Appendix G: Interventions for Falls Prevention and Injury Reduction

Tables 14, **15**, **16**, and **17** summarize evidence on specific falls prevention and injury reduction interventions. These tables include findings on a wide variety of interventions for falls prevention and/or injury reduction. The following interventions had larger bodies of evidence and have their own recommendations: environmental modifications (ensuring safe environment), exercise, medication management, rounding, vitamin D, education of the person at risk for falls, and hip protectors. For these interventions, references to the recommendation numbers are provided.

The tables are divided according to interventions with strong evidence (**Table 14**), potential benefit (**Table 15**), mixed findings (**Table 16**), and insufficient evidence (**Table 17**). Within each table, the interventions are organized in alphabetical order. When available, information is provided on the settings where research was conducted. Health-care providers must use their clinical judgment to determine whether particular interventions apply to their setting. The tables can be used to assist with deciding whether or not to initiate or continue to offer these interventions for falls prevention or injury reduction.

Table: 14: Interventions Supported by Strong Evidence

INTERVENTION	DESCRIPTION	RESEARCH FINDINGS
Environmental modifications	Providing universal falls precautions, modifying equipment and physical/ structural environment	See Discussion of Evidence for **Recommendation 5.1** on universal falls precautions, and modifying equipment and other factors in the physical/ structural environment
Exercise interventions and physical training	A range of interventions that address falls risk factors and help to prevent falls	See Discussion of Evidence for **Recommendation 2.5** and **Appendix H** on exercise interventions and physical training.
Footwear	Type of footwear worn and its association with falls	Findings within one strong review of community-based interventions found that anti-slip shoe devices reduce falls in icy conditions (Gillespie et al., 2012). Evidence from one moderately rated review on healthy older adults (unspecified setting) found: ■ thin, hard-soled footwear with high collars (surrounding the ankle region) may reduce risk of falling; ■ insoles with vibrating or magnetic features may improve balance; ■ high heels (> 2.5 cm) are associated with increased falls risk; and ■ shoes with thick, soft materials in midsole may cause instability (Aboutorabi et al., 2016).

INTERVENTION	DESCRIPTION	RESEARCH FINDINGS
Multi-faceted podiatry care	Podiatry care, including: footwear assessment, customised insoles, and foot and ankle exercises	One large trial of community-dwelling older adults within a strongly rated review found that multi-faceted podiatry care among people with disabling foot pain reduced falls (Gillespie et al., 2012).
Pacemakers	Device used to control heartbeat	Findings within one strong review of community-based interventions found that pacemakers reduced falls among those with sudden changes in heart rate and blood pressure (Gillespie et al., 2012). Pacemakers are also recommended in one strong guideline for people with cardio-inhibitory carotid sinus hypersensitivity (causing dizziness and fainting) and those who have unexplained falls (NICE, 2013).
Whole-body vibration for postmenopausal women	An anti-osteoporotic treatment for postmenopausal women that involves a vibration transmitted to the person through a vibrating platform on which she stands	One moderate review found that whole-body vibration appears to increase muscle strength and balance, and reduce falls and fractures among postmenopausal women (Ma, Liu, Sun, Zhu, & Wu, 2016).

Table 15: Interventions with Potential Benefit

INTERVENTION	DESCRIPTION	RESEARCH FINDINGS
Cognitive–motor interference	Training for the performance of two simultaneous tasks (a cognitive and a motor activity) to prevent falls	According to one moderate review, cognitive–motor interference was shown to be effective for preventing falls among older adults in the short term (Wang et al., 2015).
Continence management	Addressing incontinence as it relates to risk for falls	One study within a review rated low quality found that a prompted voiding schedule in long-term care, together with physical activity, appeared to reduce falls (Batchelor, Dow, & Low, 2013).
Medication management	Actions to reduce, gradually withdraw, or discontinue medications associated with falling	See Discussion of Evidence for **Recommendation 2.6**.

INTERVENTION	DESCRIPTION	RESEARCH FINDINGS
Medications for people at risk for fracture	Medications (e.g., bisphosphonates used to treat osteoporosis)	One strong guideline provides recommendations on specific medications for people in long-term care at risk of fracture that should and should not be taken. This includes a discussion of risks and benefits, and considerations such as fracture risk, renal function, and ability to swallow (Papaioannou et al., 2015).
Rounding	Checking in on a person to proactively meet their needs	See Discussion of Evidence for **Recommendation 5.3**.
Vitamin D	Vitamin supplementation	See Discussion of Evidence for **Recommendation 2.7**.

Table 16: Interventions with Mixed Findings

INTERVENTION	DESCRIPTION	RESEARCH FINDINGS
Education of the person at risk	Education of people at risk for falls/fall injury	See Discussion of Evidence for **Recommendation 2.2**.
Hip protectors	Shields or foam pads worn to cushion the hip during a fall	See Discussion of Evidence for **Recommendation 2.9**.
Home safety/ home assessment	Examples include assessment of home hazards, adaptation to home	One review rated low quality found that a pre-discharge home assessment visit (usually conducted by an occupational therapist) reduced the risk of falling, especially among people with a history of falls (Lockwood, Taylor, & Harding, 2015). According to one strong and moderate review and one strong guideline, there is lack of evidence demonstrating that home modifications/reducing home hazards reduces falls (Stubbs, Brefka, et al., 2015; Turner et al., 2011; U.S. Preventive Services Task Force, 2012). One strong review and one strong guideline suggest that home safety interventions are most appropriate for people at high risk for falls (e.g., those who have fallen) and when delivered by an occupational therapist (COT, 2015; Gillespie et al., 2012) or other trained professional (NICE, 2013). If home hazard assessment is conducted, it must be paired with interventions and follow-up to be effective (NICE, 2013).

INTERVENTION	DESCRIPTION	RESEARCH FINDINGS
Vision interventions	Including assessments, vision correction, cataract surgery	Vision assessment and referral for correction of visual impairment may help reduce falls if combined with other interventions, according to a strong guideline and a review rated low quality (NICE, 2013; Zhang, Shuai, & Li, 2015). However, two strong guidelines state that there is insufficient evidence demonstrating benefit of vision correction among community-dwelling older adults (NICE, 2013; U.S. Preventive Services Task Force, 2012). Single-lens glasses (versus multifocal lenses) may reduce falls for people who spend a great deal of time outdoors and are not frail, according to a strong review (Gillespie et al., 2012). One moderate review found limited evidence on the effectiveness of cataract surgery to reduce falls (Stubbs, Brefka, et al., 2015); however, a strong review reports a reduction in falls among women who had cataract surgery on the first affected eye (Gillespie et al., 2012).

Table 17: Interventions with Insufficient Evidence

INTERVENTION	DESCRIPTION	RESEARCH FINDINGS
Antimuscarinic medications	Medications used to treat overactive bladder and urinary urgency	The association between the use of antimuscarinic medications and falls risk is unclear, according to one low quality review (Hunter et al., 2011).
Falls detection technology (e.g., personal alarms around the neck or sensors that detect changes movement in the home)	Devices that distinguish falls from activities of daily living and then contact authorities who can quickly assist the individual if a fall has occurred	There is insufficient evidence to determine the effectiveness of falls detection technologies on falls prevention, early falls detection, or fear of falling, according to moderate review of people living in the community (Pietrzak, Cotea, & Pullman, 2014a). Some evidence has reported that these technologies may increase older adults' confidence, feelings of safety (Hawley-Hague, Boulton, Hall, Pfeiffer, & Todd, 2014; Pietrzak et al., 2014a; Stewart & McKinstry, 2012), and independence (Hawley-Hague et al., 2014). Considerations for acceptability include: reliability, ease of use, cost, control (e.g., ability to cancel false alarm), and privacy (Hawley-Hague et al., 2014; Pietrzak et al., 2014a). Technologies are generally acceptable among older adults if safety is a major concern (Hawley-Hague et al., 2014; Pietrzak et al., 2014a).

INTERVENTION	DESCRIPTION	RESEARCH FINDINGS
Low-height beds	A low-positioned bed intended to reduce kinetic energy of a fall and reduce injury	Common universal falls precautions include the use of low height beds (see **Appendix K**). There is little evidence for or against the use of low-height beds to prevent fall injury in hospital settings, according to one strong review (Anderson, Boshier, & Hanna, 2012).
Manual therapy	Hands-on techniques by therapists (e.g., chiropractor, physiotherapist) that address risk factors, such as postural stability and balance	There are limited and inconclusive research findings on the use of manual therapy to reduce falls, according to a moderate review (unspecified setting) (Holt, Haavik, & Elley, 2012).
Nutritional interventions or supplementation	Various interventions used to optimize nutrition	Findings cannot conclude that supplementation reduces the risk for falling, according to one strong review for community-dwelling older adults (Gillespie et al., 2012). There is insufficient evidence for or against the use of protein supplementation to prevent falls (U.S. Preventive Services Task Force, 2012). Multicomponent nutrition interventions (e.g., availability of snacks, food choice, extended meal times) may contribute to falls prevention efforts in long-term care, according to one low quality review (Wallis & Campbell, 2011).
Psychological interventions	Cognitive behavioural interventions, including feedback, counselling, and education discussions	Cognitive behavioural interventions have not been shown to reduce falls among community-dwelling older adults, according to one strong review (Gillespie et al., 2012). This is particularly true when falls risk status is unknown, according to a strong guideline (NICE, 2013). For community-dwelling older adults who are at risk for falls or are fearful of falling, one strong guideline recommends assessing fear of falling and falls risk and supporting activities that enable realistic risk-taking (COT, 2015).

INTERVENTION	DESCRIPTION	RESEARCH FINDINGS
Sensors (e.g., chair alarms, bed alarms, and wearable sensors)	Devices that detect and alert patients and staff about movements (e.g., getting out of bed or rising from a chair) so that staff can anticipate or prevent a fall	There is mixed or insufficient evidence regarding the benefits of bed exit alarms in hospital or long-term care, according to reviews rated strong and low quality. Challenges with the use of sensors include false alarms, staff desensitization to alarms, and staff relying too heavily on alarms (Anderson et al., 2012; Kosse, Brands, Bauer, Hortobagyi, & Lamoth, 2013). The use of alarms requires staff training and prompt reaction time (Kosse et al., 2013). Note: Health-care providers need to be aware of sector-specific legislation, regulations, or policies related to restraint use that may apply to the use of alarms.
"Sitter"/constant observation	Continuous observation for people at high risk for falls	There is mixed evidence demonstrating that sitters reduce falls in acutecare settings, according to a low quality review (Lang, 2014).
Walking frames (walkers), assistive devices	Devices used to assist with mobility	A strong guideline suggests that assistive devices may be used together with other interventions to prevent falls (Papaioannou et al., 2015). Advice and instructions on the use of assistive devices are recommended in one guideline (COT, 2015). According to one low-quality review, evidence on walking frames neither proves nor disproves their effectiveness in the prevention of falls or their role in contributing to falls; the effect on posture and balance is unclear (O'Hare, Pryde, & Gracey, 2013).