

Osteoporosis Action Plan: An Osteoporosis Strategy for Ontario

Report of the Osteoporosis Action Plan Committee
to the Ministry of Health and Long-Term Care

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Prepared in Partnership with the Osteoporosis Society of Canada

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Executive Summary

Osteoporosis, commonly referred to as the “brittle bone” disease, causes bones to become fragile and susceptible to breaking. Fractures associated with osteoporosis are painful, and they can limit a person’s ability to perform the activities of everyday life and reduce quality of life. They can also increase the risk of hospitalization, transfer to long-term care facilities and death. The Institute of Clinical Evaluative Sciences (ICES) estimates that, with the current level of osteoporosis care, Ontario will see 68,000 emergency department visits, 62,000 hospitalizations and 14,000 deaths from osteoporosis between 2003 and 2007.

Why is osteoporosis such a pressing problem? Beginning at age 35, both men and women begin to experience bone loss (typically 1% to 3% a year). When women reach menopause, the rate of bone loss accelerates significantly (3% to 5% a year). Over her lifetime, a woman may lose 45% of her bone mass. However, the image of osteoporosis as a disease of “little old ladies” is actually a myth. After age 65, both men and women are at high risk of osteoporosis, and recent research suggests that men over age 50 may have as great a risk as women of developing osteoporosis.

In 2000, at the request of the Minister of Health and Long-Term Care, the Ontario Women’s Health Council submitted their report *A Framework and Strategy for the Prevention and Management of Osteoporosis*. This report identified osteoporosis as an important public health concern and called for a comprehensive prevention and management strategy. In December 2001, the Minister of Health and Long-Term Care established a committee “to develop specific, feasible recommendations for actions to advance osteoporosis prevention and care.” Between June and September 2002, the Osteoporosis Action Plan Committee (OAPC) and three task groups convened and developed this Osteoporosis Action Plan.

The plan’s goal is to ensure that Ontarians have equitable access to best practices in osteoporosis prevention and management at all points along the continuum of care: primary prevention (risk factor modification), secondary prevention (early detection and treatment) and tertiary prevention (management of those diagnosed with osteoporosis) in order to prevent fractures and related deaths, pain and suffering, improve quality of life, and avoid costs to the healthcare system.

The plan's recommendations emphasize:

Health promotion to reduce risk factors for poor bone health. Health promotion and public education can promote bone health, reduce the risk of osteoporosis (primary prevention) and increase early detection and management (secondary prevention). Promotion efforts should focus on Ontarians at higher risk (i.e., seniors and post-menopausal women) and during critical periods of bone growth and development (i.e., children and adolescents).

Early detection and diagnosis of osteoporosis. At the current time, only a minority of Ontarians with osteoporosis are diagnosed before they arrive at an acute care hospital with a fracture, and only a relatively small minority of those who have had a fracture are referred for bone mineral density (BMD) testing, the “gold standard” for diagnosing osteoporosis. More appropriate use of BMD testing would identify more people with or at high risk of osteoporosis who would benefit from treatment (secondary and tertiary prevention).

Better access to effective, evidence-based treatments. According to research, 48% of people with osteoporosis or osteopenia do not receive therapies that could reduce bone loss and prevent fractures. If more people with osteoporosis had better access to effective therapies, Ontario would be able to reduce the number of fractures and increase the quality of life for thousands (secondary and tertiary prevention).

Integrated post-fracture care, rehabilitation and osteoporosis management. Patients who have sustained fragility fractures are at high risk of osteoporosis and recurrent fractures. Providing integrated fracture care, rehabilitation and osteoporosis management is an effective way to reduce recurrent fractures and improve quality of life (tertiary prevention).

Self-management and falls prevention. When they have access to accurate information, patients can play an active role in managing their condition and reducing the risk of fracture. Self-management and falls prevention programs help people with or at risk of osteoporosis to participate in their care decisions and improve their health and quality of life.

Evidence-based professional practice. Health professionals need education and resources to help them promote bone health and provide evidence-based osteoporosis management. To be effective and influence practice, educational efforts should be mutually supportive and promote multidisciplinary, client-centred care across the continuum (primary, secondary and tertiary prevention).

Research. Research will help to develop new knowledge in osteoporosis prevention, diagnosis and management, and ensure that knowledge is transferred into practice.

Leadership. Leadership and monitoring will help to ensure effective implementation of the recommendations of the Osteoporosis Action Plan, and help Ontario to make progress in reducing the burden of osteoporosis and improving quality of life.

The initiatives set out in the plan are part of a co-ordinated strategy. Actions in one area, such as professional education, support actions in other areas, such as public education or clinical changes. The plan is also designed to co-ordinate with other chronic disease prevention and health promotion programs (e.g., obesity, diabetes, stroke, heart disease) in order to increase efficiencies and reduce redundancies in population health programming.

The Osteoporosis Action Plan advocates for a multidisciplinary approach to osteoporosis prevention, management and education. While primary care physicians and specialists will continue to play a critical role in osteoporosis care, other health professionals such as nurses, nurse practitioners, pharmacists, occupational therapists, nutritionists and physiotherapists will also make important contributions.

The evidence-based interventions recommended in the plan have the potential to significantly reduce the burden of osteoporosis in Ontario. According to the ICES economic analysis, more appropriate diagnostic and prescribing practices would reduce fractures that would, in turn, help Ontario to avoid \$142 million over the next five years in emergency, hospital and long-term care costs. At the same time, early detection and more appropriate treatment of osteoporosis would lead to an increase of \$16.6 million each year in Ontario Health Insurance Plan (OHIP) and the Ontario Drug Benefit (ODB) program costs for diagnostic services and medications.

Summary of Recommendations

I Promote Bone Health and Prevent Osteoporosis (primary prevention)

Recommendation 1: The Ministry of Health and Long-Term Care should support and evaluate a multifaceted, multigenerational health promotion / communication strategy, designed to increase public knowledge about osteoporosis and bone health. Recommended tactics:

- with parents, educators and caregivers, stress the importance of nutrition and physical activity in laying down bone mass and promoting healthy bone growth in childhood and adolescence
- with adults age 50 to 64, focus on the risk factors and links between osteoporosis and fracture, and the importance of early detection and treatment for those at risk
- with seniors and their adult children, focus on the risk factors for osteoporosis, dispel myths and misunderstandings about osteoporosis and its treatment, and reduce the perceived barriers to seeking treatment
- with people with certain clinical conditions, focus on the risk of osteoporosis associated with either the clinical condition or associated medication use.

Recommendation 2: The Ministry of Health and Long-Term Care should support health promotion initiatives designed to increase physical activity and healthy eating practices, focusing particularly on children / adolescents, older adults (age 50 to 64) and seniors (age ≥ 65). Recommended tactics:

- enhance physical activity among families and seniors through existing programs, such as the Active Ontario Strategy
- co-ordinate with other agencies and ministry departments promoting nutrition and physical activity to prevent / manage other chronic diseases (e.g., obesity, diabetes, heart disease) and with general health promotion programs
- support the development of provincial nutrition programs to improve bone health of families, older adults and seniors
- support education for caregivers and individuals who provide services for children, youth and seniors living in the community and long-term care settings (e.g., parents, coaches, food provider systems) to enhance their knowledge of dietary needs and osteoporosis.

Recommendation 3: The Ministry of Health and Long-Term Care should facilitate supportive changes in the school environment designed to promote healthy eating and regular physical activity, and encourage healthy bone development among school-aged children and adolescents. Recommended tactics:

- support bone health messages in school curriculum implementation as part of nutrition and physical activity / physical education, based on effective learning strategies (e.g., enhancing the implementation and use of existing programs, such as the Active Ontario Strategy and the Curriculum and School-based Resource Centre, developing learning resources to fill identified gaps)
- work with relevant ministries and agencies to promote changes in the school environment that promote bone health, facilitate healthy eating practices and provide consistent opportunities for physical activity in the school day
- discuss with the Ministry of Education other opportunities to enhance bone health in the school setting.

II Detect Osteoporosis Early (secondary prevention)

Recommendation 4: The Ministry of Health and Long-Term Care should implement a mandatory Recommended Use Requisition for bone mineral density (BMD) testing that would support both appropriate clinical practice and data gathering.

Recommendation 5: The Ministry of Health and Long-Term Care should take steps to ensure that Ontarians have appropriate, equitable and timely access to BMD testing. Recommended tactics:

- develop algorithms for BMD testing for certain sub-groups, such as men and younger women (age 45 to 64) to encourage appropriate utilization of BMD testing
- develop a standard of care policy for BMD testing including performance indicators (e.g., wait times)
- collaborate with appropriate professional bodies to ensure that DXA (dual energy X-ray absorptiometry) technologists and test reporters are working from the new standards developed by the International Society for Clinical Densitometry
- work with other ministry departments (e.g., OHIP) to harmonize policies on BMD testing.

III Provide Evidence-based Treatment (secondary prevention)

Recommendation 6: The Ministry of Health and Long-Term Care should support the development of regional, tertiary-based interdisciplinary teams to provide integrated care for complex osteoporosis cases. At least one team should be located in Northern Ontario.

Recommendation 7: The Ministry of Health and Long-Term Care should direct the Ontario Drug Benefit program to periodically review current clinical guidelines and emerging research for osteoporosis treatment, and support increased access to evidence-based therapies through the formulary.

IV Integrate Fracture Care, Rehabilitation and Osteoporosis Management (tertiary prevention)

Recommendation 8: The Ministry of Health and Long-Term Care should improve osteoporosis management of tertiary prevention services for people with fragility fractures. Recommended tactics:

- support and expand the fracture clinic intervention developed by the Ontario Orthopaedic Association and the Osteoporosis Society of Canada to diagnose and manage osteoporosis in patients with fragility fractures
- review outcomes of current initiatives and support the roll-out of prevention programs that meet differing regional needs
- implement an osteoporosis intervention for all Ontarians over age 65 who sustain a hip fracture
- encourage post-fracture care programs, hospital emergency departments and primary care services to develop links with local falls prevention programs
- evaluate the impact of all these initiatives.

Recommendation 9: The Ministry of Health and Long-Term Care, with support from the Osteoporosis Society of Canada, should develop a model for integrated rehabilitation for people with vertebral and hip fractures. Recommended tactics:

- conduct systematic reviews of the literature to identify best practices in vertebral and hip fracture rehabilitation, including geriatric rehabilitation
- establish eight rehabilitation pilot projects to test evidence-based delivery models, with at least two of the pilots in Northern Ontario
- use the results of the literature reviews and pilot projects, with the professional education initiatives in this plan, to develop integrated rehabilitation models that respond to local needs, provide seamless co-ordinated services across the continuum of care and link with community-based nutrition and physical activity programs for seniors.

V Promote Self-Management and Falls Prevention (secondary / tertiary prevention)

Recommendation 10: The Ministry of Health and Long-Term Care should help to build a support network for people with or at high risk of osteoporosis to help them self-manage their condition, participate in their care and maintain the best possible quality of life. Recommended tactics:

- pilot test two current models for self-management programs
- evaluate the results and implement the better model
- promote the use of effective community-based falls prevention programs.

VI Promote Evidence-based Practice

Recommendation 11: The Ministry of Health and Long-Term Care should establish a multidisciplinary task force of practice experts, internal and external stakeholders and professional organizations to develop an evidence-based standard of care for the different health professionals involved in osteoporosis prevention and management, and support the development, implementation and use of discipline-specific tools and resources. Recommended tactics:

- define the respective roles of different health professionals (e.g., physicians, nurses, nutritionists, pharmacists, physical and occupational therapists, staff in long-term care facilities) in osteoporosis prevention and care, and identify their educational needs
- involve the various professional bodies in developing and disseminating collaborative, discipline-specific practice guidelines
- support the development, dissemination and evaluation of appropriate tools / resources for professionals (e.g., risk assessments, chart aids, etc.) and patients (e.g., decision aids)
- study barriers to implementing evidence-based care
- develop criteria to evaluate educational activities
- act as a resource for the various health professions on how to enhance treatment compliance (adherence) and promote bone health
- collaborate with public education campaigns to ensure consistent messages and appropriate actions.

Recommendation 12: The Ministry of Health and Long-Term Care should assemble a working group of experts in health education and osteoporosis (the Osteoporosis Education Working Group) to:

- develop multidisciplinary resources, such as case studies in best practices in paper or Internet-based formats for university and college health science curricula
- collaborate with various educational and health professional agencies and associations to develop practical resources.

Recommendation 13: The Ministry of Health and Long-Term Care should promote education for primary care providers by supporting the implementation and evaluation of existing education programs on osteoporosis, including:

- the MAINPRO-C program on osteoporosis
- the Foundation for Medical Practice program on post-menopausal women's health.

Recommendation 14: The Ministry of Health and Long-Term Care should work with long-term care facilities to reduce the risk of fragility fractures. Recommended tactics:

- develop guidelines and algorithms for falls prevention programs in long-term care facilities
- educate staff about the importance of falls prevention and effective strategies
- promote the use of protective devices, such as hip protectors
- encourage appropriate supplementation with calcium and Vitamin D for residents of long-term care facilities.

VII Develop and Transfer New Knowledge

Recommendation 15: The Ministry of Health and Long-Term Care should establish a network of researchers and stakeholders to advance research on osteoporosis and bone health, promote knowledge transfer and evaluate progress in osteoporosis prevention and management. Recommended tactics:

- establish an osteoporosis information and knowledge transfer system (i.e., an osteoporosis atlas) that would identify opportunities to collect data, co-ordinate and assimilate data from pilot project reports and evaluations, and analyze and disseminate data on osteoporosis prevention, care and management
- oversee a cost-effective system of data collection and analysis
- facilitate the integration of research findings into applied programs
- develop and implement an evaluation and monitoring strategy to evaluate the impact of the initiatives in the Osteoporosis Action Plan and care delivery, and set future directions.

Recommendation 16: The Guidelines Advisory Committee of the Physicians Services Committee should work with the Osteoporosis Society of Canada to sponsor guideline-related research and the ongoing validation, updating and promotion of clinical practice guidelines. The Osteoporosis Society of Canada should also develop a paper on how guidelines and policy come together.

Recommendation 17: The Ministry of Health and Long-Term Care should support research to gather data on the nutritional status of Ontario's children and adolescents, including their intake of calcium and Vitamin D.

Recommended tactics:

- use the Canadian Community Health Survey to gather data
- repeat the research periodically to monitor any changes over time
- conduct qualitative research to determine why intakes of calcium and other bone nutrients are low
- evaluate the best strategies to influence the eating habits of children and adolescents
- assess the nutritional / health status of institutionalized children or children in group homes (i.e., disabled, handicapped children) who, because of their medical issues, may be at high risk of osteoporosis.

VIII Provide Leadership

Recommendation 18: The Ministry of Health and Long-Term Care should establish a standing committee of internal and external stakeholders in bone health and osteoporosis prevention, diagnosis and management to implement and monitor the Osteoporosis Action Plan. The committee would be responsible for:

- supporting the orderly implementation of the plan's recommendations
- establishing the research and monitoring group (Recommendation 15)
- co-ordinating the activities of different stakeholders
- ensuring that activities are multidisciplinary and cover the full continuum of prevention and care
- establishing any working or task groups to address particular issues (e.g., professional education)
- continuing to advise the ministry on relevant bone health and osteoporosis issues (e.g., monitoring, surveillance, research, health promotion, clinical issues).

Background

What is Osteoporosis?

Osteoporosis, commonly referred to as “brittle bone” disease, is a serious health problem in Ontario. Osteoporosis causes bones to become fragile and susceptible to breaking. Fractures due to osteoporosis can occur anywhere in the body but happen most frequently in the back (vertebral fractures), the wrist and the hips. Fractures can be a result of a fall or injury, or they can happen in the course of everyday activities, such as walking, picking up a bag of groceries or even turning over in one’s sleep.

What is the Impact of Osteoporosis?

Osteoporosis has a dramatic and negative impact on people’s physical health and well-being, on their psychosocial health and well-being, on the demand for health services and on healthcare costs.

On Physical Health and Well-Being

Osteoporosis-related fractures cause pain and, in some cases, permanent deformities. They reduce physical activity, and can make it difficult for people to do common activities, such as climbing stairs, reaching, bending, lifting, walking, getting in and out of a car, shopping, putting on shoes or doing housework. Fractures can also interrupt or terminate people’s employment,¹ and cause long-term disability. Hip fractures – which are more common in women and seniors residing in long-term care facilities – cause greater morbidity, mortality and costs than other types of fractures.²

Fractures related to osteoporosis are painful, can reduce a person’s ability to perform the activities of everyday life, decrease quality of life and significantly increase the risk of institutionalization or death.

Most people find it extremely difficult to recover from a fracture. Of those who survive a hip fracture, less than half regain their pre-fracture level of function. Only 44% of people discharged from hospital for a hip fracture return home. Of the rest, 10% go to another hospital, 27% go to rehabilitation care and 17% go to long-term care facilities in Ontario.³ According to a report by the Ontario Women’s Health Council, fractures caused by osteoporosis are a leading cause of hospitalization and transfer to long-term care facilities.⁴

The inability to regain function or be physically active can lead to more bone loss and higher risk. In fact, someone who has had a fracture of the wrist, spine or hip is at increased risk of another fracture. According to a study of people with hip fractures in Hamilton, 5% re-fracture the hip within a year, and the overall re-fracture rate for all types of fractures was 10%.⁵ One fracture – regardless of where in the body – doubles the risk of subsequent fractures.⁶ This is true for both men and women⁷ and for people at all levels of bone mass density.⁸

Fractures also significantly increase the risk of death. The Institute for Clinical and Evaluative Sciences (ICES) estimates that, between 2003 and 2007, there will be 14,000 deaths in Ontario attributable to fractures caused by osteoporosis. According to a study of over 6,000 women aged 55 to 81 years, women who had sustained hip fractures had a seven times greater risk of dying prematurely and those with vertebral fractures had a nine times greater risk of premature death.⁹ The risk of dying after a fracture appears to be higher among men than women.¹⁰

Table 1 summarizes the main clinical consequences of one of the most common forms of fractures caused by osteoporosis: vertebral fractures.

Table 1: Clinical Consequences of Vertebral Fractures

Symptoms	Signs	Function	Future Risk
<ul style="list-style-type: none"> • Back pain (acute or chronic) • Sleep disturbance • Anxiety • Depression • Decreased self-esteem • Fear of future fracture and falling • Reduced quality of life • Loss of appetite 	<ul style="list-style-type: none"> • Loss of height • Kyphosis (curvature of the spine) • Protruding abdomen • Reduced lung function • Weight loss 	<ul style="list-style-type: none"> • Impaired ability to do the activities of daily living (e.g., bathing, dressing) • Difficulty fitting into clothes due to curvature of the spine and protruding abdomen • Difficulty bending, lifting, descending stairs, cooking 	<ul style="list-style-type: none"> • Increased risk of future fracture • Increased mortality

On Psychosocial Health and Well-Being

Fractures have a profound impact on a person's quality of life. "The Canadian Multi-centre Study of Osteoporosis" (CaMos)¹¹ of almost 5,000 adults aged 50 and older found that those with osteoporotic fractures had significantly lower health-related quality of life scores. Even those who had sub-clinical vertebral fractures (i.e., fractures which did not require hospitalization or acute care) scored lower on health-related quality of life measures.

Osteoporotic fractures, particularly those in the spine (vertebral), often cause disability, deformity and chronic pain. Pain and a fear of falling can cause people to avoid being active and restrict their social activities, leading to isolation from family and friends. Osteoporosis can shatter a person's self-esteem, especially if fractures cause people to lose height, develop kyphosis (curvature of the spine, often referred to as a "dowager's hump") or become incapable of doing things such as lifting, bending and stooping.

Women with established osteoporosis frequently report fear, anxiety and depression.¹² Many elderly women who have never had a fracture have a strong fear of one, perhaps from having seen its effects on friends and relatives. This anxiety may be even greater than the fear of breast cancer or stroke. In one study, a majority of elderly women reported that they would chose death over having a hip fracture and being admitted to a nursing home.¹³

On the Healthcare System and Healthcare Costs

Fractures caused by osteoporosis are associated with considerable suffering and illness (morbidity), hospitalizations, transfer to long-term care facilities and death. The impact on the healthcare system and the cost to society is substantial.

According to the findings of a Canadian study of 18 different health conditions,¹⁴ hip and vertebral fractures were among the top three conditions associated with long lengths of stay in hospital and substantive healthcare costs. The study found that a fracture patient who returns home after hospitalization costs the healthcare system \$21,385, while a patient who must be institutionalized costs over twice as much (\$44,156). These findings were supported by the Canadian Institute for Health Information (CIHI), which reports that the average Canadian cost for the year following a fracture is \$26,527 and that the costs are higher if the person has to be transferred to long-term care, which is the outcome for 25% to 30% of hip fracture patients.¹⁵

Costs for a fracture patient who requires institutionalization are almost twice as much as those for a patient who returns home after hospitalization.

In 1993, Ontario spent about \$400 million to treat fractures caused by osteoporosis (for Canada as a whole, the total was \$1.3 billion).¹⁶ In 2002, ICES estimates that there were approximately 25,000 fracture-related hospitalizations and emergency department visits in Ontario.¹⁷ In an economic analysis, ICES predicted that the number of hip fractures will remain relatively constant over the next five years. If Ontario maintains its current system of osteoporosis care (status quo), it will have about 130,000 fracture-related hospitalizations and emergency department visits between 2003 and 2007. This would cost approximately \$2.6 billion in hospital costs alone. Because of data limitations, the ICES study could not include vertebral fractures, one of the most common osteoporosis-related fractures. This means that the study projections underestimate both the care and cost implications of osteoporosis over the next five years.

Because the ICES projections are only for the next five years, they may not reflect the potential impact of the aging population. As Ontario's population ages, the burden of osteoporosis could increase. According to Statistics Canada,¹⁸ between 1996 and 2001, the median age of Canada's population had its biggest census-to-census increase in a century. The median age of the population is increasing, and the number of elderly is growing rapidly. The number of people aged 65 and over in Canada is expected to double between 2000 and 2026, when they will account for 21% of the population. Based on data from CIHI, the number of hip fractures in Ontario could increase four-fold between 1993/94 and 2041 (approximately 47 years).¹⁹ This projected increase is not isolated but reflects a worldwide phenomenon,²⁰ and could have a significant impact on the need for treatment and on healthcare costs.

It is important to note that the impact of osteoporosis is not limited to the hospital system. According to research from the United States, when hospitals decrease the length of stay and amount of care given to hip fracture patients, the burden of rehabilitation care shifts to nursing homes.²¹ Residents of long-term care facilities in Ontario, who are becoming older and more frail, require increasingly more complex care.²² Community Care Access Centres are already having difficulties responding to the rapid changes in the volume of care required by their communities.²³ Osteoporosis may be a significant factor in these growing healthcare needs.

Who is Affected?

Nearly 530,000 Ontarians have some degree of osteoporosis. Although osteoporosis is often thought of as a disease of “little old ladies,” in reality it is a growing health problem for both sexes.²⁴ Both men and women lose bone mass during aging – and both are living longer than ever before.

One study found that “almost 20% of men 50 years and older have osteoporosis of the hip, spine or wrist.”

The disease is more prevalent among women than men. In people age 50 and older, one out of every four women and one in eight men have osteoporosis.¹⁶ A recent Canadian study found that 16% of adults aged 50 years and older met the World Health Organization (WHO) definition of osteoporosis.²⁵ For all ages, the prevalence in women (16%) was more than twice that of men (7%). However, after age 70 the prevalence of vertebral deformity due to osteoporosis was actually higher in men than women. A study in Rochester, Minnesota found that almost 20% of men 50 years and older have osteoporosis of the hip, spine or wrist.²⁶ It appears that osteoporosis may be significantly under-recognized and under-treated in men.^{27, 28}

The risk of developing osteoporosis also appears to be higher among people of Caucasian and Asian descent than those of other ethnic backgrounds.

Who is at Risk?

Osteoporosis is a disease of aging. All women and men over age 50 years are at risk of developing osteoporosis.²⁹ That risk can be increased by a variety of medical, genetic and lifestyle factors.^{30, 31, 32, 33, 34} The major and minor risk factors for osteoporosis are:

Major Risk Factors:

- age > 65 years
- low bone mass density (osteopenia apparent on X-ray film)
- fragility fracture after age 40
- family history of osteoporotic fracture (especially maternal hip fracture)
- early menopause (before age 45)
- vertebral compression fracture
- systemic glucocorticoid therapy > 3 months duration
- malabsorption syndrome
- primary hyperparathyroidism (disorder of the parathyroid gland)
- propensity to fall
- hypogonadism (low testosterone levels)

Minor Risk Factors:

- low dietary calcium intake
- rheumatoid arthritis
- past history of clinical hyperthyroidism (overactive thyroid gland)
- chronic anticonvulsant therapy
- weight < 57 kg
- weight loss of more than 10% of weight at age 25
- smoker
- excessive alcohol intake
- excessive caffeine intake
- chronic heparin therapy (a “blood thinner”).

As the risk factors indicate, a number of medical conditions and therapies are associated with bone loss and osteoporosis. For example, a recent 2002 Ontario study³⁵ found high rates of skeletal fractures and low bone mass in adult residents of long-term facilities who had neurodevelopment disorders – particularly in those who were taking one or more anti-convulsant drugs.

While many factors can affect the risk of developing osteoporosis, four factors predict the risk of a fracture related to osteoporosis: low bone mass density; a prior fragility fracture; age; and a family history of osteoporotic fracture.

Are Children and Adolescents at Risk?

Although osteoporosis is most likely to cripple and even kill people who are elderly, the disease process begins years, if not decades, earlier. Bone mass is primarily laid down during childhood and adolescence. The child or adolescent who does not develop healthy bones is at risk of becoming an adult with osteoporosis.

The factors that put children at risk of problems with bone health include:

- inadequate intakes of calcium and Vitamin D
- engaging in prolonged, strenuous athletic training and / or low body weight
- delayed onset of menstruation or irregular menstruation in young women
- undernourishment due to an eating disorder (e.g., anorexia) or a malabsorption syndrome (e.g., celiac disease, cystic fibrosis)
- a history of chronic glucocorticoid steroid use (to treat diseases such as asthma, arthritis, and some forms of cancer).

Are Other Populations at Risk?

Some information suggests that Aboriginal people³⁶ may be at higher risk for osteoporotic fracture, but more data is required to confirm these preliminary findings.

Some groups of Ontarians may be at higher risk of osteoporotic fracture because of special medical conditions. For example, people with many disabling conditions are now living much longer, which may increase their risk of developing osteoporosis. The risk may also be higher for people who have limited mobility (e.g., confined to a wheelchair) or certain forms of cancer (e.g., multiple myeloma), or who are undergoing certain medical treatments (e.g., glucocorticoid steroids).

What Factors Affect Bone Health?

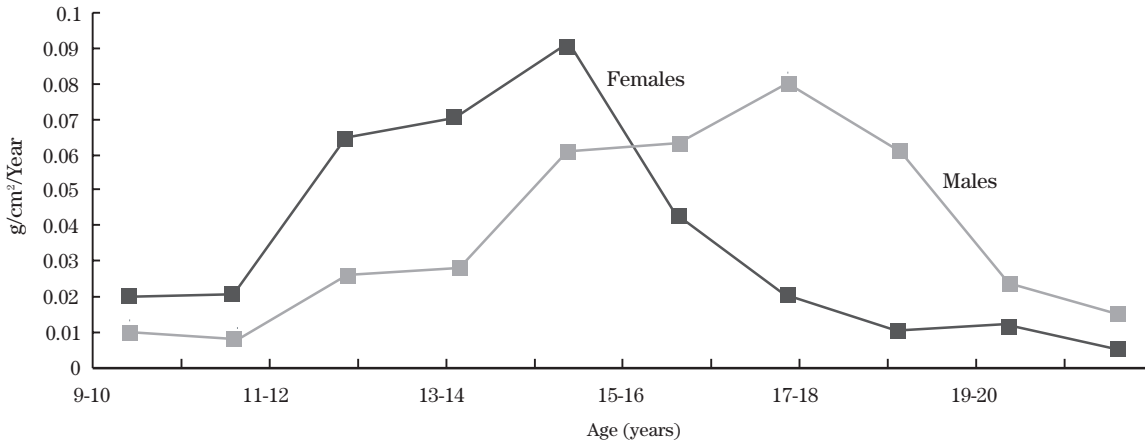
Bones may seem hard and unchanging but they are actually in a constant state of flux. Within the body, bone is continually growing and being reabsorbed, but the rate at which people grow or lose bone mass changes over their lifetime. As people age, their bones go through three important stages: bone growth, bone consolidation and bone loss.

1) Bone Growth

From birth to the mid to late 20s, most people build bone or add bone mass faster than they lose it. The most important time for healthy bone growth is childhood and adolescence (Figure 1). Between puberty and young adulthood, a person's skeletal mass doubles. By ages 17 to 20, between 90% and 95% of adult bone mass is deposited. The peak rate of bone mass development occurs around age 13 for girls and age 14.5 for boys.³⁷ People with a high peak bone mass in early life have a lower risk of bone thinning in later life.^{38, 39} Childhood and adolescence are critical “windows of opportunity” to prevent osteoporosis.

While genetics determine up to half of each person's peak bone mass, lifestyle factors such as dietary intake and weight-bearing physical activity are also critical.⁴⁰ Healthy eating and regular physical activity promote bone growth. They also help to prevent a number of other chronic diseases (e.g., obesity, diabetes, heart disease, stroke).

Figure 1: Rate of Bone Mass Development During Childhood and Adolescence

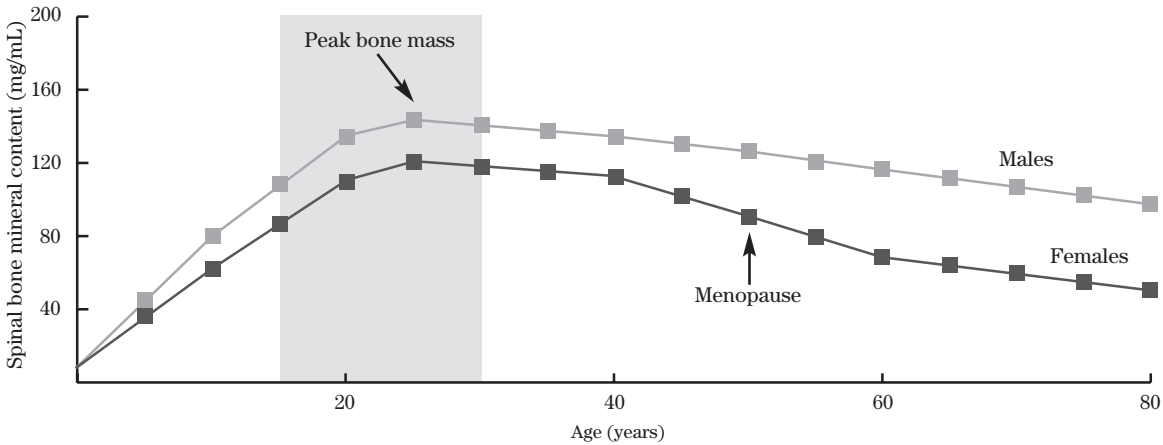


Adapted from Theintz et al⁴¹

2) Bone Consolidation

Between the mid to late 20s and age 35 is the key time for the consolidation of bone growth (Figure 2). During this time, poor nutrition, a sedentary lifestyle, medications or conditions that contribute to bone loss and / or dieting and the pursuit of thinness can interfere with bone formation and contribute to increased bone loss – even in relatively young adults. For example, a study of men and women in their early 20s⁴² found that women who were thinner and probably dieting had lower bone mineral density.

Figure 2: Change in Bone Mass Over Time



Ettinger B. *Obstet Gynecol* 1988;72(5 suppl):12S-17S.

3) Bone Loss

Around age 35, men and women begin losing bone mass faster than they can build it (Figure 2). This causes an overall decline in bone mass of about 0.5% to 1% per year. The steady decline in bone mass continues until women enter menopause (typically, between ages 45 to 55) and men reach age 65. After that, bone mass loss accelerates dramatically.⁴³ One of the reasons is the decline in kidney function that occurs with aging. Loss of kidney function leads to higher levels of parathyroid hormone in the system, which signals bones to release calcium into the bloodstream, causing bone loss.⁴⁴

After menopause (and for the following ten years), bone loss in women jumps to 3% to 5% per year. Over her lifetime, a woman may lose 45% of her bone mass, and a man about two-thirds of the bone mass that a woman loses.

Seniors who do not develop or maintain sufficient bone mass early in life are at high risk of developing osteoporosis.

Can Osteoporosis be Prevented and / or Treated?

Yes. People can make lifestyle choices that will promote bone growth and prevent bone loss (see box: *Seven Steps to Reduce the Risk of Osteoporosis and Fractures*). There are also medical treatments that can protect bone mass in people diagnosed with osteoporosis and those at risk. Some medications have been found to reduce the number of fractures even in the first year of treatment. To reduce the burden of osteoporosis, Ontario must take steps to ensure that its citizens have equitable, appropriate access to proven and cost-effective initiatives to prevent, diagnose and treat the disease.

In 2000, the Ontario Women's Health Council, at the request of the Minister of Health and Long-Term Care, released a framework and strategic plan for the prevention and management of osteoporosis. As a result of that report, the ministry funded a number of research projects and established the Osteoporosis Action Plan Committee. That expert group prepared this Osteoporosis Strategy.

Seven Steps to Reduce the Risk of Osteoporosis and Fractures

Effective prevention programs for adults focus on seven steps that individuals can take to reduce their risk:

1. Know your risk factors and change the ones you can.
2. Maintain a balanced diet and get the calcium you need (see Table 2).

The “2002 Clinical Practice Guidelines” recommend a higher intake of daily calcium and Vitamin D, particularly in adults over the age of 50. A typical Canadian diet, without dairy products or supplements, provides about 300 mg of calcium per day. If individuals cannot get enough calcium in their diet, they should consider a calcium supplement. Since Vitamin D helps the body to absorb calcium, it is important to get adequate amounts of Vitamin D. Exposure to sunlight, certain foods and multivitamins can help.

3. Include regular weight-bearing physical activity throughout life.

Children, particularly those entering and passing through puberty, should be encouraged to participate in impact exercises or sports (mainly field and court sports).

Both men and women throughout life should be encouraged to participate in regular physical activity, particularly weight-bearing physical activity such as walking, running or dancing, or sports such as tennis, bowling or soccer. Adults should take part in physical activity for a minimum of 30 minutes at least three times a week.

Older men and women at risk of falling or who have fallen should be encouraged to participate in tailored programs that involve individual assessment and include exercises to improve strength and balance.

4. Avoid excess caffeine (i.e., consistently more than four cups a day of coffee, tea or cola).
5. Avoid excess alcohol (i.e., consistently more than two drinks a day).
6. Avoid smoking.
7. Discuss osteoporosis with your doctor if you have used glucocorticoid therapy for more than three months, have a medical condition that inhibits absorption of nutrients (e.g., celiac disease, Crohn’s disease) or have hyperthyroidism.

Table 2: Daily Recommended Calcium / Vitamin D Intake by Age

Age	Daily Calcium Intake	Age	Daily Vitamin D Intake
Prepubertal children (4-8)	800 mg	Adults (19-50)	400 IU
Adolescents (9-18)	1,300 mg	Adults (>50)	800 IU
Adults (19-50)	1,000 mg	Pregnant or lactating women (≥18)	400 IU
Adults (>50)	1,500 mg		
Pregnant or lactating women	1,000 mg		

Why Does Ontario Need an Osteoporosis Strategy?

Because the problem will only get worse. The proportion of the population that is at risk of developing osteoporosis is increasing significantly, which means that the disability and healthcare costs associated with osteoporosis will also increase. Investment in a comprehensive osteoporosis strategy could ensure that people who are at risk of osteoporosis and osteoporosis-related fractures will have access to bone mineral density (BMD) tests, and effective osteoporosis-related medications, in order to significantly reduce the number of fracture-related events.

With a more comprehensive evidence-based approach to osteoporosis prevention and treatment, Ontario could expect to have 3,000 fewer visits to emergency departments, 3,000 fewer hospitalizations and 750 fewer deaths over the next five years, thereby avoiding \$142 million in healthcare costs. But more important than the cost savings are the potential improvements in quality of life for thousands of Ontarians. Fewer fractures mean less pain and suffering, fewer limits on activities and fewer admissions to long-term care facilities.

The evidence on osteoporosis and how to manage it has changed significantly over the past ten years. Yet awareness about osteoporosis and its risk factors is low – both in the general public and in healthcare professionals. As a result, many Ontarians with osteoporosis do not receive appropriate diagnosis and treatment. Although clinical practice guidelines for osteoporosis exist,^{29, 45} they are not followed consistently. Family physicians, as well as other healthcare professionals, have limited access to the training and tools they need to effectively manage patients with osteoporosis. A comprehensive strategy will help to raise public awareness, change the knowledge, attitudes and behaviours of both the public and health professionals, and improve prevention and treatment programs.

Ontario must act quickly to keep pace with provincial, national and international standards for osteoporosis prevention, diagnosis and management. Many jurisdictions around the world have already developed evidence-based recommendations for all levels of care for osteoporosis. Internationally, the WHO has released an interim report on its Strategy for Osteoporosis. Australia, the United Kingdom and the United States (the U.S. National Bone Health Campaign) have developed national strategies. The U.S. Surgeon General is preparing a report on bone health and osteoporosis (www.hc-sc.gc.ca). In Canada, British Columbia and Nova Scotia have released provincial osteoporosis strategies.

The following is Ontario’s Osteoporosis Strategy. Its recommendations are evidence-based. Ontario’s Osteoporosis Action Plan Committee graded the strength of the scientific evidence according to the following scheme, adopted from that used by The Foundation for Medical Practice Education.⁴⁶

Table 3: Levels of Evidence

Strength	Level	Description
Excellent	Level I	Large randomized trials with clear-cut results and low risk of error or meta-analysis of well-designed randomized trials using explicit criteria for inclusion and including adequately large total numbers.
Very Good	Level II	Small randomized trials with moderate to high risk of error. (a) Trials with high false-positive (a) error – interesting positive trend that is not statistically significant; or (b) Trial with high false-negative (b) error [low power] – a “negative” trial that could not exclude the real possibility of a clinically important benefit or difference because of small numbers. OR Meta-analysis of well-designed, randomized trials using explicit criteria for inclusion but still with moderate risk of error (e.g., often with subgroup analysis).
Good	Level III	Well-designed controlled trials with non-randomized contemporaneous controls.
Fair	Level IV	Comparative studies using non-randomized historical cohort controls.
Poor	Level V	No controls, case series only; expert opinion (individual or committee).

The recommendations are also designed to be co-ordinated and mutually supportive, so that efforts in one area (e.g., professional education) will reinforce efforts in other areas (e.g., public education). This approach enhances the potential for sustainable behaviour and system changes that will reduce the burden of osteoporosis and improve the quality of life of Ontarians.

The Action Plan consists of eight main strategies:

1. Promote Bone Health and Prevent Osteoporosis (primary prevention)
2. Detect Osteoporosis Early (secondary prevention)
3. Provide Evidence-based Treatment (secondary prevention)
4. Integrate Fracture Care, Rehabilitation and Osteoporosis Management (tertiary prevention)
5. Promote Self-Management and Falls Prevention (tertiary prevention)
6. Promote Evidence-based Practice
7. Develop and Transfer New Knowledge
8. Provide Leadership.

I Promote Bone Health and Prevent Osteoporosis

Osteoporosis can be prevented, but prevention must start early and continue throughout life. Activities that focus on health promotion and primary prevention – that is, intervening before people develop disease – can help Ontarians to improve their bone health and reduce their risk of osteoporosis. Effective health promotion / primary prevention programs will reduce fractures, enhance quality of life and help to reduce osteoporosis-related healthcare costs.

Effective health promotion activities to prevent osteoporosis include:

- educating people about the importance of bone health and the risk factors for osteoporosis and related fractures
- promoting bone-healthy nutrition
- promoting regular physical activity.

Health promotion is a process that enables people to increase their control over and improve their health.

Educate the Public / Raise Awareness

Ontarians of all ages should be educated about osteoporosis. Early in life, the education should focus on bone health and the healthy lifestyles that help to build strong bones, such as healthy eating and regular physical activity. In adulthood, education about healthy lifestyles should be supplemented with education about osteoporosis and its risk factors.

While everyone should be educated about bone health, osteoporosis education should focus primarily on those at higher risk, such as post-menopausal women and elderly men and women, and the people who care for them or can influence them, such as the adult children of elderly parents.

A considerable body of evidence exists to guide education and awareness-building efforts, particularly for mass media⁴⁷ campaigns and activities aimed at seniors.⁴⁸ Comprehensive, multifaceted public education that targets high-risk populations has the potential to:

- increase knowledge
- change attitudes
- promote behaviours that contribute to bone health (e.g., healthy eating, regular physical activity and self-management).

When co-ordinated with professional education initiatives, primary prevention and public education initiatives also have the potential to contribute to early detection and diagnosis, effective treatment, better adherence to treatment, referrals for integrated rehabilitation and falls / fracture prevention services, and patient and provider satisfaction. Because many of the behaviours that promote bone health, such as healthy eating and regular physical activity, also prevent other chronic diseases, osteoporosis prevention efforts will also enhance general health promotion activities in Ontario.

Promote Healthy Eating

Bone, like all of the tissues in our bodies, requires good nutrition to be healthy.⁴⁹ While genetics is the single most important factor in the set point for peak bone mass in early life, nutrition also plays an important role.⁵⁰ A healthy diet is also important in reducing bone loss in seniors.⁵¹

Genetics is the single most important contributor to the set point for peak bone mass in early life but nutrition also plays an important role.

For most people, the essential elements for bone health (i.e., protein, calcium, Vitamins C and D, phosphorus, magnesium and other minerals) can be obtained from a healthy, balanced diet. Two particular elements – calcium and Vitamin D – are critical to good bone health.⁵² Calcium helps to build bones and Vitamin D helps the body to absorb calcium. In fact, without Vitamin D, the body cannot use the calcium in the foods we eat. Calcium comes mainly from food, particularly milk and other dairy products. Although Vitamin D can be obtained from some foods, people can obtain as much as 80% to 90% of their Vitamin D requirements from exposure to sunlight.

The joint Canada / U.S. Dietary Reference Intake Report⁵³ provides evidence-based Dietary Reference Intakes (DRIs) for calcium and Vitamin D throughout the life span, including tolerable upper limits. Although Ontario has little data with which to evaluate the calcium and Vitamin D intake of its citizens, the information that is available appears to indicate that it is inadequate:

- The nutrition report of the 1990 Ontario Health Survey was unable to determine the adequacy of calcium intake in the population, but its findings did suggest that “a large proportion of the population, especially young women, could benefit from consuming more milk and milk products.”⁵⁴

- A recent study of 310 men and women across Canada estimated mean daily calcium intakes of 1,051 mg (SD 480) among women and 961 mg (SD 424) among men.⁵⁵ (The recommended daily calcium intake for both men and women is between 1,000 and 1,500mg, depending on age.)
- Several small studies among adolescents and adults suggest that consumption of dairy products (a primary source of calcium) may be inadequate.^{56, 57, 58} For example, a recent survey comparing food intake to “Canada’s Food Guide to Healthy Eating” found that the intake of milk products did not reach the minimum recommended level for all age groups in women and for men aged 35 to 65 years of age.⁵⁹
- A preoccupation with weight and dieting can cause young people to eliminate some food groups that contribute to bone mass (e.g., dairy products) and become undernourished. About 20% of Canadian male students in grades 6, 8 and 10 are on a diet or feel that they need to lose weight. Among girls, the rate is higher and increases with age, starting at 29% in grade 6 and climbing to 47% among those in grade 9.⁶⁰
- A study of young women (age 18 to 35 years) in Toronto found that wintertime Vitamin D insufficiency to be common,⁶¹ and this is likely the case throughout the province.
- Vitamin D deficiency is also a major concern among seniors, both because the ability of the skin to synthesize the vitamin declines with age and because many elderly people, especially those in long-term care facilities, have minimal exposure to sunlight.⁶²

Nutritional interventions can change behaviour.^{63, 64} For example, a recent review⁶⁵ of 92 independent programs designed to change people’s dietary fat, fruit and vegetable intake found that more than three-quarters appeared to be effective, particularly among people at risk of or diagnosed with a disease. According to the Ontario Women’s Health Council review of best practices in modifying health risk behaviour,⁶⁶ a number of family, school, workplace and community-based programs have been at least moderately successful in changing the dietary behaviour of women. The most successful healthy eating programs use a combination of individual, social and environmental approaches.

Promote Regular Physical Activity

Physical activity is a major contributor to peak bone mass.⁴² According to a number of studies and reviews of studies, physical activity helps to prevent osteoporosis by promoting peak bone mass accumulation in early life, reducing bone loss in adulthood, and helping to reduce the likelihood of fracture.^{67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77}

Long-term participation in physical activity postpones disability and increases independent living in the most elderly.

Physical activity has been found to be a major contributor to peak bone mass. In seniors, it improves fitness and muscle strength, and helps to prevent falls.

Physical activity may not protect against common osteoporotic fractures such as wrist and vertebral fractures in seniors,⁷⁹ but evidence from prospective and case-control studies indicates that it is associated with a 20% to 40% reduction in the risk of hip fracture. The Australian and New Zealand Bone and Mineral Society⁸⁰ has found good evidence that physical activity improves fitness and muscle strength in seniors and helps to prevent falls.

Physical activity can also help people with osteoporosis to manage their condition (secondary prevention). For example, a pilot project in Hamilton found that a home exercise program for frail elderly women decreased vertebral fractures and improved their quality of life. This project, which required minimal telephone contact, could easily be supported by self-management groups, public health units or other community groups.⁸¹

According to a number of systematic reviews of effective physical activity promotion interventions^{82, 83, 84} including interventions among seniors^{85, 86} and women,⁶⁶ there is good evidence upon which to base programs, particularly for two groups in critical phases of bone health: children / adolescents and seniors.

Prevention Issues by Age / Stage of Bone Health

School-aged Children (bone growth)

Childhood and adolescence are critical years for bone growth. Primary osteoporosis prevention programs during these years could have life-long benefits for millions.

Osteoporosis is a pediatric preventable disease.

As of 2001, Ontario had 2.5 million children under the age of 19, three-quarters of whom were school-aged (i.e., ages four to 19). These are critical years for bone growth and intervention at this time could have life-long benefits for millions. In fact, the National Institute of Child Health and Human Development (NICHD) has stated that “osteoporosis is a pediatric preventable disease.”⁸⁷

Ontario has no information about the level of knowledge about bone health or osteoporosis among its children and youth. Information about their nutritional status is also very limited but adolescents’ calcium intake is likely below recommended levels. For children under 12, there are no reliable data on their physical activity levels. For adolescents 12 to 19, the Canadian Community Health Survey⁸⁸ (2000/01) found that 21% of males and 38% of females were physically inactive.

Ontario can use three strategies to deliver primary prevention / bone health messages to children and adolescents:

- Build on existing nutrition / physical activities programs. Ontario has a number of programs and systems to promote healthy nutrition and physical activity among children and adolescents (e.g., Breakfast for Learning, Ontario Child Nutrition Program, Active Schools, Curriculum and School-Based Health Resource Centre). The most cost-efficient way to promote bone health in children and adolescents is to collaborate with relevant community and professional groups (e.g., Osteoporosis Society of Canada, Ontario Physical Health Education Association, YMCA) to build on these programs.
- Develop school-based initiatives. Because children and adolescents spend a significant amount of time in school, it is important that the school environment support bone health. Discussions with the Ministry of Education could help to ensure that children are receiving consistent messages / activities and school policies promote bone health.

- Develop bone health programs. Several bone health pilot projects for children and adolescents are already underway in Ontario (e.g., the Girl Guides Osteoporosis Awareness Project, the Community-Based Adolescent Bone Health Program, the Youth Bone Health Initiative of Dairy Farmers of Ontario aimed at adolescents age 11 to 14). American models could also provide valuable insights (e.g., the National Bone Health Campaign of the National Center for Chronic Disease Prevention and Health Promotion, the NICHHD Milk Matters calcium campaign).

Young Adults (Consolidation)

Young adulthood is the period of bone consolidation. The rate of bone growth declines from what it was during adolescence but bone loss has yet to begin. Healthy nutrition and regular physical activity at this stage of life can promote bone consolidation and prevent premature bone loss.

Approximately 2.5 million Ontarians are young adults (i.e., between the ages of 20 to 34). The level of awareness about osteoporosis among young adults in Ontario is unknown. Most young adults may know what osteoporosis is (i.e., name recognition may be high), but this knowledge may not translate into bone-promoting attitudes or behaviours. For example, a 1994 study of 127 American college women⁸⁹ found that 90% had heard about osteoporosis, but relatively few were personally concerned about it.

Among women this age, consumption of dairy products (a primary source of calcium) appears to be inadequate. Women this age are also more likely to be physically inactive than men (51% vs. 43%). In developing a clinical prediction rule to identify pre-menopausal women with low bone mass, Ontario researchers⁹⁰ identified the most important predictors as: low body weight, onset of menstruation at age 15 or later, and physical inactivity as an adolescent. Women with all three risk factors had a 92% chance of having low bone mass. In another study of pre-menopausal women, later age of menarche and lack of milk consumption were associated with lower bone mineral density.⁹¹

Prevention programs can be effective in changing young adult behaviour and outcomes. For example, in a recent American study among 80 young adult women (ages 18 to 30) with low baseline calcium intake (<700 mg/d), a combined behavioural and dietary intervention increased total calcium intake and the use of calcium supplements, and reduced bone mass loss.⁹²

To promote bone health to young adults, Ontario can:

- **Build on existing health promotion programs.** Several programs of the Ministry of Health and Long-Term Care promote healthy eating and physical activity among adults, including the Physical Activity Resource Centre (currently in development), the Consumer Health Information Service, the Active Ontario Strategy, the “Guide to Nutrition Promotion in the Workplace”, the Nutrition Resource Centre and its resources and programs, and chronic disease prevention strategies such as Heart Health and the Type 2 Diabetes Strategy. Rather than invest in new and perhaps repetitive programs, bone health messages and concepts should be integrated into existing programs.

Older Adults (Bone Loss)

Beginning at age 35, most adults begin to experience a gradual decline in bone mass, which increases significantly for women when they reach menopause and in men after age 65. Primary prevention programs should target low-risk adults (i.e., women aged 35 to menopause and men aged 35 to 65). As well, primary and secondary prevention programs should target high-risk adults (post-menopausal women and seniors of both sexes).

Ontario has nearly 3.7 million adults in the **low-risk** age group (2.3 million men age 35 to 64 and 1.4 million women age 35 to 49) and over 2 million in the **high-risk** for osteoporosis because of their age (approximately 670,000 men age 65 and over, and 1.8 million women age 50 and over). With longer life expectancy and the aging of the “baby boom” generation, seniors are one of the fastest growing age groups in the province.

Awareness, Risk Factors and Prevention Strategies in Low-Risk Adults

Little is known about the awareness of osteoporosis in low-risk men, but an Osteoporosis Society of Canada survey found that women 35 to 55 rated osteoporosis low on their list of health priorities.⁹³ This lack of awareness means that Ontario is missing valuable low-cost opportunities to prevent osteoporosis before this group enters the high-risk stage of life.

Most low-risk adults have at least two of the modifiable risk factors for poor bone health: inadequate intake of calcium and low levels of physical activity (57% of adult men and 60% of adult women are physically inactive). Like most Canadians, low-risk adults may also be deficient in Vitamin D for several months of the year.

Osteoporosis prevention programs for low-risk adults should:

- **raise awareness** about the importance of bone health and the prevention and diagnosis of osteoporosis
- **collaborate with existing health promotion programs for adults** to improve nutrition, particularly adequate intakes of calcium and Vitamin D, and promote higher levels of regular, physical activity, particularly weight-bearing exercise that stimulates bone growth.

Awareness, Risk Factors and Strategies in High-Risk Adults

No surveys have been conducted among high-risk adults in Ontario to determine their level of awareness, and surveys done elsewhere suggest that adults in this age group have serious gaps in both knowledge about and attitudes toward osteoporosis. For example, a small study of 145 seniors in Edmonton⁹⁴ (average age 76) found that awareness was high (89% were aware of the condition and 61% could define it correctly), but only half the men (54%) knew that osteoporosis could affect them. More importantly, only 18% of all the seniors surveyed and only 3% of the men were taking any form of therapy for osteoporosis. A community-based study of 138 men age 65 and older in the United States in 2000⁹⁵ found that they had poor knowledge of osteoporosis, did not perceive themselves to be susceptible to the disease and engaged in few preventative behaviours such as weight-bearing exercise and dietary calcium intake.

In one Canadian study, 89% of seniors were aware of osteoporosis but only 18% were taking any sort of therapy. Half of the men were not aware that osteoporosis could affect them and only 3% were receiving any therapy.

Older women are more aware of osteoporosis than men. In an Angus Reid / Parke-Davis 2000 survey of 1,800 Canadian women aged 45 to 64, 41% of respondents identified osteoporosis as their leading long-term health concern associated with menopause (compared to 24% for heart disease and 18% for breast cancer). While many women have learned about osteoporosis related to menopause, their knowledge may be incomplete. A recent survey by the American Association of Clinical Endocrinologists found that nearly 80% of women aged 50 and over know osteoporosis is a disease that causes weak and fragile bones, but less than half are aware that bone fractures from everyday activities can be a sign of the disease.⁹⁶ Nearly half (48%) reported that their doctor had not talked to them about osteoporosis or the relationship between fractures and osteoporosis.

Little is known about the nutritional status of high-risk Ontarians. Some data suggest that milk consumption by post-menopausal women is sub-optimal. The average daily calcium intake in this age group is about 1,000 mg in women and 900 mg in men. The “2002 Osteoporosis Guidelines” recommend 1,500 mg daily from all sources. While Vitamin D deficiencies have been documented in institutionalized seniors, there is little information about the calcium and Vitamin D levels in seniors living in the community. (Currently, 6.4% of Ontarians 65 and over and 33.2% of those 85 and over live in some form of institution.) Long-term physical activity is associated with postponed disability and independent living in the oldest-old adults.⁹⁷ However, physical activity levels among high-risk groups are generally inadequate: 47% of high-risk men and 64% of high-risk women are inactive. Although knowledge levels may be low in high-risk adults, research indicates that interventions can be very effective in increasing awareness and changing behaviour. For example, the majority of callers to the Osteoporosis Society of Canada’s Osteoporosis Information line⁹⁸ reported significant increases in their osteoporosis knowledge, and 90% of callers identified as high-risk followed up with their physicians. In a follow-up sample, over half reported having increased their calcium intake from “very little” to “a lot” and 48% increased their weight-bearing exercise.

Prevention programs to reduce the burden of osteoporosis in high-risk adults should:

- **collaborate with existing chronic disease prevention / health promotion programs** aimed at post-menopausal women and / or seniors, including nutrition, physical activity and falls prevention strategies (e.g., *Smart Risk*, falls prevention programs offered by Public Health Units)
- **develop osteoporosis-specific prevention programs** designed to prevent and detect osteoporosis and promote self-management. These programs should address the knowledge gap by raising awareness of the risk factors for osteoporosis, the management of osteoporosis and the relationship between fractures and osteoporosis. Some of these programs are already available in limited form from the Osteoporosis Society of Canada (e.g., Mothers / Daughters Forums, *Move Your Bones*, *Building Better Bones*, the self-management program currently being evaluated in Peterborough or the Step Safe program being piloted in British Columbia). Demonstration projects should be assessed to identify opportunities for broader implementation throughout the province.

- **public education programs to promote early detection** so that older adults with osteoporosis are diagnosed at a stage in the disease when they can be treated effectively and prevent fractures. These programs should target both seniors and their adult children, dispel myths about osteoporosis and reduce or eliminate the barriers that keep seniors from seeking treatment.
-

Recommendation 1: The Ministry of Health and Long-Term Care should support and evaluate a multifaceted, multigenerational health promotion / communication strategy, designed to increase public knowledge about osteoporosis and bone health. Recommended tactics:

- with parents, educators and caregivers, stress the importance of nutrition and physical activity in laying down bone mass and promoting healthy bone growth in childhood and adolescence
- with adults age 50 to 64, focus on the risk factors and links between osteoporosis and fracture, and the importance of early detection for those at risk
- with seniors and their adult children, focus on the risk factors for osteoporosis, dispel myths and misunderstandings about osteoporosis and its treatment and reduce the perceived barriers to seeking treatment
- with people with certain clinical conditions, focus on the risk of osteoporosis associated with either the clinical condition or associated medication use.

Performance Measures

- *Evaluating the process and impact of health promotion / communication strategies by polling the public and documenting program frequency and reach*
- *Comparing the number of BMD tests in control and test communities pre- and post-intervention*

Recommendation 2: The Ministry of Health and Long-Term Care should support health promotion initiatives designed to increase physical activity and healthy eating practices, focusing particularly on children / adolescents, older adults (age 50 to 64) and seniors (age \geq 65). Recommended tactics:

- enhance physical activity among families and seniors through existing programs, such as the Active Ontario Strategy
- co-ordinate with other agencies and ministry departments promoting nutrition and physical activity to prevent / manage other chronic diseases (e.g., obesity, diabetes, heart disease) and with general health promotion programs

- support the development of provincial nutrition programs to improve bone health of families, older adults and seniors
- support education for caregivers and individuals who provide services for children, youth and seniors living in the community and long-term care settings (e.g., parents, coaches, food provider systems) to enhance their knowledge of dietary needs and osteoporosis.

Performance Measures

- *Number of chronic disease prevention / health promotion programs integrating bone health messages*
- *Number of community-based physical activity interventions for families and adults age >50*
- *Development and evaluation of pilot projects to address nutritional issues of children, youth and adults age >50*
- *Number of nutrition programs offered to caregivers and individuals who provide services for children, youth and seniors*

Recommendation 3: The Ministry of Health and Long-Term Care should facilitate supportive changes in the school environment designed to promote healthy eating and regular physical activity, and encourage healthy bone development among school-aged children and adolescents. Recommended tactics:

- support bone health messages in school curriculum implementation as part of nutrition and physical activity / physical education, based on effective learning strategies (e.g., enhancing the implementation and use of existing programs, such as the Active Ontario Strategy and the Curriculum and School-based Resource Centre, developing learning resources to fill identified gaps)
- work with relevant ministries and agencies to promote changes in the school environment that promote bone health, facilitate healthy eating practices and provide consistent opportunities for physical activity in the school day
- discuss with the Ministry of Education other opportunities to enhance bone health in the school setting.

Performance Measures

- *Number of resources developed to address bone health in schools*
- *Number of extra-curricular activities for bone health in schools*
- *Number of healthy cafeteria programs in schools*
- *Changes to curriculum, food service or opportunities for physical activity in schools*

II Detect Osteoporosis Early

Early diagnosis of osteoporosis is an important part of effective secondary and tertiary prevention – the sort of prevention that makes it possible for people to take steps to reduce bone loss and reduce osteoporosis-related fractures. Early accurate diagnosis and effective treatment can significantly reduce the impact of osteoporosis and improve quality of life for thousands.

National and provincial clinical guidelines (e.g., the 2002 guidelines of the Osteoporosis Society of Canada, the Society of Obstetricians and Gynaecologists,^{29,34} the 2000 guidelines by the Ontario Program for Optimal Therapeutics)⁹⁹ are available to help physicians diagnose and manage osteoporosis. However, a number of practice and system barriers keep healthcare professionals from fully implementing these guidelines. As a result, Ontarians are not receiving optimal care for osteoporosis.

Because practice and system barriers interfere with full implementation of evidence-based clinical guidelines, Ontarians are not receiving optimal care for osteoporosis.

Improve Access to BMD Testing

Impact of BMD Testing

Bone mineral density (BMD) testing is the “gold standard” for diagnosing osteoporosis and osteopenia (weakening of the bone).¹⁰⁰ Appropriate access to accurate, reliable BMD testing is essential in diagnosis and treatment. An analysis of BMD testing in Ontario¹⁰¹ indicates that it has a positive impact on physicians’ treatment decisions and on patients’ willingness to adhere to treatment. For example:

- patients who have BMD testing are nine times more likely to be given a prescription for an osteoporosis drug than those who do not
- without BMD testing, 80% of patients with a history of fractures are not given osteoporosis therapies¹⁰²
- 40% of women over age 65 who had BMD testing filled a prescription for an osteoporosis drug, versus 6% of those with hip or wrist fractures but no BMD test
- women who were tested were also more likely to continue their medication.

BMD testing also plays an important role in helping to prevent future fractures in those who have already had one fragility fracture. It is used to assess patients for treatment and establish a baseline measure that can be used to monitor the course of treatment.

Trends in BMD Testing

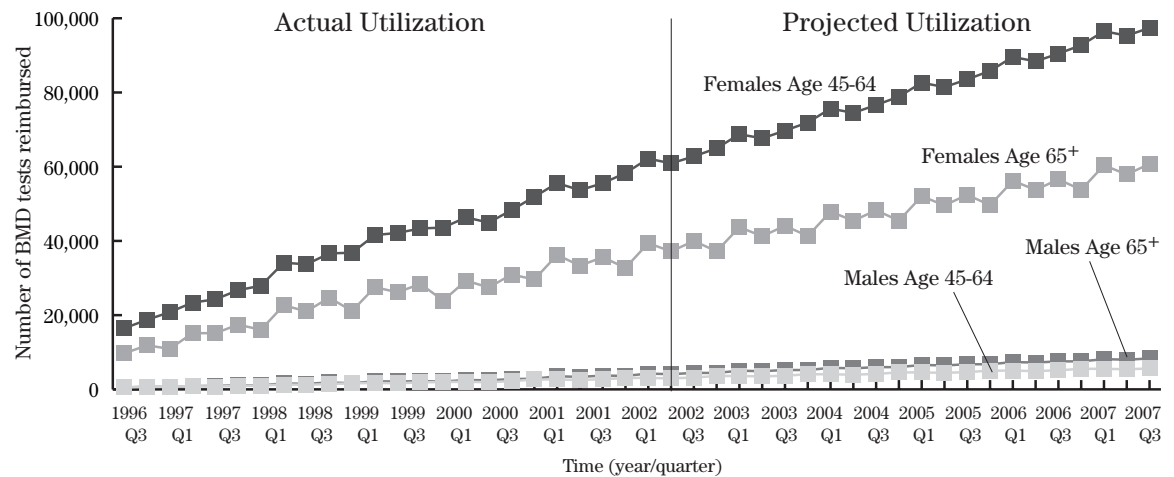
Between 1985 and 2001, the number of BMD tests increased steadily in Ontario (see Table 4, which lists billings to the Ontario Health Insurance Plan from 1985/86 to 2000/01 for BMD testing). The meaning of changes in the numbers or rate of BMD testing in Ontario is unclear. Several factors may be shaping BMD testing trends, including the publication of clinical guidelines, the increase in availability of DXA machines (in 2001 there were 247 machines: 103 in hospitals and 144 in independent health facilities),¹⁰³ the development of effective therapies and changes in fee schedules (e.g., in October 1999, the technical fee was reduced by 35%).

Table 4: Distribution Services and Payments for Bone Densitometry¹⁰³

Fiscal Year	Number of Services	Total Payments
1985/86	5,005	\$608,063
1986/87	11,583	\$2,063,194
1987/88	19,041	\$3,188,368
1988/89	22,497	\$3,643,568
1989/90	25,232	\$4,438,107
1990/91	28,314	\$5,027,596
1991/92	33,016	\$6,116,673
1992/93	40,153	\$7,758,855
1993/94	46,817	\$8,939,109
1994/95	62,377	\$11,867,331
1995/96	78,625	\$15,492,267
1996/97	128,643	\$25,382,889
1997/98	200,070	\$37,840,842
1998/99	260,999	\$33,628,470
1999/00	313,971	\$36,237,753
2000/01	351,441	\$35,454,907

In its economic analysis, ICES tracked the percentage of the population receiving BMD testing since 1996 and projected trends to 2007 (Figure 3).¹⁷ Unless changes occur, the number of BMD tests will continue to increase. The increase would be particularly dramatic in women between the ages of 45 and 64.

Figure 3: Changes in BMD Test Reimbursement Patterns Over Time



A number of factors may contribute to observed and expected increases in BMD tests in Ontario, including:

- lack of physician knowledge about who should be referred for BMD testing,¹⁰⁴ which may lead to inappropriate testing of individuals who are not at risk
- the variability in results obtained from different facilities or instruments may lead to retesting. Currently, there are at least two different standards for BMD testing in Ontario: those of the Canadian Association of Radiologists used by Independent Health Facilities¹⁰⁵ and those of the International Society of Clinical Densitometry¹⁰⁶
- reimbursement policies, which do not reflect the revised clinical recommendations for BMD testing. For example, the Ontario fee schedule currently provides payment for BMD testing every 24 months for low risk patients. This is not consistent with new recommendations (see below), which base referral for BMD testing on the presence of risk factors for fractures, and will likely lead to unnecessary testing.

The Gap Between Clinical Guidelines for BMD Testing and Practice

In its 2002 guidelines, the Osteoporosis Society of Canada revised the recommendations for BMD testing based on current evidence. The guidelines stress that mass screening is neither useful nor cost-effective. They recommend that:

- all seniors (age >65) receive BMD testing
- all adults between the ages of 50 and 65 be assessed each year for their risk of osteoporosis and only those with one major risk factor or two minor risk factors receive bone mineral density testing
- adults with a normal BMD test result should only be considered for retesting after two to three years unless in the presence of a condition associated with rapid bone loss (e.g., steroids, chemotherapy, hyperparathyroidism, rheumatoid arthritis)
- after beginning therapy, patients should be retested every one to two years in order to assess the impact of treatment.

According to evidence, the best available form of BMD measurement is dual-energy X-ray absorptiometry (DXA), which is used to measure bone mass in the spine, hip and total body. DXA scans are accurate (error rate of 4% to 8%), precise (error rate of 1% to 3%), fast (3 to 10 minutes) and result in low radiation exposure (10 to 30 μ Sv).

Despite guidelines identifying who should be tested, a good supply of DXA machines and increasing numbers of BMD tests, only a minority of Ontarians with osteoporosis or at high risk receive BMD testing.

Despite clear guidelines on who should be tested, a good supply of DXA machines in Ontario, and increasing numbers of BMD tests, only a minority of Ontarians with osteoporosis or at high risk receive BMD testing. Evidence indicates that Ontarians with fragility fractures are not being tested in sufficient numbers:^a

- While the number of BMD tests in Ontario has increased, the rates of BMD testing across the province vary up to 17-fold. According to ICES, the rate of BMD tests per 1,000 women between 1996 to 1998 ranged from a high of 47.1 (Hamilton-Wentworth) to a low of 0.2 (Rainy River District).^{107, 108}
- A study of fracture clinics in three Ontario community hospitals found that less than 20% of those with fragility fractures had been investigated and received adequate treatment for osteoporosis.¹⁰⁹ This means that, even in specialty clinics, only one out of every five patients with a fracture indicative of osteoporosis was adequately treated.

^a With funding from the Ontario Women's Health Council, a group led by Dr. Susan Jaglal of the Institute for Clinical Evaluative Sciences is currently completing a study of BMD testing. Results should be available at or before March 2003.

- Other studies have found that less than 5% of those with hip fractures are diagnosed and treated for osteoporosis.²⁹
- Despite their high prevalence in both men and women, vertebral fractures are consistently under-diagnosed.¹¹⁰

At the same time that a significant number of people at high-risk are not receiving BMD testing, many who are not at risk are receiving repeated BMD tests (e.g., pre-menopausal women who receive repeat testing without re-assessment of the risks).

Part of the gap between guidelines and practice may be due to the difficulty in determining the need for testing. Assessing the need to test pre-menopausal women can be particularly difficult for clinicians not specialized in osteoporosis management. Algorithms are under development in Ontario, including a clinical prediction rule to identify pre-menopausal women with low bone mass.⁹⁰ However, none of the decision tools developed to date are without problems and all have limited generalizability to the clinical settings because of their inadequate specificity in assessing the risk of osteoporosis.

Strategies to Improve Access to BMD Testing

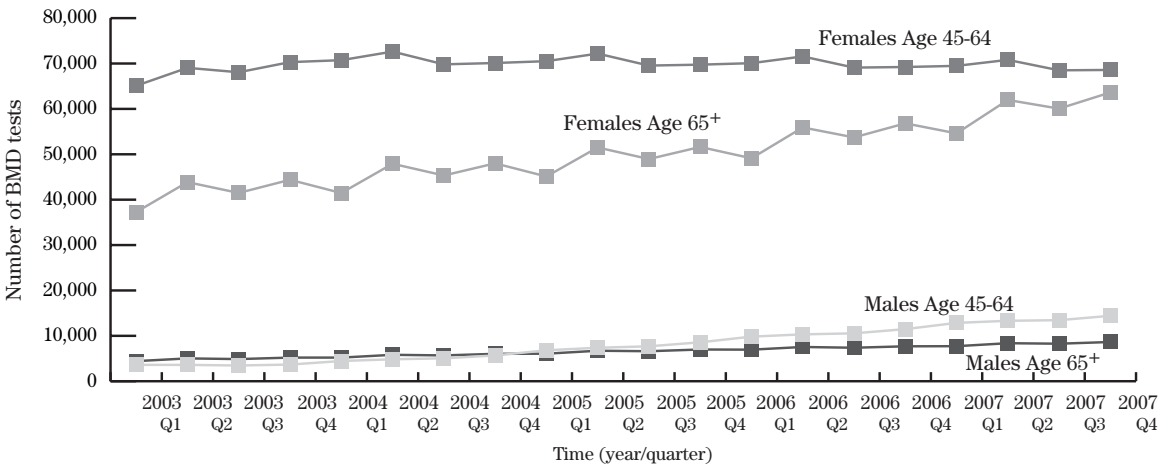
Ontario's goal is to ensure that all Ontarians with or at high risk of osteoporosis have appropriate, equitable and timely access to BMD testing, and to reduce inappropriate testing. The province is fortunate to have an adequate supply of DXA machines for BMD testing. The challenge is to optimize the use of those machines by:

- adopting a more standardized, efficient approach to selecting people to be tested (based on clinical guidelines)
- performing and reporting the tests in a standardized way to ensure consistency in interpreting test results based on clinical guidelines
- educating the public and professionals about the clinical guidelines for BMD testing. Primary care physicians order the bulk (80%) of BMD tests, so it is essential that they have the knowledge and tools, such as evidence-based algorithms, to use testing appropriately
- ensuring that reimbursement policies support and reinforce clinical practice guidelines.

A Recommended Use Requisition form for BMD testing, based on clinical guidelines, has already been developed and tested in Ontario. Evaluation indicates that clinicians would use the form, and that its use reinforces appropriate clinical practice, promotes appropriate testing and reduces inappropriate testing. A standard test requisition form will also give Ontario the ability to develop a database on BMD testing that can be used to analyze practices across the province, monitor wait times for testing and assess the impact of the strategy on testing rates.

With this type of comprehensive testing strategy, Ontario can ensure those at risk are being tested and reduce testing of low-risk individuals as well as unnecessary repeat testing. Figure 4 illustrates the potential impact of this strategy on the future demand for BMD testing. Between 2003 and 2007, the total number of tests would be reduced by about 160,000, for a savings of \$16.8 million.

Figure 4: Projected Quarterly Number of BMD Tests With Osteoporosis Strategy



Recommendation 4: The Ministry of Health and Long-Term Care should implement a mandatory Recommended Use Requisition for BMD testing that would support both appropriate clinical practice and data gathering.

Performance Measures

- *Establishment of BMD database*
- *Assessment of appropriate use of BMD testing and rate of change in practice*

Recommendation 5: The Ministry of Health and Long-Term Care should take steps to ensure that Ontarians have appropriate, equitable and timely access to BMD testing. Recommended tactics:

- develop algorithms for BMD testing for certain sub-groups, such as men and younger women (ages 45-64) to encourage appropriate utilization of BMD testing
- develop a standard of care policy for BMD testing including performance indicators (e.g., wait times)
- collaborate with appropriate professional bodies to ensure that DXA technologists and test reporters are working from the new standards developed by the International Society for Clinical Densitometry
- work with other ministry departments (e.g., OHIP) to harmonize policies on BMD testing.

Performance Measures

- *Development / testing of algorithms*
- *Rate of appropriate BMD testing by Health District*
- *Development of standardized training process*
- *Number of professionals with BMD certification*

III Provide Evidence-based Treatment

The good news about osteoporosis is that it can be treated effectively. Early appropriate treatment is an effective form of secondary prevention. It can help to increase bone mass, reduce the risk of a first or a repeat fracture and reduce costs associated with osteoporosis. All Ontarians with or at high-risk of osteoporosis should have access to effective treatment early in the disease process.

Effective Treatments

Osteoporosis can be treated using a number of different evidence-based therapies, including:

- calcium and Vitamin D supplementation
- bisphosphonates: drugs that bind permanently to mineralized bone surfaces and inhibit bone resorption
- selective estrogen receptor modulators (SERMs): non-hormonal agents that bind to estrogen receptors in the body and help to increase bone density
- calcitonin: a naturally-occurring hormone that suppresses bone resorption.

Hormone replacement therapy^b had been recommended for post-menopausal women with low bone density. However, recent studies have raised concerns about the safety of hormone replacement therapies (HRT) in the prevention of osteoporosis. Currently, HRT is a second-line treatment for post-menopausal women with osteoporosis, although there is some evidence for its use as a first-line therapy for post-menopausal women with low bone density. If used only for the prevention of post-menopausal osteoporosis, the risks of using HRT may outweigh the benefits.

Systematic reviews of osteoporosis treatments, many of which were led by Ontario researchers, provide excellent information about their efficacy in protecting bone mass density and preventing fractures.^{111, 112, 113, 114, 115, 116, 117, 118}

The findings of these reviews are reflected in the 2002 clinical practice guidelines for osteoporosis.

Many of the newer therapies can reduce the risk of fracture within the first year of treatment.

^b NOTE: A large research trial, the Women's Health Initiative in the United States, was terminated early because of an unfavourable risk-benefit ratio with estrogen-progesterone combination therapy as there was a significant relative increased risk for cardiovascular disease, stroke and invasive breast cancer. Although continuous estrogen-progesterone significantly decreases the risk of fractures at all sites, including the hip, the prolonged use of HRT may lead to an unfavourable risk-benefit ratio.

The effects of calcium alone on bone mass are relatively modest. However, there is evidence that a combination of calcium and Vitamin D supplementation can reduce both hip bone loss and the risk of hip fracture in elderly institutionalized women.¹¹⁹ A recent large study of 3,270 institutionalized individuals in seven European countries suggests that calcium (1,200 mg) and Vitamin D (800 IU) supplementation is an important therapy in preventing hip fractures in older people.¹²⁰ The study found that treating 1,000 institutionalized women with calcium-Vitamin D₃ supplementation can help to avoid 46 fractures over a three-year period. At the current time, less than 5% of those with hip fractures in Ontario receive calcium, Vitamin D or other therapy.¹²¹ Supplementation may be a relatively low-cost means of reducing the risk of hip fractures among a particularly vulnerable population: residents of long-term care facilities. (In Ontario, over 60,000 people live in long-term care facilities.)

Combination therapy using one or more medications may be appropriate for some patients. Studies have found that combination therapy (such as alendronate and hormone replacement therapy¹²² or raloxifene and alendronate)¹²³ may be more effective than single therapies.

Depending on the patient's age and underlying cause of the osteoporosis, clinicians may prescribe additional therapies, such as hormone replacement therapy, oral contraceptives or testosterone. Evidence indicates that, for men with osteoporosis, bisphosphonate alendronate is effective in reducing vertebral fractures.¹²⁴

Table 5 summarizes the latest gradings criteria for the different therapies. Table 6 summarizes the grade of recommendations of different therapies for osteoporosis prevention and treatment by clinical condition, based on the Canadian Clinical Practice Guidelines for Osteoporosis (2002).²⁹

Table 5: Grading Scheme

Grade	Criteria
A	Need supportive level 1 or 1+ evidence plus consensus*
B	Need supportive level 2 or 2+ evidence plus consensus*
C	Need supportive level 3 evidence plus consensus*
D	Any lower level of evidence supported by consensus

* An appropriate level of evidence was necessary, but not sufficient, to assign a grade so, in addition, recommendation required consensus.

Table 6: Grade of Recommendations for Osteoporosis Prevention and Treatment^c

Target Group	Recommendations
Post-menopausal women with low bone density (prevention)	<ol style="list-style-type: none"> 1) Bisphosphonates: <ol style="list-style-type: none"> a) alendronate (Grade A) b) etidronate (Grade A) c) risedronate (approved in Canada for prevention, as published in the product monograph) 2) HRT (Grade A) is a first-line preventive therapy; however, risks may outweigh the benefits when taken only for osteoporosis prevention 3) Selective estrogen-receptor modulators (SERMs) – raloxifene (Grade A)
Post-menopausal women with osteoporosis (treatment)	<ol style="list-style-type: none"> 1) Bisphosphonates: <ol style="list-style-type: none"> a) etidronate (Grade B) b) alendronate (Grade A) c) risedronate (Grade A) 2) HRT (Grade B) due to unfavourable risk/benefit ratio when taken only for osteoporosis 3) SERM – raloxifene (Grade A) 4) Nasal calcitonin (Grade B)
Pre-menopausal women with osteopenia or osteoporosis	<ol style="list-style-type: none"> 1) Use of bisphosphonates has not been examined and is not yet recommended in the absence of an identified secondary cause of osteoporosis (Grade D) 2) Due to safety profile, nasal calcitonin can be considered for use in non-pregnant women with osteoporosis (Grade D)
Men with low bone density or osteoporosis	<ol style="list-style-type: none"> 1) Bisphosphonates: <ol style="list-style-type: none"> a) alendronate (Grade A) b) etidronate (Grade B) 2) Nasal calcitonin (Grade D) for men with osteoporosis
Patients experiencing pain associated with Acute Vertebral Fractures	Nasal or parenteral calcitonin is first-line treatment for pain associated with acute vertebral fractures (Grade A)

^c Updated after the release of 2002 clinical practice guidelines

Table 6: cont'd

Target Group	Recommendations
<p>Patients requiring prolonged Glucocorticoid therapy > 3 months</p>	<p>Prevention of Glucocorticoid-induced osteoporosis (GIOP)</p> <p>Bisphosphonates:</p> <ul style="list-style-type: none"> a) alendronate (Grade A) b) risedronate (Grade A) c) etidronate (Grade A) <p>Treatment of GIOP</p> <p>Bisphosphonates:</p> <ul style="list-style-type: none"> a) alendronate (Grade A) b) risedronate (Grade A) c) etidronate (Grade B)
<p>All population groups</p>	<p>Daily Intake of Calcium and Vitamin D (including supplements)</p> <p>Calcium</p> <ul style="list-style-type: none"> 1) prepubertal children ages 4-8, 800 mg (Grade B) 2) adolescents ages 9-18, 1,300 mg (Grade B) 3) women ages 19-50, 1,000 mg (Grade A) 4) women ages > 50, 1,500 mg (Grade A) 5) pregnant or lactating women ages 18 or over, 1,000 mg (Grade A) 6) men ages 19-50, 1,000 mg (Grade C) 7) men ages > 50, 1,500 mg (Grade C) <p>Vitamin D₃</p> <ul style="list-style-type: none"> 1) women ages 19-50, 400 IU (Grade D) 2) women ages > 50, 800 IU (Grade A) 3) pregnant or lactating women ages 18 or over, 400 IU (Grade D) 4) men ages 19-50, 400 IU (Grade D) 5) men ages > 50, 800 IU (Grade A)

Treatment Compliance

Compliance (adherence) with osteoporosis treatment is a concern, as it is with other chronic conditions, such as hypertension (where 36% of patients may not be taking their medication as directed).¹²⁵ More convenient treatments could promote greater compliance. For example, the new once-weekly formulation appears to produce similar increases in bone mass density as the daily formulation, and is generally well tolerated and more convenient.¹²⁶

Treating Complex Cases

Treatment of individuals with complex cases of osteoporosis, such as disabled children and dialysis patients, can be extremely challenging for providers not specialized in osteoporosis care. Optimal care for these patients is best provided by a small number of regional, interdisciplinary teams that bring together clinicians, allied health professionals (e.g., nurses, physiotherapists, nutritionists, occupational therapists, pharmacists) and learners (e.g., undergraduate and post-graduate students).

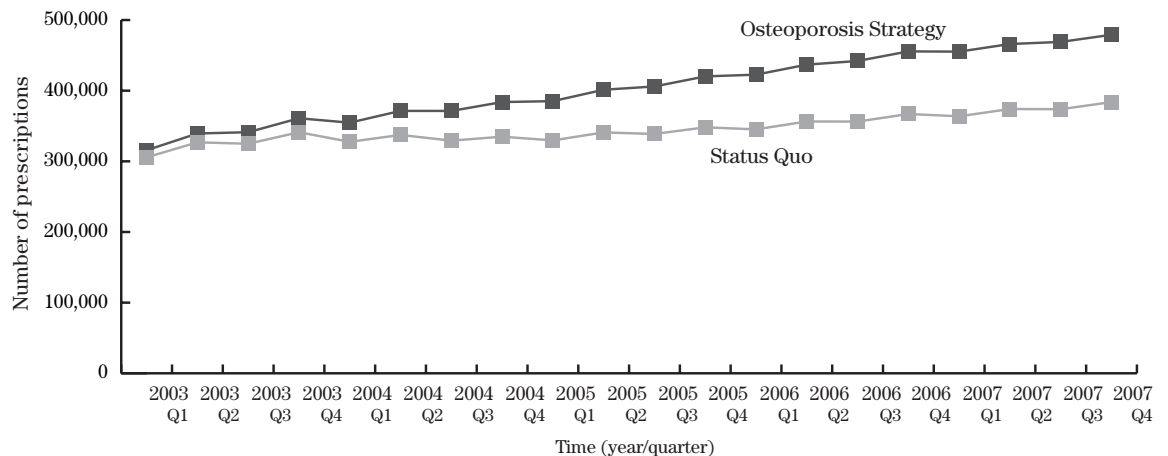
The Cost and Cost Effectiveness of Osteoporosis Treatment

If current treatment trends were to continue, treatment costs will increase under the Ontario Drug Benefit program for those 65 and older. According to the ICES economic analysis, by the end of 2007, 7% of men and 30% of women without a previous fracture, and 18% of men and 43% of women with a previous fracture, will be receiving osteoporosis treatment.

The osteoporosis strategy proposes a more aggressive treatment approach, especially for men and women with a previous fracture, in order to prevent future fractures. With an osteoporosis strategy, 46% of men and 67% of women over the age of 65, with a history of fracture, would have received evidence-based treatment by the end of 2007. Figure 5 illustrates the potential increase in osteoporosis-related prescriptions for Ontarians age 65 and older if more effective treatments are prescribed and compares it to the status quo (i.e., treatment trends without an osteoporosis strategy). As a result, the types of medications prescribed would change, and the number of prescriptions written would increase from approximately seven million in 2003 to eight million in 2007, and costs could increase from \$348 million to \$448 million.

However, the increased cost of prescriptions must be considered in light of the potential cost benefits of more effective osteoporosis treatment. ICES estimates that, between 2003 and 2007, the use of evidence-based treatments could reduce the number of fracture-related emergency department visits by approximately 3,000, the number of hospitalizations by 3,000, the number of deaths by 750, and fracture-related costs by \$142 million.

Figure 5: Number of Osteoporosis-related Prescriptions for Ontario Residents Age 65 and Older



Another way to assess the cost effectiveness of osteoporosis treatment is by analyzing the number of people the health system needs to treat to prevent one key event, and comparing that data with other treatable conditions. Table 7 compares Numbers Needed to Treat (NNT) calculations for high blood pressure, high cholesterol and osteoporosis. For women at high risk of osteoporosis (e.g., women who have already experienced a fracture), the health system needs to treat as few as 20 to prevent one fracture. For those at lower risk, the health system must treat a larger number (one study puts the number at 33 and another at 60). These numbers are significantly lower than those required to prevent events related to high blood pressure.

Compared to medications for other diseases, the treatment of osteoporosis appears to be cost-effective in terms of the numbers you must treat to prevent a fracture.

Although study results vary, the treatment of osteoporosis appears to be cost-effective. Each fracture averted helps to reduce healthcare costs and improve the quality of life for Ontarians.

Table 7: Numbers Needed to Treat (NNT)^d

Condition	Treatment	Event Prevented	NNT (middle-aged adults)
High blood pressure ¹²⁷	Beta-blockers or diuretics <ul style="list-style-type: none"> • Men and women • Within 5 yrs. 	Fatal or non-fatal coronary heart disease	390
		Fatal or non-fatal stroke	135
		Non-fatal stroke or heart attack or death	85
High cholesterol ¹²⁸	Pravastatin <ul style="list-style-type: none"> • Men without cardiovascular disease • Within 5 yrs. 	Coronary artery bypass surgery or angioplasty	125
		Non-fatal heart attack or death due to coronary artery disease	42
	Simvastatin <ul style="list-style-type: none"> • Men or women with coronary heart disease • Within 5 yrs. 	Coronary artery bypass surgery or angioplasty	16
		Non-fatal heart attack or death due to coronary artery disease	11
Osteoporosis ¹²⁹	Etidronate <ul style="list-style-type: none"> • Women with higher risk of fracture • Within 3 yrs. 	Vertebral fracture	20
		Risedronate <ul style="list-style-type: none"> • Women with higher risk of fracture • Within 3 yrs. 	Vertebral fracture
	Risedronate <ul style="list-style-type: none"> • Women with higher risk of fracture • Within 3 yrs. 	Non-vertebral fracture	43 or 20 ^e
		Hip fracture	42
	Alendronate <ul style="list-style-type: none"> • Women with higher risk of fracture • Within 3 yrs. 	Vertebral fracture	9
		Hip fracture	91
Alendronate <ul style="list-style-type: none"> • Women with higher risk of fracture • Within 3 yrs. 	Vertebral fracture	60 or 33 ^e	

^d NNT represents the number of patients who must be treated over a period of time to prevent one adverse event

^e Reflects findings from different studies

The Relationship Between Recommended Treatments and Reimbursement Policies

The majority of osteoporosis patients are over age 65 and eligible for the Ontario Drug Benefits program. To meet their needs and prevent fractures, the program should support effective treatment. Table 8 summarizes the effectiveness of different therapies in reducing fractures, and Ontario's current reimbursement policies for those therapies.

According to the Osteoporosis Society of Canada's 2002 clinical guidelines, there is excellent evidence that certain therapies, particularly the newer bisphosphonates, reduce fractures among those with severe osteoporosis (i.e., fragility fractures and / or a T score lower than -2.5). However, under the current formulary, Ontarians have restricted access to reimbursement for some of these effective drugs. An "open listing" of these therapies on the formulary would improve access and reduce the rate of fractures and re-fractures in Ontario.

Table 8: Effectiveness of Osteoporosis Treatments

Substance	Relative Risk for Fractures after Treatment	Ontario Provincial Drug Plan Status
Calcium	No significant decrease in relative risk for vertebral or non-vertebral fractures.	Not a benefit
Vitamin D	No effect of Vitamin D ₃ when given alone. Significant reduction in hip fractures (26%) and non-vertebral fractures (54%) when Vitamin D given in combination with calcium. 1-alpha hydroxy Vitamin D significantly reduced the relative risk of non-vertebral fractures in elderly (by 88%).	Not a benefit
Hormone Replacement Therapy (HRT)	Significant reduction in the relative risk of vertebral and non-vertebral fractures, including hip fractures. (Also see HRT note on previous page.)	Open listing / restricted
Raloxifene (a Selective Estrogen Receptor Modulator or SERM)	The relative risk of vertebral fractures decreased by 50% in those without prior vertebral fracture (a statistically significant reduction), but no significant decrease in the risk of non-vertebral fractures. Studies suggest that the effect on vertebral fractures can be seen after one year of treatment.	Restricted
Etidronate (a bisphosphonate)	The relative risk of vertebral fractures decreased by 37% (a statistically significant reduction), but no significant decrease in the risk of non-vertebral fractures.	Open listing
Alendronate (a bisphosphonate)	The relative risk of vertebral fractures reduced by 48% and the risk of non-vertebral fractures by 49%. Both decreases statistically significant.	Restricted
Risedronate (a bisphosphonate)	The relative risk of vertebral and non-vertebral fractures reduced by about a third (36% for vertebral fracture and 32% for non-vertebral); both decreases statistically significant. Studies suggest there can be significant effect within the first year of treatment.	Restricted
Calcitonin	The relative risk of vertebral fractures decreased by 54% (significant difference), but no significant decrease in the risk of non-vertebral fractures.	Pre-approval required

NOTE: In Table 8, the word “significant” is only used in cases where the relative risk reduction was statistically significant at 95% Confidence Interval.

Strategies to Improve Osteoporosis Treatment

Ontarians with or at high risk of osteoporosis must have access to effective, evidence-based therapies. Interventions to improve osteoporosis management include:

- professional education on osteoporosis management. Clinicians must be aware of the risk factors for osteoporosis, when to refer patients for diagnosis and the medications to prescribe (professional education is discussed in more depth in section 6)
- more effective ways to manage complex osteoporosis cases
- reimbursement policies that support evidence-based treatment.

A comprehensive osteoporosis strategy would strive to increase the prevalence of treatment among those with or at high risk of osteoporosis.

Recommendation 6: The Ministry of Health and Long-Term Care should support the development of five regional, tertiary-based interdisciplinary teams to provide integrated care for complex osteoporosis cases. At least one team should be located in Northern Ontario.

Performance Measures

- *Establishment of interdisciplinary teams*
- *Number of patients referred to the teams*
- *Number and type of services provided*
- *Patient outcomes*

Recommendation 7: The Ministry of Health and Long-Term Care should direct the Ontario Drug Benefit program to periodically review current clinical guidelines for osteoporosis treatment and emerging research, and list evidence-based therapies on the formulary.

Performance Measures

- *Number of Ontario Drug Benefit reimbursements for evidence-based treatments*
- *Changes in prescribing practices*
- *Morbidity data on fractures*

IV Integrate Fracture Care, Rehabilitation and Osteoporosis Management

One of the most cost-effective means of identifying and treating osteoporosis is to focus on people with fragility fractures (defined as a fracture sustained from a fall from standing height or less). Patients who have sustained a fragility fracture require appropriate treatment for the fracture *and* treatment for osteoporosis to prevent refracture. After a first fracture, the risk of another fracture increases dramatically. To prevent refracture, osteoporosis must be quickly identified and treated. In fact, fracture care and rehabilitation services that recognize and address osteoporosis are an effective form of tertiary prevention.

Issues in Post-Fracture Care

Research indicates that current management of fracture patients tends to focus on the care of the fracture, often neglecting patient rehabilitation and leaving the osteoporosis undiagnosed and untreated.^{130, 131, 132, 133, 134}

Access to Osteoporosis Management

Even though osteoporosis is the underlying cause of the vast majority of hip fractures, a study of hip fracture patients in three Ontario hospitals¹³⁵ revealed that fewer than 2% had osteoporosis noted on their hospital charts and, at discharge, fewer than 20% had any prescription medicine to manage osteoporosis.

Because 40% of women and 10% of men are living on their own when they experience a fracture, integrated post-fracture / osteoporosis care in the community is extremely important. At the current time, there are few communication mechanisms between the hospital and community services. Community Care Access Centres (CCACs) try to see individuals with acute fractures within two days of discharge from hospital. However, many CCACs do not have adequate resources to provide physiotherapy and homemaking services, particularly during the early stages of recovery when they are most needed. Many also lack the resources to follow up on safety assessments or help clients to make recommended changes (e.g., installing railings). To be an effective form of tertiary prevention, fracture care in the community should be closely linked with osteoporosis management, falls prevention, nutrition and physical activity programs for seniors.

Access to Integrated Rehabilitation Services

The majority of hip fracture patients are older and many are frail, with multiple medical problems. Most require geriatric rehabilitation. In fact, rehabilitation is critical to their ability to regain function. Ideally, they should receive integrated rehabilitation services that include physical and occupational therapy, psychosocial counseling, pain management, and falls and osteoporosis prevention. Rehabilitation services should be seamless, co-ordinated, client-focused and cross the continuum of care. Fracture care in Ontario is largely in the hands of orthopaedic surgeons who have a strong commitment to patient rehabilitation. However, despite the best efforts of orthopaedic surgeons, rehabilitation specialists and other health professionals, many Ontarians with osteoporotic fractures do not receive integrated rehabilitation. Appropriate rehabilitation services should be available equitably across Ontario in both the community and institutional settings.

Access to Falls Prevention Programs

Many communities have falls prevention programs that have been proven to be effective in reducing falls (e.g., SmartRisk, programs offered by hospitals, care facilities, CCACs and public health units). However, the services providing post-fracture care (e.g., fracture care programs, hospital emergency departments, family physicians) often do not have links to these local programs.

Strategies to Encourage More Integrated Care

With a more integrated approach to post-fracture care / rehabilitation / osteoporosis management and falls prevention, Ontario would be able to intervene effectively with people already at high risk of refracture. Several initiatives now underway are trying to improve integration of these services:

- an intervention with family physicians of fragility fracture patients at five Ontario hospitals was able to improve osteoporosis follow-up and investigation, but had no impact on treatment.¹³⁶
- the Ontario Women's Health Council is evaluating integrated post-fracture care in the province. The project should provide information on the scope of post-fracture care in Ontario, identify the human and organizational factors that influence the care patients receive, develop best practice case studies and recommend best practices for integrated post-fracture care in Ontario.

- a collaborative project of the Ontario Orthopaedic Association and the Osteoporosis Society of Canada, “Prevention of Osteoporotic Fractures in Fracture Clinic Patients”, is using professional and patient education to encourage osteoporosis care in the fracture clinic setting. An osteoporosis co-ordinator visits each of the fracture clinics in Ontario, distributes posters, pamphlets and tear sheets on appropriate investigation and treatment of osteoporosis in patients with fragility fractures, and advises staff about osteoporosis management and locally appropriate, realistic referrals.
- the Northern Ontario Coalition to Reduce Osteoporosis-Related Complications has formed the FORCE project (Falls, Fracture and Osteoporosis Risk Control and Evaluation), which is evaluating an integrated approach to falls, fracture and osteoporosis prevention, diagnosis and management for those age 55 years and older, both in hospital and community settings. FORCE could provide valuable insights on how to structure and improve post-fracture care.
- the Arthritis Society’s program of cross-trained, community-based therapists is one potential model for integrated rehabilitation services. However, no single model of integrated rehabilitative care can address the needs of people living in different settings and different parts of the provinces. For some clients, integrated rehabilitation care could be offered through post-fracture clinics; for others (e.g., those living in long-term care settings), other models may be required. Ontario would benefit from regional approaches to integrating, co-ordinating and enhancing existing rehabilitation services.
- a number of community-based organizations offer falls prevention programs (see next chapter for more information).

Recommendation 8: The Ministry of Health and Long-Term Care should improve osteoporosis management tertiary prevention services for people with fragility fractures. Recommended tactics:

- support and expand the fracture clinic intervention developed by the Ontario Orthopaedic Association and the Osteoporosis Society of Canada to diagnose and manage osteoporosis in patients with fragility fractures
- review outcomes of current initiatives and support the roll-out of prevention programs that meet differing regional needs

- implement an osteoporosis intervention for all Ontarians over age 65 who sustain a hip fracture
- encourage post-fracture care programs, hospital emergency departments and primary care services to develop links with local falls prevention programs
- evaluate the impact of all these initiatives.

Performance Measures

- *Number of pilot projects completed*
- *Analysis of findings*
- *Development and implementation of programs*
- *Proportion of fracture patients who receive integrated care pre- and post-intervention*
- *Fracture rates pre- and post-intervention or compared to control communities*

Recommendation 9: The Ministry of Health and Long-Term Care, with support from the Osteoporosis Society of Canada, should develop a model for integrated rehabilitation for people with vertebral and hip fractures. Recommended tactics:

- conduct systematic reviews of the literature to identify best practices in vertebral and hip fracture rehabilitation, including geriatric rehabilitation
- establish eight rehabilitation pilot projects to test evidence-based delivery models, with at least two of the pilots in Northern Ontario
- use the results of the literature reviews and pilot projects, with the professional education initiatives in this plan, to develop integrated rehabilitation models that respond to local needs, provide seamless co-ordinated services across the continuum of care, and link with community-based nutrition and physical activity programs for seniors.

Performance Measures

- *Completion of literature review and identification of best practices*
- *Funding of eight pilot projects*
- *Analysis of pilot projects*
- *Development of recommendations for integrated osteoporosis rehabilitation care*
- *Evaluation of initiatives, including quality of life measures*

V Promote Self-Management and Falls Prevention

While the care and treatment provided by the healthcare system can do a great deal to prevent bone loss and osteoporosis-related fractures, consumers and community-based services also play an important role. For those with or at high risk of osteoporosis, self-management strategies and the use of community-based falls prevention programs can significantly reduce the burden of this disease.

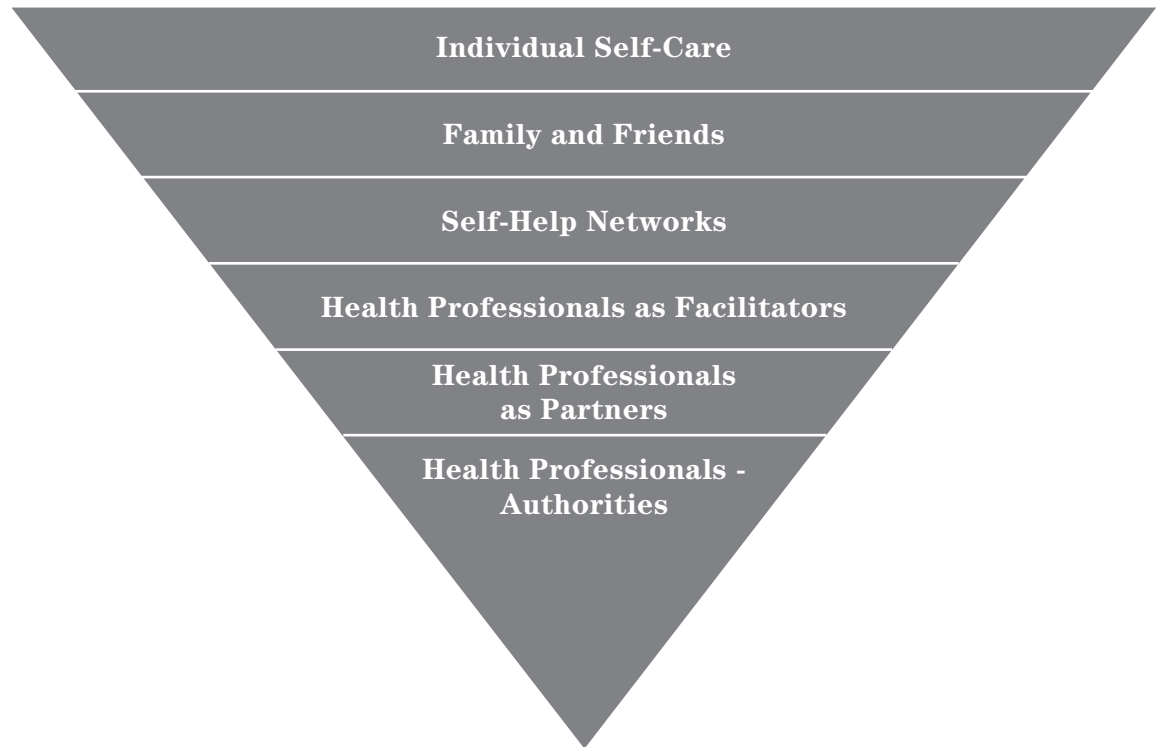
The Impact of Self-Management Programs

Self-management is an integral part of the new healthcare paradigm that has developed with the information age (see Figure 6). In the past, patients had little or no access to clinical information and tended to defer decision-making to health professionals. Today, patients have more access to information and are participating more in their own healthcare. Although healthcare professionals are still critically important, they are more likely to work with patients as facilitators and partners than as authority figures.

Self-management is beneficial. It improves the quality of clinician / patient interactions, helps patients to make informed decisions about their care and helps to improve compliance (adherence) with testing and treatment. According to several U.S. evaluations, osteoporosis self-management and education programs have been found to support coping behaviours¹³⁷ and increase knowledge, although not necessarily change health beliefs or behaviours.¹³⁸ Good evidence from other chronic diseases indicates that self-management programs can be very effective. Randomized controlled trials have found that they can improve a number of physical, social and psychological variables among patients with arthritis,¹³⁹ chronic pain¹⁴⁰ and multiple sclerosis.¹⁴¹ Chronic disease self-management programs have been found to be effective in follow-up studies of up to two years.¹⁴² Moreover, one cost analysis of an arthritis self-management program for people age 60 years and older demonstrated that the monetary savings of the intervention greatly outweighed the cost of conducting it.¹⁴³

Self-management is the decisions or actions taken by those at risk to help them cope with their condition and improve their health. Self-management programs are designed to give people the information and tools that they need to cope with their condition and interact with healthcare providers to jointly determine their treatment.

Figure 6: Self-Management Paradigm¹⁴⁴



There are several models for self-management programs:

- A program currently being field tested in the Peterborough area by the Osteoporosis Society of Canada is based on a model developed in Australia and tested in British Columbia. In this program, a nurse practitioner leads and facilitates the sessions. In surveys of the B.C. participants, 75% of those enrolling in a prevention program wanted a unique prevention strategy, and 77% had not been previously aware of self-management programs.
- POWER (Promoting Osteoporosis Wellness through Education, Exercise and Resources) is a self-help and educational program for older adults with osteoporosis that is a collaboration among Baycrest Centre for Geriatric Care, North York General Hospital, Toronto Public Health and Yee Hong Centre for Geriatric Care. Evaluations show that it has been effective in promoting healthy lifestyles in this group.
- Another model, “Choices”, developed by Duke University and tested in 42 sites in the United States, combines a facilitation team of multidisciplinary health professionals with group discussions.

The Impact of Falls and Falls Prevention

Health Canada estimates that a third (33%) of older adults fall each year (a figure confirmed by a recent survey of Ontario seniors)¹⁴⁵ and, of those, 36% develop serious injuries. According to the Canadian Institute for Health Information¹⁴⁶ (CIHI), falls are the leading cause of injury admissions to Ontario acute care hospitals, particularly for people over age 65. Approximately 40% of admissions to nursing homes are the result of falls and fractures.

Falls are the leading cause of injury admissions to Ontario acute care hospitals. Up to a third of older adults fall each year.

Seniors who are most likely to fall and least aware of their vulnerability are women over 65 and men over 75, particularly those with lower education and income, who live alone and are in poor health.¹⁴⁷ Residents of long-term care facilities are also at increased risk of hip fractures. Reducing falls and fractures may help to reduce the need for acute and long-term care, and improve the quality of life for seniors, both in the community and in long-term care facilities.

Environmental hazards such as throw rugs are thought to be responsible for between a third and one-half of all falls.¹⁴⁸ Of particular concern to Ontarians, hip fractures increase as much as 15% in the winter, in part because of ice and snow.⁴ Because the risk of subsequent (recurrent) fractures increases after the first fracture, falls prevention programs are important for seniors and those at risk.

Two recent reports – *A Best Practices Guide for the Prevention of Falls Among Seniors Living in the Community*¹⁴⁹ and the Registered Nurses Association of Ontario's report, *Prevention of Falls and Fall Injuries in the Older Adult*¹⁵⁰ – examined the literature on falls prevention and identified evidence-based best practices for falls prevention in the community and in long-term care facilities. For example, a systematic review of hospital-based programs found that effective falls prevention programs can reduce the fall rate by 25%.¹⁵¹ Effective approaches to preventing falls have also been summarized in the Health Canada report, *Prevention of Injury Among Seniors: A Framework for Action*.¹⁵²

There is Grade A evidence from studies showing that hip protectors can reduce the risk of hip fractures among the elderly. However, many seniors resist using hip protectors, so special strategies may be needed to encourage their use.

Efforts already under way in Ontario to enhance falls prevention include:

- the SmartRisk program
- various falls prevention programs offered by Public Health Units
- the Falls and Mobility Network, a provincial network of institutions and individuals interested in measures to increase the mobility of older people while reducing the number of injuries caused by falls.

Strategies to Promote Self-Management and Falls Prevention

Greater availability of self-management and self-help groups for those with or at high risk of osteoporosis could improve the health and well-being of participants, as well as compliance with both medical and non-medical treatments (e.g., medications, dietary changes, exercise).

Better use and integration of evidence-based falls prevention initiatives could significantly reduce falls, fractures and the burden of osteoporosis, and improve quality of life for many seniors.

Recommendation 10: The Ministry of Health and Long-Term Care should help to build a support network for people with or at high risk of osteoporosis to help them self-manage their condition, participate in their care and maintain the best possible quality of life. Recommended tactics:

- pilot test two current models for self-management programs
- evaluate the results and implement the better model
- promote the use of effective community-based falls prevention programs.

Performance Measures

- *Evaluation of pilot models*
- *Number of sites and programs offered*
- *Number of volunteers trained*
- *Number of program participants*
- *Impact on participants' quality of life*
- *Level of participants' knowledge*
- *Changes in attitudes and behaviour*

VI Promote Evidence-based Practice

Health professionals play a vital role in osteoporosis prevention and management. The main providers of care are family physicians and staff in long-term care facilities, but integrated osteoporosis care also involves pharmacists, nurses, nutritionists, and physical and occupational therapists.

To provide effective osteoporosis prevention and management, healthcare professionals must have the knowledge and skills to:

- recognize that kyphosis (curvature of the spine), loss of height and fractures are not normal parts of aging but possible indicators of osteoporosis
- identify people who may be at risk of osteoporosis and should be referred for BMD testing
- interpret test results
- know how to appropriately manage those with osteoporosis or at increased risk (i.e., therapies, modifiable risk factors, pain management, psychosocial support)
- know when to refer patients for specialist care (e.g., to a rheumatologist or a geriatrician) or to an allied health professional (e.g., nutritionist, nurse, pharmacist, physical or occupational therapist)
- identify those who have sustained fragility fractures and have them screened and treated for osteoporosis
- integrate osteoporosis, falls and fracture risk assessments into their practices.

There is little use in educating the public to seek care or improving access to diagnosis and treatment if health professionals do not know what they should do or are not motivated to take advantage of new opportunities.

To improve osteoporosis prevention, diagnosis and management, Ontario must remove any barriers to interdisciplinary, integrated osteoporosis care and falls prevention, create linkages between healthcare providers and community-based programs and services across the continuum of care, and promote changes in practice.

The Gap Between Evidence and Practice

In Primary Care

Family physicians can play a key role in osteoporosis management. Because they see patients over the entire life cycle, they can promote bone health during the stages of bone growth, consolidation and loss (primary prevention), detect people with osteoporosis and provide timely treatment (secondary prevention), and ensure that every patient who has had a fragility fracture receives integrated fracture care, rehabilitation and osteoporosis management (tertiary prevention). Family physicians who see patients in long-term care facilities are also in a unique position to help the facilities promote bone health, prevent osteoporosis-related fractures and prevent falls.

However, they do not appear to be filling this role. Although family physicians are concerned about osteoporosis and are trying to order BMD tests and manage their patients appropriately, they lack a rationale for testing and are confused about management.¹⁰⁴ According to a 2000 survey of Ontario physicians, almost half (46%) did not routinely assess patients in long-term care facilities for osteoporosis and over a quarter (27%) did not routinely treat the disease.¹⁵³ Another Ontario study, published the same year, found that the rate of BMD testing varies significantly across the province.¹⁰⁷ Most family physicians work in solo, fee-for-service practices and are not accustomed to working as part of multidisciplinary teams.

Given the apparent gap between evidence and practice, education of primary care providers, including nurse practitioners, is critical.

In Long-Term Care Facilities

Ontario's long-term care facilities are home to 61,000 seniors. According to research, residents of long-term care facilities are at higher risk of hip fractures and Vitamin D and calcium deficiencies than seniors living in the community. This is due to a number of factors, including age, diet, limited exposure to sunlight and limited mobility. Many residents of long-term care facilities have also already had a fracture, which puts them at higher risk of a second fracture. A number of evidence-based falls prevention programs and maneuvers have been developed for the long-term care setting. There are also opportunities for long-term care facilities to develop links with community-based nutrition and physical activity programs that could benefit residents. However, these are not promoted or used consistently in long-term care facilities across the province, and staff may not have the knowledge they need to assess residents' risk, actively promote bone health and prevent falls.

Effective Education Interventions

Over the past few decades, there has been a great deal of interest and activity in professional education and continuing medical education. Repeated studies have demonstrated that education strategies focused primarily on disseminating information (e.g., large group lectures, journal articles, unsolicited clinical practice guidelines) are ineffective in changing behaviour. On the other hand, systematic reviews have identified the characteristics of educational interventions that are likely to change clinicians' practice behaviours and / or improve health outcomes.^{154, 155, 156}

Effective interventions:

- actively involve the learner in the educational process
- are interactive rather than didactic
- provide opportunities for practice and feedback
- actively engage respected peers as part of the learning process
- include assistance at the practice level, such as chart aids, chart reminders or patient handouts
- use multifaceted interventions.

There is also good evidence from the medical literature that decision aids are effective in promoting shared decision-making, reducing uncertainty and increasing the likelihood that treatment choices are based on adequate knowledge, realistic expectations and personal values.^{157, 158, 159} Evaluation of an Ontario pilot of a decision aid for post-menopausal women with osteoporosis found it improved knowledge, encouraged realistic expectations and decreased decisional conflict.¹⁶¹ A randomized controlled trial is now underway to evaluate whether the aid can support long-term adherence to chosen therapy and quality of life.

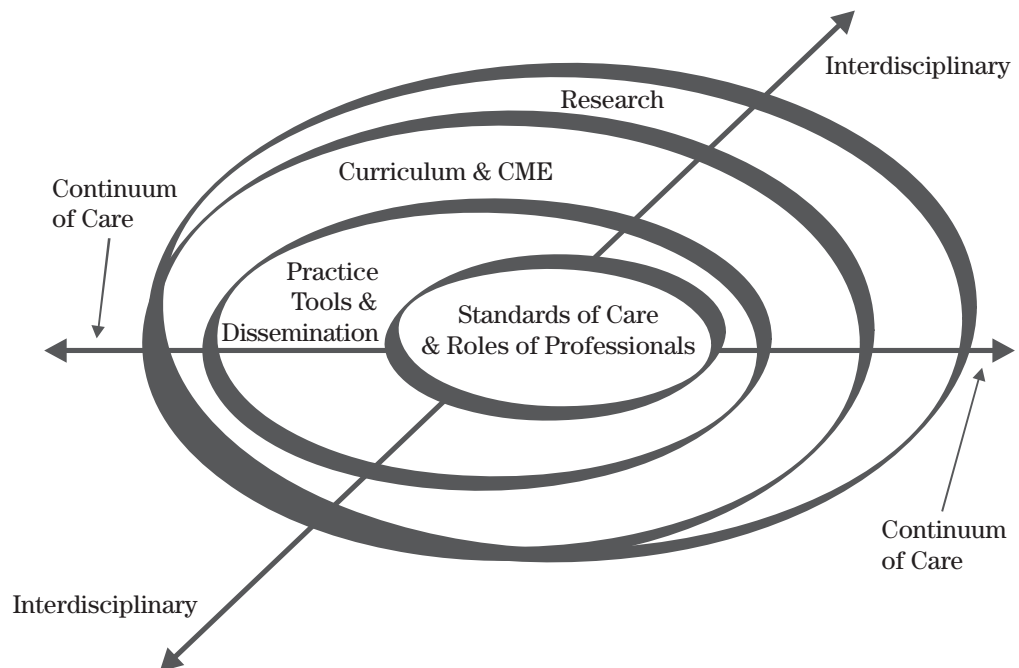
Recent research suggests that family physicians would welcome decision aids in osteoporosis. However, the current aid can only be used with menopausal / post-menopausal women (i.e., it does not apply to high-risk children or men), and it may not be appropriate for use by other health professionals, such as pharmacists.

Strategies to Improve Osteoporosis Practice

Figure 7 illustrates the professional education required to support an interdisciplinary, co-ordinated approach to osteoporosis prevention and management, including:

- an evidence-based standard of care, including clearly defined roles for each profession involved in interdisciplinary osteoporosis care (e.g., the role of the family physician, nurse practitioner, pharmacist, nutritionist, physiotherapist, specialist)
- multifaceted dissemination and implementation of tools and patient resources to support health professionals in fulfilling their role in osteoporosis care (e.g., clinical guidelines, decision aids, chart aids, patient education materials)
- educational support through curriculum and continuing education across all levels (undergraduate, graduate and post-graduate) and for all health professionals
- evaluation and research to support and promote professional education.

Figure 7: Model of Professional Education



Some comprehensive professional education programs have already been developed and tested, including:

- the MAINPRO-C program on osteoporosis of the Ontario College of Family Physicians, which is being revised to reflect the new clinical guidelines and requires funding for implementation

- the Peri-Post-Menopausal Women's Health small-group module developed and tested by the Foundation for Medical Practice Education.⁴⁶ The module includes an evidence-based chart aid to help family practitioners and their patients assess the risk of several diseases, including osteoporosis. The chart aid follows principles already developed and supported by the Ministry of Health in prenatal care and the *Rourke Baby Record: Evidence-Based Infant / Child Health Maintenance Guide*. The tool is for use with women only. Practitioners would benefit from a similar type of module / chart aid for use with men.
- universities, local academies, hospitals, the Osteoporosis Society of Canada, the Ontario College of Family Physicians and the pharmaceutical companies also provide opportunities for continuing medical education for family physicians.

Some multidisciplinary curricula resources are also currently available. For example, the Faculty of Health Sciences at McMaster University has developed a multidisciplinary case study in osteoporosis care that is used by a number of disciplines.

All efforts to shape or influence professional practice must reflect the evidence-based guidelines developed by the Osteoporosis Society of Canada. They should focus on promoting multidisciplinary care by:

- promoting evidence-based standards of care for different health professionals
- developing curricula and educating health professionals
- supporting practice change among primary care providers.

Recommendation 11: The Ministry of Health and Long-Term Care should establish a multidisciplinary task force of practice experts, internal and external stakeholders, and professional organizations to develop an evidence-based standard of care for the different health professionals involved in osteoporosis prevention and management, and support the development, implementation and use of discipline-specific tools and resources.

Recommended tactics:

- define the respective roles of different health professionals (e.g., physicians, nurses, nutritionists, pharmacists, physical and occupational therapists, staff in long-term care facilities) in osteoporosis prevention and care, and identify their educational needs
- involve the various professional bodies in developing and disseminating collaborative, discipline-specific practice guidelines
- support the development, dissemination and evaluation of appropriate tools / resources for professionals (e.g., risk assessments, chart aids, etc.) and patients (e.g., decision aids)

- study barriers to implementing evidence-based care
- develop criteria to evaluate educational activities
- act as a resource for the various health professions on how to enhance treatment compliance (adherence) and promote bone health
- collaborate with public education campaigns to ensure consistent messages and appropriate actions.

Performance Measures

- *Defined professional roles in osteoporosis care*
- *Discipline-specific standards of care*
- *Number of discipline-specific tools and patient resources*

Recommendation 12: The Ministry of Health and Long-Term Care should assemble a working group of experts in health education and osteoporosis (the Osteoporosis Education Working Group) to:

- develop multidisciplinary resources, such as case studies in best practices in paper or Internet-based formats for university and college health science curricula
- collaborate with various educational and health professional agencies and associations to develop and disseminate practical resources.

Performance Measures

- *Completed review of existing osteoporosis curricula*
- *Development of best practice case studies*
- *Development and implementation of dissemination strategies*
- *Use of case studies in curricula*

Recommendation 13: The Ministry of Health and Long-Term Care should promote education for primary care providers by supporting the implementation and evaluation of existing education programs on osteoporosis, including:

- the MAINPRO-C program on osteoporosis
- the Foundation for Medical Practice program on peri-post-menopausal women's health.

Performance Measures

- *Number completing MAINPRO-C program*
- *Number of physicians or nurse practitioners using the PBSG Women's Health*
- *Number using peri-post-menopausal years chart aid*
- *Trends in requisitions for BMD testing*
- *Trends in prescriptions for osteoporosis medications*

Recommendation 14: The Ministry of Health and Long-Term Care should work with long-term care facilities to reduce the risk of fragility fractures.

Recommended tactics:

- develop guidelines and algorithms for falls prevention programs in long-term care facilities
- educate staff about the importance of falls prevention and effective strategies
- promote the use of protective devices such as hip protectors
- encourage appropriate supplementation with calcium and Vitamin D for residents of long-term care facilities.

Performance Measures

- *Number of tools developed, evaluated and implemented*
- *Number of facilities participating in falls prevention programs*
- *Number of residents receiving supplementation*
- *Number of fractures pre- and post-intervention*
- *Number of staff reached with educational materials*

VII Develop and Transfer New Knowledge

Ontario is committed to providing evidence-based osteoporosis prevention and management. Osteoporosis research is continually evolving. With the development of new knowledge, our understanding of the most effective ways to prevent and treat osteoporosis may change.

To ensure people in Ontario have access to evidence-based care, Ontario must have the capacity to develop and assess new knowledge, and to integrate the knowledge into both policy and practice. In particular, Ontario lacks data on the nutrition of its children and adolescents, which is required to develop effective bone health and osteoporosis prevention programs. The health system must also be able to collect data on the population that will help to monitor progress in managing osteoporosis, identify problems, assess future care needs and inform practice.

Recommendation 15: The Ministry of Health and Long-Term Care should establish a network of researchers and stakeholders to advance research on osteoporosis and bone health, promote knowledge transfer and evaluate progress in osteoporosis management. Recommended tactics:

- establish an osteoporosis information and knowledge transfer system (i.e., an osteoporosis atlas) that would identify opportunities to collect data, co-ordinate and assimilate data from pilot project reports and evaluations, as well as analyze and disseminate data on osteoporosis prevention, care and management
- oversee a cost-effective system of data collection and analysis
- facilitate the integration of research findings into applied programs
- develop and implement an evaluation and monitoring strategy to evaluate the impact of the initiatives in the Osteoporosis Action Plan and care delivery, and set future directions.

Performance Measures

- *Periodic publishing of osteoporosis atlas*
- *Development of evaluation and monitoring strategy*
- *Reports on the outcomes of the Osteoporosis Action Plan*
- *Progress in care delivery*
- *Documented examples of knowledge transferred to applied programs*

Recommendation 16: The Guidelines Advisory Committee of the Physicians Services Committee should work with the Osteoporosis Society of Canada to sponsor guideline-related research and the ongoing validation, updating and promotion of clinical practice guidelines. The Osteoporosis Society of Canada should also develop a paper on how guidelines and policy come together.

Performance Measures

- *Revisions to clinical practice guidelines*
- *Paper on guidelines and policy*
- *Sponsorship of guideline-related research*

Recommendation 17: The Ministry of Health and Long-Term Care should support research to gather data on the nutritional status of Ontario's children and adolescents, including their intake of calcium and Vitamin D.

Recommended tactics:

- use the Canadian Community Health Survey to gather data
- repeat the research periodically to monitor any changes over time
- conduct qualitative research to determine why intakes of calcium and other bone nutrients are low
- evaluate the best strategies to influence the eating habits of children and adolescents
- assess the nutritional / health status of institutionalized children or children in group homes (i.e., disabled, handicapped) who, because of their medical issues, may be at high risk of osteoporosis.

Performance Measures

- *Baseline and follow-up data on child and adolescent nutrient intake*
- *Data on nutrient status of children at high risk of osteoporosis*
- *Evaluation of impact of bone nutrition related programs*

VIII Provide Leadership

Ontario's Osteoporosis Action Plan is a comprehensive multifaceted effort to ensure that everyone in the province has access to evidence-based osteoporosis prevention, treatment and management services. It is designed to prevent or reduce the fractures, pain and disability associated with osteoporosis, improve quality of life and reduce the costs of care.

The effective implementation of this ambitious plan will require leadership.

Recommendation 18: The Ministry of Health and Long-Term Care should establish a standing committee of internal and external stakeholders in bone health and osteoporosis prevention, diagnosis and management to implement and monitor the Osteoporosis Action Plan. The committee would be responsible for:

- supporting the orderly implementation of the plan's recommendations
- establishing the research and monitoring group (Recommendation 15)
- co-ordinating the activities of different stakeholders
- ensuring that activities are multidisciplinary and cover the full continuum of prevention and care
- establishing any working or task groups to address particular issues (e.g., professional education)
- continuing to advise the ministry on relevant bone health and osteoporosis issues (e.g., monitoring, surveillance, research, health promotion, clinical issues).

Performance Measures

- *Initiatives co-ordinated and implemented*
- *Liaison with stakeholders*
- *Progress in providing evidence-based care*
- *Initiatives consistent with clinical practice guidelines of the Osteoporosis Society of Canada*
- *Responsiveness to ministry and stakeholder concerns*

Summary

Over half a million Ontarians have osteoporosis and, because of family or medical history, age or lifestyle, millions more are at high risk. Osteoporosis and the resultant fractures cause severe suffering and have a devastating impact on quality of life and healthcare costs. ICES has estimated that, over the next five years, Ontario will spend \$2.6 billion on emergency department visits, hospitalizations and deaths due to osteoporosis.

The Osteoporosis Action Plan attempts to reduce the burden of osteoporosis at all stages in the continuum of care: health promotion and primary prevention; diagnosis and treatment (secondary prevention); and fracture care, rehabilitation and falls prevention (tertiary prevention). It will require the active involvement of health professionals, the public, patients, facilities and organizations.

The plan's recommendations include:

- a **health promotion and public education campaign** to promote bone health, early diagnosis and management of osteoporosis
- **health professional education** to promote appropriate utilization of bone mineral density (BMD) tests and preventative drug therapies
- changes in ministry processes to ensure that Ontarians have **improved access** to BMD testing and effective **osteoporosis drug therapies**
- a **self-management network** to help people with or at high risk of osteoporosis to manage their condition and enjoy the best possible quality of life
- a **province-wide fracture clinic** intervention to improve prevention, diagnosis and treatment for patients with fragility fractures
- five **multidisciplinary teams** in Academic Health Science Centres across the province to provide better integrated care for complex osteoporosis cases
- **rehabilitation pilot projects** to further test evidence-based service delivery models to help improve care.

When implemented, the plan will result in:

- more appropriate use of BMD testing
- more prescriptions for osteoporosis medications
- fewer fracture-related events (i.e., emergency department visits, hospitalizations, deaths)
- cost savings of \$142 million over five years due to more appropriate testing and prescribing practices
- cost increases of \$16.6 million per year for OHIP and ODB to cover increases in diagnostic services and medications.

The Osteoporosis Action Plan will also have a significant impact on quality of life, particularly for the growing number of seniors in the province.

Appendix A: Membership Lists

Osteoporosis Action Plan Committee

External Co-Chair

Alexandra Papaioannou, MD, FRCPC
Hamilton Health Sciences Chedoke Site

Ministry Co-Chair

Marjorie Keast
Manager, Population Health Strategies Unit
Strategic Health Policy Branch
Ministry of Health and Long-Term Care

External Members

Jonathan D. (Rick) Adachi, MD, FRCPC
St. Joseph's Hospital

Stephanie Atkinson, PhD, RD
McMaster Medical Centre

Earl Bogoch, MD, MSc, FRCSC
St. Michael's Hospital

Dr. Ann B. Cranney
Rheumatologist,
Queen's University

Joyce Gordon
President & CEO,
Osteoporosis Society of Canada

Elaine E. Jolly, MD, FRCSC
Ottawa General Hospital

Aliya Khan, MD, FRCPC, FACP
International Society for Clinical Densitometry

Sandra Lomaszewycz
Executive Director,
St. Demetrius Development Corporation

John Premi
Family Physician

Tazim Virani

Consultant
Representing the Registered Nurses
Association of Ontario
Nursing Best Practice Guidelines Project,
Project Director

Ministry Members

Myrna Gough
Manager, Provincial and Community Programs
Community and Health Promotion Branch,
Ministry of Health and Long-Term Care

Nancy Lewis, PhD
Senior Policy Analyst,
Ontario Women's Health Council Secretariat
Ministry of Health and Long-Term Care

Sharon Marsden
Manager (Acting), Long-Term Care
Operation Policy Unit
Ministry of Health and Long-Term Care

Sandy Nuttall
Program Consultant,
Hospital Programs Branch
Ministry of Health and Long-Term Care

Wayne Oake
Manager, Community Health Branch
Ministry of Health and Long-Term Care

Marnie Weber
Regional Director,
Toronto Region Healthcare Programs
Ministry of Health and Long-Term Care

Elizabeth Woodbury
Program Manager, Hospital Services
Toronto Region Office

Project Coordinator

Meera Jain, PhD
Senior Epidemiologist / Senior Policy Analyst
Strategic Health Policy Branch
Ministry of Health and Long-Term Care

Writer

Corinne Hodgson, MA, MSC
Corinne S. Hodgson & Associates Inc.

Project Support

Ruth Carlisle
Policy Analyst, Strategic Health Policy Branch
Ministry of Health and Long-Term Care

Muhammad Mamdani
Institute of Clinical Research &
Evaluative Sciences

Michaela Sandhu
Health Information Product and Services Unit,
Health Planning Branch
Ministry of Health and Long-Term Care

Task Group on Public Education /
Self-Management

External Co-Chair

Stephanie Atkinson, PhD, RD
McMaster Medical Centre

Ministry Co-Chair

Sarah Lambert
Program Consultant, Community
and Health Programs Branch
Ministry of Health and Long-Term Care

Myrna Gough
Manager, Provincial and Community
Programs, Community and
Health Programs Branch
Ministry of Health and Long-Term Care

External Members

Maria Bates
Wellness Consultant,
Centenary Health Centre

Michelle Brownrigg
Manager of Projects & Public Affairs,
Ontario Physical and Health Education
Association (OPHEA)

Elizabeth “Libby” Contestabile
The Ottawa Hospital – General Campus

Elaine de Grandpré
Dairy Farmers of Ontario
Nutrition Communications

Sylvia Kowal
Osteoporosis Society of Canada

Colleen Logue
Manager, Nutrition Resource Centre

Ellen Overton
Osteoporosis Society of Canada

Linda Shortt
Toronto Public Health (Retired)

Ministry / Other Government Members

Helen Brown
Sr. Nutrition Consultant, Public Health Branch
Ministry of Health and Long-Term Care

Charles Clayton
Senior Policy Analyst,
Strategic Health Policy Branch
Ministry of Health and Long-Term Care

Maggi Redmonds
Program Consultant,
Community Health Branch
Ministry of Health and Long-Term Care

Dr. Kirsten Rottensten
Sr. Medical Consultant,
Public Health Branch
Ministry of Health and Long-Term Care

Art Salmon
Policy Advisor, Ministry of Citizenship,
Culture and Recreation

Myra Schiff
Project Assistant,
Ministry of Citizenship

Leonard St. Louis
Education Officer,
Ministry of Education

Task Group for Professional Education

Co-Chairs

Dr. Ann B. Cranney
Rheumatologist,
Queen's University

Dr. John Premi
Family Physician

External Members

Thomas Brown
Osteoporosis Research Program
Sunnybrook and Women's College Health
Sciences Centre

Sid Feldman
Head, Department of Family and
Community Medicine
Baycrest Centre for Geriatric Care
Director, Care of the Elderly Program
Department of Family and Community
Medicine, University of Toronto

Susan Jaglal, PhD
Assistant Professor, Department
of Physical Therapy, Faculty
of Medicine, University of Toronto

Sylvia Kowal
Osteoporosis Society of Canada

Karen Leung
Physical Therapy Dept.,
Group Health Centre

Noreen Steinacher
Administrator,
National Child Benefit Program
Region of Waterloo

Ministry Members

Monique Maarschalkerweerd
Senior Policy Analyst,
Nursing Secretariat
Ministry of Health and Long-Term Care

Versha Prakash
Provincial Planner, Provincial Health
Services Planning Unit
Health Planning Branch
Ministry of Health and Long-Term Care

Task Group for Clinical Issues

External Co-Chair

Jonathan D. (Rick) Adachi
MD, FRCPC
St. Joseph's Hospital

Ministry Co-Chair

Elizabeth Woodbury
Program Manager, Hospital Services
Toronto Region Office
Ministry of Health and Long-Term Care

External Members

Earl Bogoch
MD, MSc, FRCSC
St. Michael's Hospital

Gillian Hawker
MSc, MD, FRCPC
Women's College Ambulatory Care Centre
Sunnybrook & Women's College Health
Sciences Centre

Dr. Robert Josse
St. Michael's Hospital

Aliya Khan
MD, FRCPC, FACP

Hui N. Lee
MD, MSc (clinical epid) FRCPC
The Group Health Centre

Sandra Lomaszewycz
Executive Director,
St. Demetrius Development Corporation

Cathy Loveys
Osteoporosis Society of Canada

Lorraine Moran
Medical Manager,
Quinte Healthcare Corp.

Alexandra Papaioannou
MD, FRCPC
Hamilton Health Sciences Chedoke Site

Tazim Virani
RN, MScN
Tazim Virani & Associates Representing
the Registered Nurses Association of Ontario
Nursing Best Practice Guidelines Project

Ministry Members

Karen Archbell
Senior Quality Assurance Advisor,
Independent Health Facilities Program
Alternative Payment Programs Branch
Ministry of Health and Long-Term Care

Louise Barry
Project Manager,
Long-Term Care Facilities Branch
Ministry of Health and Long-Term Care

Susan King
Program Consultant,
Long-Term Care Operational Policy Unit
Ministry of Health and Long-Term Care

Henry Phillips
Medical Consultant,
Provider Services Branch
Ministry of Health and Long-Term Care

Iлона Torontali
Associate Director,
Drug Programs Management
Ministry of Health and Long-Term Care

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