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The Falls/Fractures Economic Model in Ontario Residents Aged 65 Years and Over (FEMOR)

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About the Medical Advisory Secretariat

The Medical Advisory Secretariat is part of the Ontario Ministry of Health and Long-Term Care. The mandate of the Medical Advisory Secretariat is to provide evidence-based policy advice on the coordinated uptake of health services and new health technologies in Ontario to the Ministry of Health and Long-Term Care and to the healthcare system. The aim is to ensure that residents of Ontario have access to the best available new health technologies that will improve patient outcomes.

The Medical Advisory Secretariat also provides a secretariat function and evidence-based health technology policy analysis for review by the Ontario Health Technology Advisory Committee (OHTAC).

The Medical Advisory Secretariat conducts systematic reviews of scientific evidence and consultations with experts in the health care services community to produce the *Ontario Health Technology Assessment Series.*

About the Ontario Health Technology Assessment Series

To conduct its comprehensive analyses, the Medical Advisory Secretariat systematically reviews available scientific literature, collaborates with partners across relevant government branches, and consults with clinical and other external experts and manufacturers, and solicits any necessary advice to gather information. The Medical Advisory Secretariat makes every effort to ensure that all relevant research, nationally and internationally, is included in the systematic literature reviews conducted.

The information gathered is the foundation of the evidence to determine if a technology is effective and safe for use in a particular clinical population or setting. Information is collected to understand how a new technology fits within current practice and treatment alternatives. Details of the technology's diffusion into current practice and input from practicing medical experts and industry add important information to the review of the provision and delivery of the health technology in Ontario. Information concerning the health benefits; economic and human resources; and ethical, regulatory, social and legal issues relating to the technology assist policy makers to make timely and relevant decisions to optimize patient outcomes.

If you are aware of any current additional evidence to inform an existing evidence-based analysis, please contact the Medical Advisory Secretariat: MASinfo.moh@ontario.ca. The public consultation process is also available to individuals wishing to comment on an analysis prior to publication. For more information, please visit http://www.health.gov.on.ca/english/providers/program/ohtac/public_engage_overview.html.

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This evidence-based analysis was prepared by the Medical Advisory Secretariat, Ontario Ministry of Health and Long-Term Care, for the Ontario Health Technology Advisory Committee and developed from analysis, interpretation, and comparison of scientific research and/or technology assessments conducted by other organizations. It also incorporates, when available, Ontario data, and information provided by experts and applicants to the Medical Advisory Secretariat to inform the analysis. While every effort has been made to reflect all scientific research available, this document may not fully do so. Additionally, other relevant scientific findings may have been reported since completion of the review. This evidence-based analysis is current to the date of publication. This analysis may be superseded by an updated publication on the same topic. Please check the Medical Advisory Secretariat Website for a list of all evidence-based analyses: http://www.health.gov.on.ca/ohtas.

Table of Contents

List of Tables

List of Figures

Abbreviations

CI	Confidence interval
ED	Emergency Department
FEMOR	Falls/Fractures Economic Model in Ontario Residents Aged 65 Years and Over
GRADE	Grading of Recommendation Assessment, Development, and Evaluation
ICD	International Classification of Disease
ICER	Incremental cost-effectiveness ratio
INAHTA	International Agency for Health Technology Assessment
LTC	Long-term care
PATH	Program for Assessment of Technology in Health
RCT	Randomized controlled trial
RR	Relative risk

Economic Analysis

In early August 2007, the Medical Advisory Secretariat began work on the Aging in the Community project, an evidence-based review of the literature surrounding healthy aging in the community. The Health System Strategy Division at the Ministry of Health and Long-Term Care subsequently asked the secretariat to provide an evidentiary platform for the ministry's newly released Aging at Home Strategy.

After a broad literature review and consultation with experts, the secretariat identified 4 key areas that strongly predict an elderly person's transition from independent community living to a long-term care home. Evidence-based analyses have been prepared for each of these 4 areas: falls and fall-related injuries, urinary incontinence, dementia, and social isolation. For the first area, falls and fall-related injuries, an economic model is described in a separate report.

Please visit the Medical Advisory Secretariat Web site, http://www.health.gov.on.ca/english/providers/program/mas/mas_about.html, to review these titles within the Aging in the Community series.

1. *Aging in the Community: Summary of Evidence-Based Analyses*
2. *Prevention of Falls and Fall-Related Injuries in Community-Dwelling Seniors: An Evidence-Based Analysis*
3. *Behavioural Interventions for Urinary Incontinence in Community-Dwelling Seniors: An Evidence-Based Analysis*
4. *Caregiver- and Patient-Directed Interventions for Dementia: An Evidence-Based Analysis*
5. *Social Isolation in Community-Dwelling Seniors: An Evidence-Based Analysis*
6. *The Falls/Fractures Economic Model in Ontario Residents Aged 65 Years and Over (FEMOR)*

Disclaimer: The Medical Advisory Secretariat uses a standardized costing methodology for all of its economic analyses of technologies. The main cost categories and the associated methods from the province's perspective are as follows:

Hospital: Ontario Case Costing Initiative cost data are used for all in-hospital stay costs for the designated International Classification of Diseases-10 (ICD-10) diagnosis codes and Canadian Classification of Health Interventions procedure codes. Adjustments may need to be made to ensure the relevant case mix group is reflective of the diagnosis and procedures under consideration. Due to the difficulties of estimating indirect costs in hospitals associated with a particular diagnosis or procedure, the secretariat normally defaults to considering direct treatment costs only.

Nonhospital: These include physician services costs obtained from the Ontario Schedule of Benefits for physician fees, laboratory fees from the Ontario Laboratory Schedule of Fees, device costs from the perspective of local health care institutions, and drug costs from the Ontario Drug Benefit formulary list price.

Discounting: For all cost-effectiveness analyses, a discount rate of 5% is used as per the Canadian Agency for Drugs and Technologies in Health.

Downstream costs: All costs reported are based on assumptions of utilization, care patterns, funding, and other factors. These may or may not be realized by the system or individual institutions and are often based on evidence from the medical literature. In cases where a deviation from this standard is used, an explanation has been given as to the reasons, the assumptions, and the revised approach. The economic analysis represents an estimate only, based on assumptions and costing methods that have been explicitly stated above. These estimates will change if different assumptions and costing methods are applied for the purpose of developing implementation plans for the technology.

Purpose

The Program for Assessment of Technology in Health (PATH) was commissioned to develop an economic model to predict long-term costs and effects and assess the cost-effectiveness of interventions that prevent falls and fall-related injuries and that thereby keep seniors in the community. The following report summarizes the Falls/Fractures Economic Model in Ontario Residents Aged 65 and Over (FEMOR). This economic analysis was conducted by PATH for the secretariat of the ministry.

The secretariat conducts full evidence-based analyses of health technologies being considered for use in Ontario. These analyses are then presented to the Ontario Health Technology Advisory Committee, whose mandate is to provide evidence-based examination of proposed health technologies in the context of existing clinical practice and provide advice and recommendations to Ontario practitioners and the broader health care system and the ministry.

Background

Several definitions for falls exist in the literature; however, a recently published consensus statement suggested that a fall be defined as "an unexpected event in which the participant comes to rest on the ground, floor, or lower level." (1)

Although estimates of fall rates vary widely based on the location, age, and living arrangements of the elderly population, it is estimated that each year approximately 30% of community-dwelling individuals aged 65 and older, and 50% of those aged 85 and older will fall. (2-4) Of those individuals who fall, 12% to 42% will have a fall-related injury. (5;6)

In 2005, 12.8% of Ontario's population was aged 65 or older, a figure that is expected to increase by almost 65% by 2031. (7) With more than 1 in 5 Ontarians being 65 or older in 2031, the number of community-dwelling seniors at risk for encountering a fall will dramatically increase, thus increasing the demand for community-based services and the burden on Ontario's health system.

Several cohort studies and meta-analyses have identified falls and fall-related injuries as a strong predictor of admission to an LTC home. (8;9) It has been shown that the risk of LTC home admission is over 5 times higher in seniors who experienced 2 or more falls without injury, and over 10 times higher in seniors who experienced a fall causing serious injury. (10)

Minor injuries such as bruises, abrasions, lacerations, and sprains occur after 44% of falls, (11) while major injuries such as hip and wrist fractures occur after approximately 4% to 5% of falls. (12;13) As individuals age, their ability to use their hands to break a fall and protect their hip is reduced, and

therefore wrist fractures are more common than hip fractures between the ages of 65 and 75, while hip fractures become more prevalent after the age of 75. (14)

Injuries due to falls place a significant burden on the Ontario health system and are the leading cause of injury-related hospital visits (1,201/100,000 population) and emergency department visits (4,821/100,000 population) in Ontarians aged 65 and older. (15) Furthermore, once an individual is admitted into an acute hospital following a fall, their average length of stay is approximately 40% longer than that for all-cause hospitalizations. (16) This highlights not only the severity of injuries due to falls, but also the need for community-based services that will allow a more expedient discharge of elderly individuals back to their homes following a fall-related hospitalization.

Study Question

The objective of this study was to estimate the cost-effectiveness of interventions identified in the systematic review conducted by the Medical Advisory Secretariat (17) for falls in community-dwelling seniors that may be effective in reducing the probability of an elderly person's falling and/or sustaining a fall-related injury and thereby reducing the transition into health care settings (i.e., emergency departments [ED], hospitals, and LTC and rehabilitation facilities), a reduction that will offset costs to the public system.

Types of Evaluation

A cost-effectiveness analysis was conducted in order to report cost per fall avoided between the effective interventions identified through the systematic review versus the base case. Because utilities were not identified in this patient population and differences in health-related quality of life between the interventions have not been demonstrated, a cost-effectiveness analysis was deemed to be appropriate and a cost-utility analysis was ruled out. Because costs varied amongst the interventions, a cost-minimization analysis was also ruled out. Falls avoided was deemed an appropriate denominator of the incremental cost-effectiveness ratio (ICER) since trials used in the analysis assessed the outcome of falls in community-dwelling seniors.

Target Population

The target population of this cost-effectiveness analysis was seniors in the community at risk for falling.

Comparators

All effective interventions identified through the systematic review were analyzed. Table 1 shows the interventions, their target population, and respective relative risks (RRs) and confidence intervals (CIs).

Table 1: Effective Interventions Analyzed in the FEMOR Model

Intervention	Target Population	Quality of Trial Evidence	Relative Risk (95% CI)
Exercise (≥6 months)	Males and females at risk of falling	Some heterogeneity in the type of programs/services provided and duration of intervention	0.76 (0.64–0.91)
Environmental modifications	Males and females at high risk of falling (history of at least 1 fall)	Some heterogeneity in the type of programs/services provided and duration of intervention	0.66 (0.54–0.81)
Vitamin D + calcium	Females at risk of falling	Trials assessing mostly women	0.83 (0.73–0.95)
Medication withdrawal	Males and females on psychotropic medications and at risk of falling	One trial of moderate quality and several limitations to implementation	0.34 (0.16–0.74)
Gait-stabilizing device	Mobile males and females at risk of falling	Only 1 trial assessing outdoor falls in mobile seniors	0.42 (0.26–0.92)

CI indicates confidence interval.

For a description of the interventions, patient populations, and quality of trials please refer to the Medical Advisory Secretariat systematic review. (18)

Perspective

The primary analytic perspective was that of the Ministry of Health and Long-Term Care. That is, only direct medical costs were considered.

Literature Search

Studies used in this analysis were randomized controlled clinical trials (RCTs) conducted to assess the effectiveness of interventions to reduce falls in community-dwelling seniors. Please refer to the Medical Advisory Secretariat systematic review for a full description of effectiveness. (19)

A search was performed in OVID MEDLINE, MEDLINE In-Process and Other Non-Indexed Citations, EMBASE, the Cumulative Index to Nursing & Allied Health Literature (CINAHL), The Cochrane Library, and the International Agency for Health Technology Assessment (INAHTA) for studies published between January 2000 and September 2007. The search strategy is detailed in Appendix 1. Furthermore, all studies included in a 2003 Cochrane review published by Gillespie et al. (20) were considered for inclusion in this review.

Abstracts were reviewed, and studies meeting the inclusion criteria outlined below were obtained. Studies were grouped based on intervention type, and data on population characteristics, falls outcomes, and study design were extracted. Reference lists were also checked for relevant studies. Results for each outcome from individual studies were meta-analyzed using fixed-effects models.

Inclusion Criteria

- English language (January 2000–September 2007)
- population of community-dwelling seniors (majority aged 65+)
- study design: RCT, quasi-experimental trial, systematic review, or meta-analysis

Exclusion Criteria

- special populations (e.g., stroke or osteoporosis; however, studies restricted only to women were included);
- studies including a mix of older and younger individuals;
- studies reporting only surrogate outcomes (such as balance or strength improvements); and
- studies whose outcome cannot be extracted for meta-analysis.

Outcomes of Interest

- number of fallers, and
- number of falls resulting in injury/fracture.

Assessment of Quality of Studies

The quality assigned to individual studies was determined using the Medical Advisory Secretariat's adaptation of the Levels of Evidence used by the Centre for Evidence-Based Medicine at the Oxford Centre for Evidence Based Medicine in the United Kingdom. (21) The overall quality of the evidence was examined according to the Grading of Recommendation Assessment, Development, and Evaluation (GRADE) Working Group criteria. (22) As stated by the GRADE Working Group, the following definitions were used in grading the quality of the evidence.

High	Further research is very unlikely to change confidence in the estimate of effect.
Moderate	Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate.
Low	Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate.
Very low	Any estimate of effect is very uncertain.

Interventions Identified in Literature

- physical exercise
- vision assessment and referral
- cataract surgery
- environmental modifications
- vitamin D supplements
- vitamin D and calcium supplements
- hormone replacement therapy
- medication withdrawal
- gait-stabilizing devices
- hip protectors
- multifactorial interventions

Summary of Findings

Exercise programs were stratified into targeted programs where the exercise routine was tailored to the individuals' needs and untargeted programs that were identical among subjects. Furthermore, analyses were stratified by exercise program duration (< 6 months and ≥ 6 months) and fall risk of study participants. Similarly, the analyses on the environmental modification studies were stratified by risk.

Low-risk study participants had had no fall in the year prior to study entry, while high-risk participants had had at least 1 fall in the previous year.

A total of 17 studies investigating multifactorial interventions were identified in the literature search. Of these studies, 10 reported results for a high-risk population with previous falls, while 6 reported results for study participants representative of the general population. One study provided stratified results by fall risk, and therefore results from this study were included in each stratified analysis.

Table 2: Summary of Meta-Analyses of Studies Investigating the Effectiveness of Interventions on the Risk of Falls in Community-Dwelling Seniors*

Intervention	RR [95% CI]	GRADE
Exercise programs		
1. Targeted programs		
General population	0.81 [0.67–0.98]	Low
High-risk population	0.93 [0.82–1.06]	High
Short duration	0.91 [0.73–1.13]	High
Long duration	0.89 [0.79–1.01]	Moderate
2. Untargeted programs		
General population	0.78 [0.66–0.91]	Moderate
High-risk population	0.89 [0.72–1.10]	Very low
Short duration	0.85 [0.71–1.01]	Low
Long duration	0.76 [0.64–0.91]	Moderate
3. Combined targeted vs. untargeted programs		
General population	N/A	N/A
High-risk population	0.87 [0.57–1.34]	Moderate
Short duration	1.11 [0.73–1.70]	High
Long duration	0.73 [0.57–0.95]	High
Vision intervention		
Assessment/referral	1.12 [0.82–1.53]	Moderate
Cataract surgery	1.11 [0.92–1.35]	Moderate
Environmental modifications		
Low-risk population	1.03 [0.75–1.41]	High
High-risk population	0.66 [0.54–0.81]	High
General population	0.85 [0.75–0.97]	High
Drugs/Nutritional supplements		
Vitamin D (men and women)	0.94 [0.77–1.14]	High
Vitamin D (women only)	0.55 [0.29–1.08]	Moderate
Vitamin D and calcium (men and women)	0.89 [0.74–1.07]	Moderate
Vitamin D and calcium (women only)	0.83 [0.73–0.95]	Moderate
Hormone replacement therapy	0.98 [0.80–1.20]	Low
Medication withdrawal	0.34 [0.16–0.74]†	Low
Gait-stabilizing device	0.43 [0.29–0.64]‡	Moderate
Multifactorial intervention		
Geriatric screening (general population)	0.87 [0.69–1.10]	Very low
High-risk population	0.86 [0.75–0.98]	Low

*CI indicates confidence interval; N/A, not applicable; RR, relative risk.
†Hazard ratio is reported because RR was not available.
‡The RR for the gait-stabilizing device was adjusted to reflect the general population because the trial reported a RR for outdoor falls only. Risk was adjusted as per rate of outdoor falls for males and females reported in the literature. (23)

Modelling

A Markov model was built and the ICER of effective interventions that reduced the frequency of falls in community-dwelling seniors was determined using TreeAge Pro 2007. Effectiveness was expressed as falls avoided. A fall was defined as an unexpected event in which the participant comes to rest on the

ground, floor, or lower level. (24) Please see the Medical Advisory Secretariat systematic review (25) for details on trials. A clinically important fall was defined as a medical contact for a fall that resulted in either an ED or a hospital visit.

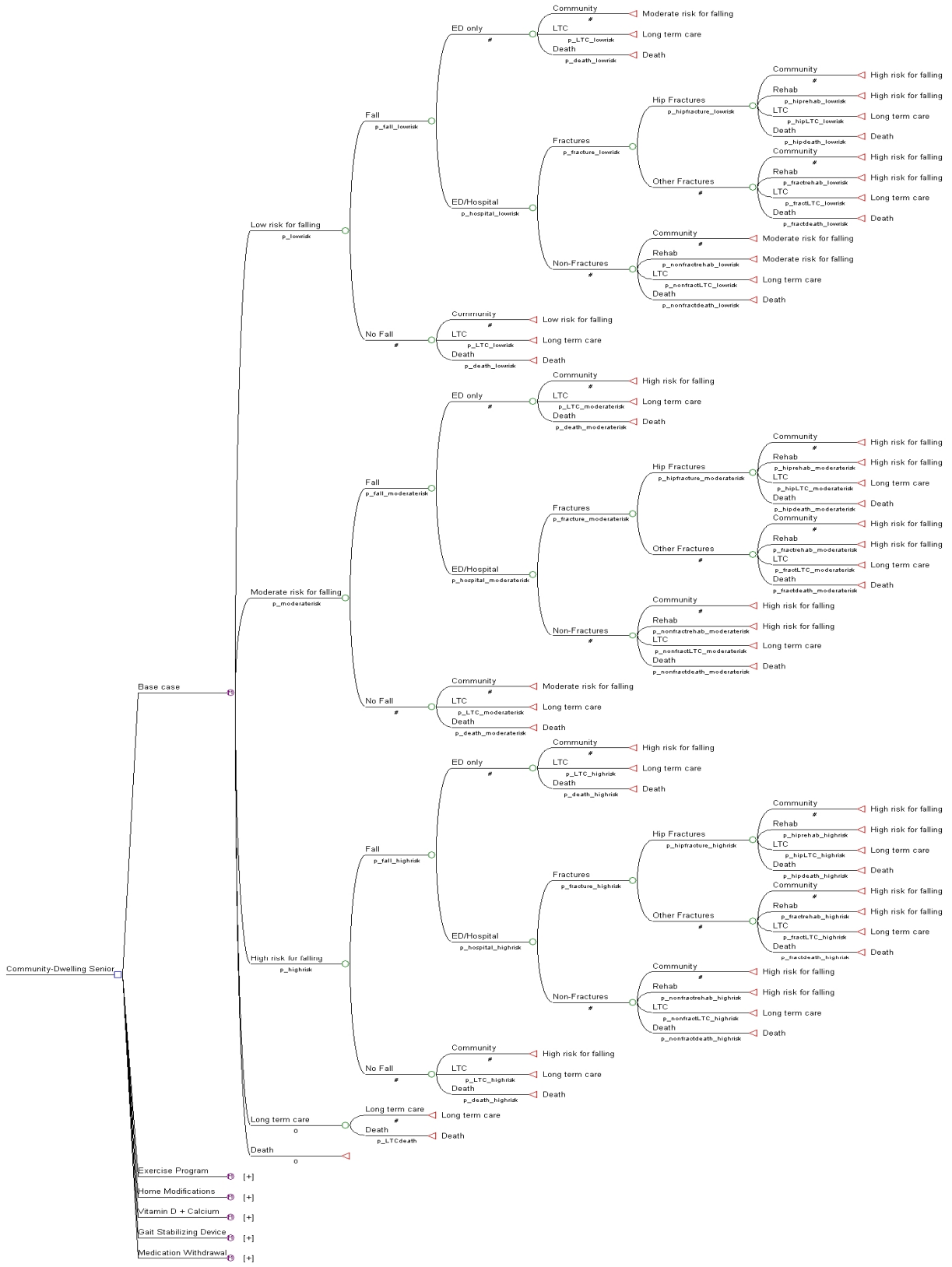
Health states of the model were based on how seniors in the community would transition between health care settings once they experience a clinically important fall that would result in either an ED or hospital visit. They would then transition between the various medical settings according to the risk they were assigned or they would die or move into LTC. They could also transition back into the community.

Figure 1 depicts how cohorts of seniors travel through the FEMOR model. As a senior enters the model, there is a choice of falling or not falling. Once a clinically important fall is experienced, there is a choice of being admitted to hospital or visiting the ED. Hospital admissions occur due to hip fractures, other fractures, and nonfracture injuries. Seniors are then discharged either back to the community, to an LTC facility, or to a rehabilitation centre, or they die in hospital, depending on the severity of their fracture or injury. Seniors may also progress to an LTC facility or die after an ED visit if they did not experience a fall. Please refer to Figure 1 for the progression of clinically important falls in the community into the various medical settings.

The model probabilities are driven by Ontario ministry-specific data. Numbers of clinically important falls and fractures were identified by searching the National Ambulatory Care Reporting System (NACRS) and Discharge Abstract Database (DAD) using International Classification of Disease (ICD) codes for the inclusive period of 2001–2006. The included ICD-9 and ICD-10 codes for falls and fractures are reported in Appendix 2.

To estimate initial proportions of low-, moderate-, and high-risk fallers on April 1, 2007, the frequency of medical contacts (i.e., either an ED or a hospital visit) for previous falls were counted for each senior in the time period of fiscal year 2001/2002 to fiscal year 2006/2007. Note that an ED visit that resulted in a subsequent hospitalization was counted as 1 medical contact for fall. The risk categories were defined as follows: low risk – no previous medical contact for falls; moderate risk – 1 medical contact for a fall with no fracture; high risk – 2 or more medical contacts for falls and/or any medical contact for fractures. Once the numbers of moderate- and high-risk fallers were identified, the low-risk fallers were assumed to be the rest of the community-dwelling seniors obtained by subtracting the number of moderate- and high-risk fallers from the general population (excluding the proportion of seniors in LTC facilities) in Ontario. All numbers were stratified by age and sex. Once numbers were identified, proportions were calculated, and tables by risk, age, and sex were entered in the FEMOR model for estimates of initial proportions of low-, moderate-, and high-risk fallers.

Figure 1: FEMOR Model Structure



To classify falls by risk, previous falls from the time of the fall in question were counted for the remainder of the time period (2001–2006), and cohorts by risk were identified based on the risk definition stated above. If a faller did not have a previous medical contact for a fall, then it was assumed that the fall was a low-risk fall. If a faller had 1 previous medical contact for a fall that did not result in a fracture, then it was assumed that the fall was a moderate-risk fall. If a faller had 2 or more medical contacts for falls and/or any medical contact for fractures, then it was assumed that the fall was a high-risk fall. Note again that an ED visit that resulted in a subsequent hospitalization was counted as 1 medical contact for fall. Approximately 4% of the data had a record for an ED visit that indicated a subsequent hospitalization but for which no hospital discharge abstract could be found. These visits were excluded from the analysis. Once numbers of falls were identified, annual falls rates were calculated by risk and probabilities were assigned to ED and hospital visits. Fractures and injuries were then identified based on the data on falls, and probabilities were assigned to hip fractures, other fractures, and nonfracture injuries and discharges to rehabilitation centres, LTC facilities, and in-hospital deaths. All numbers were stratified by age and sex, and tables by risk, age, and sex were entered in the FEMOR model.

General population rates for admission into LTC (26) (Appendix 3) and mortality (Personal communication, Program for Assessment of Technology in Health, July 2008) (Appendix 4) by age and sex in Ontario were obtained from Statistics Canada (27), and tables were entered in the FEMOR model.

Compliance rates were incorporated into the model to address adherence to the interventions. It was assumed that after a year a certain proportion of the cohort would fail to adhere to the intervention annually. Table 3 describes the compliance rates for each intervention.

Time Horizon

The time horizon of the model was lifetime with an annual time cycle.

Table 3: Compliance Rates Used in the FEMOR Model

Intervention	Annual Compliance Rate, %	Mean Age, y	Reference
Exercise (≥ 6 months)	79.0	77.5	Literature (28)
Environmental modifications	75.7	81.2	Literature (29)
Vitamin D + calcium	81.8	71.0	Literature (30)
Medication withdrawal	53.0	74.6	Literature (31)
Gait-stabilizing device	80.0	74.2	Literature (32)

Note: In order to calculate budgetary impacts for each intervention, several assumptions were made in order to calculate the impacted populations in Ontario:
N was calculated from total population 65+ in Ontario (Appendix 5) (33)
Assumed 4.5% of seniors are in LTC (34)
Exercise program – assumed compliant (79%) (35) mobile seniors in the community with no disability (65.8%) (36) willing to participate in an exercise program (57%) (37)
Environmental modification – assumed compliant (75.7%) (38) frail seniors (49.4%) (39) in the community with a disability (34.2%) (36)
Vitamin D + calcium – assumed compliant (81.8%) (40) senior females in the community with 1 of more risks for fractures (52.9%) (41)
Medication withdrawal – assumed compliant (53%) (42) seniors in the community on psychotropic medications (11.8%) (43) willing to stop their medications (27%) (44)
Gait-stabilizing device – assumed compliant (80%) (45) seniors in the community that are mobile with no disability (65.8%) (36)

Table 4 describes the affected population numbers by sex for each intervention.

Table 4: Affected Population Numbers Used in the Budgetary Impact Analysis

Intervention	Female (N)	Male (N)
Exercise (≥ 6 months)	263,629	203,037
Environmental modifications	113,793	87,639
Vitamin D + calcium	385,012	N/A
Medication withdrawal	15,024	11,571
Gait-stabilizing device	468,362	360,713

N/A indicates not applicable.

Valuing Outcomes

As well as determining the ICER for each intervention compared to the base case, total costs and outcomes for each alternative intervention were determined. Total costs are reported in 2008 Canadian dollars. Outcomes measured were the number of falls avoided, life years, LTC cost, and hospital costs. Utilities were not identified in the literature; therefore, the analysis is based upon reported events, i.e., falls avoided.

Resource Use and Costs

All physician visit costs were obtained from the Ontario Schedule of Physician Benefits (OSB). (46) Hospital costs were obtained from personal contacts within the ministry derived from the Ontario Case Costing Initiative (Personal communication, OCCI; July 2008). Rehabilitation and LTC costs were obtained from ministry reports (Personal communication, Ministry of Health and Long-Term Care, July 2008). All other costs were obtained from published literature or published websites. Please refer to Table 5 for a description of all resources, assumptions, and references used in the FEMOR model.

Table 5: Resource Use in the FEMOR Model*

Resource	Unit	Cost, $ (Cdn)	Assumptions	Reference (Cost; Assumption)
Medical visits				
Internal medicine	1 consult	132.50	Assumed 1 internal medicine consult for hospitalizations	OSB (47); literature (48)
Special orthopedic surgery	1 consult	132.50	Assumed 1 special orthopedic surgery consult for hospitalizations	OSB (49); literature (48)
Physical medicine and rehab	1 consult	149.55	Assumed 1 physical medicine and rehab consult for hospitalizations	OSB (50); literature (48)
Family medicine	1 consult	56.10	Assumed 1 family physician consult when senior goes back into the community	OSB (51); literature (48)
Emergency (ED) doctor visit	ED consult	72.80		OSB (52)
ED visit	Per fall case	110.59	Assumed weighted cost for ED falls	OCCI†
Inpatient hospitalizations				
Injuries	Per fall case	10,865.99	Assumed weighted cost for all injury codes due to a fall excluding fractures	OCCI †
All fractures	Per fall case	10,847.18	Assumed weighted cost for all fracture codes due to a fall excluding hip fractures	OCCI †
Hip fractures	Per fall case	14,146.50	Assumed weighted cost for all hip fractures codes due to a fall	OCCI †
In-hospital most responsible physician (MRP)	Per day	55.45	Assumed a weighted length of stay for each in-hospital stay. Cost of subsequent visit by MRP following admission to hospital	OSB (53)
Follow-up drugs	Per fall case	111.66	Assumed drug follow-up cost for any fall once a senior goes back into the community and sees their family physician	Literature (54)
Rehabilitation program	Per day	571.00	Assumed 21 days for injuries and 48 days for hip and other fractures	MOHLTC (Personal communication, January 2008); literature (48)
Long-term care (LTC)	Per day	133.75	Assumed once a senior enters an LTC facility - remain there for 365 days	MOHLTC (personal communication, January 2008); literature (48)

(continues)

Resource	Unit	Cost, $ (Cdn)	Assumptions	Reference (Cost; Assumption)
Interventions				
Exercise program	Annual	53.18	Assumed 9 people per group - 26 classes with a PT per year	Literature (55)
Physiotherapist (PT)	Per visit	18.41	–	PT fee schedule (56) – code P900
Home modification	Annual	290.74	Assumed 1 OT home visit (2 hours) a year plus the cost of the modifications.	Literature (57)
Occupational therapist (OT)	Per home visit	120.20	–	MOHLTC homecare costs – (Personal communication, May 2008)
Home modifications	Per home visit	50.30	–	Literature (58)
Calcium/Vitamin D	Annual	24.10	Assumed daily intake of vitamin D (1000 IU) plus calcium (1000 mg).	Literature (59)
Calcium	500 mg tablets	0.03	100 tablets of 500 mg each	Website (60)
Vitamin D	1000 IU capsules	0.02	250 capsules of 1000 IU each	Website (61)
Gait-stabilizing device	Per device	29.95	Assumed it is replaced every year	Website; (62) Literature (63)
Medication withdrawal	Annual	50.00	Assumed a pharmacy consult per year.	Website (64)

*ED indicates emergency department; MOH, Ministry of Health and Long-Term Care; OCCI, Ontario Case Costing Initiative; OSB, Ontario Schedule of Benefits.
† indicates personal communication from Ontario Case Costing Initiative.

The ministry perspective included direct medical costs only. Resources used and costs incurred were all derived from Canadian data and assumptions. All costs are presented in 2008 Canadian dollars.

Discounting

Costs and outcomes were discounted at a 5% rate annually as recommended by the Canadian Agency for Drugs and Technologies in Health (CADTH) guidelines. (65) The model is based on an annual cycle.

Reporting

Assuming that all affected individuals, both females and males, adhere to each strategy in the first year and drop out in subsequent years according to the compliance rates reported in the literature, the FEMOR model predicts the lifetime outputs reported in Tables 6 and 7 for females and males, respectively.

Table 6: Female Lifetime Outcomes From the FEMOR Model*

Females	Lifetime Cost per Patient, $	Lifetime Cost Avoided Versus Base Case per Patient, $	Lifetime Falls per Patient	Lifetime Falls Avoided per Patient	Incremental Cost-Effectiveness Ratio	Life Years per Patient
Base case	42,140		0.885			8.798
Exercise program	41,964	176.19	0.874	0.011	Dominant	8.296
Home modification	42,099	41.39	0.873	0.012	Dominant	8.797
Vitamin D + calcium	41,956	183.93	0.875	0.010	Dominant	8.296
Gait-stabilizing device	41,856	284.19	0.869	0.016	Dominant	8.798
Medication withdrawal	42,076	63.91	0.879	0.006	Dominant	8.798

*Costs are in 2008 Canadian dollars.

All strategies in females are dominant, with the gait-stabilizing device strategy providing the highest savings and preventing the most falls.

Table 7: Male Lifetime Outcomes From the FEMOR Model

Males	Lifetime Cost per Patient, $	Lifetime Cost Avoided Versus Base Case per Patient, $	Lifetime Falls per Patient	Lifetime Falls Avoided per Patient	Incremental Cost-Effectiveness Ratio	Life Years per Patient
Base case	19,201		0.554			7.901
Exercise program	19,074	126.56	0.544	0.010	Dominant	7.901
Home modification	19,159	42.07	0.543	0.010	Dominant	7.901
Gait-stabilizing device	19,003	198.16	0.540	0.014	Dominant	7.901
Medication withdrawal	19,141	60.07	0.548	0.005	Dominant	7.901

*Costs are in 2008 Canadian dollars.

All strategies in males are dominant, with the gait-stabilizing device strategy providing the highest savings and preventing the most falls.

Tables 8 and 9 show the potential cost avoided to the public system in terms of hospital and LTC costs with each strategy for females and males, respectively.

Table 8: Female Lifetime Long-Term Care and Hospital Costs From the FEMOR Model

Females	Lifetime Long-Term Cost per Patient, $	Lifetime Long-Term Care Cost Avoided per Patient, $	Lifetime Hospital Cost per Patient, $	Lifetime Hospital Cost Avoided per Patient, $
Base case	37,628		2,010	
Exercise program	37,458	170.64	1,986	23.63
Home modification	37,464	164.74	1,985	24.34
Vitamin D + calcium	37,454	174.55	1,987	22.80
Gait-stabilizing device	37,380	248.26	1,975	34.40
Medication withdrawal	37,552	76.89	1,999	10.91

Costs are in 2008 Canadian dollars.

Table 9: Male Lifetime Long-Term Care and Hospital Costs From the FEMOR Model

Males	Lifetime Long-Term Cost per Patient, $	Lifetime Long-Term Care Cost Avoided per Patient, $	Lifetime Hospital Cost per Patient, $	Lifetime Hospital Cost Avoided per Patient, $
Base case	16,234		1,146	
Exercise program	16,119	114.77	1,126	19.95
Home modification	16,121	112.78	1,125	21.30
Gait-stabilizing device	16,074	160.04	1,118	28.67
Medication withdrawal	16,173	60.94	1,135	10.79

Costs are in 2008 Canadian dollars.

The budgetary impacts in female and male Ontario residents aged ≥65 are provided in Tables 10 and 11, respectively. Based on the affected populations calculated from literature assumptions, the gait-stabilizing device has the highest impact to the Ontario public system in both women and men.

Table 10: Ontario Lifetime Savings in Women Aged ≥65 From the FEMOR Model

Females	Lifetime Cost per Patient, $	Lifetime Cost Avoided per Patient, $	N	Ontario Lifetime Savings, $
Base case	42,140			
Exercise program	41,964	176.19	263,629	46,447,835
Home modification	42,099	41.39	113,793	4,709,528
Vitamin D + calcium	41,956	183.93	385,012	70,815,345
Gait-stabilizing device	41,856	284.19	468,362	133,105,070
Medication withdrawal	42,076	63.91	15,024	960,113

Costs are in 2008 Canadian dollars.

Table 11: Ontario Lifetime Savings in Men Aged ≥65 From the FEMOR Model

Males	Lifetime Cost per Patient, $	Lifetime Cost Avoided per Patient, $	N	Ontario Lifetime Savings, $
Base case	19,201			
Exercise program	19,074	126.56	203,037	25,695,678
Home modification	19,159	42.07	87,639	3,687,375
Gait-stabilizing device	19,003	198.16	360,713	71,479,689
Medication withdrawal	19,141	60.07	11,571	695,026

Costs are in 2008 Canadian dollars.

Detailed reports of model outcomes for each intervention by age are presented in Appendix 6.

Conclusions

High-quality evidence indicates that long-term exercise programs in mobile seniors and environmental modifications in the homes of frail elderly persons are cost-effective in reducing falls in Ontario's elderly population.

A combination of vitamin D and calcium supplementation in elderly women is cost-effective in reducing falls.

The use of outdoor gait-stabilizing devices for mobile seniors during the winter in Ontario is cost-effective in reducing falls; however, evidence is based on 1 trial of moderate quality.

While withdrawal of psychotropic medication may be a cost-effective method for reducing falls, evidence is limited and long-term compliance has been demonstrated to be difficult to achieve.

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Appendices

Appendix 1: Search Strategies

Search date: October 2, 2007
Databases searched: OVID MEDLINE, MEDLINE In-Process and Other Non-Indexed Citations, EMBASE, CINAHL, Cochrane Library, INAHTA/NHS EED

Database: Ovid MEDLINE(R) <1996 to September Week 3 2007>
Search Strategy:
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1 exp Accidental Falls/pc [Prevention & Control] (2140)
2 exp Accidental Falls/ (6124)
3 exp Accident Prevention/ or exp Primary Prevention/ or exp risk reduction behavior/ or exp Preventive Health Services/ or exp Preventive Medicine/ (172856)
4 2 and 3 (718)
5 (fall$ adj4 prevent$).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (1416)
6 1 or 4 or 5 (2961)
7 limit 6 to (humans and english language and yr="2000 - 2007") (1906)
8 limit 7 to "all aged (65 and over)" (1259)
9 (elder$ or senior$).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (71440)
10 7 and (8 or 9) (1292)
11 limit 10 to (controlled clinical trial or meta analysis or randomized controlled trial) (200)
12 (meta analy$ or metaanaly$ or pooled analysis or (systematic$ adj2 review$)).mp. or (published studies or published literature or medline or embase or data synthesis or data extraction or cochrane).ab. (54569)
13 exp Random Allocation/ or random$.mp. [mp=title, original title, abstract, name of substance word, subject heading word] (326025)
14 exp Double-Blind Method/ (48004)
15 exp Control Groups/ (493)
16 exp Placebos/ (8371)
17 RCT.mp. (1998)
18 or/11-17 (366985)
19 10 and 18 (296)

Database: EMBASE <1980 to 2007 Week 39>
Search Strategy:
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1 exp Falling/pc [Prevention] (2)
2 exp Falling/ (9062)
3 exp prevention/ or exp Preventive Health Service/ or exp Preventive Medicine/ or exp Risk Reduction/ (456395)
4 2 and 3 (1568)
5 (fall$ adj4 prevent$).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name] (2198)

6 1 or 4 or 5 (2963)
7 limit 6 to (human and english language and yr="2000 - 2008") (1351)
8 limit 7 to aged <65+ years> (661)
9 (senior$ or elder$).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name] (115074)
10 8 or 9 (115397)
11 7 and 10 (797)
12 Randomized Controlled Trial/ (149282)
13 exp Randomization/ (24000)
14 exp RANDOM SAMPLE/ (792)
15 (meta analy$ or metaanaly$ or pooled analysis or (systematic$ adj2 review$)).ti,mp. or (published studies or published literature or medline or embase or data synthesis or data extraction or cochrane).ab. (76601)
16 Double Blind Procedure/ (66657)
17 exp Triple Blind Procedure/ (8)
18 exp Control Group/ (1007)
19 exp PLACEBO/ (104532)
20 (random$ or RCT).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name] (386635)
21 or/12-20 (511379)
22 11 and 21 (238)

Database: CINAHL - Cumulative Index to Nursing & Allied Health Literature <1982 to September Week 4 2007>
Search Strategy:
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1 exp Accidental Falls/pc [Prevention and Control] (2193)
2 exp Accidental Falls/ (4650)
3 exp "FALL PREVENTION (IOWA NIC)"/ (1)
4 exp Preventive Health Care/ (73373)
5 exp SAFETY/ (37546)
6 or/3-5 (109313)
7 2 and 6 (972)
8 1 or 7 (2510)
9 (fall$ adj4 prevent$).mp. [mp=title, subject heading word, abstract, instrumentation] (1057)
10 8 or 9 (2776)
11 limit 10 to (english and yr="2000 - 2007") (1916)
12 random$.mp. or exp RANDOM ASSIGNMENT/ or exp RANDOM SAMPLE/ (60536)
13 RCT.mp. (736)
14 exp Meta Analysis/ (5696)
15 exp "Systematic Review"/ (3320)
16 (meta analy$ or metaanaly$ or pooled analysis or (systematic$ adj2 review$) or published studies or medline or embase or data synthesis or data extraction or cochrane).mp. (19960)
17 exp double-blind studies/ or exp single-blind studies/ or exp triple-blind studies/ (11524)
18 exp PLACEBOS/ (3799)
19 or/12-18 (78869)
20 11 and 19 (222)

Appendix 2: ICD-9 and ICD-10 Codes Included in the FEMOR Model Analysis

ICD-9 Codes for Falls	
ICD-9 Code	**Description**
8800	FALL ON/F STAIRS/STEPS, ESCALATOR
8809	FALL ON/F STAIRS/STEPS, OTH STAIRS/STEPS
8810	FALL ON/F LADDERS/SCAFFOLDING, FALL F LADDER
8811	FALL ON/F LADDERS/SCAFFOLDING, FALL F SCAFFOLDING
8820	FALL F/OUT OF BUILDING/OTHER STRUCTURE
8831	ACCDNTL FALL INTO WELL
8832	ACCDNTL FALL INTO STORM DRAIN/MANHOLE
8839	FALL INTO OTH HOLE/OTHER OPENING IN SURFACE
8840	OTH FALL F ONE LEVEL TO ANOTHER, FALL F PLAYGROUND EQUIPMENT
8841	OTH FALL F ONE LEVEL TO ANOTHER, FALL F CLIFF
8842	OTH FALL F ONE LEVEL TO ANOTHER, FALL F CHAIR/BED
8849	OTH FALL F ONE LEVEL TO ANOTHER, OTH FALL F ONE LEVEL TO ANOTHER
8850	FALL ON SAME LEVEL F SLIPPING, TRIPPING/STUMBLING
8869	FALL ON SAME LEVEL F COLLISION, PUSHING/SHOVING, BY/W OTH PERSON, OTH & UNSPCFD
8880	OTH & UNSPCFD FALL

ICD-10 Codes for Falls	
ICD-10 Code	**Description**
W00	FALL ON SAME LEVEL INVOLVING ICE AND SNOW
W01	FALL ON SAME LEVEL FROM SLIPPING, TRIPPING AND STUMBLING
W03	OTHER FALL ON SAME LEVEL DUE TO COLLISION WITH, OR PUSHING BY, ANOTHER PERSON
W04	FALL WHILE BEING CARRIED OR SUPPORTED BY OTHER PERSONS
W0500	FALL INVOLVING WHEELCHAIR
W0501	FALL INVOLVING ADULT WALKER
W0502	FALL INVOLVING BABY WALKER
W0503	FALL INVOLVING STROLLER/CARRIAGE
W0508	FALL INVOLVING OTHER SPECIFIED WALKING DEVICES
W0509	FALL INVOLVING UNSPECIFIED WALKING DEVICES
W06	FALL INVOLVING BED
W07	FALL INVOLVING CHAIR
W08	FALL INVOLVING OTHER FURNITURE
W09	FALL INVOLVING PLAYGROUND EQUIPMENT
W10	FALL ON AND FROM STAIRS AND STEPS
W11	FALL ON AND FROM LADDER
W12	FALL ON AND FROM SCAFFOLDING
W13	FALL FROM, OUT OF OR THROUGH BUILDING OR STRUCTURE
W14	FALL FROM TREE

W15	FALL FROM CLIFF
W17	OTHER FALL FROM ONE LEVEL TO ANOTHER
W18	OTHER FALL ON SAME LEVEL
W19	UNSPECIFIED FALL

ICD-9 Codes for Fractures (Note that hip fractures are italicized)

ICD-9 Code	Description
8000	FRACTURE OF VAULT OF SKULL, CLOSED WMEN INTRACRANIAL INJURY
8001	FRACTURE OF VAULT OF SKULL, CLOSED W INTRACRANIAL INJURY
8002	FRACTURE OF VAULT OF SKULL, OPEN WMEN INTRACRANIAL INJURY
8003	FRACTURE OF VAULT OF SKULL, OPEN W INTRACRANIAL INJURY
8010	FRACTURE OF BASE OF SKULL, CLOSED WMEN INTRACRANIAL INJURY
8011	FRACTURE OF BASE OF SKULL, CLOSED W INTRACRANIAL INJURY
8012	FRACTURE OF BASE OF SKULL, OPEN WMEN INTRACRANIAL INJURY
8013	FRACTURE OF BASE OF SKULL, OPEN W INTRACRANIAL INJURY
8020	FRACTURE OF FACE BONES, NASAL BONES, CLOSED
8021	FRACTURE OF FACE BONES, NASAL BONES, OPEN
8022	FRACTURE OF FACE BONES, MANDIBLE, CLOSED
8023	FRACTURE OF FACE BONES, MANDIBLE, OPEN
8024	FRACTURE OF FACE BONES, MALAR & MAXILLARY BONES, CLOSED
8025	FRACTURE OF FACE BONES, MALAR & MAXILLARY BONES, OPEN
8026	FRACTURE OF FACE BONES, ORBITAL FLOOR (BLOW-OUT), CLOSED
8027	FRACTURE OF FACE BONES, ORBITAL FLOOR (BLOW-OUT), OPEN
8028	FRACTURE OF FACE BONES, OTH FACIAL BONES, CLOSED
8029	FRACTURE OF FACE BONES, OTH FACIAL BONES, OPEN
8030	OTH & UNQUALIFIED SKULL FRACTURES, CLOSED WMEN INTRACRANIAL INJURY
8031	OTH & UNQUALIFIED SKULL FRACTURES, CLOSED W INTRACRANIAL INJURY
8032	OTH & UNQUALIFIED SKULL FRACTURES, OPEN WMEN INTRACRANIAL INJURY
8033	OTH & UNQUALIFIED SKULL FRACTURES, OPEN W INTRACRANIAL INJURY
8040	MULT FRACTURES INVL SKULL W OTH BONES, CLSD WMEN INTRACRANIAL INJURY
8041	MULT FRACTURES INVL SKULL W OTH BONES, CLSD W INTRACRANIAL INJURY
8042	MULT FRACTURES INVL SKULL W OTH BONES, OPEN WMEN INTRACRANIAL INJURY
8043	MULT FRACTURES INVL SKULL W OTH BONES, OPEN W INTRACRANIAL INJURY
8050	FRACTURE OF VERTEBRAL COLUMN WMEN SPINAL CORD LESION, CERVICAL, CLOSED
8051	FRACTURE OF VERTEBRAL COLUMN WMEN SPINAL CORD LESION, CERVICAL, OPEN
8052	FRACTURE OF VERTEBRAL COLUMN WMEN SPINAL CORD LESION, DORSAL (THORACIC), CLOSED
8053	FRACTURE OF VERTEBRAL COLUMN WMEN SPINAL CORD LESION, DORSAL (THORACIC), OPEN
8054	FRACTURE OF VERTEBRAL COLUMN WMEN SPINAL CORD LESION, LUMBAR, CLOSED
8055	FRACTURE OF VERTEBRAL COLUMN WMEN SPINAL CORD LESION, LUMBAR, OPEN
8056	FRACTURE OF VERTEBRAL COLUMN WMEN SPINAL CORD LESION, SACRUM & COCCYX, CLOSED
8057	FRACTURE OF VERTEBRAL COLUMN WMEN SPINAL CORD LESION, SACRUM & COCCYX, OPEN
8058	FRACTURE OF VERTEBRAL COLUMN WMEN SPINAL CORD LESION, UNSPCFD, CLOSED
8059	FRACTURE OF VERTEBRAL COLUMN WMEN SPINAL CORD LESION, UNSPCFD, OPEN

8060	FRACTURE OF VERTEBRAL COLUMN W SPINAL CORD LESION, CERVICAL, CLOSED
8061	FRACTURE OF VERTEBRAL COLUMN W SPINAL CORD LESION, CERVICAL, OPEN
8062	FRACTURE OF VERTEBRAL COLUMN W SPINAL CORD LESION, DORSAL (THORACIC), CLOSED
8063	FRACTURE OF VERTEBRAL COLUMN W SPINAL CORD LESION, DORSAL (THORACIC), OPEN
8064	FRACTURE OF VERTEBRAL COLUMN W SPINAL CORD LESION, LUMBAR, CLOSED
8065	FRACTURE OF VERTEBRAL COLUMN W SPINAL CORD LESION, LUMBAR, OPEN
8066	FRACTURE OF VERTEBRAL COLUMN W SPINAL CORD LESION, SACRUM & COCCYX, CLOSED
8067	FRACTURE OF VERTEBRAL COLUMN W SPINAL CORD LESION, SACRUM & COCCYX, OPEN
8068	FRACTURE OF VERTEBRAL COLUMN W SPINAL CORD LESION, UNSPCFD, CLOSED
8069	FRACTURE OF VERTEBRAL COLUMN W SPINAL CORD LESION, UNSPCFD, OPEN
8070	FRACTURE OF RIB(S), STERNUM, LARYNX & TRACHEA, RIB(S), CLOSED
8071	FRACTURE OF RIB(S), STERNUM, LARYNX & TRACHEA, RIB(S), OPEN
8072	FRACTURE OF RIB(S), STERNUM, LARYNX & TRACHEA, STERNUM, CLOSED
8073	FRACTURE OF RIB(S), STERNUM, LARYNX & TRACHEA, STERNUM, OPEN
8074	FRACTURE OF RIB(S), STERNUM, LARYNX & TRACHEA, FLAIL CHEST
8075	FRACTURE OF RIB(S), STERNUM, LARYNX & TRACHEA, CHEA, CLOSE
8076	FRACTURE OF RIB(S), STERNUM, LARYNX & TRACHEA, CHEA, OPE
8080	FRACTURE OF PELVIS, ACETABULUM, CLOSED
8081	FRACTURE OF PELVIS, ACETABULUM, OPEN
8082	FRACTURE OF PELVIS, PUBIS, CLOSED
8083	FRACTURE OF PELVIS, PUBIS, OPEN
8084	FRACTURE OF PELVIS, OTH SPCFD PART, CLOSED
8085	FRACTURE OF PELVIS, OTH SPCFD PART, OPEN
8088	FRACTURE OF PELVIS, UNSPCFD, CLOSED
8089	FRACTURE OF PELVIS, UNSPCFD, OPEN
8090	ILL-DEFINED FRACTURES OF TRUNK, FRACTURE OF TRUNK, CLOSED
8091	ILL-DEFINED FRACTURES OF TRUNK, FRACTURE OF TRUNK, OPEN
8100	FRACTURE OF CLAVICLE, CLOSED
8101	FRACTURE OF CLAVICLE, OPEN
8110	FRACTURE OF SCAPULA, CLOSED
8111	FRACTURE OF SCAPULA, OPEN
8120	FRACTURE OF HUMERUS, UPPER END, CLOSED
8121	FRACTURE OF HUMERUS, UPPER END, OPEN
8122	FRACTURE OF HUMERUS, SHAFT/UNSPCFD PART, CLOSED
8123	FRACTURE OF HUMERUS, SHAFT/UNSPCFD PART, OPEN
8124	FRACTURE OF HUMERUS, LOWER END, CLOSED
8125	FRACTURE OF HUMERUS, LOWER END, OPEN
8130	FRACTURE OF RADIUS & ULNA, UPPER END/UNSPCFD PART, CLOSED
8131	FRACTURE OF RADIUS & ULNA, UPPER END/UNSPCFD PART, OPEN
8132	FRACTURE OF RADIUS & ULNA, SHAFT, CLOSED
8133	FRACTURE OF RADIUS & ULNA, SHAFT, OPEN
8134	FRACTURE OF RADIUS & ULNA, LOWER END, CLOSED
8135	FRACTURE OF RADIUS & ULNA, LOWER END, OPEN
8140	FRACTURE OF CARPAL BONE(S), CLOSED

8141	FRACTURE OF CARPAL BONE(S), OPEN
8150	FRACTURE OF METACARPAL BONE(S), CLOSED
8151	FRACTURE OF METACARPAL BONE(S), OPEN
8160	FRACTURE OF ONE/MORE PHALANGES OF HAND, CLOSED
8161	FRACTURE OF ONE/MORE PHALANGES OF HAND, OPEN
8170	MULTIPLE FRACTURES OF HAND BONES, CLOSED
8171	MULTIPLE FRACTURES OF HAND BONES, OPEN
8180	ILL-DEFINED FRACTURES OF UPPER LIMB, CLOSED
8181	ILL-DEFINED FRACTURES OF UPPER LIMB, OPEN
8190	MULT FRACTURES INVL BOTH UPPER LIMBS & UPPER LIMB W RIBS & STERNUM, CLSD
8191	MULT FRACTURES INVL BOTH UPPER LIMBS & UPPER LIMB W RIBS & STERNUM, OPEN
8200	FRACTURE OF NECK OF FEMUR, TRANSCERVICAL FRACTURE, CLOSED
8201	FRACTURE OF NECK OF FEMUR, TRANSCERVICAL FRACTURE, OPEN
8202	FRACTURE OF NECK OF FEMUR, PERTROCHANTERIC FRACTURE, CLOSED
8203	FRACTURE OF NECK OF FEMUR, PERTROCHANTERIC FRACTURE, OPEN
8208	FRACTURE OF NECK OF FEMUR, UNSPCFD PART, CLOSED
8209	FRACTURE OF NECK OF FEMUR, UNSPCFD PART, OPEN
8210	FRACTURE OF OTH & UNSPCFD PARTS OF FEMUR, SHAFT/UNSPCFD PART, CLOSED
8211	FRACTURE OF OTH & UNSPCFD PARTS OF FEMUR, SHAFT/UNSPCFD PART, OPEN
8212	FRACTURE OF OTH & UNSPCFD PARTS OF FEMUR, LOWER END, CLOSED
8213	FRACTURE OF OTH & UNSPCFD PARTS OF FEMUR, LOWER END, OPEN
8220	FRACTURE OF PATELLA, CLOSED
8221	FRACTURE OF PATELLA, OPEN
8230	FRACTURE OF TIBIA & FIBULA, UPPER END/UNSPCFD PART, CLOSED
8231	FRACTURE OF TIBIA & FIBULA, UPPER END/UNSPCFD PART, OPEN
8232	FRACTURE OF TIBIA & FIBULA, SHAFT, CLOSED
8233	FRACTURE OF TIBIA & FIBULA, SHAFT, OPEN
8240	FRACTURE OF ANKLE, MEDIAL MALLEOLUS, CLOSED
8241	FRACTURE OF ANKLE, MEDIAL MALLEOLUS, OPEN
8242	FRACTURE OF ANKLE, LATERAL MALLEOLUS, CLOSED
8243	FRACTURE OF ANKLE, LATERAL MALLEOLUS, OPEN
8244	FRACTURE OF ANKLE, BIMALLEOLAR, CLOSED
8245	FRACTURE OF ANKLE, BIMALLEOLAR, OPEN
8246	FRACTURE OF ANKLE, TRIMALLEOLAR, CLOSED
8247	FRACTURE OF ANKLE, TRIMALLEOLAR, OPEN
8248	FRACTURE OF ANKLE, UNSPCFD, CLOSED
8249	FRACTURE OF ANKLE, UNSPCFD, OPEN
8250	FRACTURE OF CALCANEUS, CLSD
8251	FRACTURE OF CALCANEUS, OPEN
8252	FRACTURE OF OTH TARSAL & METATARSAL BONES, CLSD
8253	FRACTURE OF OTH TARSAL & METATARSAL BONES, OPEN
8260	FRACTURE OF ONE/MORE PHALANGES OF FOOT, CLOSED
8261	FRACTURE OF ONE/MORE PHALANGES OF FOOT, OPEN
8270	OTHER, MULTIPLE & ILL-DEFINED FRACTURES OF LOWER LIMB, CLOSED
8271	OTHER, MULTIPLE & ILL-DEFINED FRACTURES OF LOWER LIMB, OPEN
8280	FRACTURES, BOTH LOWER LIMBS/LOWER W UPPER LIMB/LOWER LIMB W RIB & STERNUM, CLSD

8281	FRACTURES, BOTH LOWER LIMBS/LOWER W UPPER LIMB/LOWER LIMB W RIB & STERNUM, OPEN
8290	FRACTURE OF UNSPCFD BONES, CLOSED
8291	FRACTURE OF UNSPCFD BONES, OPEN

ICD-10 Codes for Fractures (Note that hip fractures are italicized)	
ICD-10 Code	**Description**
S02000	FRACTURE OF VAULT OF SKULL, CLOSED
S02001	FRACTURE OF VAULT OF SKULL, OPEN
S02100	FRACTURE OF BASE OF SKULL, CLOSED
S02101	FRACTURE OF BASE OF SKULL, OPEN
S02200	FRACTURE OF NASAL BONES, CLOSED
S02201	FRACTURE OF NASAL BONES, OPEN
S02300	FRACTURE OF ORBITAL FLOOR, CLOSED
S02301	FRACTURE OF ORBITAL FLOOR, OPEN
S02400	FX MALAR & MAX BONES LEFORT 1 CLSD
S02401	FX MALAR & MAXILLARY BONES LEFORT 1 OPEN
S02410	FX MALAR & MAX BONES LEFORT 2 CLSD
S02411	FX MALAR & MAX BONE LEFORT 2 OPEN
S02420	FX MALAR & MAX BONES CMB MIDFACE CLSD
S02421	FX MALAR & MAX BONES CMB MIDFACE OPEN
S02430	FX MALAR & MAX BONES LEFORT 3 UNIL CLSD
S02431	FX MALAR & MAX BONES LEFORT 3 UNIL OPEN
S02440	FX MALAR & MAX BONES BIL LEFORT 3 CLSD
S02441	FX MALAR & MAX BONES BIL LEFORT 3 OPEN
S02480	OTH FX OF MALAR & MAXILLARY BONES CLOSED
S02481	OTH FX OF MALAR & MAXILLARY BONES OPEN
S02490	UNSPEC FX MALAR & MAXILLARY BONES CLOSED
S02491	UNSPEC FX MALAR & MAXILLARY BONES OPEN
S025	FRACTURE OF TOOTH
S02600	FRACTURE OF MANDIBLE, CLOSED
S02601	FRACTURE OF MANDIBLE, OPEN
S02610	FRACTURE OF RAMUS, CLOSED
S02611	FRACTURE OF RAMUS, OPEN
S02620	FX OF TEMPOROMANDIBULAR JOINT, CLOSED
S02621	FX OF TEMPOROMANDIBULAR JOINT, OPEN
S02670	MULTIPLE MANDIBULAR FRACTURE SITES CLOSD
S02671	MULTIPLE MANDIBULAR FRACTURE SITES OPEN
S02700	MULT FX INV SKULL & FACIAL BONES, CLOSED
S02701	MULT FX INV SKULL & FACIAL BONES OPEN
S02800	FRACTURE OF ALVEOLUS, CLOSED
S02801	FRACTURE OF ALVEOLUS, OPEN
S02810	FRACTURE OF HARD PALATE, CLOSED
S02811	FRACTURE OF HARD PALATE, OPEN
S02890	FX OTH & UNSPEC SKL & FACIAL BONE CLSD
S02891	FX OTH & UNSPEC SKL & FACIAL BONES OPEN
S02900	FX SKL & FACIAL BONES, PART UNSPEC CLSD
S02901	FX SKL & FACIAL BONES PART UNSPEC OPN

S12000	FX OF FIRST CERVICAL VERTEBRA, CLOSED
S12001	FRACTURE OF FIRST CERVICAL VERTEBRA OPEN
S12100	FX OF SECOND CERVICAL VERTEBRA, CLOSED
S12101	FX OF SECOND CERVICAL VERTEBRA OPEN
S12200	FRACTURE OF C3 - C4 VERTEBRA, CLOSED
S12201	FRACTURE OF C3 - C4 VERTEBRA, OPEN
S12210	FRACTURE OF C5 - C7 VERTEBRA, CLOSED
S12211	FRACTURE OF C5 - C7 VERTEBRA, OPEN
S12700	MULTIPLE FX OF CERVICAL SPINE, CLOSED
S12701	MULTIPLE FX OF CERVICAL SPINE, OPEN
S12800	FRACTURE OF OTHER PARTS OF NECK, CLOSED
S12801	FRACTURE OF OTHER PARTS OF NECK, OPEN
S12900	FRACTURE OF NECK, PART UNSPEC CLOSED
S12901	FRACTURE OF NECK, PART UNSPEC OPEN
S22000	FX OF THORACIC VERTEBRA T1 - T6, CLOSED
S22001	FX OF THORACIC VERTEBRA T1 - T6, OPEN
S22010	FX OF THORACIC VERTEBRA T7- T12, CLOSED
S22011	FX OF THORACIC VERTEBRA T7- T12 OPEN
S22090	FX OF UNSPEC THORACIC VERTEBRA, CLOSED
S22091	FX OF UNSPEC THORACIC VERTEBRA, OPEN
S22100	MULT FRACTURES OF THORACIC SPINE, CLOSED
S22101	MULT FRACTURES OF THORACIC SPINE, OPEN
S22200	FRACTURE OF STERNUM, CLOSED
S22201	FRACTURE OF STERNUM, OPEN
S22300	FRACTURE OF RIB, CLOSED
S22301	FRACTURE OF RIB, OPEN
S22400	MULTIPLE FRACTURES OF 2 - 4 RIBS, CLOSED
S22401	MULTIPLE FRACTURES OF 2 - 4 RIBS, OPEN
S22410	MULT FRACTURES OF 5 OR MORE RIBS, CLOSED
S22411	MULT FRACTURES OF 5 OR MORE RIBS, OPEN
S22490	MULT FX OF UNSPEC NUMBER OF RIBS, CLOSED
S22491	MULT FX OF UNSPEC NUMBER OF RIBS OPEN
S22500	FLAIL CHEST, CLOSED
S22501	FLAIL CHEST, OPEN
S22800	FX OF OTHER PARTS OF BONY THORAX, CLOSED
S22801	FX OF OTHER PARTS OF BONY THORAX, OPEN
S22900	FX OF BONY THORAX, PART UNSPEC, CLOSED
S22901	FX OF BONY THORAX, PART UNSPEC, OPEN
S32000	FX OF LUMBAR VERTEBRA, L1 LEVEL, CLOSED
S32001	FX OF LUMBAR VERTEBRA, L1 LEVEL, OPEN
S32010	FX OF LUMBAR VERTEBRA, L2 LEVEL, CLOSED
S32011	FX OF LUMBAR VERTEBRA, L2 LEVEL, OPEN
S32020	FX OF LUMBAR VERTEBRA, L3 LEVEL, CLOSED
S32021	FX OF LUMBAR VERTEBRA, L3 LEVEL, OPEN
S32030	FX OF LUMBAR VERTEBRA, L4 LEVEL, CLOSED
S32031	FX OF LUMBAR VERTEBRA, L4 LEVEL, OPEN
S32040	FX OF LUMBAR VERTEBRA, L5 LEVEL, CLOSED
S32041	FX OF LUMBAR VERTEBRA, L5 LEVEL, OPEN

S32090	FX OF LUMBAR VERTEBRA, UNSPEC LVL CLOSED
S32091	FX OF LUMBAR VERTEBRA, UNSPEC LVL OPEN
S32100	FRACTURE OF SACRUM, CLOSED
S32101	FRACTURE OF SACRUM, OPEN
S32200	FRACTURE OF COCCYX, CLOSED
S32201	FRACTURE OF COCCYX, OPEN
S32300	FRACTURE OF ILIUM, CLOSED
S32301	FRACTURE OF ILIUM, OPEN
S32400	FRACTURE OF ACETABULUM, CLOSED
S32401	FRACTURE OF ACETABULUM, OPEN
S32500	FRACTURE OF PUBIS, CLOSED
S32501	FRACTURE OF PUBIS, OPEN
S32700	MULT FX OF LUMBAR SPINE & PELVIS, CLOSED
S32701	MULT FX OF LUMBAR SPINE & PELVIS, OPEN
S32800	FX OTH/UNSPEC PART LMBR SPN/PELVIS, CLSD
S32801	FX OTH/UNSPEC PART LMBR SPN/PELVIS, OPN
S42000	FX OF STERNAL END OF CLAVICLE, CLOSED
S42001	FX OF STERNAL END OF CLAVICLE, OPEN
S42010	FRACTURE OF SHAFT OF CLAVICLE, CLOSED
S42011	FRACTURE OF SHAFT OF CLAVICLE, OPEN
S42020	FX OF ACROMIAL END OF CLAVICLE, CLOSED
S42021	FX OF ACROMIAL END OF CLAVICLE, OPEN
S42090	FX OF UNSPEC PART OF CLAVICLE, CLOSED
S42091	FX OF UNSPEC PART OF CLAVICLE, OPEN
S42100	FX OF ACROMIAL PROCESS OF SCAPULA CLOSED
S42101	FX OF ACROMIAL PROCESS OF SCAPULA OPEN
S42110	FX OF CORACOID PROCESS OF SCAPULA CLOSED
S42111	FX OF CORACOID PROCESS OF SCAPULA OPEN
S42120	FX GLENOID CAV & NECK OF SCAPULA CLOSED
S42121	FX OF GLENOID CAV & NECK OF SCAPULA OPEN
S42180	FX OF OTHER PART OF SCAPULA, CLOSED
S42181	FRACTURE OF OTHER PART OF SCAPULA, OPEN
S42190	FX OF UNSPEC PART OF SCAPULA, CLOSED
S42191	FX OF UNSPEC PART OF SCAPULA, OPEN
S42200	FX OF SURGICAL NECK OF HUMERUS, CLOSED
S42201	FX OF SURGICAL NECK OF HUMERUS, OPEN
S42210	FX OF ANATOMICAL NECK OF HUMERUS, CLOSED
S42211	FX OF ANATOMICAL NECK OF HUMERUS, OPEN
S42220	FX GREATER TUBEROSITY OF HUMERUS, CLOSED
S42221	FX OF GREATER TUBEROSITY OF HUMERUS OPEN
S42280	FX OTH PART OF UPP END OF HUMERUS CLOSED
S42281	FX OTH PART OF UPP END OF HUMERUS OPEN
S42290	FX UNSPEC PART OF UPP END HUMERUS CLOSED
S42291	FX UNSPEC PART OF UPP END HUMERUS OPEN
S42300	FRACTURE OF SHAFT OF HUMERUS, CLOSED
S42301	FRACTURE OF SHAFT OF HUMERUS, OPEN
S42390	FX OF UNSPECIFIED PART OF HUMERUS CLOSED
S42391	FX OF UNSPECIFIED PART OF HUMERUS, OPEN

S42400	SUPRACONDYLAR FRACTURE OF HUMERUS CLOSED
S42401	SUPRACONDYLAR FRACTURE OF HUMERUS, OPEN
S42410	FX OF LATERAL CONDYLE OF HUMERUS, CLOSED
S42411	FX OF LATERAL CONDYLE OF HUMERUS, OPEN
S42420	FX OF MEDIAL CONDYLE OF HUMERUS, CLOSED
S42421	FX OF MEDIAL CONDYLE OF HUMERUS, OPEN
S42430	FX OF UNSPEC CONDYLE OF HUMERUS, CLOSED
S42431	FX OF UNSPEC CONDYLE OF HUMERUS, OPEN
S42480	FX OTH PART OF LOW END OF HUMERUS CLOSED
S42481	FX OTH PART OF LOW END OF HUMERUS OPEN
S42490	FX UNSPEC PART LOW PART OF HUMERUS CLOSE
S42491	FX UNSPEC PART OF LOW PART HUMERUS OPEN
S42700	MULT FX CLAVICLE SCAPULA & HUMERUS CLOSE
S42701	MULT FX CLAVICLE SCAPULA & HUMERUS OPEN
S42800	FX OTH PART OF SHOULDER & UPP ARM CLOSED
S42801	FX OTH PARTS OF SHOULDER & UPP ARM OPEN
S42900	FX SHOULDER GIRDLE PART UNSPEC CLOSED
S42901	FX SHOULDER GIRDLE PART UNSPEC OPEN
S52000	FX OF OLECRANON PROCESS OF ULNA, CLOSED
S52001	FX OF OLECRANON PROCESS OF ULNA, OPEN
S52010	FX OF CORONOID PROCESS OF ULNA, CLOSED
S52011	FX OF CORONOID PROCESS OF ULNA, OPEN
S52020	MONTEGGIA'S FRACTURE, CLOSED
S52021	MONTEGGIA'S FRACTURE, OPEN
S52080	OTH/MULT FX OF UPPER END OF ULNA, CLOSED
S52081	OTH/MULT FX OF UPPER END OF ULNA, OPEN
S52090	UNSPEC FX OF UPPER END OF ULNA, CLOSED
S52091	UNSPEC FX OF UPPER END OF ULNA, OPEN
S52100	FRACTURE OF HEAD OF RADIUS, CLOSED
S52101	FRACTURE OF HEAD OF RADIUS, OPEN
S52110	FRACTURE OF NECK OF RADIUS, CLOSED
S52111	FRACTURE OF NECK OF RADIUS, OPEN
S52120	FX OF RADIUS W ULNA, UPPER END, CLOSED
S52121	FX OF RADIUS W ULNA, UPPER END, OPEN
S52180	OTH/MULT FX OF UPP END OF RADIUS, CLOSED
S52181	OTH/MULT FX OF UPP END OF RADIUS, OPEN
S52190	UNSPEC FX OF UPP END OF RADIUS, CLOSED
S52191	UNSPEC FX OF UPP END OF RADIUS, OPEN
S52200	FRACTURE OF SHAFT OF ULNA, CLOSED
S52201	FRACTURE OF SHAFT OF ULNA, OPEN
S52300	FRACTURE OF SHAFT OF RADIUS, CLOSED
S52301	FRACTURE OF SHAFT OF RADIUS, OPEN
S52400	FX OF SHAFT OF BOTH ULNA & RADIUS CLOSED
S52401	FX OF SHAFT OF BOTH ULNA & RADIUS OPEN
S52500	COLLES' FRACTURE, CLOSED
S52501	COLLES' FRACTURE, OPEN
S52580	OTHER FX OF LOWER END OF RADIUS, CLOSED
S52581	OTHER FX OF LOWER END OF RADIUS, OPEN

S52590	UNSPEC FX OF LOWER END OF RADIUS, CLOSED
S52591	UNSPECFX OF LOWER END OF RADIUS OPEN
S52600	FX LOW END OF BOTH ULNA & RADIUS CLOSED
S52601	FX LOW END OF BOTH ULNA & RADIUS, OPEN
S52700	MULTIPLE FRACTURES OF FOREARM, CLOSED
S52701	MULTIPLE FRACTURES OF FOREARM, OPEN
S52800	FRACTURE OF OTH PARTS OF FOREARM, CLOSED
S52801	FRACTURE OF OTH PARTS OF FOREARM, OPEN
S52900	FRACTURE OF FOREARM, PART UNSPEC CLOSED
S52901	FRACTURE OF FOREARM, PART UNSPEC OPEN
S62000	FX NAVICULAR (SCAPHOID) BONE HAND CLOSED
S62001	FX NAVICULAR [SCAPHOID] BONE HAND OPEN
S62100	FRACTURE OF LUNATE BONE, CLOSED
S62101	FRACTURE OF LUNATE BONE, OPEN
S62110	FRACTURE OF TRIQUETRAL BONE, CLOSED
S62111	FRACTURE OF TRIQUETRAL BONE, OPEN
S62120	FRACTURE OF PISIFORM BONE, CLOSED
S62121	FRACTURE OF PISIFORM BONE, OPEN
S62130	FRACTURE OF TRAPEZIUM BONE, CLOSED
S62131	FRACTURE OF TRAPEZIUM BONE, OPEN
S62140	FRACTURE OF TRAPEZOID BONE, CLOSED
S62141	FRACTURE OF TRAPEZOID BONE, OPEN
S62150	FRACTURE OF CAPITATE BONE, CLOSED
S62151	FRACTURE OF CAPITATE BONE, OPEN
S62160	FRACTURE OF HAMATE BONE, CLOSED
S62161	FRACTURE OF HAMATE BONE, OPEN
S62180	FRACTURE OF OTHER CARPAL BONES, CLOSED
S62181	FRACTURE OF OTHER CARPAL BONES, OPEN
S62190	FRACTURE OF UNSPEC CARPAL BONES, CLOSED
S62191	FRACTURE OF UNSPEC CARPAL BONES, OPEN
S62200	FX BASE FIRST METACARPAL BONE, CLOSED
S62201	FX BASE FIRST METACARPAL BONE, OPEN
S62210	FX SHAFT FIRST METACARPAL BONE, CLOSED
S62211	FX SHAFT FIRST METACARPAL BONE, OPEN
S62220	FX NECK FIRST METACARPAL BONE, CLOSED
S62221	FX NECK OF FIRST METACARPAL BONE, OPEN
S62270	FX MULT SITE FIRST METACARPAL BONE, CLSD
S62271	FX MULT SITE FIRST METACARPAL BONE, OPEN
S62290	FX UNSP SITE FIRST METACARPAL BONE, CLSD
S62291	FX UNSP SITE FIRST METACARPAL BONE, OPEN
S62300	FX OF BASE OF OTH METACARPAL BONE CLOSED
S62301	FX OF BASE OF OTH METACARPAL BONE OPEN
S62310	FX OF SHAFT OF OTH METACARPAL BONE CLOSE
S62311	FX OF SHAFT OF OTH METACARPAL BONE OPEN
S62320	FX OF HEAD OF OTH METACARPAL BONE CLOSED
S62321	FX OF HEAD OF OTH METACARPAL BONE OPEN
S62370	FX MULT SITE OTH METACARPAL BONE, CLSD
S62371	FX MULT SITE OTH METACARPAL BONE, OPEN

S62390	FX UNSP SITE OTHER METACARPAL BONE, CLSD
S62391	FX UNSP SITE OTHER METACARPAL BONE, OPEN
S62400	MULT FX OF METACARPAL BONES, CLOSED
S62401	MULT FX OF METACARPAL BONES, OPEN
S62500	FRACTURE OF PROXIMAL PHALANX, CLOSED
S62501	FRACTURE OF PROXIMAL PHALANX, OPEN
S62510	FRACTURE OF DISTAL PHALANX, CLOSED
S62511	FRACTURE OF DISTAL PHALANX, OPEN
S62570	FRACTURE OF MULT SITES OF THUMB, CLOSED
S62571	FRACTURE OF MULT SITES OF THUMB, OPEN
S62590	FX OF UNSPEC PART OF PHALANX, CLOSED
S62591	FX OF UNSPEC PART OF PHALANX, OPEN
S62600	FX MID/PROXIMAL PHALANX FINGER, CLSD
S62601	FX MID/PROXIMAL PHALANX FINGER, OPEN
S62610	FX OF DISTAL PHALANX OF FINGER, CLOSED
S62611	FX OF DISTAL PHALANX OF FINGER, OPEN
S62670	FRACTURE OF MULT SITES OF FINGER, CLOSED
S62671	FRACTURE OF MULT SITES OF FINGER, OPEN
S62690	FX UNSPEC PART PHALANX FINGER, CLSD
S62691	FX UNSPEC PART PHALANX FINGER, OPEN
S62700	MULTIPLE FRACTURES OF FINGERS, CLOSED
S62701	MULTIPLE FRACTURES OF FINGERS, OPEN
S62800	FX OTH/ UNSPEC PART WRIST/HAND, CLOSED
S62801	FX OTH/ UNSPEC PART WRIST/HAND, OPEN
S72000	*FX UPP FEMORAL EPIPHYSIS/SEPARATION CLSD*
S72001	*FX UPP FEMORAL EPIPHYSIS/SEPARATION OPN*
S72010	*FX BAS FEM NECK/CERVICOTROCHANTERIC CLSD*
S72011	*FX BAS FEM NECK/CERVICOTROCHANTERIC OPEN*
S72080	*OTHER FRACTURE OF FEMORAL NECK, CLOSED*
S72081	*OTHER FRACTURE OF FEMORAL NECK, OPEN*
S72090	*UNSPEC FRACTURE OF NECK OF FEMUR, CLOSED*
S72091	*UNSPEC FRACTURE OF NECK OF FEMUR, OPEN*
S72100	*INTERTROCHANTERIC FRACTURE, CLOSED*
S72101	*INTERTROCHANTERIC FRACTURE, OPEN*
S72190	*UNSPECIFIED TROCHANTERIC FRACTURE CLOSED*
S72191	*UNSPECIFIED TROCHANTERIC FRACTURE, OPEN*
S72200	*SUBTROCHANTERIC FRACTURE, CLOSED*
S72201	*SUBTROCHANTERIC FRACTURE, OPEN*
S72300	FRACTURE OF SHAFT OF FEMUR, CLOSED
S72301	FRACTURE OF SHAFT OF FEMUR, OPEN
S72400	FX LOW FEM EPIPHYSIS/SEPARATION CLSD
S72401	FX LOW FEM EPIPHYSIS/SEPARATION OPEN
S72410	CONDYLAR FRACTURE OF FEMUR, CLOSED
S72411	CONDYLAR FRACTURE OF FEMUR, OPEN
S72420	SUPRACONDYLAR FRACTURE OF FEMUR, CLOSED
S72421	SUPRACONDYLAR FRACTURE OF FEMUR, OPEN
S72490	UNSPEC FX LOW (DISTAL) END OF FEMUR CLSD
S72491	UNSPEC FX LOW (DISTAL) END OF FEMUR OPEN

S72700	MULTIPLE FRACTURES OF FEMUR, CLOSED
S72701	MULTIPLE FRACTURES OF FEMUR, OPEN
S72800	FRACTURES OF OTHER PARTS OF FEMUR CLOSED
S72801	FRACTURES OF OTHER PARTS OF FEMUR OPEN
S72900	FRACTURE OF FEMUR PART UNSPEC CLOSED
S72901	FRACTURE OF FEMUR PART UNSPECIFIED OPEN
S82000	FRACTURE OF PATELLA, CLOSED
S82001	FRACTURE OF PATELLA, OPEN
S82100	FX UPP END TIBIA W OR W/O FIBULA, CLSD
S82101	FX UPP END TIBIA W OR W/O FIBULA, OPEN
S82200	FX SHAFT TIBIA W OR W/O FIBULA, CLSD
S82201	FX SHAFT TIBIA W OR W/O FIBULA, OPEN
S82300	FX LOW END TIBIA W OR W/O FIBULA, CLSD
S82301	FX LOW END TIBIA W OR W/O FIBULA, OPEN
S82400	FRACTURE OF FIBULA ALONE, CLOSED
S82401	FRACTURE OF FIBULA ALONE, OPEN
S82500	FRACTURE OF MEDIAL MALLEOLUS, CLOSED
S82501	FRACTURE OF MEDIAL MALLEOLUS, OPEN
S82600	FRACTURE OF LATERAL MALLEOLUS, CLOSED
S82601	FRACTURE OF LATERAL MALLEOLUS, OPEN
S82700	MULTIPLE FRACTURES OF LOWER LEG, CLOSED
S82701	MULTIPLE FRACTURES OF LOWER LEG, OPEN
S82800	BIMALLEOLAR FRACTURE OF ANKLE, CLOSED
S82801	BIMALLEOLAR FRACTURE OF ANKLE, OPEN
S82810	TRIMALLEOLAR FRACTURE OF ANKLE, CLOSED
S82811	TRIMALLEOLAR FRACTURE OF ANKLE, OPEN
S82820	TIBIAL PLAFOND FRACTURE CLOSED
S82821	TIBIAL PLAFOND FRACTURE OPEN
S82890	FRACTURE OF ANKLE NOS, CLOSED
S82891	FRACTURE OF ANKLE NOS, OPEN
S82900	FX OF LOWER LEG, PART UNSPEC, CLOSED
S82901	FX OF LOWER LEG, PART UNSPECIFIED, OPEN
S92000	FRACTURE OF CALCANEUS, CLOSED
S92001	FRACTURE OF CALCANEUS, OPEN
S92100	FRACTURE OF TALUS, CLOSED
S92101	FRACTURE OF TALUS, OPEN
S92200	FRACTURE OF NAVICULAR BONE, CLOSED
S92201	FRACTURE OF NAVICULAR BONE, OPEN
S92210	FRACTURE OF CUBOID BONE, CLOSED
S92211	FRACTURE OF CUBOID BONE, OPEN
S92220	FRACTURE OF CUNEIFORM BONE, CLOSED
S92221	FRACTURE OF CUNEIFORM BONE, OPEN
S92290	FRACTURE OF UNSPEC TARSAL BONE, CLOSED
S92291	FRACTURE OF UNSPEC TARSAL BONE, OPEN
S92300	FRACTURE OF METATARSAL BONE, CLOSED
S92301	FRACTURE OF METATARSAL BONE, OPEN
S92400	FRACTURE OF GREAT TOE, CLOSED
S92401	FRACTURE OF GREAT TOE, OPEN

S92500	FRACTURE OF OTHER TOE, CLOSED
S92501	FRACTURE OF OTHER TOE, OPEN
S92700	MULTIPLE FRACTURES OF FOOT, CLOSED
S92701	MULTIPLE FRACTURES OF FOOT, OPEN
S92900	FRACTURE OF FOOT, UNSPECIFIED, CLOSED
S92901	FRACTURE OF FOOT, UNSPECIFIED, OPEN
T0200	FRACTURES INVOLVING HEAD W NECK CLOSED
T0201	FRACTURES INVOLVING HEAD WITH NECK, OPEN
T0210	FX INV THORAX W LOWER BACK PELVIS CLOSED
T0211	FX INV THORAX W LOWER BACK PELVIS OPEN
T0220	FX INV MULT RGN ONE UPPER LIMB CLOSED
T0221	FX INV MULT RGN ONE UPPER LIMB OPEN
T0230	FX INV MULT RGN ONE LOWER LIMB CLOSED
T0231	FX INV MULT RGN ONE LOWER LIMB OPEN
T0240	FX INV MULT REGIONS BOTH UPP LIMBS CLSD
T0241	FX INV MULT REGIONS BOTH UPP LIMBS OPEN
T0250	FX INV MULT REGIONS BOTH LOW LIMBS CLSD
T0251	FX INV MULT REGIONS BOTH LOW LIMBS OPEN
T0260	FX INV MULT REGIONS UPP/LOW LIMB CLOSED
T0261	FX INV MULT REGIONS UPP/LOW LIMB OPEN
T0270	FX THORAX W LOW BACK PELV W LIMB(S) CLSD
T0271	FX THORAX W LOW BACK PELV W LIMBS OPEN
T0280	FRACTURES INV OTH CMB BODY REGIONS CLSD
T0281	FRACTURES INV OTH CMB BODY REGIONS OPEN
T0290	MULTIPLE FRACTURES, UNSPECIFIED, CLOSED
T0291	MULTIPLE FRACTURES, UNSPECIFIED, OPEN
T080	FRACTURE OF SPINE, LEVEL UNSPEC, CLOSED
T081	FRACTURE OF SPINE, LEVEL UNSPEC, OPEN
T100	FX OF UPPER LIMB, LEVEL UNSPEC, CLOSED
T101	FX OF UPPER LIMB, LEVEL UNSPEC, OPEN
T1420	FRACTURE OF UNSPECIFIED BODY REGION CLSD
T1421	FRACTURE OF UNSPECIFIED BODY REGION OPEN

Appendix 3: Residents in Long-Term Care Facilities by Age and Sex in Ontario

Age	Females	Males
All ages	61,845	33,280
Less than 10 years	75	174
10 to 17 years	1,013	1,783
18 to 44 years	2,892	5,597
45 to 64 years	3,702	5,230
65 to 69 years	1,771	1,790
70 to 74 years	3,258	2,447
75 to 79 years	7,004	3,693
80 to 84 years	12,969	4,976
85 years and over	29,161	7,590

*Residents on books on March 31 or at the end of the reporting year.
**More recent data are available in a more current Statistics Canada report; however, trends are similar by age group, and the effect upon the model of slight variations in the numbers would be negligible.
Source: Statistics Canada, 2006, Residential Care Facilities 2003/2004, Catalogue no. 83-237-XIE, *Table 4-7, p. 57. (66)*

Appendix 4: Life Tables by Age and Sex in Ontario

Females				Males			
Age	p(alive)	p(dead)	Life Expectancy	Age	p(alive)	p(dead)	Life Expectancy
60	0.99413	0.00587	24.72	60	0.99018	0.00982	20.84
61	0.99359	0.00641	23.86	61	0.98915	0.01085	20.04
62	0.99296	0.00704	23.01	62	0.98802	0.01198	19.26
63	0.99226	0.00774	22.17	63	0.98679	0.01321	18.49
64	0.99150	0.00850	21.34	64	0.98549	0.01451	17.73
65	0.99067	0.00933	20.52	65	0.98407	0.01593	16.98
66	0.98975	0.01026	19.70	66	0.98248	0.01752	16.25
67	0.98869	0.01131	18.90	67	0.98070	0.01930	15.53
68	0.98757	0.01243	18.11	68	0.97876	0.02124	14.82
69	0.98638	0.01362	17.34	69	0.97671	0.02329	14.14
70	0.98507	0.01493	16.57	70	0.97445	0.02555	13.46
71	0.98355	0.01645	15.81	71	0.97190	0.02810	12.80
72	0.98177	0.01823	15.07	72	0.96896	0.03104	12.16
73	0.97981	0.02019	14.34	73	0.96571	0.03429	11.53
74	0.97770	0.02230	13.62	74	0.96221	0.03779	10.92
75	0.97533	0.02467	12.92	75	0.95835	0.04165	10.33
76	0.97258	0.02742	12.24	76	0.95401	0.04599	9.76
77	0.96934	0.03066	11.57	77	0.94909	0.05091	9.20
78	0.96576	0.03424	10.92	78	0.94369	0.05631	8.67
79	0.96193	0.03807	10.29	79	0.9379	0.06210	8.16
80	0.95760	0.04240	9.67	80	0.93154	0.06846	7.67
81	0.95252	0.04748	9.08	81	0.92445	0.07555	7.19
82	0.94646	0.05354	8.51	82	0.91647	0.08353	6.74
83	0.93932	0.06068	7.96	83	0.90786	0.09214	6.31
84	0.93128	0.06872	7.44	84	0.89871	0.10129	5.90
85	0.92245	0.07755	6.96	85	0.88865	0.11135	5.50
86	0.91297	0.08703	6.50	86	0.87732	0.12268	5.13
87	0.90296	0.09704	6.07	87	0.86434	0.13566	4.78
88	0.89233	0.10767	5.67	88	0.84996	0.15005	4.45
89	0.88101	0.11899	5.29	89	0.83442	0.16558	4.15
90	0.86912	0.13088	4.94	90	0.81736	0.18264	3.87
91	0.85678	0.14322	4.61	91	0.79840	0.20160	3.63
92	0.84412	0.15588	4.30	92	0.77717	0.22283	3.42
93	0.82913	0.17087	4.00	93	0.77914	0.22086	3.25
94	0.81320	0.18680	3.72	94	0.76133	0.23867	3.03
95	0.79624	0.20376	3.46	95	0.74246	0.25754	2.83
96	0.77823	0.22177	3.22	96	0.72249	0.27751	2.63
97	0.75917	0.24083	2.99	97	0.70142	0.29858	2.45
98	0.73906	0.26094	2.78	98	0.67923	0.32077	2.28
99	0.71791	0.28209	2.58	99	0.65594	0.34406	2.13
100	0.69575	0.30425	2.40	100	0.63154	0.36846	1.98

Statistics Canada: Complete life table, 2000 to 2002.

Appendix 5: Population Census by Age and Sex in Ontario

Age Group	Total	Male	Female
60	124,950	60,990	63,960
61	119,185	58,175	61,005
62	117,940	57,580	60,350
63	113,995	55,515	58,485
64	105,920	51,275	54,645
65	101,270	48,710	52,565
66	95,630	45,780	49,855
67	93,605	44,560	49,040
68	89,490	42,680	46,815
69	86,240	40,915	45,325
70	85,315	40,205	45,110
71	82,505	38,610	43,895
72	78,860	37,085	41,780
73	78,795	36,465	42,335
74	76,470	35,150	41,330
75	75,615	34,495	41,120
76	71,610	32,115	39,495
77	66,475	29,325	37,155
78	64,610	27,960	36,645
79	60,605	25,690	34,915
80	58,275	23,810	34,460
81	54,715	21,680	33,040
82	50,415	19,395	31,020
83	45,550	17,175	28,375
84	41,315	15,180	26,135
85	37,160	13,375	23,785
86	30,880	10,670	20,205
87	22,730	7,405	15,325
88	19,370	6,280	13,085
89	17,050	5,355	11,695
90	14,460	4,305	10,155
91	12,675	3,715	8,960
92	10,015	2,780	7,240
93	7,665	1,995	5,670
94	5,750	1,385	4,365
95	4,280	1,000	3,275
96	3,155	795	2,355
97	2,250	525	1,725
98	1,600	410	1,190
99	1,055	240	815
100 years and over	1,730	315	1,415

Statistics Canada, 2006 Census of Population, Statistics Canada catalogue no. 97-551-XCB2006009.

Appendix 6: Additional Tables by Age

Females – Discounted Lifetime Cost per Patient per Arm in the FEMOR Model

Age	Base Case, $	Exercise Program, $	Home Modification, $	Vitamin D + Calcium, $	Gait-Stabilizing Device, $	Medication Withdrawal, $
65	36,228	35,612	35,615	35,706	35,354	35,511
66	37,885	37,361	37,413	37,424	37,128	37,477
67	39,402	38,979	39,074	39,012	38,776	39,206
68	41,276	40,911	41,031	40,927	40,725	41,172
69	43,126	42,817	42,965	42,819	42,650	43,079
70	45,105	44,844	44,997	44,834	44,693	45,090
71	45,809	45,585	45,748	45,567	45,447	45,812
72	46,600	46,413	46,583	46,387	46,288	46,616
73	47,268	47,115	47,289	47,084	47,005	47,290
74	47,494	47,368	47,544	47,334	47,268	47,521
75	47,700	47,598	47,774	47,561	47,508	47,728
76	48,022	47,941	48,117	47,903	47,861	48,052
77	48,546	48,481	48,655	48,443	48,409	48,577
78	48,954	48,906	49,076	48,869	48,843	48,985
79	47,645	47,609	47,776	47,572	47,552	47,676
80	46,160	46,136	46,298	46,100	46,086	46,190
81	44,914	44,898	45,055	44,865	44,854	44,943
82	43,742	43,734	43,885	43,702	43,694	43,771
83	42,472	42,470	42,614	42,440	42,435	42,499
84	40,014	40,017	40,155	39,990	39,987	40,041
85	37,492	37,500	37,630	37,474	37,474	37,518
86	35,060	35,070	35,194	35,047	35,048	35,084
87	33,107	33,120	33,237	33,099	33,100	33,131
88	30,968	30,982	31,094	30,963	30,964	30,990
89	28,847	28,863	28,968	28,845	28,847	28,869
90	26,779	26,795	26,895	26,779	26,781	26,799
91	24,754	24,771	24,866	24,756	24,758	24,774
92	22,933	22,949	23,040	22,936	22,938	22,951
93	21,124	21,140	21,225	21,128	21,130	21,142
94	19,602	19,617	19,697	19,606	19,608	19,618
95	18,093	18,108	18,184	18,098	18,100	18,109
96	17,061	17,076	17,149	17,066	17,068	17,076
97	15,951	15,965	16,034	16,956	15,958	15,965
98	14,692	14,706	14,771	14,697	14,699	14,709
99	14,032	14,046	14,107	14,037	14,039	14,045
100	13,630	13,643	13,704	13,635	13,637	13,643

Costs are in 2008 Canadian dollars.

Females – Lifetime Falls per Patient per Arm in the FEMOR Model

Age	Base Case	Exercise Program	Home Modification	Vitamin D + Calcium	Gait-Stabilizing Device	Medication Withdrawal
65	1.138	1.096	1.088	1.104	1.081	1.090
66	1.119	1.085	1.079	1.090	1.071	1.092
67	1.096	1.068	1.065	1.072	1.057	1.082
68	1.076	1.053	1.052	1.055	1.044	1.068
69	1.054	1.035	1.035	1.036	1.027	1.049
70	1.031	1.016	1.016	1.017	1.009	1.029
71	1.012	0.999	1.000	0.999	0.993	1.010
72	0.992	0.982	0.983	0.982	0.977	0.992
73	0.968	0.960	0.961	0.959	0.955	0.967
74	0.947	0.940	0.941	0.939	0.936	0.947
75	0.924	0.918	0.919	0.917	0.915	0.923
76	0.900	0.896	0.897	0.895	0.893	0.900
77	0.874	0.871	0.872	0.870	0.868	0.874
78	0.846	0.843	0.843	0.842	0.841	0.846
79	0.820	0.817	0.818	0.817	0.816	0.820
80	0.791	0.789	0.789	0.788	0.787	0.791
81	0.759	0.758	0.758	0.757	0.757	0.759
82	0.727	0.726	0.726	0.725	0.725	0.727
83	0.691	0.690	0.691	0.690	0.690	0.691
84	0.657	0.656	0.656	0.656	0.656	0.657
85	0.622	0.622	0.622	0.621	0.621	0.622
86	0.589	0.589	0.589	0.589	0.589	0.589
87	0.558	0.558	0.558	0.558	0.557	0.558
88	0.529	0.529	0.529	0.529	0.529	0.529
89	0.501	0.501	0.501	0.501	0.501	0.501
90	0.475	0.474	0.475	0.474	0.474	0.475
91	0.449	0.449	0.449	0.449	0.449	0.449
92	0.423	0.423	0.423	0.423	0.423	0.423
93	0.398	0.398	0.398	0.398	0.398	0.398
94	0.373	0.373	0.373	0.373	0.373	0.373
95	0.353	0.352	0.353	0.352	0.352	0.353
96	0.336	0.336	0.336	0.336	0.336	0.336
97	0.318	0.318	0.318	0.318	0.318	0.318
98	0.299	0.299	0.299	0.299	0.299	0.299
99	0.286	0.286	0.286	0.286	0.286	0.286
100	0.281	0.281	0.281	0.281	0.281	0.281

Females – Discounted Life Years per Patient per Arm in the FEMOR Model

Age	Base Case	Exercise Program	Home Modification	Vitamin D + Calcium	Gait-Stabilizing Device	Medication Withdrawal
65	12.230	12.234	12.235	12.234	12.235	12.235
66	11.940	11.941	11.924	11.941	11.942	11.942
67	11.640	11.641	11.641	11.641	11.642	11.641
68	11.333	11.334	11.334	11.334	11.334	11.334
69	11.020	11.021	11.021	11.021	11.021	11.020
70	10.700	10.701	10.701	10.701	10.701	10.700
71	10.374	10.374	10.374	10.374	10.374	10.374
72	10.042	10.042	10.042	10.042	10.042	10.042
73	9.706	9.706	9.706	9.706	9.706	9.706
74	9.366	9.366	9.366	9.366	9.366	9.366
75	9.022	9.022	9.022	9.022	9.022	9.022
76	8.674	8.674	8.674	8.674	8.674	8.674
77	8.325	8.325	8.325	8.325	8.325	8.325
78	7.975	7.975	7.975	7.975	7.975	7.975
79	7.627	7.627	7.627	7.627	7.627	7.627
80	7.279	7.279	7.279	7.279	7.279	7.279
81	6.930	6.930	6.930	6.930	6.930	6.930
82	6.587	6.587	6.587	6.586	6.586	6.587
83	6.249	6.249	6.249	6.249	6.249	6.249
84	5.923	5.923	5.923	5.923	5.923	5.923
85	5.610	5.610	5.610	5.610	5.610	5.610
86	5.310	5.310	5.310	5.310	5.310	5.310
87	5.023	5.023	5.023	5.023	5.023	5.023
88	4.749	4.749	4.749	4.749	4.749	4.749
89	4.486	4.486	4.486	4.486	4.486	4.486
90	4.236	4.236	4.236	4.236	4.236	4.236
91	3.999	3.999	3.999	3.999	3.999	3.999
92	3.774	3.774	3.774	3.774	3.774	3.774
93	3.554	3.554	3.554	3.554	3.554	3.554
94	3.349	3.349	3.349	3.349	3.349	3.349
95	3.157	3.157	3.157	3.157	3.157	3.157
96	2.983	2.983	2.983	2.983	2.983	2.983
97	2.829	2.829	2.829	2.829	2.829	2.829
98	2.693	2.693	2.693	2.693	2.693	2.693
99	2.586	2.586	2.586	2.586	2.586	2.586
100	2.527	2.527	2.527	2.527	2.527	2.527

Females – Discounted Lifetime Long-Term Care Cost per Patient per Arm in the FEMOR Model

Age	Base Case, $	Exercise Program, $	Home Modification, $	Vitamin D + Calcium, $	Gait-Stabilizing Device, $	Medication Withdrawal, $
65	31,571	31,037	30,927	31,129	30,836	30,954
66	33,199	32,742	32,669	32,808	32,562	32,838
67	34,717	34,345	34,306	34,386	34,190	34,533
68	36,563	36,237	36,216	36,264	36,096	36,452
69	38,409	38,127	38,121	38,143	38,002	38,344
70	40,380	40,138	40,142	40,144	40,026	40,343
71	41,063	40,851	40,862	40,851	40,749	41,040
72	41,821	41,638	41,654	41,632	41,547	41,807
73	42,509	42,355	42,373	42,344	42,275	42,501
74	42,714	42,581	42,602	42,568	42,511	42,709
75	42,926	42,814	42,835	42,799	42,753	42,924
76	43,249	43,154	43,174	43,138	43,100	43,247
77	43,781	43,700	43,720	43,684	43,653	43,780
78	44,237	44,170	44,189	44,154	44,130	44,237
79	42,951	42,894	42,911	42,878	42,859	42,950
80	41,535	41,488	41,503	41,474	41,459	41,535
81	40,345	40,307	40,320	40,293	40,282	40,345
82	39,262	39,230	39,242	39,217	39,209	39,262
83	38,109	38,084	38,094	38,072	38,066	38,109
84	35,782	35,762	35,770	35,752	35,747	35,782
85	33,407	33,391	33,398	33,382	33,379	33,407
86	31,107	31,095	31,100	31,087	31,085	31,107
87	29,282	29,272	29,277	29,266	29,265	29,282
88	27,292	27,284	27,288	27,279	27,278	27,292
89	25,357	25,352	25,355	25,347	25,347	25,357
90	23,464	23,460	23,462	23,456	23,456	23,464
91	21,620	21,617	21,618	21,614	21,614	21,620
92	19,961	19,959	19,960	19,956	19,956	19,961
93	18,354	18,352	18,353	18,350	18,351	18,354
94	17,002	17,001	17,002	16,999	16,999	17,002
95	15,682	15,681	15,682	15,680	15,680	15,682
96	14,755	14,754	14,755	14,753	14,753	14,755
97	13,756	13,755	13,756	13,755	13,755	13,756
98	12,646	12,645	12,646	12,645	12,645	12,646
99	12,190	12,190	12,190	12,189	12,189	12,190
100	11,855	11,855	11,855	11,854	11,855	11,855

Costs are in 2008 Canadian dollars.

Females – Discounted Lifetime Hospital Cost per Patient per Arm in the FEMOR Model

Age	Base Case, $	Exercise Program, $	Home Modification, $	Vitamin D + Calcium, $	Gait-Stabilizing Device, $	Medication Withdrawal, $
65	1,709	1,634	1,618	1,647	1,606	1,622
66	1,760	1,696	1,685	1,705	1,670	1,709
67	1,792	1,739	1,733	1,745	1,717	1,765
68	1,846	1,800	1,797	1,804	1,781	1,830
69	1,887	1,848	1,847	1,850	1,830	1,877
70	1,931	1,898	1,898	1,899	1,882	1,926
71	1,981	1,952	1,954	1,952	1,939	1,978
72	2,039	2,014	2,016	2,013	2,002	2,037
73	2,063	2,043	2,045	2,041	2,032	2,062
74	2,113	2,095	2,098	2,093	2,085	2,112
75	2,148	2,133	2,136	2,131	2,125	2,148
76	2,186	2,173	2,176	2,171	2,166	2,186
77	2,220	2,209	2,212	2,207	2,203	2,220
78	2,233	2,224	2,227	2,222	2,219	2,233
79	2,258	2,250	2,252	2,248	2,245	2,258
80	2,253	2,247	2,249	2,245	2,243	2,253
81	2,256	2,250	2,252	2,249	2,247	2,256
82	2,239	2,235	2,237	2,233	2,232	2,239
83	2,203	2,200	2,201	2,198	2,197	2,203
84	2,159	2,156	2,157	2,155	2,154	2,159
85	2,101	2,099	2,100	2,097	2,097	2,101
86	2,044	2,043	2,043	2,041	2,041	2,044
87	2,005	2,004	2,004	2,003	2,002	2,005
88	1,946	1,945	1,945	1,944	1,944	1,946
89	1,867	1,866	1,867	1,866	1,866	1,867
90	1,788	1,867	1,866	1,866	1,787	1,788
91	1,699	1,699	1,699	1,698	1,698	1,699
92	1,611	1,611	1,611	1,610	1,610	1,611
93	1,521	1,521	1,521	1,521	1,521	1,521
94	1,444	1,443	1,444	1,443	1,443	1,444
95	1,352	1,352	1,352	1,351	1,351	1,352
96	1,304	1,303	1,303	1,303	1,303	1,304
97	1,237	1,237	1,237	1,237	1,237	1,237
98	1,152	1,152	1,152	1,151	1,152	1,152
99	1,078	1,078	1,078	1,078	1,078	1,078
100	1,044	1,044	1,044	1,044	1,044	1,044

Costs are in 2008 Canadian dollars.

Males – Discounted Lifetime Cost per Patient per Arm in the FEMOR Model

Age	Base Case, $	Exercise Program, $	Home Modification, $	Gait-Stabilizing Device, $	Medication Withdrawal, $
65	17,072	16,665	16,655	16,565	17,072
66	17,684	17,350	17,462	17,409	17,684
67	18,332	18,058	18,109	18,187	18,332
68	19,039	18,816	18,886	18,968	19,039
69	19,814	19,631	19,714	19,783	19,814
70	20,729	20,576	20,667	20,719	20,729
71	20,737	20,610	20,707	20,740	20,737
72	20,752	20,649	20,750	20,762	20,752
73	20,815	20,732	20,835	20,829	20,815
74	20,757	20,691	20,795	20,773	20,757
75	20,839	20,786	20,890	20,857	20,839
76	20,970	20,929	21,033	20,989	20,970
77	21,100	21,069	21,172	21,119	21,100
78	21,348	21,325	21,427	21,366	21,348
79	20,702	20,686	20,787	20,720	20,702
80	20,035	20,026	20,124	20,053	20,035
81	19,496	19,491	19,587	19,514	19,496
82	18,872	18,872	18,965	18,890	18,872
83	18,367	18,370	18,459	18,384	18,367
84	17,266	17,272	17,357	17,283	17,266
85	16,214	16,222	16,303	16,231	16,214
86	15,247	15,257	15,334	15,263	15,247
87	14,457	14,467	14,542	14,472	14,457
88	13,584	13,595	13,667	13,599	13,584
89	12,848	12,859	12,929	12,862	12,848
90	12,087	12,098	12,165	12,100	12,087
91	11,202	11,213	11,276	11,215	11,202
92	10,444	10,455	10,515	10,456	10,444
93	9,818	9,830	9,888	9,830	9,818
94	9,180	9,191	9,247	9,192	9,180
95	8,698	8,709	8,762	8,709	8,698
96	7,916	7,926	7,975	7,926	7,916
97	7,104	4,117	4,160	4,117	7,104
98	6,335	6,344	6,388	6,344	6,335
99	6,329	6,338	6,381	6,338	6,329
100	6,452	6,452	6,506	6,461	6,452

Costs are in 2008 Canadian dollars.

Males – Lifetime Falls per Patient per Arm in the FEMOR Model

Age	Base Case	Exercise Program	Home Modification	Gait-Stabilizing Device	Medication Withdrawal
65	0.684	0.652	0.645	0.646	0.684
66	0.669	0.643	0.639	0.648	0.669
67	0.654	0.633	0.630	0.642	0.654
68	0.639	0.622	0.621	0.633	0.639
69	0.624	0.611	0.610	0.621	0.624
70	0.610	0.599	0.599	0.608	0.610
71	0.597	0.588	0.588	0.596	0.597
72	0.583	0.576	0.576	0.583	0.583
73	0.570	0.564	0.565	0.570	0.570
74	0.556	0.551	0.552	0.556	0.556
75	0.544	0.540	0.541	0.544	0.544
76	0.532	0.529	0.530	0.532	0.532
77	0.518	0.516	0.516	0.518	0.518
78	0.504	0.502	0.502	0.504	0.504
79	0.492	0.490	0.491	0.492	0.492
80	0.477	0.476	0.477	0.477	0.477
81	0.463	0.462	0.462	0.463	0.463
82	0.445	0.445	0.445	0.445	0.445
83	0.427	0.427	0.427	0.427	0.427
84	0.408	0.407	0.408	0.408	0.408
85	0.387	0.386	0.387	0.387	0.387
86	0.369	0.369	0.369	0.369	0.369
87	0.356	0.356	0.356	0.356	0.356
88	0.338	0.338	0.338	0.338	0.338
89	0.325	0.325	0.325	0.325	0.325
90	0.311	0.311	0.311	0.311	0.311
91	0.293	0.293	0.293	0.293	0.293
92	0.276	0.276	0.276	0.276	0.276
93	0.269	0.269	0.269	0.269	0.269
94	0.256	0.256	0.256	0.256	0.256
95	0.242	0.242	0.242	0.242	0.242
96	0.224	0.224	0.224	0.224	0.224
97	0.212	0.212	0.212	0.212	0.212
98	0.200	0.200	0.200	0.200	0.200
99	0.194	0.194	0.194	0.194	0.194
100	0.202	0.202	0.202	0.202	0.202

Males – Discounted Life Years per Patient per Arm in the FEMOR Model

Age	Base Case	Exercise Program	Home Modification	Gait-Stabilizing Device	Medication Withdrawal
65	10.764	10.765	10.766	10.766	10.764
66	10.454	10.455	10.455	10.455	10.454
67	10.140	10.141	10.141	10.140	10.140
68	9.823	9.823	9.823	9.823	9.823
69	9.503	9.504	9.504	9.503	9.503
70	9.180	9.181	9.181	9.180	9.180
71	8.855	8.856	8.856	8.855	8.855
72	8.529	8.529	8.529	8.529	8.529
73	8.202	8.203	8.203	8.202	8.202
74	7.877	7.877	7.877	7.877	7.877
75	7.552	7.552	7.552	7.552	7.552
76	7.229	7.229	7.229	7.229	7.229
77	6.909	6.909	6.909	6.909	6.909
78	6.594	6.594	6.594	6.594	6.594
79	6.283	6.283	6.283	6.283	6.283
80	5.977	5.977	5.977	5.977	5.977
81	5.676	5.676	5.676	5.676	5.676
82	5.382	5.382	5.382	5.382	5.382
83	5.097	5.097	5.097	5.097	5.097
84	4.819	4.819	4.819	4.819	4.819
85	4.549	4.549	4.549	4.549	4.549
86	4.288	4.288	4.288	4.288	4.288
87	4.036	4.036	4.036	4.036	4.036
88	3.796	3.796	3.796	3.796	3.796
89	3.573	3.573	3.573	3.573	3.573
90	3.366	3.366	3.366	3.366	3.366
91	3.178	3.178	3.178	3.178	3.178
92	3.019	3.019	3.019	3.019	3.019
93	2.899	2.899	2.899	2.899	2.899
94	2.730	2.730	2.730	2.730	2.730
95	2.576	2.576	2.576	2.576	2.576
96	2.428	2.428	2.428	2.428	2.428
97	2.295	2.295	2.295	2.295	2.295
98	2.176	2.176	2.176	2.176	2.176
99	2.090	2.090	2.090	2.090	2.090
100	2.037	2.037	2.037	2.037	2.037

Males – Discounted Lifetime Long-Term Care Cost per Patient per Arm in the FEMOR Model

Age	Base Case, $	Exercise Program, $	Home Modification, $	Gait-Stabilizing Device, $	Medication Withdrawal, $
65	13,773	13,433	13,357	13,309	13,354
66	14,416	14,135	14,085	14,026	14,182
67	15,095	14,861	14,831	14,767	14,965
68	15,838	15,645	15,629	15,563	15,767
69	16,648	16,486	16,480	16,415	16,608
70	17,589	17,451	17,452	17,388	17,566
71	17,629	17,510	17,515	17,454	17,615
72	17,671	17,572	17,579	17,523	17,663
73	17,766	17,683	17,693	17,641	17,762
74	17,742	17,673	17,683	17,637	17,740
75	17,847	17,788	17,798	17,756	17,845
76	18,006	17,956	17,966	17,928	18,005
77	18,175	18,134	18,143	18,110	18,174
78	18,458	18,424	18,433	18,404	18,458
79	17,843	17,815	17,823	17,798	17,843
80	17,228	17,205	17,213	17,191	17,228
81	16,744	16,725	16,731	16,712	16,743
82	16,187	16,172	16,177	16,162	16,187
83	15,767	15,754	15,759	15,746	15,766
84	14,755	14,746	14,750	14,739	14,755
85	13,797	13,790	13,793	13,784	13,797
86	12,896	12,890	12,893	12,886	12,896
87	12,160	12,156	12,158	12,152	12,160
88	11,378	11,374	11,376	11,371	11,378
89	10,743	10,740	10,742	10,738	10,743
90	10,083	10,081	10,082	10,079	10,083
91	9,278	9,277	9,278	9,275	9,278
92	8,623	8,622	8,623	8,621	8,623
93	8,074	8,073	8,074	8,072	8,074
94	7,495	7,494	7,494	7,493	7,495
95	7,164	7,164	7,164	7,163	7,164
96	6,567	6,567	6,567	6,566	6,567
97	5,888	5,888	5,888	5,888	5,888
98	5,200	5,200	5,200	5,200	5,200
99	5,259	5,259	5,259	5,259	5,259
100	5,188	5,188	5,188	5,188	5,188

Costs are in 2008 Canadian dollars.

Males – Discounted Lifetime Hospital Cost per Patient per Arm in the FEMOR Model

Age	Base Case, $	Exercise Program, $	Home Modification, $	Gait-Stabilizing Device, $	Medication Withdrawal, $
65	1,028	968	955	954	1,028
66	1,044	994	985	1,002	1,044
67	1,060	1,019	1,013	1,036	1,060
68	1,074	1,040	1,037	1,062	1,074
69	1,089	1,061	1,060	1,082	1,089
70	1,110	1,087	1,086	1,106	1,110
71	1,128	1,108	1,109	1,126	1,128
72	1,146	1,130	1,131	1,145	1,146
73	1,164	1,150	1,151	1,163	1,164
74	1,180	1,168	1,170	1,179	1,180
75	1,201	1,191	1,193	1,201	1,201
76	1,222	1,214	1,216	1,222	1,222
77	1,231	1,224	1,226	1,231	1,231
78	1,244	1,238	1,239	1,244	1,244
79	1,261	1,256	1,257	1,261	1,261
80	1,261	1,257	1,258	1,261	1,261
81	1,262	1,259	1,260	1,262	1,262
82	1,251	1,248	1,249	1,251	1,251
83	1,237	1,234	1,235	1,237	1,237
84	1,213	1,211	1,212	1,213	1,213
85	1,188	1,187	1,187	1,188	1,188
86	1,170	1,169	1,170	1,170	1,170
87	1,168	1,167	1,168	1,168	1,168
88	1,141	1,140	1,140	1,141	1,141
89	1,108	1,107	1,108	1,108	1,108
90	1,077	1,076	1,077	1,077	1,077
91	1,042	1,041	1,042	1,042	1,042
92	995	994	994	995	995
93	966	966	966	966	966
94	926	926	926	926	926
95	870	870	870	870	870
96	766	766	766	766	766
97	693	693	693	693	693
98	642	642	642	642	642
99	643	643	643	643	643
100	789	789	789	789	789

Costs are in 2008 Canadian dollars.

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