material are based on data and information provided by CIHI. However, the analyses, conclusions, opinions and statements expressed herein are those of the authors and not necessarily of CIHI.

Coefficient of variation, used to quantify variation in surgery rates among provinces, is the ratio of the standard deviation of the rates of procedures across the provinces to the mean rate – i.e., the rate for Canada.

Since only Ontario, New Brunswick and British Columbia have consistently submitted data to DAD since 1994, time trends in the number and rate of orthopedic procedures draw on data from only these three provinces. By 2000, data were available for all of Canada excluding Manitoba, Alberta and Quebec. Canadian totals for the year 2000 include data from the available regions.

References

1. Girard F, Guillemin F, Novella JL, Valckenaere I, Krzanowska K, Vitry F, et al. *Health-care use by rheumatoid arthritis patients compared with non-arthritic subjects*. Rheumatology 2002;41:167-75.
2. Gabriel SE, Crowson CS, Campion ME, O'Fallon WM. *Direct medical costs unique to people with arthritis*. J Rheumatol 1997;24:719-25.
3. Gabriel SE, Crowson CS, Campion ME, O'Fallon WM. *Indirect and nonmedical costs among people with rheumatoid arthritis and osteoarthritis compared with nonarthritic controls*. J Rheumatol 1997;24:43-8.
4. Anderson RB, Needleman RD, Gatter RA, Andrews RP, Scarola JA. *Patient outcome following inpatient vs outpatient treatment of rheumatoid arthritis*. J Rheumatol 1988;15:556-60.
5. Hunt SA, Jazrawi LM, Sherman OH. *Arthroscopic management of osteoarthritis of the knee*. J Am Acad Orthop Surg 2002;10:356-63.
6. Ostendorf M, Johnell O, Malchau H, Dhert WJ, Schrijvers AJ, Verbout AJ. *The epidemiology of total hip replacement in The Netherlands and Sweden: present status and future needs*. Acta Orthop Scand 2002;73:282-6.
7. Esmail N, Walker M. *Waiting Your Turn: Hospital Waiting Lists in Canada,* 12th edition. Vancouver: Fraser Institute, 2002.
8. 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;342:1016-22.
9. 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;347:81-8.
10. 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;8:412-8.
11. 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;46:100-8.
12. Coyte PC, Hawker G, Wright JG. *Variations in knee replacement utilization rates and the supply of health professionals in Ontario, Canada*. J Rheumatol 1996;23:1214-20.
13. Naylor CD. *Variations in surgical services over time and by site of residence*. In: Naylor CD, Anderson GM, Goel V, editors. *Patterns of health care in Ontario*. Toronto: Institute for Clinical Evaluative Sciences, 1994;69-124.
14. Wright JG, Hawker GA, Bombardier C, Croxford R, Dittus RS, Freund DA, et al. *Physician enthusiasm as an explanation for area variation in the utilization of knee replacement surgery*. Med Care 1999;37:946-56.

GLOSSARY

Data Sources

Canadian Community Health Survey (CCHS) CYCLE 1.1, 2000-2001 – Statistics Canada

The CCHS is a cross-sectional general population health survey that collects information related to health status, health care utilization and health determinants for the Canadian population. The CCHS (Cycle 1.1) has a large sample and was designed to provide reliable estimates down to the health region level.

The target population of the CCHS was people aged 12 years or older who were living in private dwellings in the 10 provinces and three territories. People living on Indian Reserves or Crown lands, clientele of institutions, full-time members of the Canadian Armed Forces and residents of certain remote regions were excluded. The overall response rate was 84.7%, and 130,827 individuals participated. Data for people aged 15 years and over were included in Chapter 2. All analyses performed on the CCHS data were weighted in order to ensure that derived estimates were meaningful or representative of the entire targeted Canadian population 15 years of age and older.

Canadian Joint Replacement Registry (CJRR) – Canadian Institute for Health Information (CIHI)

The CJRR is maintained by CIHI, which captures information on hip and knee joint replacements performed in Canada and follows joint replacement patients over time to monitor their revision rates and outcomes. Data are collected with patients' consent at the time they receive joint replacements and are submitted voluntarily by participating facilities and provincial registries (where established). This database contains data on hip and knee replacement patients. The database includes demographic and administrative information, the type of replacement, surgical approach, fixation modes and implant types.

Annual Mortality Data – Statistics Canada

Statistics Canada's annual mortality database is an administrative database that collects information annually from all provincial and territorial vital statistics registries on all deaths in Canada. Under a federal-provincial agreement, the registration of deaths is the responsibility of the provinces and territories. In most provinces and territories, the personal information part of the death registration form is completed by an informant, usually a relative of the deceased. The part of the form comprising the medical certificate of death is completed by the medical practitioner last in attendance or, if an inquest or enquiry was held, by the coroner. The database includes demographic information and the underlying cause of death as defined by the physician.

Discharge Abstract Database (DAD) – Canadian Institute for Health Information (CIHI)

DAD is maintained by CIHI. DAD contains data on hospital discharges across Canada and includes demographic, administrative and clinical data for hospital discharges (inpatient acute, chronic, rehabilitation) and day surgeries. CIHI receives data directly from participating hospitals. These include all hospitals in every province and territory, except Quebec and parts of Manitoba. Coverage represents roughly 75% of all hospital inpatient discharges in Canada, or about 4.3 million records annually.

Hospital Morbidity Database (HMDB) – Canadian Institute for Health Information (CIHI)

HMDB is maintained by CIHI and provides a count of patients separated (through discharge or death) from a hospital, listed by the primary morbidity (disease) diagnosed. In addition to demographic and administrative information, the database contains up to 16 diagnostic codes and some procedure codes. Data are downloaded from the Discharge Abstract Database (DAD) for participating provinces. Data files for the remaining provinces/territories are submitted by the appropriate provincial or territorial ministry of health. Data are received from general and allied special hospitals, including acute care, convalescence and chronic facilities (except in Ontario). Data do not include any outpatient services in any hospital, or services in psychiatric hospitals.

National Population Health Survey (NPHS) – Statistics Canada

Statistics Canada conducts the NPHS, a cross-sectional and longitudinal household-based survey, every two years. Designed to collect information about the health status of Canadians, the NPHS expands our knowledge of the determinants of health, including health behaviour, use of health services and socio-demographic information. It is composed of three components: the Household survey, the Health Care Institutions survey and the Northern Territories survey. The first cycle of data collection began in 1994.

The Household component includes household residents in all provinces, with the principal exclusion of populations on Indian Reserves, Canadian Forces Bases and some remote areas in Quebec and Ontario. The target population consists of household residents in all provinces, except people living on Native reserves, on Canadian Forces bases, or in some remote areas. The survey has specific components for individuals living in institutions (long-term residents of hospitals and residential care facilities) and in the territories.

Definitions

Aboriginal People Living Off-Reserve

> The CCHS used the following question to define the Aboriginal population in Canada: "People living in Canada come from many different cultural and racial backgrounds. Are you…Aboriginal People of North America?" CCHS data do not include Aboriginal people living on reserves and settlements. Analyses were

carried out comparing those with arthritis in both the off-reserve Aboriginal and non-Aboriginal populations.

Activity Limitations

Respondents to the 2000 CCHS were asked, "Because of a long-term physical or mental condition or a health problem, are you limited in the kind or amount of activity you can do: at home? at school? at work? in other activities?" (Yes/No).

Age-standardized Rates

The age-standardized rate represents what the crude rate would be if the population under study had the age distribution of the standard population. It is the weighted average of age-specific rates applied to a standard distribution of age.

Alternative or Complementary Medicine

Respondents to the 2000 CCHS were asked whether, in the previous 12 months, they had seen or talked to an alternative health care provider such as

- an acupuncturist;
- a homeopath; or
- a massage therapist

about physical, emotional or mental health. (Yes/No).

Body Mass Index (BMI)

BMI is calculated as weight in kg divided by height in m^2.

Chronic Conditions

The 2000 CCHS defined long-term conditions as those that have lasted or are expected to last six months or more and that have been diagnosed by a health professional. These included food allergies, any other allergies, asthma, fibromyalgia, arthritis or rheumatism (excluding fibromyalgia), back problems (excluding fibromyalgia and arthritis), high blood pressure, migraine headaches, chronic bronchitis, emphysema or chronic obstructive pulmonary disease (asked of those aged 30+), diabetes, epilepsy, heart disease, cancer, stomach or intestinal ulcers, effects of a stroke, urinary incontinence, bowel disorder such as Crohn's disease or colitis, Alzheimer's disease or any other dementia (asked of those aged 18+), cataracts (asked of those aged 18+), glaucoma (asked of those aged 18+), thyroid condition, Parkinson's disease, multiple sclerosis, chronic fatigue syndrome, multiple chemical sensitivities, any other long-term condition.

Depression

A subset of items from the Composite International Diagnostic Interview (CIDI) that measure major depressive episode, where the score is translated into a probability of "caseness" of depression. A score of ≥ 0.25 is considered to be indicative of a case depression.

Disability Days

The number of days in the previous 14 days in which the respondent to the 2000 CCHS reported spending all or part of the day in bed or, because of illness or injury, having to reduce activities normally performed during the day.

Education

Highest level of education attained, coded as less than secondary school graduation, secondary school graduation, some post-secondary or post-secondary graduation.

Health-adjusted Life Expectancy (HALE)

HALE is a measure of population health that takes into account both mortality and morbidity. HALE adjusts overall life expectancy, or life years lived according to the amount of time spent in less-than-perfect health or with disability. It sheds more meaning on longer life by determining whether an increase in the average lifespan is accompanied by better quality of life.

Health Care Provider Visits

The number of times in the previous 12 months that the respondent to the 2000 CCHS had seen or talked on the telephone about physical, emotional or mental health with a family doctor or general practitioner; any other medical doctor (such as a surgeon, allergist, orthopedist, gynecologist or psychiatrist) (referred to as a specialist); a nurse for care or advice; a chiropractor or a physiotherapist; a social worker or counsellor; or a psychologist.

Health Utility Index (HUI)

A generic health status measure designed to assess both quantitative and qualitative aspects of life, with scores ranging from 0.0 (worst health state, death) to 1.0 (best state, full health). HUI provides a description of an individual's overall functional health based on eight attributes: vision, hearing, speech, mobility (ability to get around), dexterity (use of hands and fingers), cognition (memory and thinking), emotion (feelings), pain and discomfort. The responses are weighted, and the derived score describes the individual's overall functional health status: a score < 0.830 was taken to indicate disability.

Help with Daily Activities

Using data from the CCHS, recoded for this report as needing help with at least one domestic activity (preparing meals and/or shopping for groceries and/or other necessities and/or housework), personal care (washing, dressing or eating and/or moving about in the house) or heavy household chores, versus needing no help.

ICD

International Classification of Diseases - 9th Revision, 1977.

Incidence

The number of instances of illness commencing, or of persons falling ill, during a given period in a specified population.

Income

For this report, a 5-level total household income variable designated by Statistics Canada was grouped into two categories. The lowest/lower middle/middle income category was defined as a household income of ≤ $29,999, ≤ $39,999 or ≤ $59,999 if there were 1-2, 3 or 4, or 5+ people in the household respectively. Otherwise, the household income was categorized as upper middle/highest income.

Medication Use

Information on medication use was taken from the National Population Health Survey (NPHS) 1998/99. Data are presented for people who reported taking in the previous month:

- Pain relievers such as Aspirin or Tylenol (including arthritis medicine and anti-inflammatories);
- Anti-depressants; and
- Codeine, Demerol or morphine.

Overweight

Body mass index (BMI) ≥ 27, which was the accepted Canadian standard at time of analysis. Health Canada has since revised its standards with a BMI ≥ 25 indicating overweight, however. The 2000 CCHS calculated BMI only for individuals 64 years of age and under, excluding pregnant women.

Pain

Respondents to the 2000 CCHS were asked to identify which of the following four categories best described their situation with respect to pain: no pain or discomfort, mild pain, moderate pain, or severe pain.

Physical Activity Index

The energy expenditure (EE) in leisure activities* was estimated using the frequency and time per session of the physical activity as well as its MET value, a value of metabolic energy cost expressed as a multiple of the resting metabolic rate. The index was recoded with EE < 1.5 identified as "inactive" versus all other levels.

* Walking for exercise, gardening or yard work, swimming, bicycling, popular or social dance, home exercises, ice hockey, ice skating, in-line skating or rollerblading, jogging or running, golfing, exercise class or aerobics, downhill skiing or snowboarding, bowling, baseball or softball, tennis, weight-training, fishing, volleyball, basketball and other.

Prevalence

The number of instances of a given disease or other condition in a given population at a designated time. The term usually refers to the situation at a specified point in time.

Self-perceived Unmet Health Care Needs

Respondents to the 2000 CCHS were asked "During the past 12 months, have you felt that health care was needed but not received?" (Yes/No).

Self-rated Health

Respondents to the 2000 CCHS were asked to rate their health as either "excellent", "very good", "good", "fair" or "poor". Respondents were also asked to rate their health as compared with one year earlier (better, same, or worse).

Stress

The perceived amount of stress in daily life (not at all stressful, not very stressful, a bit stressful, quite a bit stressful, and extremely stressful).