**Healthy Aging**

What is ‘healthy aging’ and how do we go from being independent to long-term care facilities?

**Prevention of falls and fall-related injuries in community-dwelling seniors: an evidence-based analysis**

**Abstract**

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. AGING IN THE COMMUNITY: Summary of Evidence-Based Analyses Prevention of Falls and Fall-Related Injuries in Community-Dwelling Seniors: An Evidence-Based Analysis Behavioral Interventions for Urinary Incontinence in Community-Dwelling Seniors: An Evidence-Based Analysis Caregiver- and Patient-Directed Interventions for Dementia: An Evidence-Based Analysis Social Isolation in Community-Dwelling Seniors: An Evidence-Based Analysis The Falls/Fractures Economic Model in Ontario Residents Aged 65 Years and Over (FEMOR) OBJECTIVE: To identify interventions that may be effective in reducing the probability of an elderly person's falling and/or sustaining a fall-related injury.

**Background:**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. Of those individuals who fall, 12% to 42% will have a fall-related injury. Several meta-analyses and cohort studies have identified falls and fall-related injuries as a strong predictor of admission to a long-term care (LTC) home. 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. Falls result from the interaction of a variety of risk factors that can be both intrinsic and extrinsic. Intrinsic factors are those that pertain to the physical, demographic, and health status of the individual, while extrinsic factors relate to the physical and socio-economic environment. Intrinsic risk factors can be further grouped into psychosocial/demographic risks, medical risks, risks associated with activity level and dependence, and medication risks. Commonly described extrinsic risks are tripping hazards, balance and slip hazards, and vision hazards. NOTE: It is recognized that the terms "senior" and "elderly" carry a range of meanings for different audiences; this report generally uses the former, but the terms are treated here as essentially interchangeable. EVIDENCE-BASED ANALYSIS OF EFFECTIVENESS:

*What was the question researchers asked and what did they find?*

**Research question:**Since many risk factors for falls are modifiable, what interventions (devices, systems, programs) exist that reduce the risk of falls and/or fall-related injuries for community-dwelling seniors?

**Summary of findings:**The following 11 interventions were identified in the literature search: exercise programs, vision assessment and referral, cataract surgery, environmental modifications, vitamin D supplementation, vitamin D plus calcium supplementation, hormone replacement therapy (HRT), medication withdrawal, gait-stabilizing devices, hip protectors, and multifactorial interventions. **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 one 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. Executive Summary Table 1: Summary of Meta-Analyses of Studies Investigating the Effectiveness of Interventions on the Risk of Falls in Community-Dwelling Seniors(\*) InterventionRR [95% CI]GRADE Exercise programs 1. Targeted programs General population0.81 [0.67-0.98] Low High-risk population0.93 [0.82-1.06 ]High Short duration0.91 [0.73-1.13]High Long duration0.89 [0.79-1.01]Moderate 2. Untargeted programs General population0.78 [0.66-0.91] Moderate High-risk population0.89 [0.72-1.10] Very low Short duration0.85 [0.71-1.01] Low Long duration0.76 [0.64-0.91] Moderate 3. Combined targeted vs. untargeted programs General populationN/AN/A High-risk population0.87 [0.57-1.34]Moderate Short duration1.11 [0.73-1.70]High Long duration0.73 [0.57-0.95]High Vision intervention Assessment/referral1.12 [0.82-1.53]Moderate Cataract surgery1.11 [0.92-1.35]Moderate Environmental modifications Low-risk population1.03 [0.75-1.41]High High-risk population0.66 [0.54-0.81]High General population0.85 [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 therapy0.98 [0.80-1.20]Low Medication withdrawal0.34 [0.16-0.74]†LowGait-stabilizing device0.43 [0.29-0.64]ModerateMultifactorial intervention Geriatric screening (general population)0.87 [0.69-1.10]Very low High-risk population0.86 [0.75-0.98]Low\*CI refers to confidence interval; RR, relative risk.†Hazard ratio is reported, because RR was not available.Executive Summary Table 2:Summary of Meta-Analyses of Studies Investigating the Effectiveness of Interventions on the Risk of Fall-Related Injuries in Community-Dwelling Seniors\*InterventionRR [95% CI]GRADEExercise programs Targeted programs0.67 [0.51-0.89]Moderate Untargeted programs0.57 [0.38-0.86]Low Combined targeted vs untargeted programs0.31 [0.13-0.74]HighDrugs/nutritional supplements Vitamin D plus calcium (women only)0.77 [0.49-1.21]ModerateGait-stabilizing device0.10 [0.01-0.74]ModerateHip protectors3.49 [0.68-17.97]†LowMultifactorial intervention Geriatric screening (general population)0.90 [0.53-1.51]Low High-risk population0.86 [0.66-1.11]Moderate\*CI refers to confidence interval; RR, relative risk.†Odds ratio is reported, because RR was not available.

The results are in, and you’re not going to be too surprised by what they reveal!

**Conclusions:**High-quality evidence indicates that long-term exercise programs in mobile seniors and environmental modifications in the homes of frail elderly persons will effectively reduce falls and possibly fall-related injuries in Ontario's elderly population.A combination of vitamin D and calcium supplementation in elderly women will help reduce the risk of falls by more than 40%.The use of outdoor gait-stabilizing devices for mobile seniors during the winter in Ontario may reduce falls and fall-related injuries; however, evidence is limited and more research is required in this area.While psychotropic medication withdrawal may be an effective method for reducing falls, evidence is limited and long-term compliance has been demonstrated to be difficult to achieve.Multifactorial interventions in high-risk populations may be effective; however, the effect is only marginally significant, and the quality of evidence is low.

How much exercise do you need every week? About 30 minutes/day can have huge impacts on the brain. Cardiovascular exercise is best and cardio depends on the age and the person.

Exercise has amazing impacts on the brain.

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