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Falls Prevention in the Elderly: A Review of Strategies for Protection in Old Age

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Abstract
A vast majority of the disability and mortality cases in older persons are as a result of falls. These falls are quite common, affecting 1 in 4 older adults. They also predispose this high-risk population to fractures, reduce their mobility, affect their independence, and result in hospital admissions and even deaths. Falls can occur due to extrinsic factors like unsafe environments, and intrinsic factors like chronic diseases, gait and vision problems, sarcopenia, and polypharmacy. To prevent first-time falls and recurrent falls, proper evaluation of fall risk assessment is important in the identification and correction of these risk factors. This is also where strategies such as exercise, home interventions, review of medications, eliminating hazards, and technologies come in. These strategies can either be used solely, or combined, with each option yielding different results in reducing fall risk and occurrence/recurrence. This narrative review highlights key evidence on falls, fall prevention strategies, and the need for patient-focused innovation to improve the health of older adults and promote safe aging in our communities.

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Introduction

A fall is an event where a person drops to the ground or a level lesser than their original position unintentionally (Stefanacci & Wilkinson, 2025) [53]. Tinetti *et al*. (1998) [54] further explained that an event where someone inadvertently drops to the ground or a lower standpoint, can only be called a fall if it is not caused by any major intrinsic factor like stroke or an overwhelming hazard.

The above definitions broadly encompass a range of events that may not typically be regarded as falls. Hence, there are modifications to this definition with new studies and trials. For example, the Atlanta Frailty and Injuries Cooperative Studies of Intervention Techniques (FICSIT) trial, described falls as all events excluding stumbles leading to a person unexpectedly ending on the ground, or any lesser orientation different from the original position (Wolf *et al*., 1996) [57].

However, for research purposes, the definition with the most contextual relevance and consistency with categories and types of events is in the ninth revision of the International Classification of Diseases (ICD). This definition summarizes that falls are an accidental event where a person drops to the ground from either the same level or somewhere higher (World Health Organization, 1977) [58].

In persons aged 65 or older, falls happen to be the seventh highest cause of deaths and the foremost cause of deaths related to injuries (Colón-Emeric *et al*., 2024) [11]. They are major public health concerns in terms of health indicators (Rizzo *et al*., 1998) [47]. They can also lead to disabilities, which may jeopardize the independence of older persons and their contributions to society, leading to socioeconomic consequences.

This is seen in the medical costs and cost of social services in the U.S., as over $50 billion is spent on rehabilitation and treatment of falls (Centers for Disease Control and Prevention, 2016) [7]. In the U.K., the yearly cost of fractures caused by falls in the elderly is estimated at £4.4 billion, and the cost of neglected fall hazards in homes on the National Health Service (NHS) is about £435 million (Department of Health and Social Care, UK, 2022) [14].

Epidemiology: The Global Fall Crisis

Annually in the U.S., over 1.4 million people from 65 years and above report falling, and this amounts to a total of about 3.6 million cases of falls yearly (Centers for Disease Control and Prevention, 2025) [8]. These cases in the elderly are not limited only to those who stay by themselves or with relatives. Choi *et al*. (2019) [9] explain that the occurrence of falls in nursing facilities for the elderly has also increased by 50%.

In England, about 33% of people from 65 years and above, and 50% of the population of adults aged 80 years and above, experience one or more falls annually. Narrowing it further, cases of falls of older persons on hospital admissions are the most commonly reported patient incidents among older adults, with over 240,000 cases in both England and Wales (Department of Health and Social Care, UK, 2022) [14].

A fall can affect both physiological and cognitive functions of an older adult, sometimes leading to death, injury, or a reduction in functionality, further affecting their independence. Some older adults experience a post-fall psychological response, described as "fear of falling," characterized by a fear of doing activities such as walking or leaving the comfort of their homes (Giovannini *et al*., 2022) [22].

The death rate as a result of falls has also been increasing exponentially. Falls are the second highest cause of injury-causing deaths globally, with about 684,000 deaths yearly. There has been a 41% increase in death rate (age-adjusted) from 55.3 per 100,000 adults in 2012 to 78 per 100,000 older adults as of 2021 (Kumar *et al*., 2025) [28].

There are variations in the fall-related death rates among different age groups, races, and genders. A study by Fife (1987) [17] reports in white people from 70 years and above, the incidence of deaths related to falls increases rapidly with age, while fall-related deaths rise less quickly in non-whites, even those aged 75 years and older. Baker *et al*. (1992) [3] also highlight that deaths occurring as a result of falls are more common in men who are 65 years and above than in women of the same age group.

Injuries can occur as a result of falls, and studies show that about 33% of people who are 65 years and above have injuries that require hospitalization following falls, with bone fractures and head trauma being the most common (Choi *et al*., 2019) [9]. Ambrose *et al*. (2015) [1] highlight that 80-90% of bone fractures in the elderly are from these falls.

In England, falls are the number one cause of injuries in people who are 65 years and over, and the ninth highest cause of Disability Adjusted Life Years (Department of Health and Social Care, UK, 2022) [14]. From 2017 to 2018, reports show that there were a total of 220,000 emergency hospitalizations of older persons following a fall, with about 66% of them being 80 years and above (Public Health Outcomes Framework, 2025) [43].

Using places of residence as a criterion to assess fall-related injuries, Luukinen *et al*. (1995) [36] point out that, contrary to what most might assume, injury-causing falls are often twice as common among the elderly in institutionalized nursing settings as in others in community-dwelling populations.

Also, contrary to the incidence of more fall-related deaths in men than in women aforementioned, women are more susceptible to injuries from falls than men (Centers for Disease Control and Prevention, 2006) [6]. This disparity between injuries and deaths points to the differences in health-seeking behaviors of men and women (Rata Mohan *et al*., 2025) [44].

The Underlying Problem Is Not Just Age; Rather, It's Multi-Factorial

Falls are due to several factors, divided into two broad categories namely; intrinsic and extrinsic factors, and age is a precipitating factor for some of them (Deandrea *et al*., 2010) [13]. Aging in the context of old age predisposes older persons to falls solely because of the physical, physiological, and psychological changes that come with it, like worsening of gait, worsening of vision, cognitive problems like dementia, sarcopenia, osteoporosis, slower reaction time, and pace, etc (Lee *et al*., 2013) [31].

Another factor linked to falls in elderly people is the use of multiple medications concurrently also known as polypharmacy. Medications that are especially indicated include psychoactive medications e.g., opioids, anticonvulsants, depressants etc. (Haddad *et al*., 2019) [23]. Polyarthritis presents as chronic musculoskeletal pain among other symptoms, and is a major factor that contributes to the incidence of falls in the elderly (Leveille *et al*., 2009) [32]. Management of chronic musculoskeletal pain is polyarthritis and other conditions require a balance, which is, achieving the desired therapeutic results without using multiple indicated medications.

A primary risk factor which cannot be ignored is a past history of falls, and this is because, if a fall has happened before, it can recur (Dionyssiotis, 2012) [15]. Florence *et al*. (2018) [18] also explain that older adults with a recent history of hospital admissions are quite vulnerable to falls. Another factor that has been noted to be a fall risk in the elderly is Parkinson's disease (Canning *et al*., 2014) [5].

Long term use of antihypertensives is known to cause postural hypotension, and this condition is a factor that can cause recurrent falls (Salari *et al*., 2022) [48]. Mood disorders are also exempted as depression is known to affect gait especially in those 80 years and above, predisposing them to falls (Dragašević-Mišković *et al*., 2021) [16]. Heart disease, diabetes and stroke, together with other chronic diseases are risk factors for falls in the elderly (International Osteoporosis Foundation, 2025) [26].

Lastly, extrinsic factors like unsafe environments, slippery floors, uneven surfaces, poor lighting, and obstacles, when combined with intrinsic factors like visual and gait problems, medication use, or chronic diseases, amongst others, significantly increase falls among elderly people (Deandrea *et al*., 2010) [13].

Single-factor Fall Prevention Strategies

At the core of every strategy for fall prevention is the evaluation of increased risk for falls in the elderly. Amber Huntzinger (2010) [25] underscores this and also the importance of giving priority to elderly people who experienced a fall recently, elderly people who fell twice or more in the last year, and those with injuries from falls, and

gait disorders.

The process of evaluating fall risk in older adults should start with taking a good clinical history. This includes observing and identifying exposure, indications and signs of risk factors such as, a previous history of falls which can cause recurrence of falls, and further consequences like injuries and death in cases of poor management (Ganz *et al*., 2007) [19].

After a good patient history, physical examination follows. It is important that the examinations and history-taking are done by a physician or physiotherapist, and should include examinations of muscle mass, muscle function, gait and balance. Screening tests such as the Short Physical Performance Battery (SPPB) which predicts the possible occurrence or recurrence of falls, can also be used. A total score of less than 10 using the Short Physical Performance Battery (SPPB) denotes a history of falls (de Rekeneire *et al*., 2003) [45]; (Lauretani *et al*., 2019) [30].

The ability of elderly people who are 65 years and above, to stand from sitting at a fixed level, walk a specific distance e.g. 3 metres, and then return to sit at that small level can also be assessed using a tool called the Timed Up and Go (TUG) tool (Podsiadlo & Richardson, 1991) [42]. In addition, prediction of falls in adults can be carried out using the Performance-Oriented Mobility tool (POMA) which ascribes a score of less than 21 to a high risk for falls (Mehta *et al*., 2021) [38].

Other tools that can be used to assess fall risks in the elderly are the Tinetti Gait and Balance Assessment Tools, and the Berg Balance Scale (Gates *et al*., 2008) [20]; (Scott *et al*., 2007) [50]. Park (2018) [40] points out that using one of these screening tests does not screen for fall risk accurately; hence, two or more of these tools should be used to accurately evaluate risks.

Sherrington *et al*. (2019) [51] emphasize that a major prevention strategy that has proven to reduce fall risks in older adults is exercise. These exercises can be home based or performed with a group of people; however, they should be done at least three hours every week (Sherrington *et al*., 2017) [52]. Due to the risk of worsening of chronic conditions like some cardiovascular diseases, it is important that older adults be assessed for these chronic conditions before these exercises are conducted.

Examples of exercise programmes which elderly people can do include the Otago Exercise Programme which is a strength and balance exercise that can be done at home, and LiFE (Lifestyle Interventions and Independence for Elders) exercise plan which is centered around patients' choices and preferences, as well as patients' daily routines (Campbell *et al*., 2007) [4]; (Clemson *et al*., 2012) [10].

A Chinese meditative practice, Tai Chi, which combines breathing exercises with easy movement, aimed at coordination, balance, and flexibility, is seen as a strategy to protect against falls (Lomas-Vega *et al*., 2017) [35]. Huang & Liu (2015) [24] also explain that Yoga is another popular meditative modality that is less tedious than conventional exercise, yet appears to improve mobility in the elderly.

Podiatric devices like assistive devices, footwear adjustments, braces, etc., help to reduce the number of falls in elderly persons who use them compared to those who don't. However, Gillespie *et al*. (2012) [21] explain that these devices do not affect risk of falling. Gradual discontinuation and review of psychoactive medications by the geriatrician is also a strategy to reduce falls (Gillespie *et al*., 2012) [21]; (Pit *et al*., 2007) [41]. In addition, vitamin D and protein supplementation may help reduce fall risks by supporting bone strength (Antoniak & Greig, 2017) [2]; (Liao *et al*., 2017) [33].

A fall prevention strategy that caters to extrinsic risk factors like unsafe environments is home safety intervention which is always done by occupational therapists. This strategy entails identifying and removing fall hazards, introducing mobility supports for frail older adults, and making modifications based on the health status of elderly persons (Giovannini *et al*., 2022) [22].

Cognitive behavioral therapy, as well as motivation, may also be useful for short-term reduction in fall risk by dealing with risk factors like fear of falling, depression, or lack of motivation to proceed with health recommendations (Liu *et al*., 2018) [34]; (Jancey *et al*., 2007) [27]. Correction of eye defects e.g., cataract removal, use of correction lenses, may also help prevent falls in older adults (Kwan & Straus, 2014) [29].

In today's world, the role of technology in reducing falls in the elderly cannot be ignored. With these technologies, mobility is assessed accurately and falls predicted with a precision that is not seen with other strategies, improving health and promoting better aging in the elderly (van Diest *et al*., 2013) [55].

Coraci *et al*. (2020) [12] highlight an example of these advanced technologies, a lower limb rehabilitation robot, which was used to measure balance deficit associated with post-COVID syndrome. Video games like Exergames have also shown their rehabilitative functions in preventing further falls by improving balance, mobility, and physical functions among others (Rendon *et al*., 2012) [46]; (Maillot *et al*., 2012) [37].

Lastly, wearable technologies like smartwatches and wristbands have sensors like accelerometers, heart rate monitors, and gyroscopes, which are useful in tracking physical activity and detecting falls (Schoeppe *et al*., 2016) [49]; (Warrington *et al*., 2021) [56].

Discussion

Preventing falls in the elderly is complex, whether it is primary, secondary, or tertiary prevention. This is another reason why there are several schools of thought on the best strategies or interventions to prevent falls, whether single-factor strategies or multi-factor interventions (Dionyssiotis, 2012) [15]. Most health programs for older adults still rely on single-factor fall prevention procedures, such as home assessment and interventions, discontinuation of psychoactive medications, exercise medications, as single treatment strategies, among others.

However, Giovannini *et al*. (2022) [22] explain that multifactorial interventions (MCIs) are the best strategy in preventing falls in the elderly. This strategy rightly starts with evaluating potential risk factors, taking a good clinical history, then it further extends to drug therapy as well as assessing the cognition and physical functions of older adults. This strategy explores several single-factor prevention strategies, e.g., home risk assessment, muscle strengthening exercise, assistive devices, etc., combining them based on the needs and status of the individual, and creating a comprehensive health approach. It can also employ a multi-component exercise approach using different single-factor fall prevention methods.

Zijlstra *et al*. (2007) [27] speaks to multi-component exercise interventions and their roles in preventing falls in elderly

people. Gillespie *et al*. (2012) [21] further buttress the role of multifactorial interventions by highlighting how they cause a 68% decrease in fall rate in the elderly.

On the other hand, using vitamin D supplements as a single-factor fall prevention strategy showed no reduction in the risk of falling. Similarly, using cognitive behavior interventions as a single-factor fall prevention strategy showed no decrease in falls in elderly people. In addition, vision defects' corrections such as first-time cataract extraction in elderly women reduced the number of falls in that demographic; however, second-time cataract extraction did not (Gillespie *et al*., 2012) [21].

There is no clear-cut method for selecting the components of multifactorial interventions, and this is because it's unclear which single-factor strategy is the most effective (Giovannini *et al*., 2022) [22]. Multifactorial interventions should be patient-focused, and the integrated strategies should align with information obtained from the patients' history and patients' needs.

Lastly, technology is a strategy that cannot be ignored. With the challenges of an ever-growing population of older persons, there is an urgent need for further high-quality innovation and future technologies that can bridge the prevention gap, preventing falls and improving health at an exponential rate (Olsson Möller *et al*., 2021) [39].

Conclusion

Falls in the elderly have been shown to have devastating consequences on individuals and society at large. This is why there has been an exponential growth in the strategies for preventing falls in elderly for the past three to four decades. This development is due to countless research on strategies for fall prevention in older persons, which yet remains a cause of concern today. Thousands of works have been published about this, with information that can hardly be fit into a single article.

However, this narrative review offers an evidence-based panoramic view on the challenge of falls in elderly populations. This review not only explores evidence-based strategies comparing their effectiveness, but also highlights the burden of falls in falls in the elderly. It also summarizes key elements and developments in the fall prevention in high risk populations.

However, it is germane that more innovations and research are conducted to improve knowledge about falls in elderly people, and more about the application of these new technologies to improve geriatric medicine. It is important to note that innovation in this aspect of healthcare is no longer optional, but compulsory to reduce the morbidity and mortality in older populations. This review seeks to be a tool for further research and advancements in geriatric medicine, specifically the prevention of falls.

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