

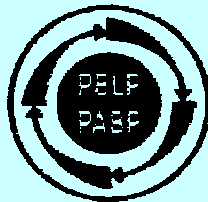
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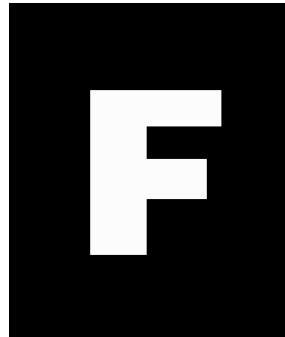
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**FALLS IN THE
ELDERLY**

Fractures and other injuries. Social isolation. Fear of falling and institutionalization. Depression. Reduced quality of life. Death. Nearly 1 in every 3 community-dwelling adults over age 65 falls each year, risking these and other physical, social, and psychological consequences.

Orthostatic hypotension. Medications. Environmental hazards. Medical conditions that affect gait, balance, lower body strength, vision, proprioception. These are factors that act in concert with age-related physiological changes to cause older adults to fall.

This module focuses primarily on *preventing falls in community-living seniors*. It is intended to help you apply a structured approach that will make it easier to:

- T** quickly identify patients at increased risk for falls
- T** perform a structured but tailored falls assessment, to identify the most relevant and modifiable risk factors
- T** implement individualized interventions to help reduce these risks

Three case profiles, provided below, are designed to address common clinical dilemmas. However, considering actual cases from your own clinical practice may enrich the learning experience.

CASES

Case 1: Grace L., age 82, female**Part 1**

Mrs. L. lives alone in an apartment about 10 blocks from your office. She comes for her regular follow-up visits by bus or taxi. Her primary diagnoses are temporal arteritis (well controlled by prednisone) and hypertension (which has been difficult to control). Significant history includes cataract extraction (both eyes) and stress incontinence. She uses no walking aids.

Her long-standing medications consist of 5 mg amlodipine (Norvasc®), 12.5 mg hydrochlorothiazide, 5 mg prednisone, and 5 mg alendronate (Fosamax®). She was started on 8 mg candesartan (Atacand®) 6 months ago. (All medications are taken once daily.)

How could you quickly assess Mrs. L.'s risk of falling during the next 12 months?

Part 2

In response to direct questions about any new problems or concerns, Mrs. L. denies any.

When specifically asked if she has had any falls or near-falls in the last year, Mrs. L. admits to a fall last winter. While returning from the local variety store, she slipped on a small patch of ice and fell. She bruised her buttock but had no other injuries.

Upon further questioning, Mrs. L. mentions that she has needed help walking up or down stairs for the past month or two, because she sometimes feels "a little wobbly."

How could you more thoroughly assess her risk of repeat falls?

Part 3

Mrs. L. agrees to do the Get-Up-and-Go test as you observe her: stand up from her chair, walk 3 metres (10 feet) across the room; turn; walk back to the chair; turn again and sit down.

What would you look for in the Get-Up-and-Go test? What could you recommend to help reduce her risk of falling again?

Case 2A: Alice M., age 88, female

Mrs. M.'s husband died 8 years ago. She became your patient several years ago, when she moved into a "granny flat" addition next door to her daughter Brenda, who is also your patient. She uses no walking aids and relies on her daughter for transportation. Today, accompanied by Brenda, Mrs. M. arrives for her annual assessment.

Mrs. M. is a tall, slightly stooped woman wearing a tailored dress and shoes with a slight heel. In response to specific questions, she admits to two falls during the past year. On the first occurrence (during the middle of the night, about 5 months ago) she lost her balance on her way to the washroom. The second fall occurred roughly a month later, when she tripped on the edge of the area rug in her living room. She denies feeling dizzy or lightheaded before either fall. She also denies any loss of consciousness. Although she sustained no serious injury either time, she did bruise an elbow in the first fall. She also has had several "near-falls."

Mrs. M. admits to feeling anxious about falling again and to worrying "about what might happen" if she does. Consequently, she has significantly curtailed her activities inside and outside her home.

Examination reveals:

- supine BP of 125/80; standing BP of 105/70; regular heart rate (76 BPM)
- normal cardiac exam; strong peripheral pulses; no peripheral edema
- mild osteoarthritic changes of the hands and feet
- decreased external rotation of the left hip
- no tender joints
- footwear-induced pressure markings on her feet, but no abrasions or ulcers

No lateralizing neurological signs, tremor or rigidity are noted. Left hip flexor strength is decreased, compared to the right side. Gait is a bit unsteady, but arm swing is normal.

Her medical history includes chronic depression and hypertension. Her long-standing medications consist of 25 mg OD hydrochlorothiazide, 50 mg HS nortriptyline (Aventyl®), and acetaminophen as needed. She also takes calcium (1500 mg) and vitamin D (800 IU) supplements daily.

What specific concerns would you have if Mrs. M. falls again?

How could you more thoroughly assess her risk of falling?

How would you manage her situation?

Case 2B: Brenda W. (Alice's daughter), age 66, female

The following month, Brenda presents for her annual assessment. When asked if she has any concerns, she indicates an increasing worry that she will "end up like my mother." Brenda recognizes that her mother is limiting her activities and losing her sense of independence because of her recent falls. She indicates that it "would be nice if I could do something" to avoid that.

How would you advise Brenda?**Case 3: Bert I., age 76, male**

Mr. Bert I. and his 74-year-old wife have been your patients for several years. He has no active medical problems and does not drink alcohol regularly. Since he stopped driving his car last year (due to the expense), they see you only infrequently. Last month, while visiting their daughter, they visited a walk-in clinic in her area.

They present together this afternoon, on a semi-urgent basis. Mrs. I. reports that her husband "fell and hit his head" overnight. He suffered no loss of consciousness, and she has seen no subsequent change in his memory or ability to walk.

Discussion reveals that Mr. I. has had increasing difficulty sleeping over the past 6 months, and that he was prescribed "a sleeping pill", 15 mg HS oxazepam, by a physician at the walk-in clinic. He also frequently takes 50 mg HS dimenhydrinate (Gravol®) as a sedative, on a friend's suggestion.

Mrs. I. reports that her husband started having nightmares about two weeks ago. He is also more confused at night, and convinced that someone is entering their home. At 3 a.m., he got out of bed quickly—certain that an intruder was in the house—and fell.

You examine Mr. I. and see no sign of bruising or injury. His gait is stooped, with a decrease in arm swing. Reflexes are normal. No lateralizing or focal neurologic signs are evident. His Folstein Mini Mental State Exam (MMSE) score is 26/30, with loss of points for: orientation; attention; 5-minute recall; inability to draw intersecting pentagons.

The rest of the examination is within normal limits.

What would you do today, to help prevent Mr. I. from falling again?**Would you be concerned about his wife's risk of falling?****INFORMATION SECTION****INCIDENCE AND CONSEQUENCES OF FALLS**

- "Accidental" falls are a major cause of morbidity and mortality in seniors, and they also contribute to nearly half of nursing home admissions.^{1,2} Up to 85% of injuries and 66% of accidental deaths in seniors are due to falls.³
- Every year, approximately:¹⁻⁷
 - 1/3 of all community-living seniors \geq 65 years, and 1/2 of all those \geq 80 years fall
 - 15 to 25% of these falls result in major injuries (fractures, head injuries, major soft tissue injuries), of which 3/4 involve fractures
 - 1 to 2% of falls result in hip fractures—and about 1 in every 4 seniors who fractures a hip dies within 6 to 12 months

Thus, for every 1000 community-living seniors, roughly 330 will fall at least once during the course of a year. Of these, about 16 will sustain a fracture, including about 5 hip fractures—1 or 2 of whom will die within the following year.
- Falls translate into a major public health problem with massive associated health care costs (over \$1 billion annually in Canada for treatment and rehabilitation).² **The best way to reduce the impact of falls in the elderly is to reduce the number of falls.**
- Even when falls do not result in death or serious injury, they often lead to feelings of incompetence, and to fear of falling and institutionalization. Seniors who fall may tend to limit various discretionary activities (e.g., church, exercise and physical activity, shopping, social activities) and essential activities (e.g., bathing, dressing, cleaning).⁵ This may increase their dependence on others, which may in turn lead to: decreased quality of life; social isolation and depression; decreased strength, balance and mobility.^{3,5,6,8}
- The best single predictor of a fall is a prior fall.** At least half of seniors who have fallen once will fall again in the following 6 to 12 months.⁹
- Multiple falls may be indicative of other cardiac, mental or physical conditions and be a prelude to a potentially rapid and ultimately fatal decline in health status. Identification and treatment of the underlying cause(s) of a fall can:⁶
 - return patients to baseline function
 - reduce their risk of further falls
 - substantially reduce morbidity and mortality due to falls

patients who have fallen to multidisciplinary assessment teams (where the service is available).¹⁴

Table B: The Get-Up-and-Go test^{2,15}

Test procedure

With the patient seated in a chair, ask the patient to:

- stand up from the chair (preferably without using hands/arms)
- walk a short distance— across the room is usually about 3 m or 10 ft (using a cane or walker, if the patient generally uses one)
- turn around
- walk back to the chair
- turn and sit down

Watch for unsteadiness or other difficulties

Factors assessed

- balance (while standing up, walking, turning, and sitting down)
- gait (ease of initiation, speed, symmetry, step height)
- mobility
- strength (when standing up and sitting down)
- cognitive function (ability to interpret overall request and remember components)
- hearing (when instructions given)

12. The following manoeuvres are likely to reduce the probability of future falls in the elderly.^{5,16}
- detecting a **history of falls** or near-falls
 - performing a **structured falls assessment**, which often identifies intrinsic and extrinsic factors that are amenable to treatment or intervention
 - implementing appropriate **tailored interventions** that result in improved ambulatory stability

Identifying and Assessing Seniors Who Have Fallen

13. **The simplest and most effective way to identify seniors who fall is to ask!** All seniors—and especially those 75 years old or older or with known risk factors—should be questioned at every opportunity. Many are unlikely to volunteer that they have fallen because of fear of being institutionalized.^{2,6,9}

14. Seniors who deny any falls or near-falls should be asked to perform the **Get-Up-and-Go test** (Table B). For this brief screening test, the following series of skills crucial to safe mobility for seniors are observed: standing up, walking, turning, stopping, sitting down.²
- a. Patients who experience no difficulty with the test require no further assessment—for now.²

- b. A thorough falls assessment is indicated for those who have difficulty with the test.²

15. Several variations of the Get-Up-and-Go test incorporate the time taken to complete the test: the Timed Get-Up-and-Go, the Timed Up-and-Go, and the Expanded Timed Get-Up-and-Go. Studies indicate that these tests are valid and reliable for balance, gait, and mobility capacity, and that they can be used to establish a baseline and monitor the effect of targeted interventions.^{6,17-19} Patients without hearing, cognitive, or mobility impairments can usually complete the timed test in under 10 seconds. In busy clinical practice, however, timing the test may actually distract from the observation unless one uses a stopwatch.²⁰
16. Most falls are caused by a complex interplay of various contributory factors. This precludes a single approach/solution to successfully assessing the risk of falls and preventing their occurrence.²
- a. Although a single fall may be an isolated event, it is important that recurrent falls be evaluated for any treatable causes.⁶
 - b. A thorough history and focussed assessment of each patient's medical condition and living situation can identify individualized interventions or factors that can be corrected to effectively reduce the risk of subsequent falls (Appendix 1).⁶
17. Falls that result in injuries or are associated with a new acute illness, loss of consciousness, fever, or blood pressure abnormality require immediate evaluation.⁶
- a. Patients who have fallen may have lost consciousness without realizing it, so consider syncope in those who just "go down."²
 - b. Dizziness from various causes may also need assessment, (e.g., orthostatic hypotension, carotid sinus syncope, arrhythmias).^{8,21}
18. Time must be devoted to thoroughly detailing the fall and looking for clues to the contributing factors. This involves:^{5,6}
- a. Questioning observers, when possible.
 - b. Determining if this is the first or a recurrent fall—since the strongest predictor for a fall is a prior fall, and since recurrent falls are more likely to result from intrinsic factors.
 - c. Determining the location and time of the fall.
 - d. Identifying events, activities and symptoms that immediately preceded the fall (e.g., lightheadedness or positional changes may suggest orthostasis; palpitations may suggest an arrhythmia) and followed the fall (e.g., loss of consciousness, incontinence, or confusion).

- e. Determining if previous falls involved the same location and/or features (e.g., tripped).
 - f. Conducting a thorough review of:
 - all medications taken, including prescription, over-the-counter, herbal, and alternative products
 - musculoskeletal, neurologic and cardiac histories
19. Potentially-modifiable risk factors for falls associated with climbing, slipping, transferring, tripping or loss of balance have been examined in a broad range of prospective studies. A review of 83 such trials forms the basis of new practice-focussed guidelines intended to assess and prevent falls in the elderly⁹ These new guidelines correspond well with and expand upon the most comprehensive of the earlier guidelines^{12,22-25} (Table C; Table D).

- is guided by information already known about intrinsic contributors for the patient
21. Laboratory testing, if indicated, will depend upon the findings of the preceding assessments.^{5,9}
22. A home visit is invaluable for assessing modifiable environmental risk factors and for determining appropriate interventions.⁶
- a. A home safety checklist (see Patient Information Sheet, "Do a home safety check..") can guide the visit and ensure a thorough evaluation. Patients or caregivers can often do part of this themselves.
 - b. It is particularly important to assess caregiver and housing arrangements, environmental hazards, alcohol use and compliance with medications.

Table C: Recommendations for seniors with positive fall history^{9,26,27}

Recommended Assessment(s)	Grade of Recommendation²⁸
Screening (by an occupational therapist) for hazards in the living environment	Grade A
Multifactorial screening for deficits and environmental hazards	Grade B
Repeated assessment using a disability rating scale	Grade not assessable

Table D: Key potentially modifiable risk factors⁹

Intrinsic factors	<ul style="list-style-type: none"> • mental (cognitive and psychiatric) status • lower limb disability or decreased lower limb strength • impaired vision • balance or gait problems • decreased peripheral neuromuscular function
Extrinsic factors	<ul style="list-style-type: none"> • psychotropic drug use • use of multiple medications • environmental hazards • use of a walking aid • activities of daily living

20. The physical examination component of the structured risk assessment (Table E):^{5,6}
- aims to identify contributing factors and/or validate the factors already detected in the history
 - starts with and focusses on recognized "high-yield" areas

MANAGING SENIORS WHO FALL

23. Once the assessments are completed, a careful prioritization of contributing factors can guide appropriate management strategies.⁵ Management of positive risk factor findings involves:⁹
- performing further targeted investigation
 - providing patient education
 - recommending treatment and/or compensatory strategies for identified factors
24. Identified factors may be amenable to management/intervention.⁵
- a. Treatment of acute or reversible deficits (e.g., pneumonia, urinary tract infection, or congestive heart failure)
 - b. Reduction of the cumulative burden of deficits
 - reducing or eliminating offending medications
 - improving visual acuity
 - improving footwear, or referring to a podiatrist
 - c. Use of adaptive devices or approaches for irreversible deficits (e.g., arm supports, protective rails, walking aids)

Table E: Key components of physical assessment^{5,6}

Assessment	Approach and Comments *** Focus on the most likely intrinsic contributors ***
Cardiovascular exam and vital signs	<ul style="list-style-type: none"> • determine blood pressure and pulse with patient supine, and again after five minutes of standing, to detect orthostatic changes • slight temperature changes may indicate acute illness • increased respiratory rate may indicate congestive heart failure, pneumonia, or early sepsis • recent weight changes may be important (e.g., weight loss may indicate dehydration or serious illness) • pulse rate and rhythm
Musculoskeletal exam	<ul style="list-style-type: none"> • joint range of motion and muscle strength • common foot problems (calluses, corns, nails) and conditions (biomechanical and metatarsal) account for 75% of difficulties but are frequently unreported and undiagnosed
Gait, balance, and mobility	<ul style="list-style-type: none"> • use to complement musculoskeletal assessment • include the Get-Up-and-Go test
Neurological exam	<ul style="list-style-type: none"> • include tone, power, reflexes, proprioception, sensation, cerebellar findings, visual acuity and fields, and hearing • use to look for signs of Parkinson's, cerebrovascular accident, and diminished power (especially quadriceps)
Mental status (cognitive and psychiatric)	<ul style="list-style-type: none"> • consider Geriatric Depression Scale (GDS)* and Mini Mental State Exam (MMSE) • investigate etiology of abnormal findings—which may represent either sequelae from the fall or contributory factors for the fall

* The GDS can be obtained, in different formats, from various websites, including the University of Buffalo (www.acsu.buffalo.edu/~drstall/gds.txt) the Geriatric Education Center at the University of Iowa (www.medicine.uiowa.edu/igec/library/assess_tools/assets/geriatric_depression_scale.pdf) [Accessed 03-07-04]

25. Reducing medications (especially psychotropics) can have marked impact [Level 1a evidence].²⁹ For example, in the FICSIT trial, the number of medications taken was reduced in the intervention group, which experienced an improvement in gait speed and transfer abilities, and a 30% decrease in falls.³⁰
26. **Modifying the senior's environment generally is more effective than trying to change behaviour.** Among the particularly effective interventions are those involving stairs (especially those with no rails or undifferentiated edges), slippery floors, surface clutter (removing rugs and mats), poor lighting, and unsafe footwear.^{2,31} Professional home hazard assessment and modification can reduce falls both inside and outside the home.²⁹
27. Moderate physical activity is protective for seniors, whereas too little—or too much—increases their risk of falling.
- a. With inadequate preparation, participation in high levels of activity can actually increase risk. Seniors must therefore be cautioned about taking recommendations for increased activity to the extreme.⁹
 - b. For example, brisk walking alone (without complementary balance, gait, and strength exercises) actually increased the risk of falls in one small RCT of post-menopausal women with a history of upper limb fracture [Level 2b evidence].³¹
28. The nature of the exercise program is critical (Table F).
- a. Although the FICSIT trial findings suggested that lower extremity strength exercise guided by a physical therapist was beneficial,² a recent RCT of progressive resisted quadriceps strengthening reported that older adults doing a home exercise had no reduction in falls.³²
 - b. Recent data show that balance training is effective in preventing falls.^{2,9} The Cochrane meta-analysis of 4 studies²⁹ concluded that even though untargeted exercise alone had no evidence of effectiveness, a program of muscle strengthening and balance retraining was beneficial. Similarly, recent systematic reviews of secondary prevention showed that seniors with recurrent falls benefit from long-term exercise and balance training.^{9,12}
 - c. Safety in the performance of basic mobility and other activities of daily living should be an important focus. However, without accompanying follow-up, education alone (whether targeted or untargeted) about falls or fear of falling does not seem to be effective.⁹

Table F: Management of seniors with positive fall history but *without* specific risk factors⁹

Target Population	Management	Grade of Recommendation ²⁸
Either sex, age >65	<ul style="list-style-type: none"> Request home hazard environmental assessment and modification with follow-up (by an Occupational Therapist if at all possible) Arrange for balance exercises (Tai Chi or equilibrium control exercises) on a firm foam surface. 	Grade A Grade B
Either sex, age >74	<ul style="list-style-type: none"> Periodically (every 3 to 6 months) reassess using a disability questionnaire. This can be administered by trained office staff or lay volunteers. 	unable to grade
Women, age >80	<ul style="list-style-type: none"> Refer for an individualized, in-house, physiotherapist-led training program (4 visits over 2 months) that includes strengthening, balance, and flexibility exercises and regular encouragement by telephone. 	Grade B

CASE COMMENTARIES

29. The use of hip protector devices is advocated in preventing hip fractures for those at high risk of fracture due to falls.^{8,11,33} An updated Cochrane Review [Level 2a evidence]³⁴ concludes that hip protectors reduce the risk of hip fractures within targeted populations at high risk of sustaining hip fractures. However, the true efficacy of such devices is difficult to determine due to the quality of studies completed to date.³⁴ The generalizability of results beyond high-risk populations and the cost-effectiveness of use are unclear. Poor user acceptance and compliance, due to discomfort and impracticality, remain problematic. Only 25% of users will wear hip pads consistently.^{8,33}

30. Screening and appropriate treatment for osteoporosis can reduce the risk of fracture, if falls do occur.^{2,35,36} (See the National Guideline Clearing House at www.guideline.gov and Mar/2003 FMPE Module on Osteoporosis & Fragility Fractures.)

Case 1: Grace L., age 82, female

Part 1

How could you quickly assess Mrs. L.'s risk of falling during the next 12 months?

The quickest way is to *ask her if she has fallen* in the past year (Info point 13), because a prior fall is the best predictor of another fall (Info point 5). Based exclusively on age (>80), Mrs. L.'s risk of falling in the next year is at least 50% (Info point 5).

Part 2

How could you more thoroughly assess her risk of repeat falls?

At least 50% of fallers will fall again in the subsequent 6 to 12 months (Info point 5). This risk compounds Grace's age-related risk. Thus, she is at very high risk of falling again.

A structured falls assessment (Appendix 1) can help.

From her history, you know that a significant number of risk factors are present: (Table A)

- more than 3 prescription medications
- visual impairment (cataracts)
- difficulty navigating stairs
- stress incontinence
- increased risk due to level of activity (e.g., bus travel)

The next stage in assessing her risk of falling involves finding out whether she:

- has any balance or gait difficulties (easily assessed with the Get-Up-and-Go test, Table B)

THE BOTTOM LINE (Appendix 2)

The best way to reduce the impact of falls in the elderly is to reduce the number of falls. To help reduce the serious health impact of falls:

- T** Ask seniors about a history of falls and near-falls at every opportunity.
- T** At the visit at which you learn about a fall, focus on:
 - the details of the fall
 - medication history
 - exam (especially vitals with postural BP and Get-Up-and-Go test)
- T** Systematically **assess** risk factors for future falls, implement interventions selectively, and arrange specific **follow-up** visits.

- is experiencing any orthostatic hypotension assessed by means of history, and by supine/standing blood pressure measurements (Table E).

Part 3

What would you look for in the Get-Up-and-Go test?

The Get-Up-and-Go test provides information on a variety of levels (Info points 14, 15; Table B).

- strength and balance (difficulty standing up unassisted, walking, turning, or sitting down unassisted)
- gait and balance (difficulty walking, stopping, or turning)
- cognitive function (difficulty interpreting or following your instructions)
- hearing impairment (difficulty hearing your instructions)

What could you recommend, to help reduce her risk of falling again?

Consider the following interventions for Mrs. L. (see Appendix 1):

- Suitable adjustment of her medications.
 - Try reducing her anti-hypertensive agents if your check for orthostatic hypotension reveals a problem. (Also recommend adequate hydration, hand clenching or ankle pumps (gentle flexion and extension of the ankle, with the leg elevated), pressure stockings, and/or elevating the head of her bed.)
- Reassess her level of visual impairment and possibly make a referral.
- Although Mrs. L. has not yet fallen at home, it would be useful to recommend an environmental assessment, beginning with a handout for her to review (preferably together with a family member) and to act on.
- Correct urinary incontinence, if possible, or make a referral.
- Discuss cautions involved with:
 - riding in elevators (e.g., doors closing too quickly, or with too much force; elevator not stopping level with hallway; jarring due to rapid, uneven, or emergency stops)
 - riding on the bus (e.g., falling while she is getting on or off, or if the vehicle speeds up or slows while she is standing)

Schedule a follow-up appointment 1 to 2 months from now—to review her “falls status” and her Get-Up-and-Go test, assess the impact of any medication or dietary changes, and review prevention strategies.

Case 2A: Alice M., age 88, female

What specific concerns would you have if Mrs. M. falls again?

Her risk of falling again during the next year is more than 50%, due to multiple risk factors (Info point 5, Table A). Given her advanced age and likely osteoporosis, Mrs. M. has a risk of fracturing a hip, if she does fall, that is greater than the average 1-2% risk of all seniors who fall (Info point 2).

How could you more thoroughly assess her risk of falling?

As in the previous case, use of the Get-Up-and-Go test is indicated (Table B, Appendix 2).

Mrs. M.’s intrinsic risk factors (Table A) include:

- non-modifiable demographic factors (age >80, female sex, history of falls and near-falls)
- cardiovascular factors (postural systolic pressure drop of 20 mm Hg) that may be modifiable through medication adjustment or other means
- mobility factors (e.g., unsteady gait; muscle weakness; osteoarthritic changes that are likely contributing to the hip flexor weakness and may contribute to a fall in the event of a flare-up) that are potentially modifiable through appropriate balance and strengthening exercises.

Mrs. M.’s extrinsic risk factors (Table A) include improper footwear (ill-fitting shoes with a heel) and medications (a diuretic and a psychoactive drug). Environmental hazards (e.g., carpet transitions) may also be present. Hip protectors might be considered, since Mrs. M. is at high risk (previous fall and osteoporosis), but she may not be able to use them consistently (Info point 29).

A home environmental assessment, conducted by an Occupational Therapist, would be invaluable.

How would you manage her situation?

A medication review is in order, specifically focussed on Mrs. M.’s diuretic and antidepressant regimens (Info point 25; Table D).

The first step would be to get rid of the anticholinergic tricyclic antidepressant medication. If Mrs. M. still requires anti-depressant treatment, replacing the tricyclic with a newer agent, such as an SSRI, that has less anticholinergic activity might be helpful. Another option would be a switch to venlafaxine (Effexor®), which has tricyclic-like properties without postural changes. Since the patient responded to a tricyclic in the past, the chance is good that her depression would respond well

to venlafaxine. The downside is that it might increase her blood pressure.

Given a supine systolic blood pressure of 125 mm Hg and a significant postural drop, another consideration would be reducing hypertensive agents. This could initially involve halving the diuretic dose, then making further adjustments based on the outcome. If blood pressure control is inadequate or if orthostasis persists with the lower dose, consider stopping (with close blood pressure monitoring) or switching to an alternative agent. All anti-hypertensives can cause postural hypotension, so consider other measures (adequate hydration, elevate head of bed, rise slowly, do leg exercises before getting out of bed, etc.)

Environmental interventions would be the next priority (Info point 18,22; Table D). Ideally, this would involve a home assessment by an Occupational Therapist. If referral is either not feasible or involves a long wait, providing Alice and her daughter a suitable handout could be an effective initial intervention (Patient Information Sheet, "Do a home safety check").

Encourage Mrs. M. to wear more suitable footwear. Referral to a specialized shoe store that will fit walking shoes could be helpful, because concern about the aesthetic features of more "sensible" footwear may cause resistance to change. If she continues to have balance problems, a recommendation to use a walker would be appropriate, given her history of multiple falls and near-falls.

Referral for exercises to strengthen her lower limbs and improve her balance (e.g., strength and balance training, Tai Chi) would reduce her long-term risk of falls, and help counteract the effects of arthritis and osteoporosis (Info point 28).

Alice is already taking adequate vitamin D and calcium supplements, but she would likely benefit from bisphosphonate treatment if she could tolerate the likely side-effects (Info point 30).

Finally, a follow-up appointment is indicated within the next few months, to review Alice's history and repeat the Get-Up-and-Go test (Table B), as well as assess the impact of medication changes and other risk reduction strategies.

Case 2B: Brenda W. (Alice's daughter), age 66, female

How could you advise Brenda?

It would be helpful to:

- a. Acknowledge that her concerns are well-founded, regardless of any possible genetic predisposition.
- b. Explain that she can use lifestyle measures to help delay problems, and then provide education about such measures. Have her do the Get-Up-and-Go test. Brenda is entering the higher risk category for falls. Using this test now will quickly provide a baseline from which to assess Brenda's status on an ongoing basis, and get her accustomed to being asked to do the test at later visits. It could even reveal the presence of subtle impairments already present.

Lifestyle recommendations for Brenda could include:

- participating regularly in balance and strength exercises and activities
- avoiding high-risk activities
- wearing suitable footwear
- maintaining an appropriate diet (including adequate vitamin/mineral intake)

She also could do an environmental assessment on her own home (which would be beneficial when her mother visits).

Case 3: Mr. Bert I., age 76, male

What would you do today, to help prevent Mr. I. from falling again?

Mr. I.'s confusion is a new issue that requires prompt attention. Until it resolves, he will remain at high risk of further falls—and resulting serious injury (Table A). Confusion combined with misinterpretation of environmental noises or lighting can cause agitation, which further increases the risk of falling.

A medication review would be the first priority. Mr. I.'s underlying problem is cognitive impairment and confusion that may well have been induced or exacerbated by his psychoactive medications. Benzodiazepine use is a significant risk factor for falls (Tables A and D), and can cause disinhibition and delirium in patients with dementia. Dimenhydrinate and other medications with anticholinergic activity can increase confusion and cause delirium in the elderly (especially for those with cognitive losses).

Immediate management: recommend that he discontinue dimenhydrinate and start tapering the benzodiazepine (Info point 25); administer the Get-Up-and-Go test (Info point 14, Table B); check for postural hypotension.

Short-term management would also involve a follow-up visit (during the next few days) to allow you to:

- conduct a structured risk assessment, including cognitive assessment
- reinforce the importance of tapering oxazepam
- rule out depression as a contributor to sleep impairment

Consider prescribing a low dose of an atypical neuroleptic such as olanzapine (Zyprexa®) or risperidone (Risperdal®) at bedtime if you think his nightmares may involve hallucinations/psychosis.

Arrange for a home/environmental assessment, if resources are available.

Would you be concerned about his wife's risk of falling?

By virtue of age alone (74 years), Mrs. I. is at risk of falling and being injured (Info point 2). Her efforts to help deal with Mr. I.'s confusion and anxiety, stop a fall, or recover from one, adds to her risk. His condition is interfering with her sleep, which further increases her risk of falling.

Therefore, you might schedule a follow-up visit for her, to allow you to: determine her fall history and baseline Get-Up-and-Go test status; assess her risk factors for falling; and assess her emotional health.

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While every care has been taken in compiling the information contained in this module, the Program cannot guarantee its applicability in specific clinical situations or with individual patients. Physicians and others should exercise their own independent judgement concerning patient care and treatment, based on the special circumstances of each case. Anyone using the information does so at their own risk and releases and agrees to indemnify The Foundation for Medical Practice Education and the Practice Based Small Group Learning Program from any and all injury or damage arising from such use.

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Companion materials to this module, entitled **Seniors' Guide to Falls Prevention**, have been created especially for seniors, and are available for downloading free of charge at:

www.medicine.uottawa.ca/family/eng/presentation.html

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We encourage you to direct your questions and comments to the clinical discussion bulletin board on our website: www.fmpe.org

Grades of Recommendation based on quality of evidence²⁸

Grade	Source of results
Grade A	Single RCT in which the lower limit of the confidence interval (CI) for the treatment effect exceed the minimal clinically important benefit.
	Meta-analysis of RCTs in which the treatment effects from individual studies are consistent, and the lower limit of the CI exceeds the minimal clinically important benefit.
	Meta-analysis of RCTs in which the treatment effects from individual studies are widely disparate, but the lower limit of the CI exceeds the minimal clinically important benefit.
Grade B	Single RCT in which the CI for the treatment effect overlaps the minimal clinically important benefit. The point estimate is clinically important.
	Meta-analysis of RCTs in which the treatment effects from individual studies are consistent and the CI overlaps the minimal clinically important benefit. The point estimate is clinically important.
	Meta-analysis of RCTs in which the treatment effects from individual studies are widely disparate, and the CI overlaps the minimal clinically important benefit. The point estimate is clinically important.
Grade C	Expert opinion
Not graded	Studies in which the point estimate was not deemed to be clinically important. Studies in which it was not possible to calculate an estimator.

Adapted from: Cook DJ, Guyatt GH. Clinical recommendations using levels of evidence for antithrombotic agents. *Chest* 1995;108(4):S:227-223.

LEVELS OF EVIDENCE

Level of Evidence	Therapy/Prevention	Prognosis	Diagnosis
1a	Systematic review or meta-analysis of well-designed randomized trials using explicit criteria for inclusion and including adequately large total numbers	Systematic review (with homogeneity) of inception cohort studies <i>or</i> a CDR (clinical decision rule or guide) validated in different populations	Systematic review (with homogeneity) of Level 1 diagnostic studies; or a clinical decision rule validated in different clinical centres
1b	Large randomized trials with clear-cut results (and low risk of error)	Individual inception cohort study with ≥80% follow-up	Study with independent blind comparison of an appropriate spectrum of consecutive patients
1c	<i>All or none</i> case-series	<i>All or none</i> case-series	<i>Absolute</i> positive specificity (rules in diagnosis) <u>or</u> negative sensitivity (rules out)
2a	Systematic review or meta-analysis of well-designed randomized trials using explicit criteria for inclusion but still with moderate risk of error (e.g., often with subgroup analysis). Systematic review of cohort studies with homogeneity	Systematic review (with homogeneity) of retrospective cohort studies <i>or</i> untreated control groups in RCTs	Systematic review (with homogeneity) of diagnostic studies at 2b level
2b	Small RCT with moderate to high risk of error [low power]: a. Trial with high false-positive (α) error—interesting positive trend that is <i>not</i> statistically significant. b. Trial with high false-negative (β) error—a ‘negative’ trial that could not exclude the real possibility of a clinically important benefit or difference because of small numbers. Individual well-designed cohort study	Retrospective cohort study <i>or</i> follow-up of untreated control patients in an RCT <i>or</i> CPG not validated in a test set	Any of: • Independent blind or objective comparison; • Study performed in a set of non-consecutive patients, or confined to a narrow spectrum of study individuals (or both), all of whom have undergone both the diagnostic test and the reference standard; • A diagnostic CDR not validated in a test set
2c	Audit <i>or</i> “Outcomes” Research	Audit <i>or</i> “Outcomes” Research	
3a	Systematic review of case-control studies with homogeneity	Prospective or retrospective cohort study of adequate size, but with some limitations in methodology	Systematic review with homogeneity of 3b studies
3b	Individual well-designed case-control study		Study with independent blind comparison of an appropriate spectrum, but the reference standard was not applied to all study patients; Non-consecutive study
4	Case-series; Cohort and case-control studies that lack defined comparison groups and/or did not measure interventions & outcomes in similar and appropriate ways	Poor quality prognostic cohort studies in which sampling was biased or measurement of outcomes achieved in <80% of study patients	Case-control study in which: • Reference standard was unobjective, unblinded or not independent; • Positive and negative tests were not verified using separate reference standards; <i>or</i> • Study was performed in an inappropriate spectrum of patients
5	Expert opinion (individual or committee) without explicit critical appraisal	Expert opinion without explicit critical appraisal, or based on physiology, bench research or “first principles”	Expert opinion without explicit critical appraisal, or based on physiology, bench research or “first principles”

Adapted from Sackett DL. Rules of evidence and clinical recommendations. *Can J Cardiol* 1993;9:487-489 and NHS Research and Development Centre for Evidence-Based Medicine 2001.

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Appendix 1: Assessment and management checklist for community-living seniors who have fallen¹²

Patient Name: _____

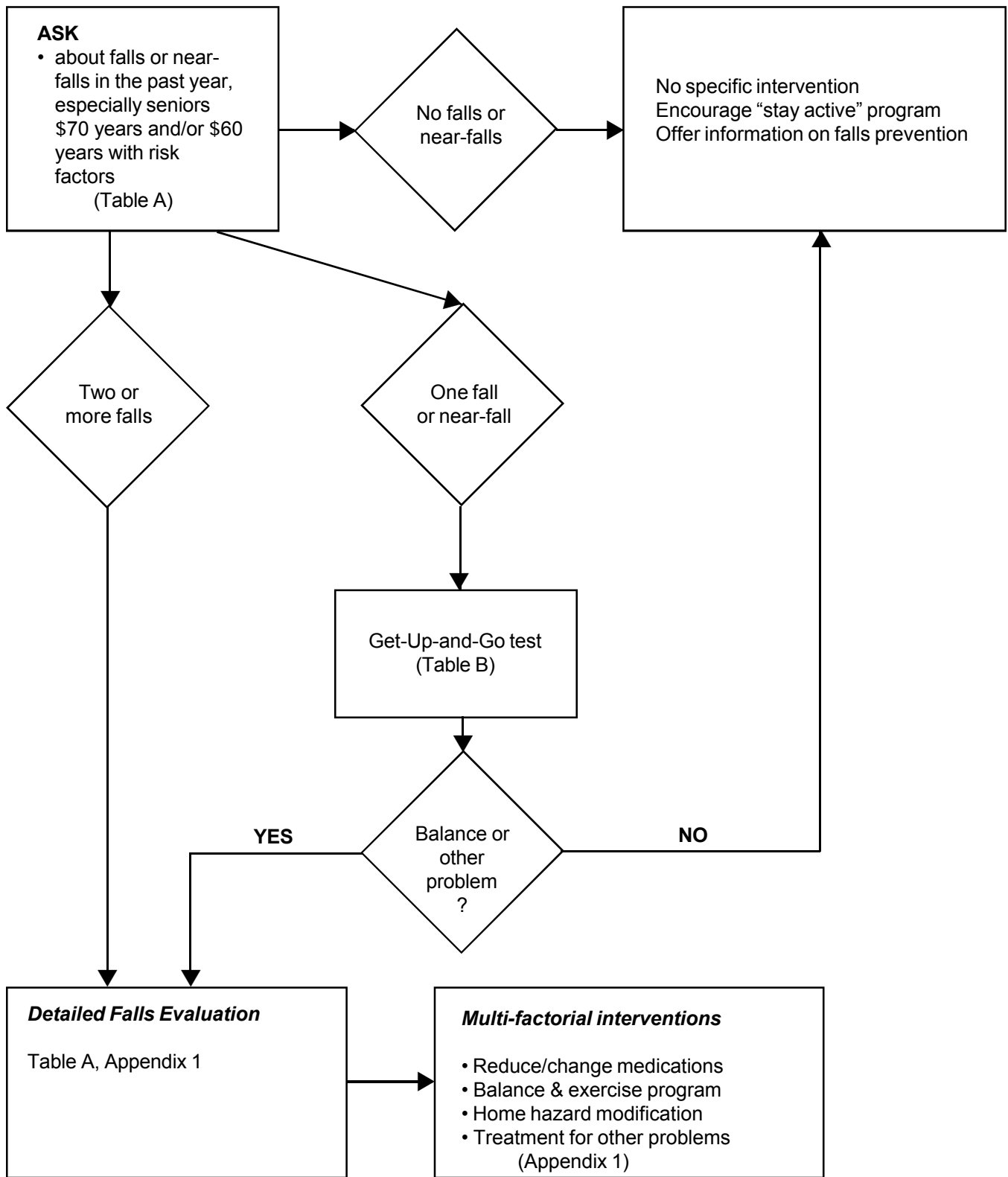
Date: _____

Assessments		Important factor(s) to consider (<i>T</i> if present)	Management approach	Comments
History & Subjective	Medical history	<ul style="list-style-type: none"> ' -acute illness ' -chronic condition (especially neuro-muscular) 	<ul style="list-style-type: none"> ' -investigate etiology ' -treat, as appropriate 	
	Medication profile	<ul style="list-style-type: none"> ' -more than 3 prescription medications ' -psychoactive medication ' -recently-added medication 	<ul style="list-style-type: none"> ' -adjust as appropriate ' -especially try to reduce or discontinue psychoactive drugs 	
	Alcohol use	<ul style="list-style-type: none"> ' -every day or >2 drinks per day 	<ul style="list-style-type: none"> ' -educate or refer 	
	Daily activities	<ul style="list-style-type: none"> ' -difficulty performing 	<ul style="list-style-type: none"> ' -refer to Occupational Therapy 	
	Physical activity	<ul style="list-style-type: none"> ' -level too low or excessive ' -type of activity too risky 	<ul style="list-style-type: none"> ' -educate 	
	Environmental risks	<ul style="list-style-type: none"> ' -rugs, stairs, lighting, furniture ' -clothing, footwear, pets 	<ul style="list-style-type: none"> ' -home hazard assessment ' -refer to Occupational Therapy 	
	Social network	<ul style="list-style-type: none"> ' -inadequate 	<ul style="list-style-type: none"> ' -problem-solve 	
Physical & Objective	Cognitive Status	<ul style="list-style-type: none"> ' -Mini-Mental Status Exam score <26 	<ul style="list-style-type: none"> ' -investigate and treat 	
	Depression Status	<ul style="list-style-type: none"> ' -Geriatric Depression Scale score ≥ 6 	<ul style="list-style-type: none"> ' -investigate and treat cautiously 	
	Balance and Gait	<ul style="list-style-type: none"> ' -impaired balance or transfer ' -Get-Up-and-Go ' -slow or unsteady gait ' -low foot swing ' -foot deformity or disorder 	<ul style="list-style-type: none"> ' -investigate ' -refer to Physiotherapy for strengthening, possible gait aid 	
	Strength, coordination, and range of joint motion	<ul style="list-style-type: none"> ' -impaired leg or arm strength ' -impaired coordination ' -limited range of motion in hip, ankle, knee, shoulder, hand or elbow 	<ul style="list-style-type: none"> ' -investigate and treat ' -refer to Physiotherapy 	
	Vitals	<ul style="list-style-type: none"> ' -identify postural hypotension (drop of systolic blood pressure, on standing of ≥ 20 mm Hg or to <90 mm Hg) ' -abnormal heart rate or rhythm ' -abnormal respiratory rate ' -elevated temperature 	<ul style="list-style-type: none"> ' -investigate etiology ' -treat and/or adjust medications ' -educate 	
	Vision and hearing	<ul style="list-style-type: none"> ' -visual impairment ' -diminished hearing 	<ul style="list-style-type: none"> ' -treat and educate ' -refer as needed 	

If no specific factors are identified:

- ' - age >65, male or female (request environmental assessment and follow-up by Occupational Therapy
(arrange for balance exercises (Tai Chi movements or equilibrium control exercises on firm foam surface)
- ' - age >74, male or female (arrange periodic disability questionnaires
(manage any increase in disability)
- ' - age >80, female (arrange for individual in-home physiotherapist-led program (4 visits over 2 months) of strengthening, balance and flexibility exercises
(regular encouragement by telephone)

Appendix 2. Clinical Algorithm for Falls in the Elderly



Appendix 3: RESOURCES FOR PHYSICIANS & SENIORS

Veterans Affairs Canada

Falls Initiative
Fact Sheets

www.vac-acc.gc.ca/clients/sub.cfm?source=health/fallsp/fallprevbroc
www.vac-acc.gc.ca/clients/sub.cfm?source=health/fallsp/factsheets

An Inventory of Canadian Programs of the Prevention of Falls Among Seniors Living in the Community

The Division of Aging & Seniors, Health Canada

www.hc-sc.gc.ca/seniors-aines/pubs/inventory/intro_e.htm

A Best Practices Guide for the Prevention of Falls Among Seniors Living in the Community

Health Canada

www.hc-sc.gc.ca/seniors-aines/pubs/best_practices/intro_e.htm

Physical activity handbook for older adults

Health Canada

FREE by calling 1-888-334-9769 or at
www.hc-sc.gc.ca/hppb/paguide/older/pdfs/guide_handbook.pdf

Good Living and Independence—That's the Ticket for Aging Canadians

Canada Safety Council

www.safety-council.org/info/seniors/fallprev.html

Falls Prevention Guide for Seniors—Shedding Light on Falls

North York Coalition for Seniors' Falls Prevention

www.sunnybrook.utoronto.ca/~csia/Falls&Mobility/fallsmain.htm

MedlinePlus Health Information

www.nlm.nih.gov/medlineplus/falls.html

Seniors Canada On-line

www.seniors.gc.ca/index.jsp

Centers for Disease Control and Prevention

www.cdc.gov/ncipc/duip/spotlite/falfacts.htm

The American Geriatrics Society

www.americangeriatrics.org/education/forum/falling.shtml

Take good care of yourself to reduce your risk of falling!

You can do many things to take care of yourself and help reduce your risk of falling and hurting yourself. **Please check (U) each of the things that you already do**, then review this sheet with your doctor.

Have you fallen in the last year?

“ No “ Yes ◦ Talk with your doctor

Have you had any “near falls” in the last year?

“ No “ Yes ◦ Talk with your doctor

Use your medicines properly

Some medicines can make you dizzy, weak, or drowsy. The more medicines you take, the more they may cause problems.

How many medicines do you take each day? _____

- “ Know why you take each medicine.
- “ Regularly review your prescriptions, over-the-counter and herbal medicines with your doctor or pharmacist.
- “ Take your medicines as directed.
- “ Tell your doctor about any side effects.
- “ Choose low, safe limits for alcohol.

Watch out!

People who cannot see properly are more likely to fall.

- “ Talk to your doctor about any changes in your vision or hearing.
- “ Have good lighting in all entrances, hallways, rooms and stairways.
- “ Use night lights in your bedroom, hallway and bathroom.
- “ When the lighting changes, let your eyes adjust before you walk.
- “ Do not wear reading glasses (especially bifocal or multifocal glasses) when walking.

Eat well

- “ Avoid missing meals, as this can cause weakness and dizziness.
- “ Eat a balanced diet to keep up your muscle and bone strength.

Keep up your balance and strength

- “ Tell your doctor about changes in your balance or strength.
- “ Have your blood pressure checked regularly, and follow your doctor’s advice.
- “ Get up slowly after sleeping or sitting — to avoid getting dizzy.
- “ Tell your doctor about aches and pains that affect your walking.
- “ If your doctor has asked you to use a walking aid, use it all the time.

Maintain a healthy lifestyle

- “ Get regular exercise (30 to 60 minutes of moderate activity most days is best).
- “ Walk every day if possible.
- “ Take an exercise class/program to keep strong the muscles you use to walk and lift with. (Check at your local seniors’ centre or recreational department.)
- “ Keep your joints flexible with gentle heat, massage, or exercise such as Tai Chi or yoga.
- “ Consult *Canada’s Physical Activity Guide to Healthy Active Living for Older Adults* for more information (Get a FREE copy at 1-888-334-9769 or www.paguide.com).



Do a home safety check to reduce your risk of falling

You can do some simple things to stay safe in your home and outside, and to help reduce your risk of falling and hurting yourself. *Please check (U) each of the things that you already do.* Try to get a **U** in each box! Then, try to change your habits for any empty boxes.

Personal safety

- “ Avoid footwear that is too loose or too tight.
- “ Wear good shoes—with good support, low or flat heels, closed toes, non-slip soles.
- “ Avoid long clothing (such as bathrobes, dressing gowns, nighties, or winter coats) that can interfere with walking.
- “ Ask for help with tasks that you may not be able to do safely.
- “ If your phone has speed dial buttons, add your emergency numbers.
- “ Rent a personal response and support service (an emergency HELP button), in case you do fall and can't get up.

Make your bathroom safe

- “ Ask a professional about installing a raised toilet seat and grab bars for your toilet and bathtub.
- “ Use a rubber bath mat or other non-slip surface in your bathtub or shower.
- “ Use a bath seat for extra safety.
- “ Have your water heater set to a temperature below 49° C (120° F).
- “ Install a night light.
- “ Use liquid soap instead of slippery bar soap.
- “ Have good bathroom and hall lighting.

Make the rest of your home safe

- “ Keep floors and stairs clear of clutter.
- “ Don't climb on stepladders, step stools, chairs, or other objects.
- “ Wipe up spills right away.
- “ Keep electrical and phone cords away from where you walk.
- “ Use a cordless phone.
- “ Buy rugs with a nonskid backing (or fasten them to the floor), and tack the edges.
- “ Install two handrails on your stairs.
- “ Store things that you use often at a comfortable height, so you don't have to bend or stretch too much to get them.
- “ Watch out for pets lying in or crossing your path when you stand up or walk.
- “ Use night lights in your bedroom, hallway and bathroom.

Stay safe outdoors

- “ Plan ahead and don't rush.
- “ Install railings by your entrance.
- “ Make sure your entrance is well-lit.
- “ Avoid going outside in poor weather or when sidewalks are not clear and dry.
- “ Avoid busy traffic times, and cross at traffic lights.
- “ Avoid walking in poorly lit areas.
- “ Let your eyes adjust to changes in lighting; wear sunglasses on sunny days.





Be active! Be healthy! Feel fit! Stay safe!

Why stay active?

It's important to stay active as you age. Lack of activity can be as bad for you as smoking!

Physical activity will help you stay healthy, feel better, have more fun, and be more independent. It will help you keep your bones and muscles strong, reduce aches and pains, and improve your balance and mobility. It will also lower your risk of falling—and of having a serious injury if you do fall.

What activities are best?

Be active and be careful. Some activities may be safe for someone else, but not for you. *Canada's Physical Activity Guide to Healthy Active Living for Older Adults* provides good advice on how to stay safe while you get more active. Your doctor or a fitness, healthcare or recreation provider can also help you find activities that improve your strength, flexibility, and endurance without being hurt.

Strength and balance activities include things you may already do regularly such as carrying groceries and laundry, climbing stairs, and standing up from your chair! (Next time you stand up from your chair, sit down and stand up several times before walking away.) They also include simple things that you can do at home, such as wall push-ups and lifting cans of food—or you can take a formal weight-training class.

Flexibility activities include stretching, bowling, dancing, gardening, golf, Tai Chi

and yoga. Chores like mopping the floor, washing your car, and yard work count too!

Endurance activities include dancing, walking and swimming. Cross-country skiing, cycling, hiking and skating may be appropriate for some people.

How do I avoid injuries?

- Start any new activity slowly and build up gradually. You may want to increase your activity level as your fitness improves. But don't increase what you do by more than 10% each week.
- Use the right equipment. Start with shoes suited to your activity. And wear whatever other safety gear is appropriate (such as a helmet if you cycle).
- If you use any equipment, such as a bike, rower, or treadmill, make sure it's in good working order and adjusted for your safety and comfort.
- Warm up before you exercise. An easy way to do this is to walk at your normal pace while you emphasize your arm swing.
- Aim for 30 to 60 minutes of moderate activity every day. Break it up into periods of 10 to 15 minutes if you need to.
- Vary your routine, to exercise different muscles and avoid getting bored. Maybe you can walk one day, and swim the next.
- Listen to your body. If you experience severe pain or swelling, STOP and get professional advice.

Get a FREE copy of *Canada's Physical Activity Guide to Healthy Active Living for Older Adults*, at 1-888-334-9769 or www.paguide.com