THE IMPACT OF ARTHRITIS IN CANADA: TODAY AND OVER THE NEXT 30 YEARS

Fall, 2011

Arthritis Alliance of Canada
Alliance de l'arthrite du Canada

The Impact of Arthritis in Canada: Today and Over the Next 30 Years is available at www.arthritisalliance.ca.

Alternative formats are available upon request.

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List of Abbreviations

BC	British Columbia
Biologics	Biologic Response Modifiers
BMI	Body Mass Index
CATCH	The Canadian Early Arthritis Cohort
CCHS	Canadian Community Health Survey
CHAPS	Community Hypertension and Arthritis Project Study
CIHI	Canadian Institute for Health Information
CTUMS	Canadian Tobacco Use Monitoring Survey
DMARDs	Disease-Modifying Anti-Rheumatic Drugs (includes traditional DMARDs such as Methotrexate and new Biologic Response Modifiers)
DMARD-IR	DMARD- Inadequate Responders
HAQ	Health Assessment Questionnaire
NPHS	National Public Health Survey
OA	Osteoarthritis
ON	Ontario
PHAC	Public Health Agency of Canada
RA	Rheumatoid arthritis
TJR	Total joint replacement
WOMAC	Western Ontario and McMaster Universities Osteoarthritis Index

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Executive Summary

The Impact of Arthritis in Canada: Today and Over the Next 30 Years

Arthritis is a chronic disease that has a devastating and debilitating effect on the lives of more than 4.6 million Canadians. Arthritis brings with it a burden of pain and disability that those living with this disease have to face every day. The main symptoms of arthritis are joint pain, stiffness and swelling, which result in significant disability and poor quality of life.

Arthritis is costly to society—in both personal and economic terms. It is the most common cause of disability in Canada resulting in both poor quality of life and workplace limitations. The disease has a significant impact on costs to both the public health care system and the economy. Without a doubt, arthritis' greatest burden is on the personal lives of those living with the condition and on the lives of their families.

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The Impact of Arthritis in Canada: Today and Over the Next 30 Years focuses on two forms of arthritis, osteoarthritis and rheumatoid arthritis, but these are only part of the larger family of arthritis and musculoskeletal diseases, a family that numbers in excess of 100 separate conditions:

1. Osteoarthritis (OA) is a progressive joint disease that occurs when damaged joint tissues are unable to normally repair themselves resulting in a breakdown of cartilage and bone. OA, the most common of arthritis, affects 1 in 8 (13%) Canadians and has a significant impact on long-term disability and the Canadian labour force.
2. Rheumatoid arthritis (RA) is the most common inflammatory joint disease. While it affects all age groups, more than one half of all new cases occur between the ages of 40 and 70 years. RA affects an estimated 0.9% of the Canadian population. Within ten years of the onset of the disease, up to 50% of people living with RA are work disabled if untreated. For those living with RA, related inflammation in the arteries result is an increased risk of mortality. Today, effective RA treatments exist, which can change these outcomes.

The goals of the report are to better understand the burden of arthritis on Canadians living with the disease today and over the next 30 years and to investigate the potential impact of targeted arthritis interventions to mitigate this burden.

Four targeted interventions thought to offer the greatest return on public investment are examined in the report: three for OA and one for RA, as follows:

Osteoarthritis (OA)

1. Total joint replacement (TJR) intervention
2. Reduction of obesity rates in Canada
3. Adequate pain management strategies

Rheumatoid arthritis (RA)

4. Early diagnosis and treatment with cost-effective Disease Modifying Anti-Rheumatic Drugs (DMARDs) and for those who do not respond to traditional DMARDs, access to Biologic Response Modifiers (Biologics),

There will be a new diagnosis of OA **every 60 seconds**, resulting in almost 30% of the employed labour force (one in three workers) having difficulty working due to OA.

The Human Burden of Arthritis

Findings from *The Impact of Arthritis in Canada: Today and Over the Next 30 Years* indicate that the burden of arthritis in Canada is expected to have significant consequences in terms of health and costs on Canadians today and over the next 30 years.

There are currently more than 4.4 million people living with OA. Within a generation (in 30 years), more than 10 million (or one in four) Canadians are expected to have OA. There will be a new diagnosis of OA every 60 seconds, resulting in almost 30% of the employed labour force (one in three workers) having difficulty working due to OA. In addition, approximately 500,000 Canadians will be suffering with moderate to severe disability due to OA.

Today, more than 272,000 people are living with RA, comprising 0.9% of the Canadian adult population, which will increase to 1.3% over the next 30 years. Approximately 0.74% of the employed labour force, or 1 in 136 workers is suffering from RA. Within a generation, this will increase to 1.5%, or 1 in 68 workers

Approximately 0.74% of the employed labour force, or 1 in 136 workers is suffering from RA.

There is hope, however. The evidence presented in this report illustrates examples of key interventions and strategies, that if implemented would result in significant direct cost savings of valuable health care dollars and indirect cost savings to the economy, and more importantly, reduce the burden and consequences of the disease on Canadians living with arthritis.

Potential Interventions/Strategies for Managing the Burden of Arthritis

Total Joint Replacement (TJR) for OA

The long-term impacts (2010–2040) of enhanced access to TJR would result in **cumulative savings of more than $17 billion** to Canadian society over the next 30 years, which is a reduction of $3 billion in health care costs (direct costs) and $14 billion in wage-based productivity costs (indirect costs).

Reduction of Obesity Rates in Canada

The impact of programs resulting in weight reduction among the obese (BMI ≥30) population in Canada would lead to the prevention of more than 200,000 new cases of OA over the next 30 years with **cumulative savings of more than $212 billion** to Canadian society, which is a reduction of $48 billion in direct costs and $164 billion in indirect costs. Further research is needed to improve on current strategies for preventing and treating obesity.

Pain Management Strategies for OA

The potential impact of adequate pain management strategies on OA would result in **cumulative savings of $488 billion** over the next 30 years, which is a reduction of nearly $41 billion in direct costs and $447 billion in indirect costs. Today, pain management strategies are inadequate, investment in research is essential in order to achieve these savings.

Early Diagnosis and Treatment and Access to Disease Modifying Anti-Rheumatic Drugs (DMARDs) for RA

Early diagnosis and treatment of RA with cost effective DMARD and for those who do not respond to traditional DMARDs, access to Biologic therapy, would result in **cumulative savings of almost $39 billion** to Canadian society over the next 30 years, which is a reduction of over $5 billion in direct costs and nearly $34 billion in indirect costs.

This report identifies proven and effective interventions (total joint replacement for OA and access to diagnosis and treatment with DMARDs therapy for RA) that require urgent implementation. It also identifies two other intervention strategies for OA (reduction in population obesity rates and effective pain management) that have the potential to significantly reduce the burden of arthritis in Canada; however, further research is required to identify the best treatment strategies for these interventions.

Next Steps: Developing a National Framework for Arthritis

The four interventions outlined are only the beginning. Based on the findings of *The Impact of Arthritis in Canada: Today and Over the Next 30 Years*, the Arthritis Alliance of Canada will build the outline for a comprehensive National Framework for Arthritis. The framework will:

1. Identify principles to guide the design and delivery of more efficient and effective care;
2. Devise effective disease prevention strategies;
3. Propose an ongoing mechanism for the arthritis community to dialogue with governments and the broader healthcare community; and,
4. Establish research priorities and strategies to support ongoing improvements in the quality of arthritis care and prevention.

Solutions are possible for people living with arthritis. If nothing is done, the 4.6 million Canadians currently bearing the burden of this chronic disease will continue to live in pain. Implementation of the interventions outlined in this report, along with other targeted initiatives, can make a difference. The arthritis community is already collaborating towards the development and implementation of these potential solutions. It is only with the collaboration of all stakeholders, including governments and the broader healthcare community, however, that success can be achieved. All stakeholders are invited to contribute to the development and implementation of a National Framework for Arthritis.

NOW IS THE TIME.

If nothing is done, the
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Introduction

Arthritis and musculoskeletal conditions are the most common chronic health conditions in Canada today, affecting over 4.6 million Canadians.[1-3] Arthritis encompasses over 100 different conditions and is the leading cause of limited function and long-term disability in Canada.[4-8]

Arthritis knows no age limits. Although it is one of the major reasons why people over 65 years of age visit their family physicians, arthritis can strike children and adults of all ages.

Arthritis has been shown to be costly to society—in both personal and economic terms.[7,8] It results in both activity and workplace limitations.[3] Due to increased longevity, reduced physical activity, increasing obesity and lack of access to timely health care, the burden of arthritis in the population is increasing. This has significant impact on costs to both the health care system and the economy. But without a doubt, its greatest burden is on the personal lives of Canadians living with arthritic conditions and on the lives of their families. Arthritis sufferers often require assistance to perform daily activities, including getting out of bed, dressing, eating and personal care.[5] They often face both the inability to work and/or to live independently and the disappointment of lost opportunities.

Strategies must be developed to reduce the burden of arthritis on Canada's population. Unless these strategies are developed immediately, arthritis will place even greater stress on the health care system—and more importantly, will continue to destroy lives—in the years to come.

Goals and Objectives of *The Impact of Arthritis in Canada: Today and Over the Next 30 Years*

The Impact of Arthritis in Canada: Today and Over the Next 30 Years is one element of the Arthritis Alliance of Canada's ongoing efforts toward the development of strategies to reduce the burden of arthritis in Canada.

The goals of the report are to improve understanding about the burden of arthritis today and its anticipated impact over the next 30 years, and to investigate the potential impact of targeted arthritis interventions to mitigate the burden.

Specifically, the report's objectives are to:

- Simulate the incidence, prevalence and mortality rates of osteoarthritis (OA) in Canada and its economic burden over the next 30 years, using the RiskAnalytica Life at Risk platform. The greatest risk factors for OA are aging (non-modifiable) and obesity (modifiable);

- Simulate the incidence, prevalence and mortality rates of rheumatoid arthritis (RA) in Canada and its economic burden over the next 30 years, using the RiskAnalytica Life at Risk platform. The greatest risk factors for RA are aging (non-modifiable) and smoking (modifiable); and
- Contrast current patterns of diagnosis and treatment for OA and RA with specific targeted interventions aimed at reducing their burden over the next 30 years.

OA is a progressive joint disease that occurs when damaged joint tissues are unable to normally repair themselves resulting in a breakdown of cartilage and bone.[9] The most commonly affected joints include the hands and weight-bearing joints (hips, knees, feet and spine).[10] It is more common with age—but it is not a normal condition of aging.[3] OA was chosen as one of the diseases to be modeled because it is the most common form of arthritis and has a significant impact on long-term disability and on the Canadian labour force: 1 in 8 Canadians have OA and almost everyone over 65 years of age has OA in at least one joint.[11] Three interventions were modeled for OA:

- Provision of total joint replacement (TJR) surgery of the hip and knee to individuals with need;
- Significant reduction in obesity rates (BMI ≥ 30) in the population (50% decrease); and
- Adequate pain management for individuals with symptomatic hip and knee OA.

RA is the most common inflammatory arthritis in Canada, with 0.9% of Canadians living with RA. RA causes significant disability: within ten years of the onset of disease, up to 50% of people with RA are work disabled if left untreated.[12] While RA affects all ages, more than one half of all new cases are diagnosed between the ages of 40 and 70 years. RA related inflammation in the arteries result is an increased risk of mortality. On average, the life expectancy of someone with RA is 10 years less than the general population. In recent years, research has shown that early diagnosis and early access to medications (DMARDs) will improve the outcomes of the disease, prevent disability and reduce mortality.[13-16] DMARDs are medications used to treat arthritis and other rheumatic conditions by reducing inflammation and slowing disease progression.[17] New guidelines in the treatment of RA, to be released by the Canadian Rheumatology Association, reflect these new strategies and should be implemented.

Within ten years of the onset of disease, up to 50% of people with RA are work disabled if left untreated.

The fourth intervention focused on RA:

- Early diagnosis and access to cost-effective Disease-Modifying Anti-Rheumatic Drugs (DMARDs) and, for those who do not respond to traditional DMARDs, access to Biologic Response Modifiers (Biologic) therapy.

Two Reports—Two Approaches—One Future

The Impact of Arthritis in Canada: Today and Over the Next 30 Years is the second of two major reports about arthritis in Canada to be published in recent years. Both enhance the knowledge of arthritis in this country and will contribute to the development of the National Arthritis Framework.

In July 2010, the Public Health Agency of Canada (PHAC) released *Life with Arthritis in Canada: A Personal and Public Health Challenge*, the second national surveillance report on arthritis. *Life with Arthritis* provides an overview of arthritis in the Canadian population and suggests approaches for reducing the risk and adverse consequences of the disease. Using publicly available health care utilization databases, such as those held by the Canadian Institute for Health Information (CIHI), and population-based surveys, such as the Canadian Community Health Survey (CCHS), *Life with Arthritis in Canada* reported on arthritis as a whole, with no specific focus on either OA or RA. It is available at: http://www.phac-aspc.gc.ca/cd-mc/arthritis-arthrite/lwaic-vaaac-10/index-eng.php.

In contrast, *The Impact of Arthritis in Canada: Today and Over the Next 30 Years* uses clinical, survey and administrative data from cohorts of patients living with a diagnosis of OA or RA that has been confirmed by a physician to better understand the current state of arthritis in Canada. Information collected directly from patients is cross-linked with data from their healthcare providers and from administrative databases (e.g. billing databases) to provide a more complete picture on actual health status, health care utilization and disease progression over time for *individual* persons living with these two types of arthritis. In cases where Canadian data were not available, published literature from other sources was used. As a result, a simulated population of patients living with OA and RA was modeled over time, looking at disease activity, the resulting disability and its impact on the labour force.

RiskAnalytica's Life at Risk platform provides a detailed evaluation of all aspects of the burden of a disease on society today and over the next 30 years, as well as an evaluation of the impact of the four OA- and RA-specific interventions.

Despite their different assumptions, data sources and methodologies, *Life with Arthritis in Canada* and *The Impact of Arthritis in Canada: Today and Over the Next 30 Years* are truly complementary. Together, they provide a larger picture of arthritis and its impact on Canadian society. Consequently, *The Impact of Arthritis in Canada: Today and Over the Next 30 Years* will play a central role alongside the PHAC document in the ongoing effort to help improve the lives of Canadians with arthritis.

The Arthritis Alliance of Canada

The Arthritis Alliance of Canada, formerly the Alliance for the Canadian Arthritis Program (ACAP), was formed in 2002. Its goal is to improve the lives of Canadians with arthritis.

With more than 20 member organizations, the Alliance brings together arthritis health care professionals, researchers, funding agencies, governments, voluntary sector agencies, industry and, most importantly, representatives from arthritis consumer organizations from across Canada. While

each member organization continues its own work, the Alliance provides a central focus for national arthritis-related initiatives.

In 2005, the Alliance hosted the Summit on Standards for Arthritis Prevention and Care, a two-year effort by the arthritis community that established evidence- and consensus-based standards for the prevention and care of arthritis (see http://www.arthritisalliance.ca). Twelve standards were established in three categories: arthritis awareness, arthritis prevention and arthritis management (see Appendix A). In addition, three provisional standards requiring further research were identified.

Over the past few years the Alliance has focused its efforts on the creation of this report, *The Impact of Arthritis in Canada: Today and Over the Next 30 Years*. The Alliance has determined that the formation of a National Arthritis Framework will facilitate the implementation of the Summit Standards and our vision for improved outcomes for people living with arthritis. We recognize that in our work moving forward there is a need for fiscal responsibility and the principle of "value added" must be incorporated into any recommendation. We also believe that savings achieved need to be reinvested to further improve our health care system.

Toward a National Arthritis Framework

The Impact of Arthritis in Canada: Today and Over the Next 30 Years will make a major contribution to the Arthritis Alliance of Canada's development of a National Arthritis Framework.

Vision

The vision of a National Arthritis Framework is to improve the lives of people with arthritis though facilitated access to a diagnosis and treatment, research and education and, where possible, to address and identify methods of disease prevention.

Goals

The Arthritis Alliance of Canada's goals for a National Framework include:

1. Identifying principles to guide the design and delivery of more efficient and effective care;
2. Devising effective disease prevention strategies;
3. Proposing an ongoing mechanism for the arthritis community to dialogue with governments and the broader healthcare community; and,
4. Establishing research priorities and strategies to support ongoing improvements in the quality of arthritis care and prevention.

The Framework is being developed through the leadership, expertise and knowledge of three working groups whose members bring special expertise and represent associations and stakeholder groups. The working groups—Research, Models of Care, and Advocacy and Awareness—will report to the Alliance with priorities and implementation strategies. These, along with Standards for Arthritis Prevention and Care and *The Impact of Arthritis in Canada: Today and Over the Next 30 Years,* will

form the basis for the National Arthritis Framework. All arthritis stakeholders are invited to contribute to the development and implementation of the National Arthritis Framework.

Reading Onward

The chapters that follow will take the reader through:

- A description of the process that the Arthritis Alliance of Canada has undertaken in preparing *The Impact of Arthritis in Canada: Today and Over the Next 30 Years*;
- A description of the Canadian population, including the simulations provided by the RiskAnalytica Life at Risk platform;
- A picture of the incidence and prevalence of OA and its economic impact both today and 30 years into the future, with and without interventions;
- A picture of the incidence and prevalence of RA, its impact on mortality rates and its economic impact, both today and 30 years into the future, with and without interventions; and
- A summary of the key messages.

The Approach

The Life at Risk Model

The Impact of Arthritis in Canada: Today and Over the Next 30 Years used RiskAnalytica's Life at Risk simulation platform for its analysis.[18]

Life at Risk estimates the current and future incidence, prevalence, mortality rates and economic burden of a disease. Its cell-based approach takes a holistic view of a health condition and the management of its related disability. It considers the perspectives of the working population and their complex interrelations within the health system.

The Life at Risk platform uses a series of simulation modules to show how changes in an individual's health status interact over time. Life at Risk uses two sets of data (Health at Risk and Economics at Risk) as represented in Figures 1 and 2:

- Health at Risk shows the impact of a condition on the individual.
- Economics at Risk shows the condition's impact on an individual's ability to work (i.e. estimates the cost of disease in terms of lost wages) and, therefore, its cost to society.

Figures 1 and 2 summarize the simulation modules and data sources that were used in the Life at Risk analysis of osteoarthritis (OA) and rheumatoid arthritis (RA), respectively.

RiskAnalytica held a wide range of Canadian population data for use in its Life at Risk platform, including age, sex, province, immigration rates and wages by industry. RiskAnalytica's data specific to OA and RA were limited, however. As a result, the Arthritis Alliance of Canada provided OA- and RA-specific data to populate the health and economics modules pertaining to disease risk factors, diagnosis (incidence and prevalence rates), disability, mortality, interventions and economics. To do this, the Alliance brought together arthritis experts, government representatives and stakeholders from across Canada for a series of three workshops, where additional data and data sources for these modules were identified and reviewed for appropriateness to include in the Life at Risk platform.

Figure 1 Life at Risk Platform Simulation Modules - Osteoarthritis

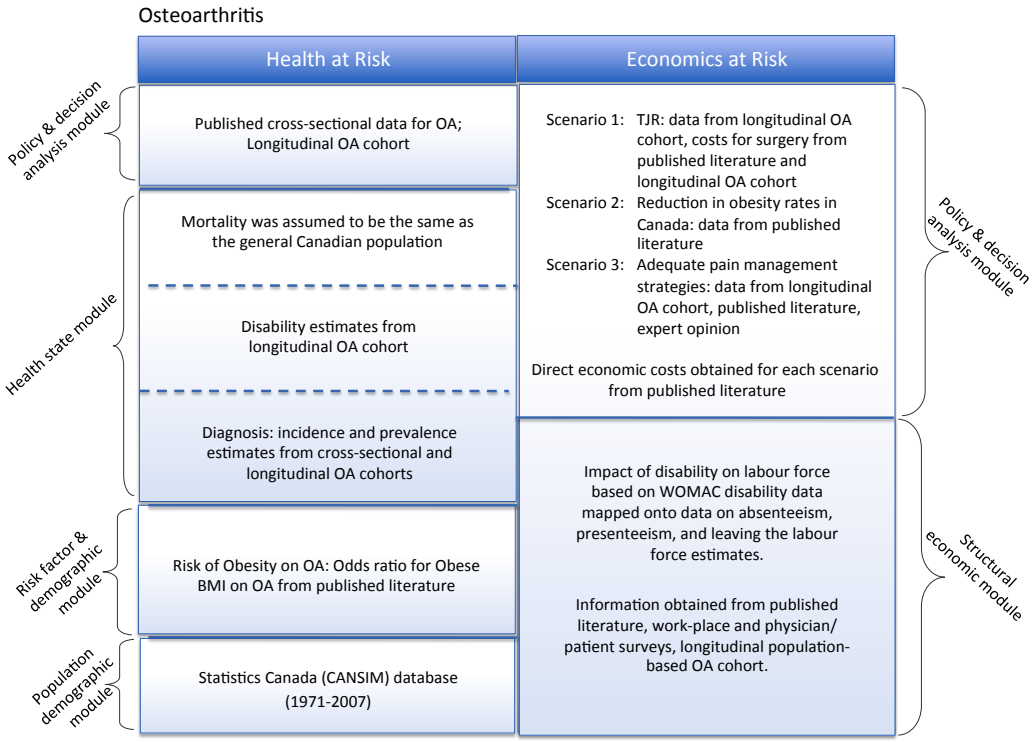
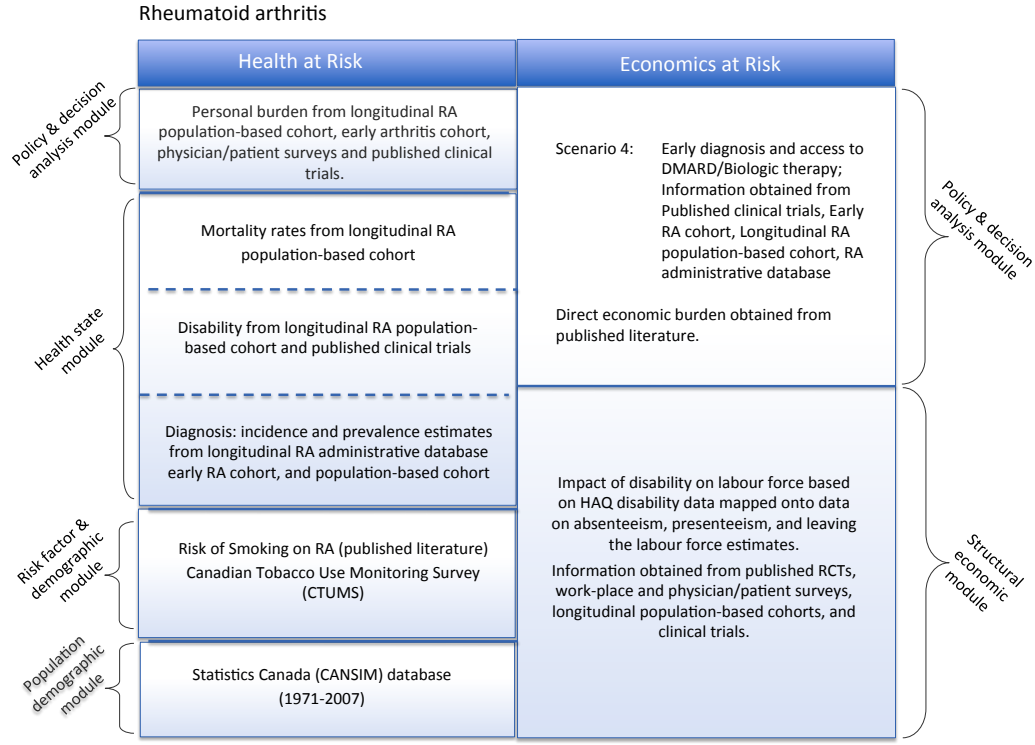


Figure 2 Life At Risk Platform Simulation Modules - Rheumatoid Arthritis



For the Life at Risk analysis, current state (baseline) and "what if" intervention simulations were established:

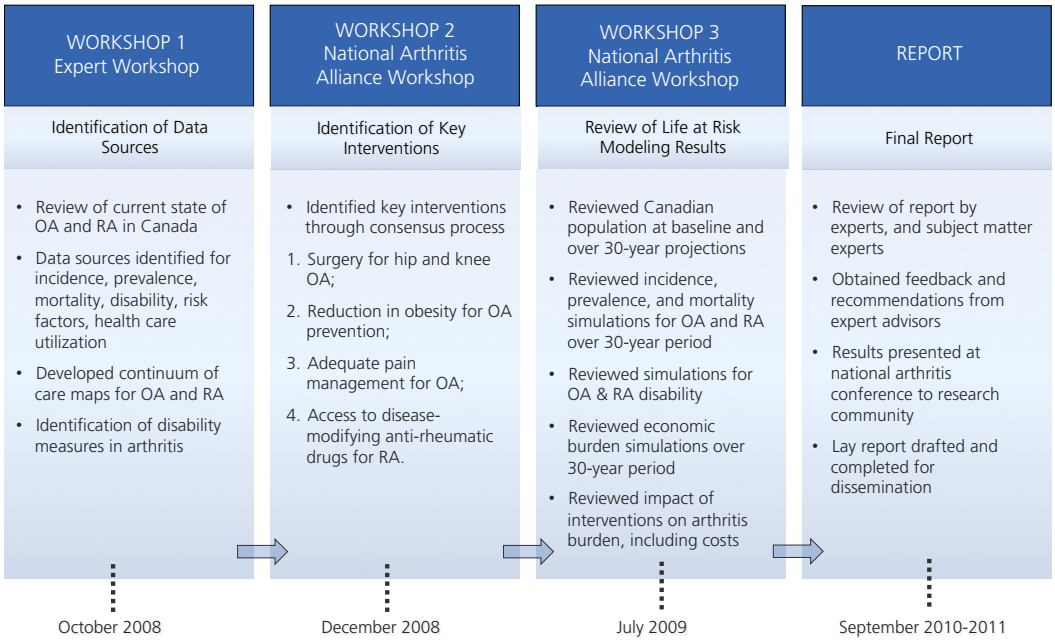
- Current (baseline) simulation defined a baseline for incidence, prevalence and economic burden of both OA and RA and the future costs without interventions.
- Intervention simulations or scenarios were then run (three for OA and one for RA) and compared to the baseline. Reductions in incidence, prevalence and burden arising from the interventions formed the business case for implementation.

Process Overview – 2008–2011

The process leading to this report consisted of three workshops hosted by the Arthritis Alliance of Canada (Figure 3). Workshop 1 brought together Canadian investigators to identify and provide arthritis-specific data sources pertaining to incidence, prevalence, mortality, risk factor and disability data to facilitate the Life at Risk modeling. Continuum of care maps were also developed showing the significant steps patients with OA and RA must take through the health care system, from disease onset to death.

Workshop 2 brought together representatives from the Alliance's member organizations, Canadian investigators, expert advisors and other arthritis stakeholders. The goal was to identify key arthritis interventions that had the potential to reduce the burden of arthritis in Canada. Workshop 3 reconvened Canadian investigators who provided data from workshop 1 and expert advisors from workshop 2 to review the Life at Risk modeling of burden and intervention results.

Figure 3 The Process at a Glance 2008 to 2011



The Scenarios

The following three intervention scenarios for OA were considered to offer the greatest return on public investment:

Scenario 1 Total Joint Replacement (TJR) Intervention for OA

Joint replacement of the hip and knee has been shown to be a cost-effective and potentially a cost-saving treatment for OA that relieves pain and improves physical function. What would be the effect if, over the next 30 years, all individuals with appropriate indications received TJR surgery for the hip and knee?

Scenario 2 A 50% Reduction in Obesity Rates in Canada

Weight loss has been shown to reduce the incidence and progression of symptomatic knee OA. What effect would a 50% reduction in obesity rates (percentage of individuals with BMI ≥ 30) in the population without OA have on the incidence and prevalence of OA? The model assumed that it would take 10 years to achieve the 50% reduction in obesity rates in the population.

Scenario 3 Adequate Pain Management Strategies for OA

Uncontrolled OA joint pain is associated with increased health care use. What would be the effect if pain was adequately managed among individuals with hip and knee OA?

The following intervention scenario for RA was considered to offer the greatest return on public investment:

Scenario 4 Early Diagnosis and Access to Disease Modifying Anti-Rheumatic Drugs (DMARDs) and, for those who do not respond to traditional DMARDs, access to Biologic therapy for RA

Since early pharmacological treatment with DMARDs has been shown to prevent further joint damage, reduce pain and disability, what would be the effect if RA was diagnosed early and DMARDs were readily available?

Economic Burden: Assessing the Cost of Arthritis

Evaluation of the economic burden associated with OA and RA included both direct and indirect costs.

Direct Costs

The direct economic burden of OA and RA included estimates of all health care costs—including annual costs for drugs, visits to health professionals, tests, hospitalizations and community services. Direct costs included those that were attributable not only to arthritis but also to comorbidities, as it is difficult at times to discern where to attribute the costs. Data for the year 2000 were obtained from published literature[19] and adjusted for inflation.

Direct Costs Associated with OA

For OA, health care costs associated with non-symptomatic or mild OA were considered to be negligible. Costs associated with having moderate hip and knee OA with or without receiving TJR were estimated from the prospective OA cohort study by Hawker et al., 2009.[20] These costs were first determined for the "base" case (status quo) and then, for the reduction in both direct and indirect costs after timely access to TJR treatment.

Direct Costs Associated with RA

Direct costs were estimated for both early incident RA and late RA for those receiving and not receiving appropriate DMARD therapy. These costs were first determined for the "base" case (status quo) and then for the reduction in these costs after timely access to therapy was modeled.

Indirect Costs

For both OA and RA, the indirect economic burden was evaluated as the loss to the economy, in both the private and public sectors, that can be directly attributed to the relative increase in disability among the disease population, compared to that observed in the general population. It is the disability-associated wage-based productivity loss. This was conservatively computed as a sum of the loss of earned wages only.

Disease-specific disability impacts the ability of both the unemployed to find work and the employed to be productive. Three work productivity effects, which would otherwise not exist in the general population, were considered in the model:

- *Presenteeism,* defined as the loss of productivity capacity while at work due to OA or RA disability;[21]
- *Absenteeism,* defined as absence from work due to disease-related disability;[22] and
- *Leaving the labour force,* defined as the loss of productivity due to permanent absence from work as a result of OA or RA.[23]

Canadian Population

The Canadian population was simulated using current provincial and territorial population demographic data obtained from the Canadian Socio-economic Information Management System (CANSIM), Statistics Canada's key socioeconomic database. This database includes the number of births, deaths and individuals immigrating into or emigrating out of Canada between 1971/72 and 2006/07. Future births, deaths and migration rates were simulated using 2007 Canadian population data.

Simulations of the Canadian Population

The Life at Risk simulations of the demographics of the current and future Canadian population focused on modifiable risk factors that have been associated with OA (obesity) and RA (smoking).

Aging Canadian Population

The Canadian population is aging. As a result, multiple chronic health conditions and associated disabilities are expected to increase. Rising rates of OA and RA and the aging population will exert a significant burden on the health care and social systems (Figure 4).

> Rising rates of OA and RA and the aging population will exert a significant burden on the health care and social systems.

Obesity

Rising Rates of Obesity

The rising rate of obesity in the Canadian population is a major factor in the burden of chronic disease in the aging population—and obesity is a primary modifiable risk factor for OA.[24-26]

The Life at Risk simulations indicate that the number of obese Canadians will nearly double in the next 30 years. While approximately 17.7% of Canadians are currently obese, by 2040 this is expected to increase to 29.3% of Canadians (Figure 5). Obesity is also a risk factor for several other chronic health conditions, such as diabetes and cardiovascular disease. As a result, rising rates of obesity will have significant consequences for the Canadian health care system and economy.

> Obesity is a primary modifiable risk factor for OA.

Figure 4 Canadian Population Age Structure 2010 to 2040

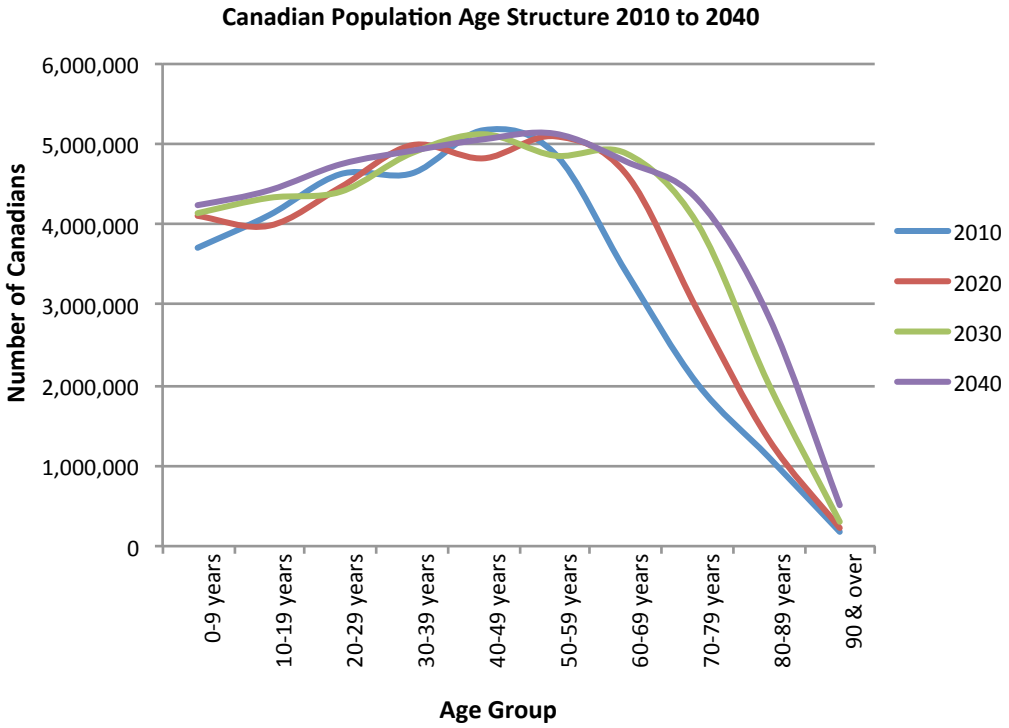
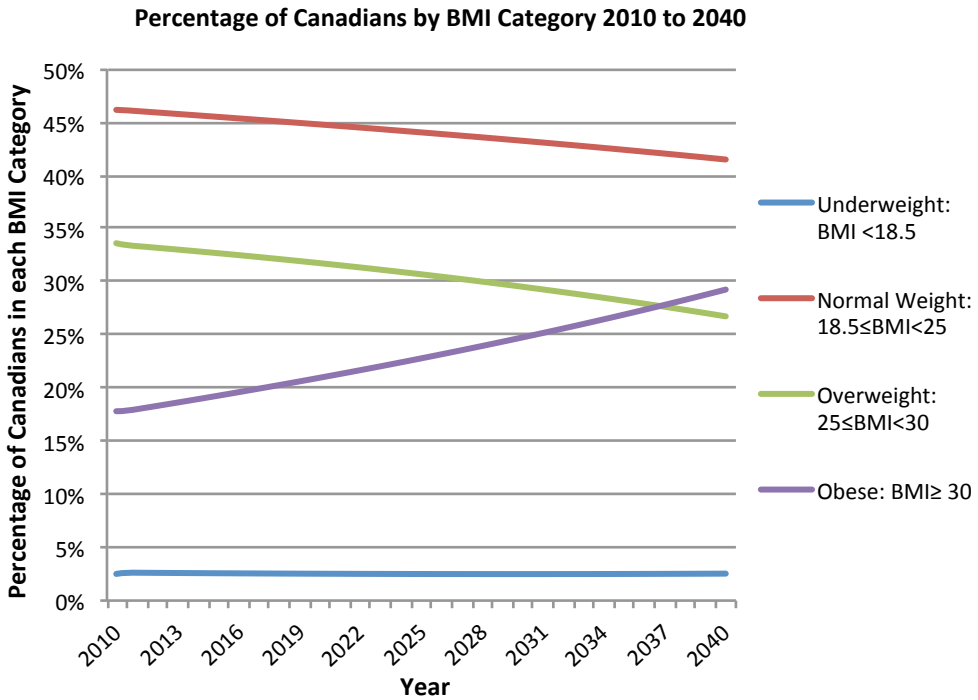


Figure 5 Percentage of Canadians by BMI* Category 2010 to 2040



* BMI (Body Mass Index) is a measure of body mass based on height and weight.

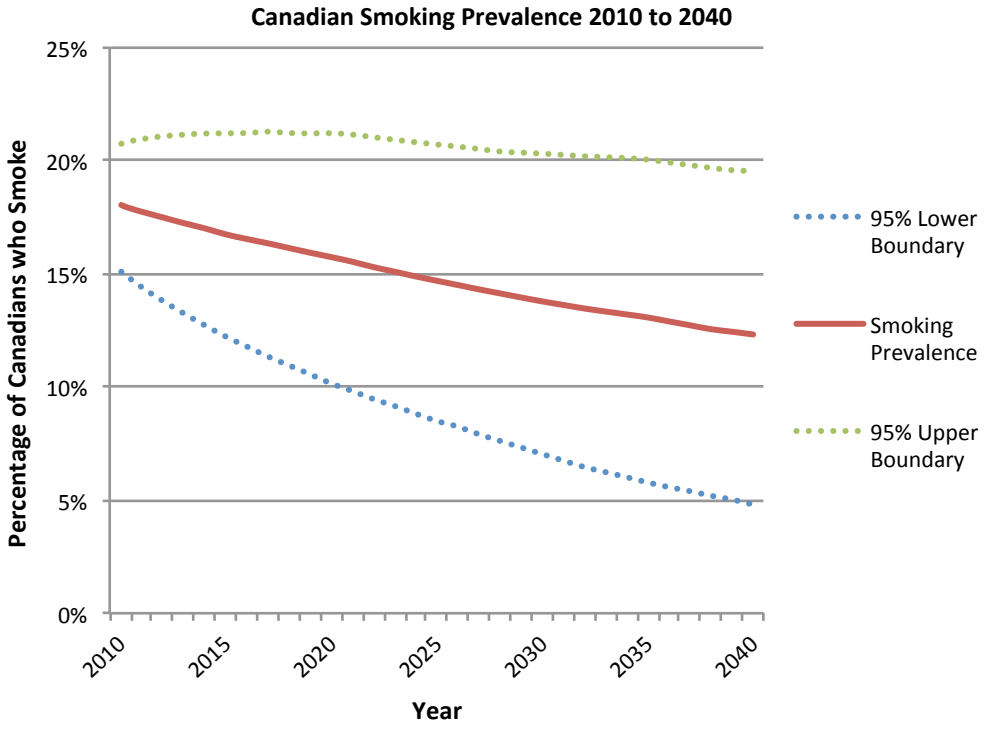
Smoking Prevalence

Decreasing Prevalence of Smoking

For a sub-group of the population with a specific genetic background, smoking has been associated with significantly increased risk for RA.[27]

Simulations of smoking prevalence in Canada suggest that smoking rates are declining as a result of the Federal Tobacco Control Strategy, which was implemented in 2001. Canadian smoking prevalence is estimated to decline from an estimated 19.2% over all in 2007 to approximately 12.3% by 2040 (Figure 6).

Figure 6 Canadian Smoking Prevalence 2010 to 2040



Osteoarthritis

Osteoarthritis Today

Establishing the "Base Case" for Osteoarthritis (OA)

To provide the foundation for the analysis of the future scenarios for OA, a base case for 2010 was established, using:

- Cross-sectional prevalence and incidence administrative data for OA;[28,29]
- Direct OA costs, including all costs for an individual with arthritis, whether or not the costs were related to arthritis (arthritis-attributable costs were modeled for the TJR scenario, however);[19,20]
- Estimates of indirect costs, derived from presenteeism, absenteeism and leaving the labour force data, as described in a previous section "Canadian Population";[21-,23]
- Estimates of unmet need for total joint replacement (TJR), based on data from a longitudinal population cohort with hip and knee OA.[30]

OA Population

Two main population groups were considered:

- A population with no previous diagnosis of OA (i.e. at risk of *developing* OA)[a]
- A population with a previous diagnosis of OA (i.e. at risk for *progression* of OA)

OA Risk Factor – Obesity

Obesity is considered to be the primary and modifiable risk factor for the onset of OA. Body Mass Index (BMI), a measure of body mass based on height and weight, is a tool to screen for obesity.

Studies have demonstrated that there is an increased risk of OA among individuals who are overweight.

- Population-based studies have demonstrated that there is an increased risk of OA among individuals who are overweight (BMI 25–29.9) or obese (BMI ≥ 30), compared to those who are of normal weight or underweight.[24-26]

[a] An OA diagnosis was defined as a visit to a health professional or hospital discharge associated with a diagnosis of OA (ICD-9 code 715).

- The strongest association appears to be between obesity and the onset of knee OA.[25,31]
- Weight reduction has been shown to not only prevent the development of OA but also improve symptoms among those who are already living with the condition.[25,26]
- Individuals who are underweight (BMI < 18.5) or of normal weight (BMI 18.5–24.9) are assumed not to be subject to risks associated with obesity.
- In contrast, individuals who are overweight (BMI 25.0–29.9) or obese (BMI ≥ 30) are assumed to be subject to risks associated with obesity.

Pain and Disability

Nearly 1 in 100 (or 300,000) Canadian adults (aged 20+ years) have experienced at least moderate to severe pain limiting their activities due to OA.

Among all cases of OA, it was estimated that 40% of patients had moderately severe hip and/or knee OA. Among these, 5% had more severe hip and/or knee complaints and qualified for total joint replacement (TJR) (defined as WOMAC total score ≥ 39/100, willingness to have surgery, and absence of an absolute surgical contraindication), but had not received one.

Mortality

The mortality rates for the population with OA were assumed to be identical to those of the sex- and age-matched population without OA.

OA Tomorrow – If Nothing Changes

Projected Burden of OA

Projections of the burden of OA into the future were based on the following assumptions:

- Current trends will continue into the future.
- Obesity is the only modifiable risk factor for OA.
- OA does not contribute to an increase in mortality.

Future prevalence was computed as previous prevalent cases plus incident cases minus age/sex-adjusted mortality.

OA Incidence Simulation

Simulations suggest that incidence rates for OA are rising and will increase over the next 30 years with an estimated 469,467 new OA cases, compared to the 373,428 new cases observed in 2010 (Table 1).

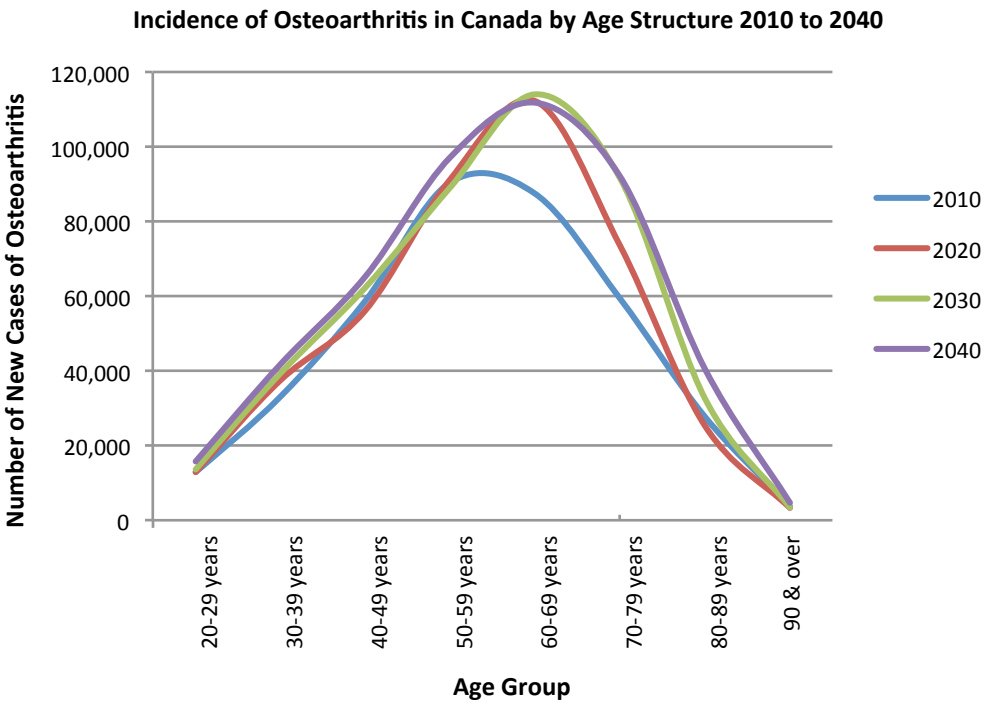
Table 1 Current and Future Osteoarthritis Incidence by Sex, Canada, 2010 to 2040

Year	Men	Women	Total
2010	145,883	227,545	373,428
2015	156,549	236,252	392,801
2020	167,312	245,415	412,727
2025	177,568	253,789	431,358
2030	186,402	260,224	446,625
2035	193,738	264,847	458,585
2040	200,504	268,963	469,467

Incidence is expected to be higher among women than men (average women:men ratio of 1.43:1 over the next 30 years) (Table 1).

In 2010, approximately 48% of all new cases of OA occurred among Canadians over the age of 60 years. This number is expected to increase to 53% by the year 2040 (Figure 7).

Figure 7 Incidence of Osteoarthritis in Canada by Age Structure 2010 to 2040



4.4 million Canadians are living with OA in 2010 and this number is expected to reach over 10.4 million people by 2040.

OA Prevalence Simulation

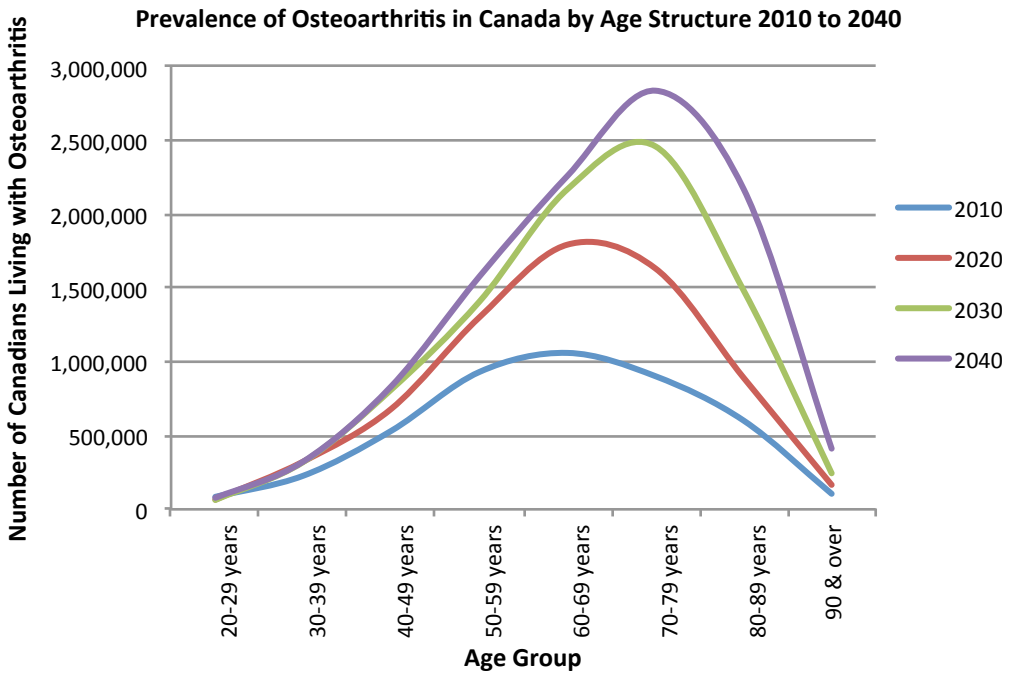
Simulations show that 4.4 million Canadians are living with OA in 2010 and this number is expected to reach over 10.4 million people by 2040. The prevalence of OA is shown to be higher among women than men (average ratio women:men ratio = 1.46:1 over the next 30 years) (Table 2).

Table 2 Current and Future Osteoarthritis Prevalence by Sex, Canada, 2010 to 2040

Year	Men (% men total)	Women (% women total)	Total (% total population)
2010	1,785,287 (10.6%)	2,662,009 (15.5%)	4,447,296 (13.0%)
2015	2,272,513 (12.9%)	3,412,199 (19.1%)	5,684,712 (16.0%)
2020	2,752,817 (15.1%)	4,106,792 (22.1%)	6,859,609 (18. 6%)
2025	3,221,368 (17.1%)	4,744,641 (24.8%)	7,966,009 (20.9%)
2030	3,661,386 (18.8%)	5,304,498 (26.9%)	8,965,885 (22.9%)
2035	4,052,729 (20.4%)	5,760,379 (28.5%)	9,813,109 (24.5%)
2040	4,388,500 (21.6%)	6,104,060 (29.6%)	10,492,560 (25.6%)

As the Canadian population ages, OA prevalence is expected to increase and be highest among those over the age of 70 years (Figure 8). In 2010, approximately 49% of seniors over the age of 70 years are expected to be living with symptomatic OA. By 2040, this number is expected to increase to 71%.

Figure 8 Prevalence of Osteoarthritis in Canada by Age Structure 2010 to 2040



OA Economic Simulation

If no changes are made in prevention and in improving access to effective care, by the year 2040 estimated new cases of OA in Canada will increase by one third and estimated prevalence of OA in the population will more than double.

Direct costs, indirect costs and the total economic burden of OA will increase over the next 30 years (in 2010 dollars) (Table 3). It is estimated that OA drives $10 billion in direct health care costs and the cumulative costs are expected to reach almost $550 billion in 30 years. Similarly, the estimated indirect costs are currently $17 billion and the cumulative indirect costs are expected to reach $909 billion in 30 years.

Although OA is generally considered to be a condition of older adults, one in eight workers (12% of the employed labour force) currently has OA. Within a generation, that number will grow to one in three workers, or almost 30% of the employed labour force. Today, more than 220,000 (0.7%) workers have moderate-to-severe disability due to OA. Within 30 years, that number will grow to approximately 500,000.

Table 3 Cumulative Economic Burden of Osteoarthritis, Canada, 2010 to 2040*

OA	2010	2015	2020	2030	2040
Total direct costs	$ 10.2 B	$ 75.3 B	$ 157.5 B	$ 339.3 B	$ 546.4 B
Total indirect costs	$ 17.3 B	$ 119.9 B	$ 247.6 B	$ 555.1 B	$ 909.1 B
Total economic burden	$ 27.5 B	$ 195.2 B	$ 405.1 B	$ 894.4 B	$ 1,455.5 B

* B = Billion

OA Tomorrow – If Change Could Be Made

Scenario 1 TJR Intervention

Scenario 1 considers the implications if TJR surgery was to be provided to all who need it and want it between 2010 and 2040. The need to revise the joint prosthesis was also considered, assuming that, based on current data, 10% of TJR recipients will require revision (repeat surgery) and that the prosthesis survival rate is 12.5 years.

Results

If all new severe OA cases who are willing to have surgery and have no other major medical conditions were given a total hip or knee replacement surgery starting in 2011 (including all eligible cases that previously qualified for the surgery but had never received it):

- 16,000 cases of severe OA could be avoided over 10 years, and over 72,000 cases of severe OA could be avoided over 30 years. These people

16,000 cases of severe OA could be avoided over 10 years, and over 72,000 cases of severe OA could be avoided over 30 years.

could enjoy a significant reduction in pain and improved physical functioning (in particular, the ability to live independently, walk, stand for long periods, climb stairs), allowing, for many, the return to mobility in the community and participation in valued activities.

There would be significant cumulative savings in direct health care costs and costs to the labour force over 30 years, even after considering costs of surgery:

- $400 million could be saved in direct health care costs over 10 years and $2.9 billion saved over 30 years (2010 dollars);
- 10,000 workers could avoid severe OA over 10 years and over 50,000 cases of severe OA in the labour force could be avoided over 30 years, resulting in $1.5 billion cumulative savings in productivity losses over 10 years and $14.3 billion saved over 30 years (2010 dollars).

Scenario 2 A 50% Reduction in Obesity Rates in Canada

This scenario is hypothetical, in that the cost of intervention (such as public education and individual gym memberships, etc.) is unknown. The number of incident cases and the prevalence of OA in the Canadian population and thus costs would be reduced assuming:

- A population-based intervention was undertaken to reduce obesity rates (percentage of people with BMI ≥ 30) by 50% in Canadian population without OA;
- This reduction could be achieved by 2020 and be maintained.

Results

If a prevention program was available to reduce obesity rates by 50% in the Canadian population over the next 10 years:

- 45,000 new cases of OA could be avoided over 10 years and over 200,000 cases of OA could be avoided over 30 years;
- 25,000 workers could avoid OA over 10 years and over 136,000 cases of OA in the labour force could be avoided over 30 years;
- $3.8 billion could be saved in cumulative direct health care costs over 10 years and $48.3 billion over 30 years (2010 dollars); and
- $14.0 billion could be saved in cumulative productivity losses over 10 years and $163.7 billion saved over 30 years (2010 dollars).

Limitation: Costs attributable to obesity-reduction interventions were unavailable and, therefore, not considered in the model.

Scenario 3 Adequate Pain Management Strategies for OA

Scenario 3—also a hypothetical model—assumes that pain management would be provided to all individuals with at least moderately painful knee and hip OA. This includes the assumptions that:

- Interventions are available to reduce moderate to severe pain from hip and knee OA;

- Pain is the only predictor of changes in health care costs;
- Reduced pain has no effect on the progression of OA; and
- The relationship between the severity of knee and hip OA pain and health care costs, derived from an Ontario population cohort study, is representative of that for the Canadian population overall.

Results

Because uncontrolled pain drives health care utilization, if a pain management intervention was available that could safely and effectively reduce painful OA by 33% among those with symptomatic OA:

- $11.7 billion could be saved in cumulative direct health care costs over 10 years and $40.8 billion saved over 30 years (2010 dollars);
- $173.0 billion could be saved in cumulative productivity losses over 10 years and $447.2 billion saved over 30 years (2010 dollars).

Limitation: Costs attributable to pain management intervention were unavailable and, therefore, not considered in the model.

Rheumatoid Arthritis

Rheumatoid Arthritis Today

Establishing the "Current State" for Rheumatoid Arthritis (RA)

To create a current picture of RA in Canada in 2010 as a "base case," several sources of data were used:

- Incidence and prevalence rates for RA from British Columbia[32,33] were used and verified using administrative data from Ontario: as a result, the British Columbia rates were used to represent all of Canada.
- Ontario provincial billing databases and a British Columbia population-based cohort were used to determine the percentage of patients on DMARDs therapy[32,33]
- Clinical trials,[34-38] administrative databases[32,33] and observational cohorts[39] were used to determine outcomes of patients on no DMARDs and on DMARDs therapy .

In addition, the economic burden associated with RA in Canada in 2010 for the "base case" were determined using:

- Direct RA costs, including all costs for an individual with arthritis, whether or not the costs were related to arthritis;[19,20]
- Indirect costs, derived from presenteeism, absenteeism and leaving the labour force data,[21-23] as described in the previous section entitled, *Economic Burden - Assessing the Cost of Arthritis*.

RA Population

The RA population was divided into two main population groups:

- Individuals without RA
- Individuals with RA,[b] who were further defined as
    - Incident early RA (diagnosed with RA by a physician within less than 1 year); and
    - Prevalent late RA sub-groups (diagnosed with RA by a physician for 1 year or longer).

[b] An RA diagnosis was defined as at least two physician visits more than two months apart with an RA diagnostic code (ICD-9 code 714.X). Incident RA cases had a first diagnosis of RA between January 1996 and December 2000 without a prior RA diagnosis.

RA Risk Factor

Smoking was considered to be the only modifiable known risk factor for RA in the Life at Risk platform:

- Smoking severity was modeled using smoking trend data from the Canadian Tobacco Use Monitoring Survey (CTUMS), 2001–2008.
- There was an increased risk of RA across three levels of smoking (light, moderate and heavy).[40]
- No increased risk was assumed to be associated with individuals who had never smoked or were ex-smokers.

Disability due to RA

Over 233,000 Canadian adults currently live with a moderate to severe disability from RA. These individuals have a range of difficulties with basic daily activities, such as dressing/grooming, eating, walking and basic hygiene. Among these, approximately 50,000 Canadians have either significant difficulty or no capacity to dress and groom themselves, walk, wash or use a toilet.

Approximately 50,000 Canadians have either significant difficulty or no capacity to dress and groom themselves, walk, wash or use a toilet.

Mortality

For RA, mortality included all causes of mortality among those with RA due to the RA condition itself, or due to comorbidities illnesses. The mortality rate among individuals with RA was estimated from a population-based RA cohort for BC[32] and then compared to standard mortality rates in the general population for similar ages and sex.

Diagnosis/Treatment

Control of disease activity is necessary to prevent joint damage and loss of function and to maintain quality of life. Joint damage occurs within three months and leads to disability. Research has shown that intervention with DMARD therapy will help achieve disease remission, improve physical function and prevent long-term disability[13-16].

Research has shown that intervention with DMARD therapy will help achieve disease remission, improve physical function and prevent long-term disability.

Currently, only 38.5% of the early incident RA population and 45% of the prevalent late RA population were found to be receiving DMARD therapy.[33,41] It is known that DMARD therapy should be used in most patients with RA, and early diagnosis and treatment are critical. This low proportion of RA patients on therapy likely reflects gaps

in access to diagnosis or the lack of awareness around the necessity of treatment for all RA patients with active disease.[32]

RA Tomorrow – If Nothing Changes

Projected Burden of RA

Projections were based on the assumptions that:

- Current trends in incidence will continue unchanged;
- Smoking is the only risk factor for incidence of RA;
- Excess mortality due to RA will remain unchanged; and
- Current patterns of therapeutic interventions can be projected into the future.

RA Incidence

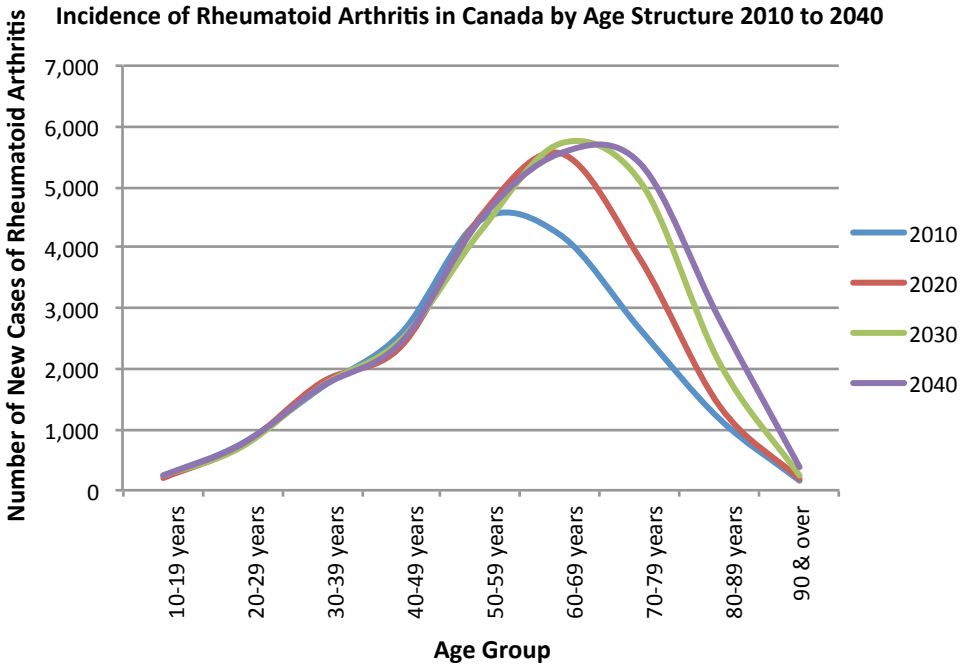
Simulations suggest that the incidence rates for RA in Canada are rising. By 2040, the numbers of new cases of RA are expected to increase to an estimated 23,732 cases from 17,916 in 2010. The annual number of incident cases is expected to be higher among women than men (average women: men ratio = 2.13:1 over the next 30 years) (Table 4).

Table 4 Current and Future Rheumatoid Arthritis Incidence by Sex, Canada, 2010 to 2040

Year	Men	Women	Total
2010	5,551	12,365	17,916
2015	6,040	13,222	19,262
2020	6,504	14,029	20,533
2025	6,921	14,730	21,651
2030	7,271	15,279	22,550
2035	7,542	15,688	23,231
2040	7,743	15,988	23,732

The number of Canadians newly diagnosed with RA is expected to increase as the Canadian population ages. In 2010, approximately 46% of all new cases of RA occurred among Canadians over the age of 60. This number is expected to increase to 60% by 2040 (Figure 9).

Figure 9 Incidence of Rheumatoid Arthritis in Canada by Age Structure 2010 to 2040



RA Prevalence

In 2010, 272,299 Canadians were living with RA (0.9% of the Canadian population) and this is expected to increase to an estimated 549,218 in 2040 (1.3% of the Canadian population). In addition, the prevalence of RA is approximately two times higher among women than among men (average women:men ratio = 2.33:1 over the next 30 years) (Table 5)

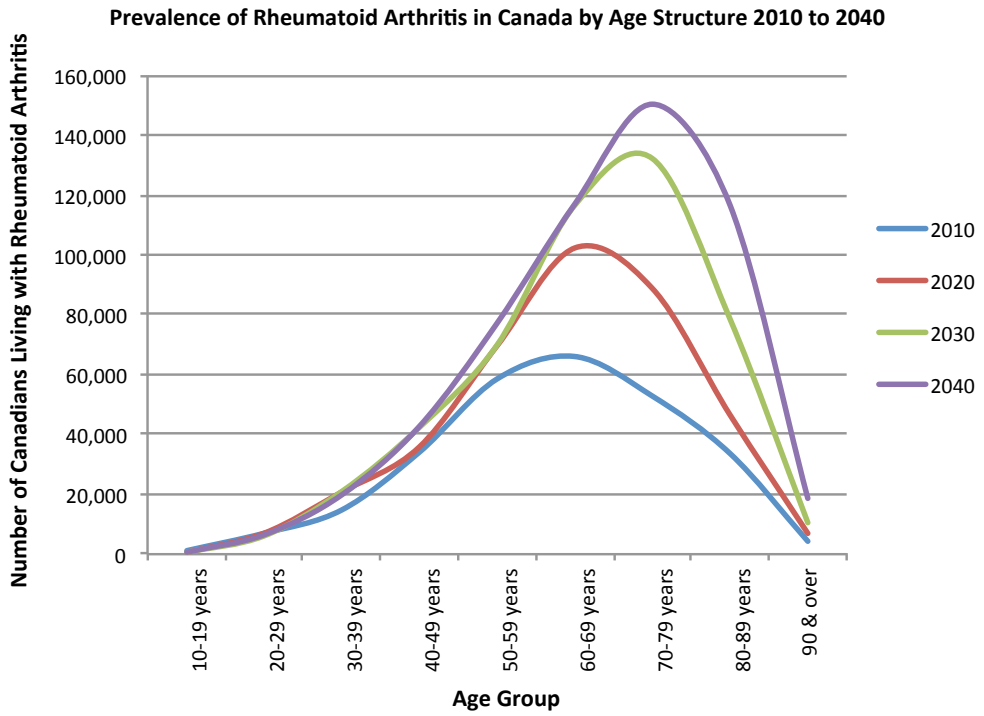
Table 5 Current and Future RA Prevalence by Sex, Canada, 2010 to 2040

Year	Men (% men total)	Women (% women total)	Total (% total population)
2010	82,085 (0.49%)	190,214 (1.11%)	272,299 (0.89%)
2015	97,985 (0.56%)	227,182 (1.27%)	325,168 (0.92%)
2020	113,813 (0.62%)	264,446 (1.43%)	378,259 (1.03%)
2025	129,245 (0.68%)	300,838 (1.57%)	430,083 (1.13%)
2030	143,438 (0.74%)	334,148 (1.70%)	477,586 (1.22%)
2035	155,433 (0.78%)	362,270 (1.79%)	517,703 (1.29%)
2040	164,815 (0.81%)	384,404 (1.87%)	549,218 (1.34%)

Figure 10 illustrates the future prevalence of RA by year and by age groups. As the Canadian population ages, the number of Canadians with RA is expected to increase and be highest among those over 60 years of age. Currently, 2.3% of the Canadian population over 60 years of age live with

RA; this will increase to 3.3% by 2040 (a 40% increase). Meanwhile, in Canadians of the working age group, 1.5% of the employed labour force will be living with RA representing 1 in 68 workers.

Figure 10 Prevalence of Rheumatoid Arthritis in Canada by Age Structure 2010 to 2040



Smoking Simulation

Within the Life at Risk platform, the relationship between smoking and the incidence of RA is very modest: the relative effect of changes in smoking prevalence on incidence rates of RA was found to be minimal. Thus, changes in the annual incidence of RA will be driven primarily by changes in population demographics.

Mortality Simulation

People with RA have a shorter life expectancy than those without the disease. The mortality of individuals with RA is approximately 30% higher than mortality of individuals in the general population with the same age and sex (18,098 with RA versus 14,059 without RA) (Table 6).

The mortality of individuals with RA is approximately 30% higher than mortality of individuals in the general population with the same age and sex

Table 6 Number of Deaths among Those Living with RA, Compared to the General Population without Disease by Similar Ages and Gender, Canada, 2010 to 2040

RA	2010	2015	2020	2030	2040
Total with RA	7,386	8,654	9,942	13,560	18,098
Total without RA	5,451	6,423	7,425	10,394	14,059

RA Economic Simulation

If no changes in access to diagnosis and treatment with DMARDs are made by the year 2040, direct costs, indirect costs and the total economic burden of RA will increase.

It is currently estimated that RA drives more than $2 billion in direct health care costs, and costs are expected to increase cumulatively to reach almost $95 billion within the next 30 years (in 2010 dollars). Similarly, the indirect costs are estimated to be more than $3 billion, and are expected to increase cumulatively to reach almost $163 billion within the next 30 years (in 2010 dollars) (Table 7).

Approximately 0.74% of the employed labour force, or 1 in 136 workers, lives with RA. Within a generation, this will increase to 1.5%, or 1 in 68 workers. Today, more than 200,000 (0.63%) workers live with moderate-to-severe RA. Within 30 years, that number will grow to more than 400,000, or 1.3%.

Table 7 Cumulative Economic Burden of RA, Canada, 2010 to 2040

RA	2010	2015	2020	2030	2040 ($ 2010)
Total direct costs	$ 2.4 B	$ 16.1B	$ 31.5 B	$ 62.2 B	$ 94.6 B
Total indirect costs	$ 3.3 B	$ 22.2 B	$ 45.1 B	$ 100.1 B	$ 162.8 B
Total economic burden	$ 5.7 B	$ 38.3 B	$ 76.6 B	$ 162.3 B	$ 257.4 B

*B = Billion

RA Tomorrow – If Change Could Be Made

Scenario 4 Early Diagnosis and Access to DMARD Therapy

Scenario 4 considers both early incident and established prevalent RA.

In both incident and prevalent RA, if RA was diagnosed early and treated with traditional DMARDs, and for those who don't respond, Biologic therapy, the number of patients with minimal disease activity or remission would increase.

Results

If all new cases of RA and all people living with RA who require DMARDs and Biologics had access to early and appropriate treatment:

- 12,200 cases of severe RA could be avoided over 10 years and over 178,000 cases of severe RA could be avoided over 30 years;
- 6,700 workers could avoid severe RA over 10 years and over 120,000 cases of severe RA in the labour force could be avoided over 30 years;
- $1.7 billion could be saved in cumulative direct health care costs over 10 years and over $5.1 billion saved over 30 years (2010 dollars); and
- $11.6 billion could be saved in cumulative productivity losses over 10 years and over $33.7 billion saved over 30 years (2010 dollars).

6,700 workers could avoid severe RA over 10 years and over 120,000 cases of severe RA in the labour force could be avoided over 30 years.

Conclusions and Next Steps

The Human Story

Osteoarthritis

Currently, 4.4 million Canadians are living with osteoarthritis (OA). In the next 20 years, this number will double to more than 9 million, or one in four. Within a generation, there will be a new diagnosis of OA every 60 seconds.

Arthritis is painful and it can be severe. Of the 4.4 million Canadians with OA, approximately 600,000 will have severe enough pain such that it significantly limits their activities.

This means that people living with arthritis will have difficulty with, or simply cannot perform daily activities such as dressing themselves, using the toilet, walking up and down stairs, and tying their shoes. Pain interferes with sleep and is associated with low mood and depression.

If no strategies are implemented to prevent OA or to slow disease progression, the number of people living with OA will grow to 10.4 million by 2040. There are currently no medications or procedures that will restore cartilage and modify the damage caused by arthritis. Further, while being obese has long been recognized as a risk factor for OA, especially knee OA, the importance of strategies to reduce obesity cannot be underestimated. Research is urgently needed in this area.

The most successful treatment for OA is hip and knee replacement. In 2010, over 190,000 of untreated OA patients who are eligible for and willing to have hip and knee replacement surgery did not receive it. By 2040, that number will increase to over 430,000.

Rheumatoid Arthritis

Rheumatoid Arthritis (RA) can occur at any age. It affects the hands, wrists, elbows, shoulders, neck, hips, knees, ankles and feet, causing swelling, pain and deformity. On average, a person with RA will be work disabled within 10 years of getting the disease if left untreated, and their life expectancy may be reduced by 10 years. Today, effective RA treatments exist that can change this outcome. Furthermore, early recognition of the disease and early treatment with disease modifying drugs are known to improve outcomes and in some cases result in remission. However, the failure to recognize RA in its early stages and the lack of understanding of the need for treatment among patients and health care professionals continue to persist.

More than 272,000 people currently live with RA, comprising 0.9% of the Canadian adult population. This will increase to 1.3% over the next 30 years. Similar to OA, these Canadians will have difficulties with dressing/grooming, eating, walking and playing with their children. More disturbing is the fact that over 50,000 will have significant difficulties or, in many cases, no capacity to dress and groom themselves, walk, wash or use a toilet.

The current number of untreated RA patients in Canada (those who require traditional DMARDs and Biologic therapy but do not have access) is estimated to be 117,000. If the present level of understanding of the disease and access to appropriate drug therapies does not improve then this number can be expected to grow to 230,000 Canadians over the next 30 years. If left untreated, up to 50% of patients will be disabled within 10 years and their life expectancy will be reduced by up to 30% compared to their peers. Today, RA treatments exist that can change this outcome.

Re-shaping the Future: Constructing a National Framework

The four principal interventions identified in this report are foundational in character. If implemented progressively, they hold the promise of providing a solid platform for the successful containment of two of the most significant and most costly of the arthritis diseases—osteoarthritis and rheumatoid arthritis. But these are only part of the larger family of arthritis diseases, a family that numbers in excess of 100 separate conditions. And sadly, thus far, there is no cure for any of them.

The larger goal is to
reduce the costly
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contribute fully
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The Canadian population that is currently afflicted with arthritis (as well as the expanding disease population of the future) urgently needs real and tangible progress in combatting arthritis disease. The objective is not just to relieve suffering, even though the relief of suffering is an intrinsic good associated with any effective system of medical care—and arthritis produces plenty of suffering. But instead, the larger goal is to reduce the costly marginalization of a very large segment of the Canadian population, freeing it to contribute fully to the building of a prosperous and creative national future.

Drawing on the work and the findings of *The Impact of Arthritis in Canada: Today and Over the Next 30 Years*, the Arthritis Alliance proposes to construct the basis for a better life for those Canadians with arthritis through the development of a National Framework by:

- Identifying principles to guide the design and delivery of more efficient and effective care;
- Devising effective strategies for disease prevention strategies;
- Proposing an ongoing mechanism for the arthritis community to dialogue with governments and the broader healthcare community; and,
- Establishing research priorities and strategies to support ongoing improvements in the quality of arthritis care and prevention.

In keeping with the slogan of the Arthritis Society of Canada—"Arthritis: Fight It"—this battle must be taken forward. As Winston Churchill said in another context and another war, "Give us the tools and we will finish the job."

> "Give us the tools and we will finish the job."
>
> - Winston Churchill

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Glossary

Absenteeism	Absence from work due to disease-related disability[1] was modeled as loss of work productivity due to absence and the inherent inability for the system to compensate for this absence. Survey data on 6,000 people in BC living with OA were used to estimate absenteeism in days for individuals in each quartile of WOMAC total scores (provided by Dr. Linda Li). Due to the absence of similar data for RA, a similar relationship between disability measured by HAQ and absenteeism was assumed.
Leaving the labour force	The loss of productivity due to permanent absence from work as a result of OA or RA[2] was also considered in the models. ON cohort data provided estimates of the average numbers of people with OA who were unable to work because of their OA for each quartile of WOMAC severity scores (provided by Dr. Gillian Hawker). Survey data from arthritis and hypertensive patients recruited from medical practices in ON were used to define the relationship between those leaving the labour force and disability measured by HAQ (provided by Dr. Claire Bombardier).
Presenteeism	The loss of productive capacity due to OA or RA disability.[3] It is assessed using a self-rated productivity global measure (provided by Dr. Monique Gignac) that measures an individual's ability to perform his/her duties at work on a scale from 0 to 100: 0 indicating complete disability (no ability to perform the assigned duties at work) and 100 indicating no additional disability (ability to perform duties within the work environment that is indistinguishable from the general population).
WOMAC	Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) – A valid and reliable measure of OA symptoms and disability. WOMAC is comprised of three subscales (pain, stiffness and physical function); subscale scores can be summed to create a total score (range 0–96),[4]
HAQ	The Health Assessment Questionnaire (HAQ) is a comprehensive valid and reliable measure of outcome in patients with a wide variety of rheumatic diseases in four domains: 1) disability, 2) discomfort and pain, 3) drug side effects (toxicity) and 4) dollar costs.[5]

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Appendix A

Arthritis Alliance of Canada
Standards for Arthritis Prevention and Care

Definitive Standards for Arthritis Prevention and Care[1]

1. Every Canadian must be aware of arthritis.
2. Every Canadian with arthritis must have access to accurate information and education on arthritis that meet a defined set of criteria and are appropriate to their age and stage of disease.
3. Participation in social, leisure, education, community and work activities must be an integral measure used to evaluate outcomes by health professionals, educators, policy makers and researchers.
4. Every Canadian must be informed about the importance of achieving and maintaining a healthy body weight, and actively encouraged to engage in physical activity to prevent the onset and worsening of arthritis.
5. All relevant health professionals must be able to perform a valid, standardized, age appropriate musculoskeletal screening assessment.
6. Inflammatory arthritis must be identified and treated appropriately within four weeks of seeing a health-care professional.
7. Health care professionals must recognize OA as a significant health issue and treat it according to current treatment guidelines.
8. Bone mineral density testing must be offered free to all women > 65 years, all men and women with low-trauma fracture after age 40, and every Canadian of any age with risk factors for osteoporosis, according to current prevention and treatment guidelines.
9. Every Canadian with arthritis must have timely and equal access to appropriate medications.
10. Post-approval evaluation of arthritis medications must be part of drug approval.
11. Patient preferences, including risk-benefit trade-offs, must be incorporated into regulatory-decision making and prescribing of arthritis medications.
12. Every Canadian requiring joint surgery must wait no longer than six months from the time the decision to have surgery is made by the patient and physician.

Provisional Standards Requiring Further Research

1. To prevent arthritis, every Canadian must understand and implement prevention strategies to reduce sport and recreation injuries.
2. Every Canadian with arthritis must have timely access to appropriate integrated health care appropriate to their age and disease stage.
3. Every Canadian with arthritis will be enabled to participate in life roles that are important to them.

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The Arthritis Alliance of Canada, formerly the Alliance for the Canadian Arthritis Program (ACAP), was formed in 2002. Its goal is to improve the lives of Canadians with arthritis.

With more than 20 member organizations, the Alliance brings together arthritis health care professionals, researchers, funding agencies, governments, voluntary sector agencies, industry and, most importantly, representatives from arthritis consumer organizations from across Canada. While each member organization continues its own work, the Alliance provides a central focus for national arthritis-related initiatives.

http://www.arthritisalliance.ca