

Falls in the elderly: a major public health challenge with some encouraging developments. A mini review

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Falls are among the major causes of morbidity and mortality in the elderly. Well-known risk factors are reduced physical activity, obstacles in the environment, balance and gait disorders, depression and neurological diseases. The gravity of trauma related to falls has been studied extensively, the main predictors of a harmful development within 12 months of a fall being dementia, old age, the level of dependency and restricted mobility. Efficient prevention interventions do exist, especially exercise-based interventions and assessment and modification of the home environment.

A shift in the trend of falls among the elderly has indeed been reported in several Western countries: since the 1990s, rates of fall-related injuries have declined in countries such as Finland, Sweden, Canada and Switzerland.

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Conflict of interest

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INTRODUCTION

Falls are among the major causes of morbidity and mortality in the elderly. According to a systematic review, every year about one-third of people aged 65 and over, and nearly half of those over 80 years of age, suffer from a fall. Between one-fifth and one-third of them suffer moderate to severe injuries, including fractures¹. The prevalence of falls is increasing due to the aging of the population. This makes preventing falls among the elderly and strengthening bone health in general a major public health challenge², albeit not an insurmountable one. Indeed, as many studies report, the main risk factors of falls among the elderly are well documented, even though “fall risk assessment tools currently used for the elderly did not show sufficiently high predictive validity for differentiating high and low fall risks”³.

RISK FACTORS

Several systematic reviews on the topic of risk factors of falls in the elderly have been published. Following are four examples:

- according to a systematic review of observational studies⁴, sedentaryness increases the risk of falls, while physical activity reduces it. Physical activity also reduces the risk of fall-related injuries (particularly fractures). According to the results of the meta-analysis performed on

23 articles, the combined odds ratio for physical activity and falls was 0.75 (95% CI: 0.64-0.88); the combined odds ratio for physical activity and fall-related injuries was 0.59 (95% CI: 0.45-0.74); and the combined odds ratio for sedentary lifestyle and falls was 1.14 (95% CI: 1.10-1.82);

- another systematic review of observational studies focusing on the influence of the environment confirms that the home environment and the use of walking aids are significantly associated with an increased probability of falling ⁵;
- according to a systematic review of prospective studies on risk factors for falls in older adults living in community settings ⁶, the main risk factors for falls are a history of falls (OR = 2.8), gait disorders (OR = 2.1), the use of walking aids (OR = 2.2), dizziness (OR = 1.8), Parkinson's disease (OR = 2.7), and antiepileptic drug therapy (OR = 1.9). All these risks are further increased among recurrent fallers;
- another recent review and meta-analysis identified 25 prospective studies on the risk of falling related to depressive symptoms ⁷. A high level of depressive symptoms at baseline was associated with an increased likelihood of falling by 52% (14 studies: pooled OR = 1.46, 95% CI: 1.27-1.67; 6 studies: pooled RR = 1.52, 95% CI: 1.19-1.84). There was no observed difference in the risk of falling between elderly people living in institutions and those living in the community.

GRAVITY OF FALLS IN THE ELDERLY

The gravity of trauma related to falls is well assessed. A prospective study from Basel, Switzerland, may serve as an example. It examined the outcome at 12 months of 272 people aged 65 and over that were treated for a fracture of the femoral neck after falling ⁸:

- the mean age was 84 years (standard deviation: 7.5). Before the fracture, 70% of the patients lived in a community environment, 59% could walk without help or with a walking cane, and "26% needed a walker, a wheelchair or were bedridden before the fracture";
- a diagnosis (or suspected diagnosis) of dementia at entry was reported in 35% of the patients. Overall mortality at 12 months was 22% (12% in patients living in a community setting before the incident, and 44% in patients in institutional settings). Death rates were significantly higher among the older ones;
- among the patients living in a community setting before the incident, 17% had moved to an institutional setting 12 months after the fracture. One-third (30%) reported problems with increased dependency for activities of daily life;

- the main predictors of a harmful development at 12 months were dementia, old age, level of dependency in activities of daily life, and restricted mobility.

PREVENTION STRATEGIES

In 2012, a Cochrane review on fall prevention interventions targeting the elderly in a community environment⁹ analyzed 159 randomized controlled trials representing 79,193 participants. The authors concluded that the following interventions are effective in preventing falls:

- *multi-component group exercises* reduce the rate of falls (rate ratio = 0.71, 95% CI: 0.63-0.82) and the risk of falling by 15% (risk ratio = 0.85, 95% CI: 0.76-0.96);
- *multi-component home exercises* reduce the rate of falls (rate ratio = 0.68, 95% CI: 0.58-0.80) and the risk of falling by 22% (risk ratio = 0.78, 95% CI: 0.64-0.94);
- with *Tai Chi*, the reduction in the rate of falls is at the limit of statistical significance (rate ratio = 0.72, 95% CI: 0.52-1), but the reduction of the risk of falling, around 29%, is significant (risk ratio = 0.71, 95% CI: 0.57-0.87);
- *overall, exercise-based interventions* reduce the risk of fractures related to falling by 66% (risk ratio = 0.34, 95% CI: 0.18-0.63);
- *assessment and modification of the home environment* reduce the relative risk of falling by approximately 12% (rate ratio = 0.81, 95% CI: 0.68-0.97; risk ratio = 0.88, 95% CI: 0.80-0.96). These interventions are even more effective when they are targeted at high-risk individuals;
- *multifactorial interventions* that incorporate an individualized risk assessment reduce the rate of falls (rate risk = 0.76, 95% CI: 0.67-0.86) but not the risk of falling.

A more recent systematic review on the benefits of resistance training in physically frail elderly persons ¹⁰ mentioned a significant reduction in falls after 12 weeks in three out of four studies. And a 2018 updated evidence report and systematic review for the U.S. Preventive Services Task Force concluded: "Multifactorial and exercise interventions were associated with fall-related benefit, but evidence was most consistent across multiple fall-related outcomes for exercise. Vitamin D supplementation interventions had mixed results, with a high dose being associated with higher rates of fall-related outcomes" ¹¹.

RECENT DEVELOPMENTS

Remarkably, we are observing a downward shift in the trend of falls among the elderly in several Western

countries¹², although it is unclear what role such factors as the mean BMI increase, the changes in lifestyle and environment, or ramped-up prevention campaigns may have played. For example, a population-based study of Finns 80 years of age and older has found that the age-adjusted incidence of fall-related injuries has stalled since the late 1990s and is even declining for men and women of all ages, with the exception of men over the age of 90¹³. A similar development has been observed in Sweden, with a stabilization of the absolute number of hip fractures between 1987 and 2009, a decreased incidence rate “for all age- and sex-specific groups, with the largest changes in the younger age groups and among women”¹⁴. In Canada, age-standardized incidence rates of hip fractures have been declining since about 1985, and this trend has been accelerating in recent years¹⁵. In Austria, by contrast, no stabilization of age-adjusted incidence rates could be observed between 1994 and 2006, except among women aged 80 to 84^{16,17}. In Geneva, Switzerland, between 1991 and 2000, the total number of hip fractures has stabilized and the age of women with a fracture has increased significantly¹⁸. The age-adjusted incidence showed a significant decrease of -1.4% among women (95% CI: -2.6--0.1) but not among men. This decrease is mainly attributable to a 1.9% annual decline in the incidence of hip fractures among women living in institutional settings¹⁹. For the whole of Switzerland, there has been a reduction in the number of hospitalizations for hip fractures over the past decades (-15% for women and -11% for men aged 45 and over), but this is more than offset by an increase in the number of osteoporotic nonhip fractures (+ 24.8% for women and + 13.8% for men aged 45 and over). As a result, the burden on the healthcare system continues to increase^{20,21}.

CONCLUSIONS

Yet implementation of validated community-based fall prevention programs has to contend with a number of obstacles: lack of time among professionals, low motivation among the elderly, insufficient cooperation between service providers, lack of participation in specific exercises to develop balance and limited adherence to programs, especially among people of low socio-educational background, obese people, people in poor subjective health, people with difficulties walking or using a walking aid, and people with a history of prior falls^{22,23}.

As a result, the attractiveness of and adherence to programs should be recognized as key priorities, all the more since the costs related to falls among the elderly represent a significant share of global health costs²⁴⁻²⁶.

References

- Ambrose AF, Paul G, Hausdorff JM. Risk factors for falls among older adults: a review of the literature. *Maturitas* 2013;75:51-61.
- Bergström U, Jonsson H, Gustafson Y, et al. The hip fracture incidence curve is shifting to the right. *Acta Orthopaedica* 2009;80:520-4.
- Park S. Tools for assessing fall risk in the elderly: a systematic review and meta-analysis. *Aging Clin Exp Res* 2018;30:1-16.
- Thibaud M, Bloch F, Tournoux-Facon C, et al. Impact of physical activity and sedentary behaviour on fall risks in older people: a systematic review and meta-analysis of observational studies. *Eur Rev Aging Phys Activ* 2011;9:5-15.
- Letts L, Moreland J, Richardson J, et al. The physical environment as a fall risk factor in older adults: systematic review and meta-analysis of cross-sectional and cohort studies. *Aus Occup Ther J* 2010;57:51-64.
- Muir SW, Berg K, Chesworth B, et al. Quantifying the magnitude of risk for balance impairment on falls in community-dwelling older adults: a systematic review and meta-analysis. *J Clin Epidemiol* 2010;63:389-406.
- Kvelde T, McVeigh C, Toson B, et al. Depressive symptomatology as a risk factor for falls in older people: systematic review and meta-analysis. *J Am Geriatr Soc* 2013;61:694-706.
- Pretto M, Spirig R, Kaelin R, et al. Outcomes of elderly hip fracture patients in the Swiss Healthcare System. *Swiss Medical Weekly* 2010;140:w13086.
- Gillespie LD, Robertson MC, Gillespie WJ, et al. Interventions for preventing falls in older people living in the community. *Cochrane Database System Rev* 2012;CD007146.
- <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007146.pub3/abstract> John Wiley & Sons, Ltd.
- Lopez P, Pinto RS, Radaelli R, et al. Benefits of resistance training in physically frail elderly: a systematic review. *Aging Clin Exp Res* 2018;30:889-99.
- Guirguis-Blake JM, Michael YL, Perdue LA, et al. Interventions to prevent falls in older adults: updated evidence report and systematic review for the US Preventive Services Task Force. *JAMA* 2018;319:1705-16.
- Cooper C, Cole ZA, Holroyd CR, et al. Secular trends in the incidence of hip and other osteoporotic fractures. *Osteoporosis Int* 2011;22:1277-88.
- Korhonen N, Niemi S, Palvanen M, et al. Declining age-adjusted incidence of fall-induced injuries among elderly Finns. *Age Ageing* 2012;41:75-9.
- Nilsson F, Moniruzzaman S, Gustavsson J, et al. Trends in hip fracture incidence rates among the elderly in Sweden 1987-2009. *J Public Health* 2013;35:125-31.
- Leslie WD, O'Donnell S, Jean S, et al. Trends in hip fracture rates in Canada. *JAMA* 2009;302:883-9.
- Mann E, Icks A, Haastert B, et al. Hip fracture incidence in the elderly in Austria: an epidemiological study covering the years 1994 to 2006. *BMC Geriatrics* 2008;8:35.
- Mann E, Icks A, Meyer G. Discrepancies in national incidence trends for hip fracture: why does Austria have

- such a high incidence? *Wiener Klinische Wochenschrift* 2010;122:126-8.
- ¹⁹ Chevalley T, Guille E, Herrmann FR, et al. Incidence of hip fracture over a 10-year period (1991-2000): reversal of a secular trend. *Bone* 2007;40:1284-9.
- ²⁰ Chevalley T, Herrmann FR, Rizzoli R, et al. Tendances séculaires des fractures de hanche. *Ostéoporose* 2011;299:1294-8.
- ²¹ Lippuner K, Popp AW, Schwab P, et al. Fracture hospitalizations between years 2000 and 2007 in Switzerland: a trend analysis. *Osteoporosis Int* 2010;22:2487-97.
- ²² Lippuner K, Grifone S, Schwenkglenks M, et al. Comparative trends in hospitalizations for osteoporotic fractures and other frequent diseases between 2000 and 2008. *Osteoporosis Int* 2011;23:829-39.
- ²³ Hester AL, Wei F. Falls in the community: state of the science. *Clin Interv Aging* 2013;8:675-9.
- ²⁴ Merom D, Pye V, Macniven R, et al. Prevalence and correlates of participation in fall prevention exercise/physical activity by older adults. *Preventive Med* 2012;55:613-7.
- ²⁵ Gannon B, O'Shea E, Hudson E. Economic consequences of falls and fractures among older people. *Irish Med J* 2008;101:170-3.
- ²⁶ Heinrich S, Rapp K, Rissmann U, et al. Cost of falls in old age: a systematic review. *Osteoporosis Int* 2009;21:891-902.
- ²⁷ Florence CS, Bergen G, Atherly A, et al. Medical costs of fatal and nonfatal falls in older adults. *J Am Geriatr Soc* 2018;66:693-8.