Aging in the Community

Summary of Evidence-Based Analyses

October 2008

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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.

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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.

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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.
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**Abbreviations**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADL</td>
<td>Activities of daily living</td>
</tr>
<tr>
<td>CCAC</td>
<td>Community Care Access Centre</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence interval</td>
</tr>
<tr>
<td>HR</td>
<td>Hazard ratio</td>
</tr>
<tr>
<td>HRT</td>
<td>Hormone replacement therapy</td>
</tr>
<tr>
<td>IADL</td>
<td>Instrumental activities of daily living</td>
</tr>
<tr>
<td>LTC</td>
<td>Long-term care</td>
</tr>
<tr>
<td>NCA</td>
<td>Nurse continence advisor</td>
</tr>
<tr>
<td>OR</td>
<td>Odds ratio</td>
</tr>
<tr>
<td>PFMT</td>
<td>Pelvic floor muscle training</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomized controlled trial</td>
</tr>
<tr>
<td>RR</td>
<td>Relative risk</td>
</tr>
<tr>
<td>UI</td>
<td>Urinary incontinence</td>
</tr>
</tbody>
</table>
Objective

To identify interventions (e.g., devices and programs) that are effective at enabling seniors to live healthily and independently in the community.

Clinical Need: Target Population and Condition

Between 1981 and 2005, the proportion of elderly persons (aged 65+) in Ontario grew from 9.9% to 12.8%, and by 2031, more than 1 in 5 people in Ontario are expected to be over the age of 65. (1) Due to the longer life expectancy of women, the majority of seniors in Ontario are women. (1;2) This trend increases with age, with women accounting for over 75% of seniors aged 90 or older in 2006. (1) Dwelling type and whether or not an elderly person lives alone can have a large impact on his or her ability to remain living independently in the community. Although the majority of seniors in Canada (70.1%) live in an urban area with a population of 50,000 or more, 22.6% live in rural settings that often have less access to community-based services for the elderly. (2) In Ontario, 9% of seniors live in rural
Several sociodemographic factors can lead to the decision for a senior to move to a long-term care (LTC) home, including intrinsic characteristics such as gender, age, or medical conditions. Furthermore, increased caregiver burden and a lack of social support and community-based services further increase the probability that a senior living in the community will move to a LTC home. As a result, it is important to consider both medical and social determinants of LTC home admission, as well as the impact of informal and formal caregivers on the decision-making process.

The following is a summary of evidence-based analyses of the literature surrounding 4 areas associated with LTC home admission and healthy aging in the community.

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.

Project Scope

Research Questions

- What are the main modifiable predictors of admission to an LTC home in Ontario?
- What interventions (e.g., devices and program) are effective at targeting these predictors, and thus potentially delaying the transition from community-based living to LTC home admission?

Search Strategy

A preliminary literature search in OVID Medline was conducted to identify studies investigating common predictors of LTC home admission (Appendix 1).

Inclusion Criteria

- English-language;
- published between January 1950 and October 2007;
- population: seniors (aged 65+); and
- related to patient admission or institutionalization.

Abstracts were reviewed, and studies meeting the inclusion criteria outlined above were obtained. Significant predictors of LTC home admission were identified and compared across all studies.

Predictors of Long-Term Care Home Admission

Ten studies were identified that investigated general predictors of LTC home admission. These studies described several population characteristics that are significantly associated with LTC home admission. (3;5-13) Table 1 summarizes the most commonly identified factors in these 10 studies.
Table 1: Predictors Associated With Increased Odds of Admission to a Long-Term Care Home

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Banaszak-Holl et al. (8)</th>
<th>Bharucha et al. (9)</th>
<th>Coughlin et al. (10)</th>
<th>Gaugler et al. (3)</th>
<th>Jette et al. (11)</th>
<th>Lachs et al. (12)</th>
<th>Mustard et al. (5)</th>
<th>Oura et al. (7)</th>
<th>Rockwood et al. (6)</th>
<th>Trottier et al. (13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Y</td>
<td>Y</td>
<td>–</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N†</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Gender (male)</td>
<td>Y</td>
<td>N</td>
<td>–</td>
<td>N†</td>
<td>N†</td>
<td>Y</td>
<td>Y†</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Not married</td>
<td>Y</td>
<td>N</td>
<td>–</td>
<td>Y</td>
<td>–</td>
<td>Y</td>
<td>N†</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Lives alone</td>
<td>–</td>
<td>N</td>
<td>N†</td>
<td>Y</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>Y</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>ADL dependency</td>
<td>Y</td>
<td>–</td>
<td>N†</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>–</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Dementia</td>
<td>Y</td>
<td>Y</td>
<td>N†</td>
<td>Y</td>
<td>Y</td>
<td>–</td>
<td>–</td>
<td>N†</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>No available informal caregiver</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>Y‡</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>N†</td>
<td>Y</td>
<td>–</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Y§</td>
<td>–</td>
<td>–</td>
<td>Y</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>Y</td>
<td>–</td>
</tr>
<tr>
<td>Falls</td>
<td>Y§</td>
<td>–</td>
<td>–</td>
<td>Y</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Urinary incontinence</td>
<td>Y§</td>
<td>–</td>
<td>–</td>
<td>N†</td>
<td>–</td>
<td>N†</td>
<td>–</td>
<td>N†</td>
<td>Y</td>
<td>–</td>
</tr>
</tbody>
</table>

* – refers to predictor not reported; ADL, activities of daily living; N, no association; Y, a statistically significant association.
† Positive effect, but not statistically significant
‡ Opposite effect
§ After adjusting for activities of daily living and instrumental activities of daily living, no longer significant

Furthermore, a study was published by Tinetti and Williams in 1997 (14) that investigated the effects of falls and fall-related injuries on LTC home admission. This study found that after controlling for demographic, psychosocial, cognitive, health-related and functional characteristics, the hazard of being admitted to a LTC home was more than 3 times higher after a fall without serious injury and more than 10 times higher after a fall with serious injury. (14)

Similarly, several large cohort studies have examined the association between urinary incontinence (UI) and admission to a LTC home. (15-17) These studies found that, overall, UI is a significant predictor of LTC home admission, even after adjusting for age, dementia, cardiovascular disease and renal disease. (16)

Based on the above results, as well as through consultation with experts in the area, 4 key predictors were identified for further research in this area. These were:

1. falls and fall-related injuries,
2. urinary incontinence,
3. dementia, and
4. social isolation.

**Summary of Analyses**

**Assessment of Quality of Evidence**

In all analyses, the quality of the evidence was assessed as high, moderate, low or very low according to the GRADE methodology and GRADE Working Group (Appendix 2). (18) 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.
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.

## Budget Impact Analysis

The analyses for each of the 4 key predictors of LTC home admission are summarized below. See Tables 2 and 3 for a summary of effective interventions and the budget impact analysis.

### Table 2: Summary of Characteristics of Effective Exercise Interventions and Budget Impact Analysis Per 100,000 Population

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Target Population* (Ontario)</th>
<th>Risk Estimate</th>
<th>Staffing Requirement</th>
<th>GRADE Quality of Evidence</th>
<th>Cost Impact per 100,000 Population $ million (Cdn)†</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Falls &amp; Fall-Related Injuries:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Exercise Programs:</td>
<td>N = 476,992</td>
<td>RR, 0.76; 95% CI, 0.64–0.91</td>
<td>PT</td>
<td>Moderate</td>
<td>1.5</td>
</tr>
<tr>
<td>Untargeted, long duration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Urinary Incontinence:</strong></td>
<td>Seniors with UI</td>
<td>No. incontinent episodes/wk:</td>
<td>PT</td>
<td>Moderate</td>
<td>2.1</td>
</tr>
<tr>
<td>Patient directed behavioural techniques (PFMT only) (home and clinic)</td>
<td>N = 196,011</td>
<td>WMD, 10.50; 95% CI, 4.30–16.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dementia:</strong></td>
<td>Seniors with mild/moderate dementia</td>
<td>Effect size, 0.62; 95% CI, 0.55–0.70</td>
<td>OT, PT, PSW or RT</td>
<td>Moderate</td>
<td>OT: 8.8, PT: 8.0, PSW: 2.2, RT: 1.9</td>
</tr>
<tr>
<td>Patient directed exercise program (in home visit)</td>
<td>N = 38,696</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Social Isolation:</strong></td>
<td>Community exercise and education programs</td>
<td>Mean loneliness score change, 0.3 (P &lt; .01) Activity change score, 2.0 (P &lt; .01)</td>
<td>RT, OT or PT</td>
<td>Moderate</td>
<td>RT: 2.1, OT: 2.4, PT: 1.5</td>
</tr>
</tbody>
</table>

*CI refers to confidence interval; GP, general practitioner; N, number; NCA, nurse continence advisor; OT, occupational therapist; PFMT, pelvic floor muscle training; PSW, personal support worker; PT, physiotherapist; RR, relative risk; RT, recreational therapist; UI, urinary incontinence; WMD, weighted mean difference.

†The budget impact analyses were calculated for the first year after introducing the interventions from the Ministry of Health and Long-Term Care perspective using prevalence data only. Incidence and mortality rates were not factored in. Numbers may change based on population trends, rate of intervention uptake, trends in current programs in place in the Province, and assumptions on costs. Impacted numbers refer to patients likely to access these interventions in Ontario based on assumptions from the literature. These numbers are not comparable between domains as the assumptions come from heterogeneous different trials with different patient populations and different resource utilization. Resource consumption was confirmed by expert panel.
<table>
<thead>
<tr>
<th>Intervention</th>
<th>Target Population (Ontario)</th>
<th>Risk Estimate</th>
<th>Staffing Requirement</th>
<th>GRADE Quality of Evidence</th>
<th>Cost Impact per 100,000 Population $ million (Cdn) †</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falls &amp; Fall-Related Injuries:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Modifications (high-risk seniors)</td>
<td>High-risk seniors N = 271,980</td>
<td>RR, 0.66; 95% CI, 0.54–0.81</td>
<td>OT</td>
<td>High</td>
<td>4.7</td>
</tr>
<tr>
<td>Falls &amp; Fall-Related Injuries:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin D + Calcium Supplementation</td>
<td>Women at risk for osteopenia N = 477,662</td>
<td>RR, 0.83; 95% CI, 0.73–0.95</td>
<td>None</td>
<td>Moderate</td>
<td>0.7</td>
</tr>
<tr>
<td>Urinary Incontinence:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient directed multicomponent</td>
<td>Mobile, motivated seniors with UI N = 196,011</td>
<td>No. incontinent episodes/wk: WMD, 3.63; 95% CI, 2.07–5.19</td>
<td>NCA</td>
<td>Moderate</td>
<td>1.5</td>
</tr>
<tr>
<td>Dementia:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caregiver-directed behavioural</td>
<td>Caregivers of seniors with dementia N = 56,629</td>
<td>Not estimable</td>
<td>OT or Nurse</td>
<td>Moderate</td>
<td>OT: 4.8</td>
</tr>
<tr>
<td>Dementia:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Nurse: 3.3</td>
</tr>
<tr>
<td>Caregiver- and patient-directed</td>
<td>Seniors with dementia and their caregivers N = 56,629</td>
<td>Caregiver burden: NNT, 2.5; 95% CI, 2.3–2.7</td>
<td>OT or nurse</td>
<td>Moderate</td>
<td>OT: 4.0</td>
</tr>
<tr>
<td>Patient (motor/ process skills):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Nurse: 2.8</td>
</tr>
<tr>
<td>Patient (deterioration in ADLs):</td>
<td></td>
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</tbody>
</table>

*ADL refers to activities of daily living; CI, confidence interval; GP, general practitioner; N, number; NCA, nurse continence advisor; NNT, number needed to treat; OT, occupational therapist; PT, physiotherapist; PSW, personal support worker; RR, relative risk; RT, recreational therapist.

†The budget impact analyses were calculated for the first year after introducing the interventions from the Ministry of Health and Long-Term Care perspective using prevalence data only. Incidence and mortality rates were not factored in. Numbers may change based on population trends, rate of intervention uptake, trends in current programs in place in the Province, and assumptions on costs. Impacted numbers refer to patients likely to access these interventions in Ontario based on assumptions from the literature. These numbers are not comparable between domains as the assumptions come from heterogeneous different trials with different patient populations and different resource utilization. Resource consumption was confirmed by expert panel.
1. Falls and Fall-Related Injuries

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.

Clinical Need: Target Population and Condition

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.

Evidence-Based Analysis Methods

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?

Inclusion and Exclusion Criteria

Inclusion Criteria

- English Language;
- published between January 2000 and September 2007;
- population of community-dwelling seniors (majority aged 65+);
- randomized controlled trials (RCTs), quasi-experimental trials, systematic reviews, or meta-analyses

Exclusion Criteria:

- Special populations (e.g., stroke or osteoporosis);
- studies only reporting surrogate outcomes;
- studies where outcome cannot be extracted for meta-analysis
Outcomes of Interest

Number of fallers and number of falls resulting in injury/fracture

Search Strategy

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 (INAIHTA) for studies published between January 2000 and September 2007. Furthermore, all studies included in a 2003 Cochrane review were considered for inclusion in this analysis. Abstracts were reviewed by a single author, and studies meeting the inclusion criteria outlined above were obtained. Studies were grouped based on intervention type, and data on population characteristics, fall outcomes, and study design were extracted. Reference lists were also checked for relevant studies. The quality of the evidence was assessed as high, moderate, low, or very low according to the GRADE methodology.

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.
Table 4: Summary of Meta-Analyses of Studies Investigating the Effectiveness of Interventions on the Risk of Falls in Community-Dwelling Seniors*

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

*CI refers to confidence interval; RR, relative risk.
†Hazard ratio is reported, because RR was not available.

Table 5: Summary of Meta-Analyses of Studies Investigating the Effectiveness of Interventions on the Risk of Fall-Related Injuries in Community-Dwelling Seniors*

<table>
<thead>
<tr>
<th>Intervention</th>
<th>RR [95% CI]</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise programs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Targeted programs</td>
<td>0.67 [0.51–0.89]</td>
<td>Moderate</td>
</tr>
<tr>
<td>Untargeted programs</td>
<td>0.57 [0.38–0.86]</td>
<td>Low</td>
</tr>
<tr>
<td>Combined targeted vs untargeted programs</td>
<td>0.31 [0.13–0.74]</td>
<td>High</td>
</tr>
<tr>
<td>Drugs/nutritional supplements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin D plus calcium (women only)</td>
<td>0.77 [0.49–1.21]</td>
<td>Moderate</td>
</tr>
<tr>
<td>Gait-stabilizing device</td>
<td>0.10 [0.01–0.74]</td>
<td>Moderate</td>
</tr>
<tr>
<td>Hip protectors</td>
<td>3.49 [0.68–17.97]†</td>
<td>Low</td>
</tr>
<tr>
<td>Multifactorial intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geriatric screening (general population)</td>
<td>0.90 [0.53–1.51]</td>
<td>Low</td>
</tr>
<tr>
<td>High-risk population</td>
<td>0.86 [0.66–1.11]</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

*CI refers to confidence interval; RR, relative risk.
†Odds ratio is reported, because RR was not available.
2. Urinary Incontinence

Objective

To assess the effectiveness of behavioural interventions for the treatment and management of urinary incontinence (UI) in community-dwelling seniors.

Clinical Need: Target Population and Condition

Urinary incontinence defined as “the complaint of any involuntary leakage of urine” was identified as 1 of the key predictors in a senior’s transition from independent community living to admission to a long-term care (LTC) home. Urinary incontinence is a health problem that affects a substantial proportion of Ontario’s community-dwelling seniors (and indirectly affects caregivers), impacting their health, functioning, well-being and quality of life. Based on Canadian studies, prevalence estimates range from 9% to 30% for senior men and nearly double from 19% to 55% for senior women. The direct and indirect costs associated with UI are substantial. It is estimated that the total annual costs in Canada are $1.5 billion (Cdn), and that each year a senior living at home will spend $1,000 to $1,500 on incontinence supplies.

Interventions to treat and manage UI can be classified into broad categories which include lifestyle modification, behavioural techniques, medications, devices (e.g., continence pessaries), surgical interventions and adjunctive measures (e.g., absorbent products).

The focus of this review is behavioural interventions, since they are commonly the first line of treatment considered in seniors given that they are the least invasive options with no reported side effects, do not limit future treatment options, and can be applied in combination with other therapies. In addition, many seniors would not be ideal candidates for other types of interventions involving more risk, such as surgical measures.

Description of Technology/Therapy

Behavioural interventions can be divided into 2 categories according to the target population: caregiver-dependent techniques and patient-directed techniques. Caregiver-dependent techniques (also known as toileting assistance) are targeted at medically complex, frail individuals living at home with the assistance of a caregiver, who tends to be a family member. These seniors may also have cognitive deficits and/or motor deficits. A health care professional trains the senior’s caregiver to deliver an intervention such as prompted voiding, habit retraining, or timed voiding. The health care professional who trains the caregiver is commonly a nurse or a nurse with advanced training in the management of UI, such as a nurse continence advisor (NCA) or a clinical nurse specialist (CNS).

The second category of behavioural interventions consists of patient-directed techniques targeted towards mobile, motivated seniors. Seniors in this population are cognitively able, free from any major physical deficits, and motivated to regain and/or improve their continence. A nurse or a nurse with advanced training in UI management, such as an NCA or CNS, delivers the patient-directed techniques. These are often provided as multicomponent interventions including a combination of bladder training techniques, pelvic floor muscle training (PFMT), education on bladder control strategies, and self-monitoring. Pelvic floor muscle training, defined as a program of repeated pelvic floor muscle contractions taught and
supervised by a health care professional, may be employed as part of a multicomponent intervention or in isolation.

Education is a large component of both caregiver-dependent and patient-directed behavioural interventions, and patient and/or caregiver involvement as well as continued practice strongly affect the success of treatment. Incontinence products, which include a large variety of pads and devices for effective containment of urine, may be used in conjunction with behavioural techniques at any point in the patient’s management.

**Evidence-Based Analysis Methods**

A comprehensive search strategy was used to identify systematic reviews and randomized controlled trials that examined the effectiveness, safety, and cost-effectiveness of caregiver-dependent and patient-directed behavioural interventions for the treatment of UI in community-dwelling seniors (see Appendix 1).

**Research Questions**

1. Are caregiver-dependent behavioural interventions effective in improving UI in medically complex, frail community-dwelling seniors with/without cognitive deficits and/or motor deficits?
2. Are patient-directed behavioural interventions effective in improving UI in mobile, motivated community-dwelling seniors?
3. Are behavioural interventions delivered by NCAs or CNSs in a clinic setting effective in improving incontinence outcomes in community-dwelling seniors?

**Summary of Findings**

Table 6 summarizes the results of the analysis.

The available evidence was limited by considerable variation in study populations and in the type and severity of UI for studies examining both caregiver-directed and patient-directed interventions. The UI literature frequently is limited to reporting subjective outcome measures such as patient observations and symptoms. The primary outcome of interest, admission to a LTC home, was not reported in the UI literature. The number of eligible studies was low, and there were limited data on long-term follow-up.
Table 6: Summary of Evidence on Behavioural Interventions for the Treatment of Urinary Incontinence in Community-Dwelling Seniors

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Target Population</th>
<th>Interventions</th>
<th>Conclusions</th>
<th>GRADE quality of the evidence</th>
</tr>
</thead>
</table>
| 1. Caregiver-dependent techniques (toileting assistance) | Medically complex, frail individuals at home with/without cognitive deficits and/or motor deficits | - Prompted voiding  
- Habit retraining  
- Timed voiding | There is no evidence of effectiveness for habit retraining (n=1 study) and timed voiding (n=1 study). Prompted voiding may be effective, but effectiveness is difficult to substantiate because of an inadequately powered study (n=1 study). Resource implications and caregiver burden (usually on an informal caregiver) should be considered. | Low |
| 2. Patient-directed techniques                     | Mobile, motivated seniors                                                       | Multicomponent behavioural interventions  
- Include a combination of  
  - Bladder training  
  - PFMT (with or without biofeedback)  
  - Bladder control strategies  
  - Education  
  - Self-monitoring | Significant reduction in the mean number of incontinent episodes per week (n=5 studies, WMD 3.63, 95% CI, 2.07–5.19)  
Significant improvement in patient’s perception of UI (n=3 studies, OR 4.15, 95% CI, 2.70–6.37)  
Suggestive beneficial impact on patient’s health-related quality of life | Moderate |
| 3. Behavioural interventions led by an NCA/CNS in a clinic setting | Community-dwelling seniors                                                      | Behavioural interventions led by NCA/CNS  
- PFMT alone | Significant reduction in the mean number of incontinent episodes per week (n=1 study, WMD 10.50, 95% CI, 4.30–16.70) | Moderate |

*CI refers to confidence interval; CNS, clinical nurse specialist; NCA, nurse continence advisor; PFMT, pelvic floor muscle training; RCT, randomized controlled trial; WMD, weighted mean difference; UI, urinary incontinence.
3A. Dementia: Caregiver-Directed Interventions

Objective

To identify interventions that may be effective in supporting the well-being of unpaid caregivers of seniors with dementia living in the community.

Clinical Need: Target Population and Condition

Dementia is a progressive and largely irreversible syndrome that is characterized by a loss of cognitive function severe enough to impact social or occupational functioning. The components of cognitive function affected include memory and learning, attention, concentration and orientation, problem-solving, calculation, language, and geographic orientation. Dementia was identified as one of the key predictors in a senior’s transition from independent community living to admission to a long-term care (LTC) home, in that approximately 90% of individuals diagnosed with dementia will be institutionalized before death. In addition, cognitive decline linked to dementia is one of the most commonly cited reasons for institutionalization.

Prevalence estimates of dementia in the Ontario population have largely been extrapolated from the Canadian Study of Health and Aging conducted in 1991. Based on these estimates, it is projected that there will be approximately 165,000 dementia cases in Ontario in the year 2008, and by 2010 the number of cases will increase by nearly 17% over 2005 levels. By 2020 the number of cases is expected to increase by nearly 55%, due to a rise in the number of people in the age categories with the highest prevalence (85+). With the increase in the aging population, dementia will continue to have a significant economic impact on the Canadian health care system. In 1991, the total costs associated with dementia in Canada were $3.9 billion (Cdn) with $2.18 billion coming from LTC.

Caregivers play a crucial role in the management of individuals with dementia because of the high level of dependency and morbidity associated with the condition. It has been documented that a greater demand is faced by dementia caregivers compared with caregivers of persons with other chronic diseases. The increased burden of caregiving contributes to a host of chronic health problems seen among many informal caregivers of persons with dementia. Much of this burden results from managing the behavioural and psychological symptoms of dementia (BPSD), which have been established as a predictor of institutionalization for elderly patients with dementia.

It is recognized that for some patients with dementia, an LTC facility can provide the most appropriate care; however, many patients move into LTC unnecessarily. For individuals with dementia to remain in the community longer, caregivers require many types of formal and informal support services to alleviate the stress of caregiving. These include both respite care and psychosocial interventions. Psychosocial interventions encompass a broad range of interventions such as psychoeducational interventions, counseling, supportive therapy, and behavioural interventions.

Assuming that 50% of persons with dementia live in the community, a conservative estimate of the number of informal caregivers in Ontario is 82,500. Accounting for the fact that 29% of people with dementia live alone, this leaves a remaining estimate of 58,575 Ontarians providing care for a person with dementia with whom they reside.
Description of Interventions

The 2 main categories of caregiver-directed interventions examined in this review are respite care and psychosocial interventions. Respite care is defined as a break or relief for the caregiver. In most cases, respite is provided in the home, through day programs, or at institutions (usually 30 days or less). Depending on a caregiver’s needs, respite services will vary in delivery and duration. Respite care is carried out by a variety of individuals, including paid staff, volunteers, family, or friends.

Psychosocial interventions encompass a broad range of interventions and have been classified in various ways in the literature. This review will examine educational, behavioural, dementia-specific, supportive, and coping interventions. The analysis focuses on behavioural interventions, that is, those designed to help the caregiver manage BPSD. As described earlier, BPSD are one of the most challenging aspects of caring for a senior with dementia, causing an increase in caregiver burden. The analysis also examines multicomponent interventions, which include at least 2 of the above-mentioned interventions.

Methods of Evidence-Based Analysis

A comprehensive search strategy was used to identify systematic reviews and randomized controlled trials (RCTs) that examined the effectiveness of interventions for caregivers of dementia patients.

Research Questions

- Are respite care services effective in supporting the well-being of unpaid caregivers of seniors with dementia in the community?
- Do respite care services impact on rates of institutionalization of these seniors?
- Which psychosocial interventions are effective in supporting the well-being of unpaid caregivers of seniors with dementia in the community?
- Which interventions reduce the risk for institutionalization of seniors with dementia?

Outcomes of Interest

- any quantitative measure of caregiver psychological health, including caregiver burden, depression, quality of life, well-being, strain, mastery (taking control of one’s situation), reactivity to behaviour problems, etc.;
- rate of institutionalization; and
- cost-effectiveness.

Summary of Findings

Conclusions in Table 7 are drawn from Sections 2.1 and 2.2 of the report Caregiver- and Patient-Directed Interventions for Dementia in this series.
Table 7: Summary of Conclusions on Caregiver-Directed Interventions for Dementia

<table>
<thead>
<tr>
<th>Section</th>
<th>Intervention</th>
<th>Conclusion</th>
</tr>
</thead>
</table>
| 2.1     | Respite care for dementia caregivers | Assessing the efficacy of respite care services using standard evidence-based approaches is difficult.  
- There is limited evidence from RCTs that respite care is effective in improving outcomes for those caring for seniors with dementia.  
- There is considerable qualitative evidence of the perceived benefits of respite care.  
- Respite care is known as one of the key formal support services for alleviating caregiver burden in those caring for dementia patients.  
- Respite care services need to be tailored to individual caregiver needs as there are vast differences among caregivers and patients with dementia (severity, type of dementia, amount of informal/formal support available, housing situation, etc.) |
| 2.2a    | Behavioural interventions (individual ≥ 6 sessions) | There is moderate- to high-quality evidence that individual behavioural interventions (≥ 6 sessions), directed towards the caregiver (or combined with the patient) are effective in improving psychological health in dementia caregivers. |
| 2.2b    | Multicomponent interventions | There is moderate- to high-quality evidence that multicomponent interventions improve caregiver psychosocial health and may affect rates of institutionalization of dementia patients. |

RCT indicates randomized controlled trial.

3B. Dementia: Patient-Directed Interventions

Clinical Need: Target Population and Condition

Secondary Prevention

Exercise

Physical deterioration is linked to dementia. This is thought to be due to reduced muscle mass leading to decreased activity levels and muscle atrophy, increasing the potential for unsafe mobility while performing basic ADLs such as eating, bathing, toileting, and functional ability.

Improved physical conditioning for seniors with dementia may extend their independent mobility and maintain performance of ADL.

Nonpharmacologic and Nonexercise Interventions

Cognitive impairments, including memory problems, are a defining feature of dementia. These impairments can lead to anxiety, depression, and withdrawal from activities. The impact of these cognitive problems on daily activities increases pressure on caregivers.

Cognitive interventions aim to improve these impairments in people with mild to moderate dementia.

1 Secondary prevention covers all activities to take care of early symptoms of a disease and to preclude the development of possible irreparable medical conditions.
Primary Prevention

Exercise

Various vascular risk factors have been found to contribute to the development of dementia (e.g., hypertension, hypercholesterolemia, diabetes, overweight).

Physical exercise is important in promoting overall and vascular health. However, it is unclear whether physical exercise can decrease the risk of cognitive decline/dementia.

Nonpharmacologic and Nonexercise Interventions

Having more years of education (i.e., a higher cognitive reserve) is associated with a lower prevalence of dementia in cross-sectional population-based studies and a lower incidence of dementia in cohorts followed longitudinally. However, it is unclear whether cognitive training can increase cognitive reserve or decrease the risk of cognitive impairment, prevent or delay deterioration in the performance of ADLs or IADLs or reduce the incidence of dementia.

Description of Interventions

Physical exercise and nonpharmacologic/nonexercise interventions (e.g., cognitive training) for the primary and secondary prevention of dementia are assessed in this review.

Methods of Evidence-Based Analysis

A comprehensive search strategy was used to identify systematic reviews and RCTs that examined the effectiveness, safety and cost effectiveness of exercise and cognitive interventions for the primary and secondary prevention of dementia.

Research Questions

- What is the effectiveness of physical exercise for the improvement or maintenance of ADLs in seniors with mild to moderate dementia?
- What is the effectiveness of nonpharmacologic/nonexercise interventions to improve cognitive functioning in seniors with mild to moderate dementia?
- Can exercise decrease the risk of subsequent cognitive decline/dementia?
- Does cognitive training decrease the risk of cognitive impairment, prevent or delay deterioration in the performance of ADLs or IADLs, or reduce the incidence of dementia in seniors with good cognitive and physical functioning?

Summary of Findings

Table 8 summarizes the conclusions from Sections 3.1 through 3.4 of the report on dementia.

---

2 Primary prevention covers all activities designed to preclude the development of a disease.
Table 8: Summary of Conclusions on Patient-Directed Interventions for Dementia*

<table>
<thead>
<tr>
<th>Section</th>
<th>Intervention</th>
<th>1° or 2° Prevention</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Physical exercise for seniors with dementia</td>
<td>2° Prevention</td>
<td>Physical exercise is effective for improving physical functioning in patients with dementia.</td>
</tr>
</tbody>
</table>
| 3.2     | Nonpharmacologic and nonexercise interventions to improve cognitive functioning in seniors with dementia | 2° Prevention | - Previous systematic review indicated that “cognitive training” is not effective in patients with dementia.  
- A recent RCT suggests that CST (up to 7 weeks) is effective for improving cognitive function and quality of life in patients with dementia. |
| 3.3     | Physical exercise for delaying onset of dementia | 1° Prevention | Long-term outcomes  
- Regular leisure time physical activity in midlife is associated with a reduced risk of dementia in later life (mean follow-up 21 years).  
Short-term outcomes  
- Regular physical activity in seniors is associated with a reduced risk of cognitive decline (mean follow-up 2 years).  
- Regular physical activity in seniors is associated with a reduced risk of dementia (mean follow-up 6–7 years). |
| 3.4     | Nonpharmacologic and nonexercise interventions for delaying onset of dementia | 1° Prevention | For seniors with good cognitive and physical functioning:  
- Evidence that cognitive training for specific functions (memory, reasoning, and speed of processing) produces improvements in these specific domains.  
- Limited inconclusive evidence that cognitive training can offset deterioration in the performance of self-reported IADL scores and performance assessments. |

*1° indicates primary; 2°, secondary; CST, cognitive stimulation therapy; IADL, instrumental activities of daily living; RCT, randomized controlled trial.

Benefit/Risk Analysis

As per the GRADE Working Group, the overall recommendations consider 4 main factors:
- the trade-offs, taking into account the estimated size of the effect for the main outcome, the confidence limits around those estimates, and the relative value placed on the outcome;
- the quality of the evidence;
- translation of the evidence into practice in a specific setting, taking into consideration important factors that could be expected to modify the size of the expected effects such as proximity to a hospital or availability of necessary expertise; and
- uncertainty about the baseline risk for the population of interest.

The GRADE Working Group also recommends that incremental costs of health care alternatives should be considered explicitly alongside the expected health benefits and harms. Recommendations rely on judgments about the value of the incremental health benefits in relation to the incremental costs. The last column in Table 9 reflects the overall trade-off between benefits and harms (adverse events) and incorporates any risk/uncertainty (cost-effectiveness).
Table 9: Overall Summary Statement of the Benefit and Risk for Patient-Directed Interventions for Dementia*

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Quality</th>
<th>Benefits</th>
<th>Risks/Burden</th>
<th>Overall Strength of Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Section 3.1: Physical Exercise for Seniors with Dementia – Secondary Prevention</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise – mix</td>
<td>Moderate</td>
<td>Improvement in functional, cognitive and behavioural outcomes</td>
<td>Short-term follow-up and heterogeneity in studies</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unclear if leads to delayed institutionalization</td>
<td></td>
</tr>
<tr>
<td><strong>Section 3.2. Nonpharmacologic &amp; Nonexercise Interventions to Improve Cognitive Functioning in Seniors with Dementia – Secondary Prevention</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive training</td>
<td>Very low</td>
<td>None</td>
<td>Intervention does not offer significant benefit (possible type 2 error)</td>
<td>Very low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unclear if leads to delayed institutionalization</td>
<td></td>
</tr>
<tr>
<td>Cognitive stimulation therapy (CST)</td>
<td>Moderate/Low</td>
<td>Increased cognition and quality of life</td>
<td>Unclear how CST compares with past terminologies and methodologies.</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Short-term results. Role and extent of maintenance CST.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unclear how CST may impact functional dependence.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unclear if leads to delayed institutionalization.</td>
<td></td>
</tr>
<tr>
<td><strong>Section 3.3. Physical Exercise for Delaying the Onset of Dementia – Primary Prevention</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise – walking only</td>
<td>High/Moderate</td>
<td>Short-term decreased incidence of dementia</td>
<td>Unknown if leads to delayed institutionalization.</td>
<td>High/Moderate</td>
</tr>
<tr>
<td>Exercise – mix</td>
<td>High/Moderate</td>
<td>Short-term reduced risk of subsequent cognitive decline</td>
<td>Unknown if leads to delayed diagnosis of dementia or institutionalization.</td>
<td>High/Moderate</td>
</tr>
<tr>
<td>Exercise – mix</td>
<td>Moderate</td>
<td>Long-term decreased incidence of dementia</td>
<td>Unknown if leads to delayed institutionalization.</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Section 3.4. Nonpharmacologic &amp; Nonexercise Interventions for Delaying the Onset of Dementia – Primary Prevention</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive interventions</td>
<td>Low</td>
<td>Cognitive improvements sustained after 5 years (however, none of these improvements had effects beyond the specific cognitive domains of the intervention)</td>
<td>Results addressing functional outcomes unclear.</td>
<td>Very low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Need more than 5-year follow-up.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No evidence to determine if cognitive training leads to: 1) delayed diagnosis of dementia 2) delayed institutionalization</td>
<td></td>
</tr>
</tbody>
</table>
4. Social Isolation

Objective

The objective was to systematically review interventions aimed at preventing or reducing social isolation and loneliness in community-dwelling seniors, that is, persons \( \geq 65 \) years of age who are not living in long-term care institutions. The analyses focused on the following questions:

- Are interventions to reduce social isolation and/or loneliness effective?
- Do these interventions improve health, well-being, and/or quality of life?
- Do these interventions impact on independent community living by delaying or preventing functional decline or disability?
- Do the interventions impact on health care utilization, such as physician visits, emergency visits, hospitalization, or admission to long-term care?

Target Population and Condition

Social and family relationships are a core element of quality of life for seniors, and these relationships have been ranked second, next to health, as the most important area of life. Several related concepts—reduced social contact, being alone, isolation, and feelings of loneliness—have all been associated with a reduced quality of life in older people. Social isolation and loneliness have also been associated with a number of negative outcomes such as poor health, maladaptive behaviour, and depressed mood. Higher levels of loneliness have also been associated with increased likelihood of institutionalization.

Evidence-Based Analysis Methods

The scientific evidence base was evaluated through a systematic literature review. The literature searches were conducted with several computerized bibliographic databases for literature published between January 1980 and February 2008. The search was restricted to English-language reports on human studies and excluded letters, comments and editorials, and case reports. Journal articles eligible for inclusion in the review included those that reported on single, focused interventions directed towards or evaluating social isolation or loneliness; included, in whole or in part, community-dwelling seniors (\( \geq 65 \) years); included some quantitative outcome measure on social isolation or loneliness; and included a comparative group. Assessments of current practices were obtained through consultations with various individuals and agencies including the Ontario Community Care Access Centres and the Ontario Assistive Devices Program. An Ontario-based budget impact was also assessed for the identified effective interventions for social isolation.

Summary of Findings

A systematic review of the published literature focusing on interventions for social isolation and loneliness in community-dwelling seniors identified 11 quantitative studies. The studies involved European or American populations with diverse recruitment strategies, intervention objectives, and limited follow-up, with cohorts from 10 to 15 years ago involving mainly elderly women less than 75 years of age. The studies involved 2 classes of interventions: in-person group support activities and technology-assisted interventions. These were delivered to diverse targeted groups of seniors such as those with mental distress, physically inactive seniors, low-income groups, and informal caregivers. The interventions were primarily focused on behaviour-based change. Modifying factors (client attitude or
preference) and process issues (targeting methods of at-risk subjects, delivery methods, and settings) influenced intervention participation and outcomes.

Both classes of interventions were found to reduce social isolation and loneliness in seniors. Social support groups were found to effectively decrease social isolation for seniors on wait lists for senior apartments and those living in senior citizen apartments. Community-based exercise programs featuring health and wellness for physically inactive community-dwelling seniors also effectively reduced loneliness. Rehabilitation for mild/moderate hearing loss was effective in improving communication disabilities and reducing loneliness in seniors. Interventions evaluated for informal caregivers of seniors with dementia, however, had limited effectiveness for social isolation or loneliness.

Research into interventions for social isolation in seniors has not been broadly based, relative to the diverse personal, social, health, economic, and environmentally interrelated factors potentially affecting isolation. Although rehabilitation for hearing-related disability was evaluated, the systematic review did not locate research on interventions for other common causes of aging-related disability and loneliness, such as vision loss or mobility declines. Despite recent technological advances in e-health or telehealth, controlled studies evaluating technology-assisted interventions for social isolation have examined only basic technologies such as phone- or computer-mediated support groups.

Table 10: Effectiveness of Diverse Interventions for Social Isolation, Loneliness, and Depression in Heterogenous Populations of Community-Dwelling Seniors*

<table>
<thead>
<tr>
<th>Population</th>
<th>Country, Year</th>
<th>Intervention Type</th>
<th>N</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wait list for senior apartments</td>
<td>Sweden, 1985</td>
<td>Social worker–led self-help groups</td>
<td>108</td>
<td>↓ Isolation†</td>
</tr>
<tr>
<td>2. Residents of senior apartments</td>
<td>Sweden, 1983</td>
<td>Support groups</td>
<td>60</td>
<td>↓ Isolation†</td>
</tr>
<tr>
<td>3. Physically inactive seniors</td>
<td>Netherlands, 2002</td>
<td>Group exercise programs</td>
<td>382</td>
<td>↓ Isolation‡ ↓ Loneliness‡</td>
</tr>
<tr>
<td>4. Physically inactive seniors</td>
<td>United States, 2000</td>
<td>Group exercise programs</td>
<td>174</td>
<td>↓ Loneliness†</td>
</tr>
<tr>
<td>5. Bereaved seniors</td>
<td>United States, 1993</td>
<td>Peer- and professional- led self-help support groups</td>
<td>339</td>
<td>NS</td>
</tr>
<tr>
<td>6. Users of mental health services at senior centres</td>
<td>United States, 1982</td>
<td>Social worker–led self-help groups</td>
<td>68</td>
<td>↓ Isolation‡ ↓ Loneliness§</td>
</tr>
<tr>
<td>7. Seniors experiencing mental health crisis</td>
<td>United States, 1998</td>
<td>Social worker crisis phone line</td>
<td>61</td>
<td>↓ Isolation‡ ↓ Depression†</td>
</tr>
<tr>
<td>8. Seniors with low income and low perceived social support</td>
<td>United States, 1991</td>
<td>Telephone friendships</td>
<td>291</td>
<td>NS</td>
</tr>
<tr>
<td>9. Hearing-impaired seniors</td>
<td>Germany, 1997</td>
<td>Hearing aids</td>
<td>148</td>
<td>↓ Loneliness†</td>
</tr>
<tr>
<td>10. Informal caregivers of persons with Alzheimer’s disease</td>
<td>United States, 1995</td>
<td>Nurse moderated computer link</td>
<td>102</td>
<td>NS</td>
</tr>
<tr>
<td>11. Informal caregivers of persons with dementia</td>
<td>United States, 2007</td>
<td>Social worker–led telephone-based support</td>
<td>103</td>
<td>↓ Depression† (subgroup &gt; 65 y)</td>
</tr>
</tbody>
</table>

↓ indicates decrease; NS, not significant , P > .05. †P < .05; ‡P < .01; §P < .001.
Economic Analyses

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.

Falls and Fall-Related Injuries

A separate report in this series presents 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.

Urinary Incontinence

A budget impact analysis was conducted to forecast costs for caregiver-dependent and patient-directed multicomponent behavioural techniques delivered by NCAs, and PFMT alone delivered by physiotherapists. All costs are reported in 2008 Canadian dollars. Based on epidemiological data, published medical literature and clinical expert opinion, the annual cost of caregiver-dependent behavioural techniques was estimated to be $9.2 M, while the annual costs of patient-directed behavioural techniques delivered by either an NCA or physiotherapist were estimated to be $25.5 M and $36.1 M, respectively. Estimates will vary if the underlying assumptions are changed.

Currently, the province of Ontario absorbs the cost of NCAs (available through the 42 Community Care Access Centres across the province) in the home setting. The 2007 Incontinence Care in the Community Report estimated that the total cost being absorbed by the public system of providing continence care in
the home is $19.5 M in Ontario. This cost estimate included resources such as personnel, communication with physicians, record keeping and product costs. Clinic costs were not included in this estimation because currently these come out of the global budget of the respective hospital and very few continence clinics actually exist in the province. The budget impact analysis factored in a cost for the clinic setting, assuming that the public system would absorb the cost with this new model of community care.

**Dementia**

Caregiver-directed behavioural techniques and patient-directed exercise programs were found to be effective when assessing mild to moderate dementia outcomes in seniors living in the community. Therefore, an annual budget impact was calculated based on eligible seniors in the community with mild and moderate dementia and their respective caregivers who were willing to participate in interventional home sessions. Table 11 below describes the annual budget impact for these interventions.

**Social Isolation**

Community exercise programs were found to be effective in reducing social isolation outcomes in seniors living in the community. Therefore, an economic analysis to project total cost to implement the program in the first year based on eligible seniors in the community willing to participate in a community exercise program was calculated. Table 12 describes the cost to implement the program in the first year for these interventions.

This economic analysis was calculated for the first year after an introduction of the interventions, from the Ministry of Health and Long-Term Care perspective, using prevalence data only. Incidence and mortality rates were not factored in. Numbers may change based on population trends, rate of intervention uptake, trends in current programs in place in the province, and assumptions on costs. Number refers to patients likely to access these interventions in Ontario based on assumptions from the literature. Resource consumption was confirmed by an expert panel.

As a result of these assumptions, and due to the limited data available in the literature, uncertainty could become an issue. If and when new evidence is presented, these results may change and may better predict program resources over time, allowing for a more accurate analysis.
Table 11: Annual Budget Impact of Effective Interventions for Dementia

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Annual Cost ($ CDN)</th>
<th>Population*</th>
<th>No. of Patients</th>
<th>Annual Impact ($ CDN)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Caregiver-Directed Behavioural Techniques†</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupational Therapist</td>
<td>1 hour session</td>
<td>120.22</td>
<td>1,442.64</td>
<td>56,629</td>
<td>81,695,125</td>
</tr>
<tr>
<td>Nurse</td>
<td>1 hour session</td>
<td>82.12</td>
<td>985.44</td>
<td>56,629</td>
<td>55,804,389</td>
</tr>
<tr>
<td><strong>Patient-Directed Exercise Program‡</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupational Therapist</td>
<td>1 hour session</td>
<td>120.22</td>
<td>3,847.04</td>
<td>38,696</td>
<td>148,866,672</td>
</tr>
<tr>
<td>Physiotherapist</td>
<td>1 hour session</td>
<td>108.49</td>
<td>3,471.68</td>
<td>38,696</td>
<td>134,341,585</td>
</tr>
<tr>
<td>Personal Support Worker</td>
<td>1 hour session</td>
<td>30.48</td>
<td>975.36</td>
<td>38,696</td>
<td>37,742,939</td>
</tr>
<tr>
<td>Recreation Therapist</td>
<td>1 hour session</td>
<td>25.85</td>
<td>827.20</td>
<td>38,696</td>
<td>32,009,678</td>
</tr>
<tr>
<td><strong>Caregiver- and Patient-Directed Behavioural Techniques§</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupational Therapist</td>
<td>1 hour session</td>
<td>120.22</td>
<td>1,202.20</td>
<td>56,629</td>
<td>68,079,271</td>
</tr>
<tr>
<td>Nurse</td>
<td>1 hour session</td>
<td>82.12</td>
<td>821.20</td>
<td>56,629</td>
<td>46,503,658</td>
</tr>
</tbody>
</table>

*Assumed 7% prevalence of dementia aged 65+ in Ontario.
†Assumed 8 weekly sessions plus 4 monthly phone calls.
‡Assumed 12 weekly sessions plus biweekly sessions thereafter (total of 20).
§Assumed 2 sessions per week for first 5 weeks. Assumed 90% of seniors in the community with dementia have mild to moderate disease. Assumed 4.5% of seniors 65+ are in long-term care, and the remainder are in the community. Assumed a rate of participation of 60% for both patients and caregivers and of 41% for patient-directed exercise. Assumed 100% compliance since intervention administered at the home. Cost for trained staff from Ministry of Health and Long-Term Care data source. Assumed cost of personal support worker to be equivalent to in-home support. Cost for recreation therapist from Alberta government Website. 

Note: This budget impact analysis was calculated for the first year after introducing the interventions from the Ministry of Health and Long-Term Care perspective using prevalence data only. Prevalence estimates are for seniors in the community with mild to moderate dementia and whose respective caregivers are willing to participate in an interventional session administered at the home setting. Incidence and mortality rates were not factored in. Current expenditures in the province are unknown and therefore were not included in the analysis. Numbers may change based on population trends, rate of intervention uptake, trends in current programs in place in the province, and assumptions on costs. The number of patients was based on patients likely to access these interventions in Ontario based on assumptions stated below from the literature. An expert panel confirmed resource consumption.
Table 12: Cost to Implement Community-Based Exercise Programs (2008 $Cdn)*

<table>
<thead>
<tr>
<th>Type of Professional Delivering Program</th>
<th>Unit Cost, $</th>
<th>First Year Cost, $</th>
<th>Population</th>
<th>Number</th>
<th>First Year Total Cost, $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recreation Therapist</td>
<td>25.85</td>
<td>74.68</td>
<td>Seniors in the community willing to participate in an exercise program</td>
<td>476,992</td>
<td>35,620,736</td>
</tr>
<tr>
<td>Occupational Therapist</td>
<td>29.68</td>
<td>85.74</td>
<td>Seniors in the community willing to participate in an exercise program</td>
<td>476,992</td>
<td>40,898,392</td>
</tr>
<tr>
<td>Physiotherapist</td>
<td>18.41</td>
<td>53.18</td>
<td>Seniors in the community willing to participate in an exercise program</td>
<td>476,992</td>
<td>25,368,578</td>
</tr>
</tbody>
</table>

*Assumed hourly exercise group sessions of 9 seniors per group once biweekly with either an occupational therapist, a physiotherapist, or a recreation therapist. Assumed 4.5% of seniors are in long-term care. Assumed 57% of seniors 65+ would participate in a community exercise program and 79% would be compliant. Assumed 65.8% of seniors in the community are mobile.

Feedback from Expert Panel

Experts in the field of aging, with specific focus on community-based services, were invited to take part in panel meetings between January and May 2008 (See Appendix 3 for a list of members of the expert panel). The objectives of this panel were

- to review and consolidate evidence on the effectiveness of devices, programs, and systems provided in the home to elderly individuals in Ontario;
- to assess the appropriateness of the evidence in the context of the Ontario health system; and
- to identify gaps in the evidence and opportunities for improvement in current practice.

The feedback from the expert panel for the key predictors is summarized below.

Falls and Fall-Related Injuries

Medication Withdrawal

- Medication withdrawal involves a fine balance between benefit and risk, and cannot be as accurately implemented as other initiatives.
- There are not enough best practice guidelines for medication withdrawal in seniors.
- As a general rule, psychotropic medications are not prescribed unless there are specific needs (such as wandering, inability to sleep, hitting, and other abusive behaviour). In these cases, it is difficult (and perhaps inappropriate) to withdraw this medication since doing so can greatly increase caregiver burden.
- A discussion followed that indicated that inadequate training of caregivers to deal with behaviours in seniors may increase the reliance on psychotropic medications. Perhaps if proper training were provided, medication withdrawal could be more successful.
- In a home setting, individual compliance with taking psychotropic medications can be low and requires caregiver support for reminders.
Causes of Falls and Injury in Seniors

- Many injurious falls occur around indoor stairs, and therefore the proper design of stairs and appropriate handrails (shape, diameter, and height) should be investigated.
- Injuries following falls from ladders frequently occur in seniors (largely due to cleaning of eavestroughs and windows). Ladders with hoops or services to clean eavestroughs and windows for seniors should be considered.
- Falls on sidewalks and road crossings are frequent, particularly in the winter. With the deteriorating condition of street clearing, this is becoming a larger issue.
- Fear of falling is another important cause of falls since it perpetuates a cycle of immobility, followed by deconditioning and falls.

Falls in the Winter

- In the winter, several factors reduce the likelihood that an elderly person will go outdoors:
  - Seniors are most likely to go out during daylight hours, which are fewer.
  - Fear of slipping on the ice and snow reduces the likelihood of an elderly person choosing to go outdoors unless it is absolutely necessary.
  - Poorly designed coats and boots make it difficult for seniors with difficulty moving or with lowered flexibility to dress for the outdoors.
- These factors can lead to lowered fitness levels, which in turn leads to an increased likelihood of falls both indoors and outdoors.
- Furthermore, in the colder months, people tend to walk faster when outdoors, which can increase the likelihood that an individual will fall.

Mobility Aids

- At both meetings, the issue of mobility aids was raised by experts on the panel. Regrettably it is very rare to find published trials investigating the effectiveness of mobility aids, and therefore it was not appropriate to include this as a section of this literature review. However, the panel felt that it was important to discuss these aids and their use in reducing falls and fall-related injuries in the elderly population, and that more work should be done to improve existing mobility devices.
- Mobility aids that were discussed as being effective included
  - wheeled walkers – while wheeled walkers can decrease the frequency of falls, the panel mentioned that walkers must be properly designed to ensure the best stability and that poorly designed walkers can actually increase the likelihood of falls.
  - handrails that are at an appropriate height, are cylindrical and are easy to see and grab
  - raised toilet seats to decrease falls that occur when sitting at and standing up from the toilet
  - grab bars, particularly in washrooms
- While mobility aids are an important tool to reduce falls in community-dwelling seniors, when renovations are not done to an appropriate standard, they can actually increase home hazards and risk of falling. Therefore, it was felt that elderly populations should be provided with access to affordable high-standard renovations.
- Emergency buttons that act as a lifeline after a fall were discussed. Because quick access to help can prevent long-term complications and disabilities, it was argued that these emergency buttons are highly effective in elderly populations, although it was suggested that uptake of the technology may be limited, based on reports that many people forget after a fall that they have access to these buttons.
Urinary Incontinence

- Services/interventions that currently exist in Ontario offering behavioural interventions to treat UI are not consistent. There is a lack of consistency in how seniors access services for treatment of UI, who manages patients and what treatment patients receive.
- Help-seeking behaviours are important to consider when designing optimal service delivery methods.
- There is considerable social stigma associated with UI and therefore there is a need for public education and an awareness campaign.
- The cost of incontinent supplies and the availability of NCAs were highlighted.

Dementia

Respite Care

Methodological and Quality Issues with Studies

- Respite care is difficult to define.
- Randomized controlled trials are very challenging to conduct in this population.
- Caregivers of seniors with dementia have complex and diverse needs.
- Patients differ greatly with respect to type of dementia, severity of disease, and limits in ADLs and IADLs.
- Caregivers differ greatly with respect to characteristics, age, health status, relationship to care recipient, amount of formal or informal support available, and use/access of other supportive services.
- Outcomes measured may not be sensitive/appropriate measures to detect effectiveness of respite.
- Interventions are heterogeneous (type of respite, duration, intensity).
- Study duration is typically short; therefore, it is difficult to assess medium- to long-term effects.
- There are many forms of respite that are effective but have not been studied (i.e., respite provided through religious groups). One must be careful with how the results of the respite care literature are reported.

Current Delivery

- Community Care Access Centres (CCACs) provide respite care in 3 ways:
  - informal in-home, 1-on-1 care for a couple of hours per day,
  - referral to community-support programs, and
  - referral to short-term nursing home stays.
- Hours of respite are coordinated by CCACs and delivered by personal support workers (PSWs).
- Informal agencies and religious groups provide some respite services (congregate driving, meals on wheels, and friendly visiting).
- What seems to be useful is someone taking the senior with dementia for a walk for 1 to 2 hours per day since this gives the caregiver free time. This is often organized by a PSW from a CCAC.
- In general, a short-term stay in a nursing home has less positive effects than other forms of respite since there is disruption of routine for the patient/caregiver.

System Pressures

- Problem: not enough hours of respite provided by PSWs from CCACs.
- Other issues are: high turnaround of staff, lack of flexibility, lack of knowledge to manage behavioural challenges, inconsistency in delivery of services.
- Individuals with dementia need a familiar face and an individualized approach.
Large issue in evaluating effectiveness of interventions in the dementia population.
Often, informal arrangements are made (i.e., with neighbours/friends, etc.) to alleviate the burden of the caregiver.

**Future Research/Direction**

- There exist caregiver-support programs that define the number of hours in-home and flexibility benchmarks for caregiver-support interventions.
- In nursing homes, spouses of people with dementia support one another and help with the caregiving requirements, which is a form of respite for these caregivers.
- Not enough research is done into what happens to caregivers once the care receiver dies.

**Behavioural Management Interventions**

**Current Delivery**

- Two groups generally provide behavioural management interventions: community occupational therapists and psychogeriatric nurses.
- Psychogeriatric nurses counsel caregivers, and occupational therapists make environmental modifications to the home and provide case management.
- Physicians are reluctant to prescribe medications to seniors with dementia for problem behaviours; however, when caregivers have major difficulties with managing the care recipient (i.e., wandering, sleep disruptions), physicians will prescribe medication.

**Systems Pressures**

- Programs/tools are needed which will give caregivers the skills to manage and provide relief.
- It is difficult to co-ordinate funding of technology and of research.
- There are fundamental problems with studying caregiver interventions for dementia.

**Future Research/Direction**

- Examine the research being done at the occupational therapy department at the University of Toronto around family caregivers and outcome measures; identify which interventions are most effective.
- Field evaluations are required as different models and evaluations are needed.
- Technological interventions such as websites and online networking for care providers can be effective.
- It is important to focus on characteristics of people requiring services since response to interventions greatly differs according to type and severity.

**Physical Exercise**

- Community Care Access Centres can provide referrals for occupational therapists, physiotherapists, and personal support workers to go to homes.
- Community recreation centres – recreationalists can teach caregiver and client exercise programs.
- Community agencies and religious groups offer exercise programs – volunteer-led informal exercise groups (e.g., “mall walkers”).
- Exercise programs often provided in/around supportive housing units.
- Exercise activities often organized outside of the formal health system.
- Municipality websites often list services available within the area.
Conclusions

Falls and Fall-Related Injuries

- 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.

Urinary Incontinence

There is moderate-quality evidence that the following interventions are effective in improving UI in mobile motivated seniors:
- Multicomponent behavioural interventions including a combination of bladder training techniques, PFMT (with or without biofeedback), education on bladder control strategies and self-monitoring techniques.
- Pelvic floor muscle training alone.

There is moderate quality evidence that when behavioural interventions are led by NCAs or CNSs in a clinic setting, they are effective in improving UI in seniors.

There is limited low-quality evidence that prompted voiding may be effective in medically complex, frail seniors with motivated caregivers.

There is insufficient evidence for the following interventions in medically complex, frail seniors with motivated caregivers:
- habit retraining, and
- timed voiding.

Dementia

Caregiver Interventions for Seniors with Dementia

- There is limited evidence from RCTs that respite care is effective in improving caregiver outcomes for those caring for seniors with dementia.
- There is moderate- to high-quality evidence that individual behavioural interventions (≥ 6 sessions), directed at the caregiver (or combined with the patient) are effective in improving psychological health in dementia caregivers.
- There is moderate- to high-quality evidence that multicomponent interventions improve caregiver psychosocial health and may impact rates of institutionalization of dementia patients.
Patient-Directed Interventions

Secondary Prevention

- Physical exercise is effective for improving physical functioning in patients with dementia.
- Previous systematic review indicated that “cognitive training” is not effective in patients with dementia.
- A recent RCT suggests cognitive stimulation therapy (up to 7 weeks) is effective for improving cognitive function and quality of life in patients with dementia.

Primary Prevention (Delaying the Onset of Dementia)

- Regular leisure time physical activity in midlife is associated with a reduced risk of dementia in later life (mean follow-up 21 years).
- Regular physical activity in seniors is associated with a reduced risk of cognitive decline (mean follow-up 2 years).
- Regular physical activity in seniors is associated with a reduced risk of dementia (mean follow-up 6–7 years).

For seniors with good cognitive and physical functioning, there is:

- evidence that cognitive training for specific functions (memory, reasoning, and speed of processing) produces improvements in these specific domains, and
- limited inconclusive evidence that cognitive training can offset deterioration in the performance of self-reported IADL scores and performance assessments.

Social Isolation

Although effective interventions were identified for social isolation and loneliness in community-dwelling seniors, they were directed at specifically targeted groups and involved only a few of the many potential causes of social isolation. Little research has been directed at identifying effective interventions that influence the social isolation and other burdens imposed upon caregivers, in spite of the key role that caregivers assume in caring for seniors. The evidence on technology-assisted interventions and their effects on the social health and well-being of seniors and their caregivers is limited, but increasing demand for home health care and the need for efficiencies warrant further exploration. Interventions for social isolation in community-dwelling seniors need to be researched more broadly in order to develop effective, appropriate, and comprehensive strategies for at-risk populations.

Overall Conclusions

- There is moderate- to high-quality evidence that interventions that treat or reduce the risk of falls, UI, dementia or social isolation can improve health outcomes in community-dwelling seniors.
- There is moderate- to high-quality evidence that regular exercise can significantly improve health outcomes in community-dwelling seniors through the primary or secondary prevention of falls, UI (using PFMT), dementia, and social isolation.
- Low-quality or limited evidence is available and therefore no conclusions as to the effectiveness of the following interventions in the Ontario senior population can be made:
  - psychotropic medication withdrawal to prevent falls,
  - multicomponent interventions to prevent falls and falls-related injuries in high-risk seniors,
  - gait-stabilizing devices to prevent outdoor falls,
- caregiver-dependent behavioural techniques for UI (prompted voiding),
- rehabilitation for hearing loss (hearing aids),
- respite care for caregivers of seniors with dementia,
- cognitive stimulation therapy for seniors with dementia,
- cognitive training for seniors with good cognitive function, and
- focus/support group activities for seniors on wait lists for senior apartments.
## Appendices

### Appendix 1: Search Strategy

Database: Ovid MEDLINE(R) <1950 to October Week 1 2007>

Search Strategy:

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<td>institutionalization.mp.</td>
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<td>1 or 2</td>
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<td>4</td>
<td>exp Patient Admission/</td>
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<tr>
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<td>exp Nursing Homes/ or exp Homes for the Aged/</td>
<td>(28869)</td>
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Appendix 2: Grade Score for the Body of Evidence

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<th>Quality of Studies</th>
<th>Consistency</th>
<th>Directness</th>
<th>Other Modifying Factors</th>
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<td>N</td>
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<td>Important inconsistency (−1)</td>
<td>Some uncertainty about directness (−1)</td>
<td>Association strong (+1)</td>
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<td>Observational =Low</td>
<td>Very serious limitation to study quality (−2)</td>
<td>Major uncertainty about directness (−2)</td>
<td>Association very strong (+2)</td>
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<tr>
<td></td>
<td>Any other evidence =Very Low</td>
<td></td>
<td></td>
<td>Dose response gradient (+1)</td>
<td>Dose response gradient (+1)</td>
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<td></td>
<td></td>
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<td>All plausible confounders would have reduced the effect (+1)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Imprecise or sparse data (−1)</td>
<td>Imprecise or sparse data (−1)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High probability of reporting bias (−1)</td>
<td>High probability of reporting bias (−1)</td>
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</table>

## Appendix 3: Expert Panel Membership

Members of the Expert Panel were as follows:

<table>
<thead>
<tr>
<th>Name</th>
<th>Position and Affiliation</th>
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<tbody>
<tr>
<td>Dr. Shirlee Sharkey (Chair)</td>
<td>President and CEO, St. Elizabeth Health Care</td>
</tr>
<tr>
<td>Ms. Trish Barbato</td>
<td>President and CEO, COTA Health</td>
</tr>
<tr>
<td>Dr. Ed Brown</td>
<td>Executive Director, North network</td>
</tr>
<tr>
<td>Dr. Geoff Fernie</td>
<td>Vice President Research, Toronto Rehabilitation Institute</td>
</tr>
<tr>
<td>Ms. Malini Hall</td>
<td>Resource Occupational Therapist, St. Elizabeth Health Care</td>
</tr>
<tr>
<td>Mr. Eric Hong</td>
<td>Director of Corporate Development, Yee Hong Centre for Geriatric Care</td>
</tr>
<tr>
<td>Ms. Kay McGarvey</td>
<td>Clinical Resource Nurse, St. Elizabeth Health Care</td>
</tr>
<tr>
<td>Dr. Alex Mihailidis</td>
<td>Department of Occupational Therapy and Director of Intelligent Assistive Technology and Systems Lab</td>
</tr>
<tr>
<td>Ms. Nancy Murray</td>
<td>Manager, Staff Education &amp; Training, Waterloo Wellington CCAC</td>
</tr>
<tr>
<td>Dr. Sandy Nuttall</td>
<td>Director, Emerging Innovation Investment Strategy Branch, MOHLTC</td>
</tr>
<tr>
<td>Ms. Susan Paetkau</td>
<td>Director, Health Program Policy and Standards Branch, MOHLTC</td>
</tr>
<tr>
<td>Dr. David Ryan</td>
<td>Director of Education, Regional Geriatric Program of Toronto</td>
</tr>
<tr>
<td>Ms. Loretta Ryan</td>
<td>Manager, Policy and Communications; Ontario Professional Planners Institute</td>
</tr>
<tr>
<td>Dr. Jennifer Skelly</td>
<td>Associate Professor at McMaster University and the Director of the Continenence Program at St. Joseph's Healthcare Hamilton</td>
</tr>
<tr>
<td>Ms. Joan Stevens</td>
<td>Program Manager, Assistive Devices Program</td>
</tr>
<tr>
<td>Dr. Paul Williams</td>
<td>Professor, HPME, University of Toronto</td>
</tr>
<tr>
<td>Dr. Maria Zorzitto</td>
<td>Head of Geriatrics, St. Michael’s Hospital</td>
</tr>
</tbody>
</table>
References


