

THE ROLE OF FALL PROPHYLAXIS IN THE QUALITY OF LIFE OF THE GERIATRIC PATIENTS

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Abstract Elderly people are not only more susceptible to disease, but they are also at a higher risk of sustaining accidents such as falls, which definitely affects the quality of human life. Aging, in other words, carries with it an increased danger of illness and injuries, including those caused by falling.

Research referred to in this article consisted in collecting and analyzing anonymized data of 411 geriatric patients admitted to a hospital in Berlin, Germany, over a period of six months, between January and June 2020, and attempted to look at how fall prophylaxis can reduce the overall healthcare costs generated by senior citizens. Of the 411 geriatric patients, 105, aged between 49 and 97 (69 females and 36 males), sustained injuries due to falling and made up 34.3% of all geriatric patients.

Conclusions that the author arrived at can prove useful to determine the importance of the prevention of falls of older people in reducing the complications resulting from falls. The overall costs of senior citizens' health care were also taken into consideration. Therefore, solutions should be sought to reduce the number of falls of older people. Falls are an important public health problem causing suffering for elderly patients, worsening the comfort of further life and additionally generating relatively high costs for the economy.

Key words ageing, public health, quality of life, physical activity, walkability, geriatric patients, falls

Introduction

A growing life span of contemporary Europeans means that people all over the continent tend to remain in need of medical care longer than ever before, which oftentimes puts a considerable strain on national health care systems. It is estimated that by 2030 in some EU member states costs of broadly understood medical care will have risen up to 14% of their GDPs while, with dropping fertility rates, the number of citizens over 65 years of age will have reached approximately 24% of their populations (OECD, 2017). At the same time, however, longer life in combination with a variety of environmental factors is shortening the time in which people are expected to live in good health (WHO, 2020).

Recently, the pace of population aging in Europe has considerably picked up all across the continent. The worst demographic situation can be seen in Germany and Italy where as early as 2009 people over 60 years of age constituted over 20% of the population. The only country in which the number of seniors dropped was Ireland, while Sweden, Denmark, Great Britain, and Luxembourg witnessed a relatively small increase (Żołędowski, 2012). Experts estimate that in 2030 about 24% of the continent's population will be citizens over 65 (UN, 2019). Aging societies and a shrinking generational turnover on the one hand and the challenges of implementation of modern medical technologies on the other call for urgent decisions to be made to assure sufficient funding for the growing needs of broadly understood health care systems. It is therefore necessary to have solutions rationalizing medical spending without detriment to the quality and effectiveness of treatment, in order to provide the patients with the possibility to return home from the hospital, to live in comfortable conditions.

Maintaining universal access to medical services, including prevention, will necessitate finding new sources of financing and consolidating medical care service providers as there seems to be no turning back from the available-to-all and equal access to medical care in return for additional medical fees (Przywara, 2010). For example, German patients pay an extra EUR 10.00 out of their own pocket for each day they spend in a hospital or a sanatorium and cover 15% of costs of rehabilitation therapies. On top of these flat fees, German hospitals receive additional funds for providing emergency help, holding educational and training events, and maintaining necessary stand-by facilities. In the case of geriatric patients, it may not be possible to return to full fitness, and thus to live a comfortable life. (Jaworzyńska, 2010).

It would seem that for a medical care system to function properly and, as a result, for the general quality of life of a population to grow, it is necessary that individuals take more responsibility for their health while the system becomes reorganized so that it can render prophylactic and treatment procedures that are of high quality and economically cost-effective at the same time, assuring continuity and coordination of treatment to patients who need them the most (Delnoij, Klazinga, Velden, 2003).

One of the consequences of an aging society is a rise in the number of geriatric patients. A person growing old usually experiences a gradual deterioration of movement and posture. These changes can impair the person's balance, locomotion, and general fitness, posing a threat of injuries and premature death (Radecka, Karakiewicz, Bryczkowska, Lubkowska, 2015).

Elderly citizens (over 65 years of age) who fall down and injure themselves pose a serious problem that has medical, social, and economic consequences. Contributing factors are usually either health-related, such as: impaired vision, balance disorders that stem from dizziness or vascular conditions, and locomotive dysfunctions, or environment-related, for example: maladapted housing arrangements or bad lighting. According to Scandinavian research reports, as many as 40% of falls produce serious injuries, especially limb fractures and craniocerebral traumas (Edbom-Kolarz, Marcinkowski, 2011). 50% of elderly fall victims need hospitalization (Thornby, 1995). Some of them, when discharged home, can suffer from impaired mobility that calls for a permanent change in lifestyle. Some never recover and die (Rigler, 1999).

Involuntary changes that occur in the process of aging of the human body lead to, among other things, an impairment of the mechanisms that controls posture, a decrease in muscle tone, and balance disorders, all of which substantially heightens the risk of falls and geriatric injuries (Skalska, 2003).

According to the National Institute for Health and Clinical Excellence (NICE), there are over 400 fall risk factors, although not all of them can be controlled and prevented.

A 'fall' is defined as an instance of a patient finding themselves, suddenly and unintentionally, lying on the floor or another flat surface, without a substantial operation of outside physical forces (Ferrari et al., 2016). Some of the pathophysiological changes that predispose a person to falling are primarily deterioration in the functioning of their nervous system, muscular system, and vision (i.e. body systems that are responsible for coordination, walking, and balance), slower reaction times, and weakness in the lower limbs (Bonner et al., 2003). To people over 65, falls pose a particular hazard, having a great influence on their prognosis as patients, the type of care they receive, the quality of life in the home environment or the cost of treatment. Next to dementia and urinary incontinence, falling is considered one of the so-called 'great geriatric problems' (Synak, Bień, 2003, pp. 35–57).

Seniors fall most often while walking on a flat surface or when engaged in everyday routines (Timsina et al., 2017). Most accidents occur at home or near the home (Edbom-Kolarz, Marcinkowski, 2011), where seniors trip on a carpet, threshold, or stairs while moving about or when performing household chores. Quite often, they fall due to impaired vision, especially lack of binocular vision and, consequently, inability to judge distance caused by macular degeneration, cataract, or wearing incorrect glasses. In other words, as time goes by people who have previously grown accustomed to going down the stairs at a vigorous pace, or to getting in and out of a bathtub quickly, or to moving freely about the house with carpets and rugs on the floor and thresholds in the doorways sometimes fail to notice that their sense of distance has changed for the worse.

Conclusions of the article can be proved to be useful in order to determine the importance of the prevention of falls of older people in reducing the complications resulting from falls. The overall costs of senior citizens' health care were also taken into consideration. Therefore, solutions should be sought to reduce the number of falls of older people. Falls are an important public health problem causing suffering for elderly patients, worsening the comfort of further life and additionally generating relatively high costs for the economy.

Materials and Methods

According to the German Federal Health Administration (GBE-B), in 2012 16.2% of senior citizens over 65 in Germany sustained fall accidents that resulted in their hospitalization. Data used in this article has been sourced from reports of German health maintenance organizations (Krankenkassen), European statistical agencies, and anonymized data collected between January and June 2020 at a geriatric department in a hospital in Berlin. The data was then processed statistically and illustrated graphically with the use of 'Statistica 13' software.

Table 1. Number and age of patients hospitalized at a geriatric department between January and June 2020

cause of hospitalization	average	Age		
		N	std. deviation	percent
Fall	74.47	105	5.82	34.3
Other	79.85	306	10.13	65.7
Total	77.16	411	7.97	100.0

An analysis of statistically processed data reveals the following. Between January and June 2020, a total of 411 patients were hospitalized in one geriatric department, including 105 patients (69 women and 36 men) aged

from 49 to 97 who had suffered injuries due to a fall (Table 1). This group made up 34.3% of all patients of the geriatric department.

Results

The largest group of patients hospitalized for fall-related injuries were seniors aged between 80 and 85 (6.6% of all geriatric patients), between 60 and 65 (3.2%), and between 90 and 95 (2.9%). Numbers of patients hospitalized due to falls and those hospitalized due to other causes were relatively similar in the 55–75 group, whilst they were relatively different in the 75–95 group. The biggest increase in patients admitted to hospital due to falls was seen in the 80–85 group. The most numerous group hospitalized for reasons other than falls were patients aged 75–80. Agewise, the largest group of senior patients were those aged 75–85. In total, medical care was provided to 179 patients, i.e. 44% of all patients hospitalized at the geriatric department within the indicated timeframe (Figure 1).

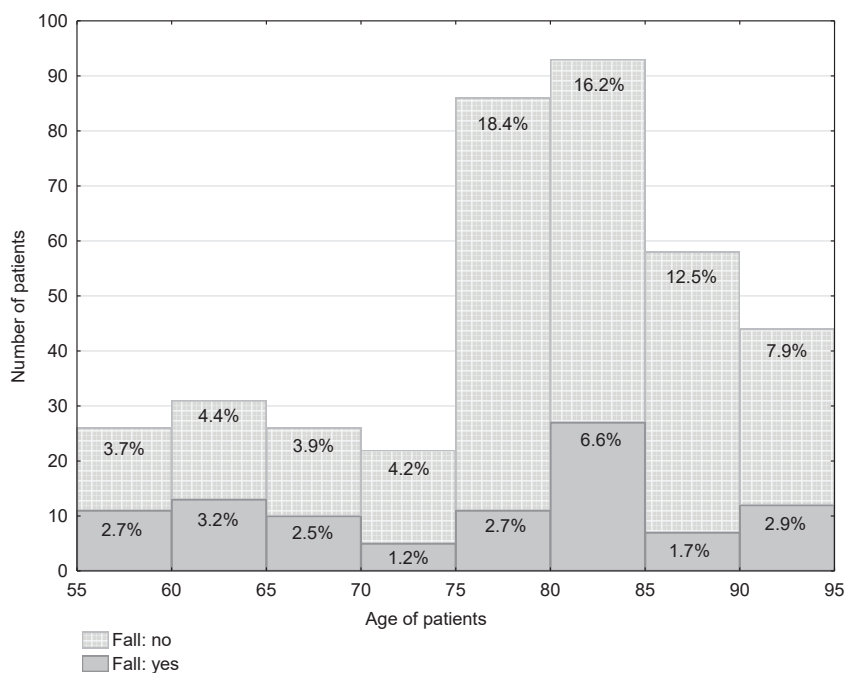


Figure 1. Patients hospitalized for injuries sustained in falls and patients hospitalized for other reasons, divided into age groups (between 55 and 95). Numbers at the top of each bar represent percentages of all patients admitted to the geriatric department over the researched period. N = 411 (100%)

The consequences of falling can be quite serious, from contusions and bruises to complex fractures of the humeral bone, fractures of the femoral bone, spinal fractures, pelvic fractures, head injuries, and other injuries, some of which result in death. The average age of patients admitted to the geriatric department for treatment of fall injuries was 74.47 (s = 5.82), the oldest one being a 97-year old woman diagnosed with rib fractures, the youngest one a man of 49 who had fallen down at his home and suffered a broken thigh bone. He was referred to the geriatric department by specialists from the orthopedic department. Out of 105 patients admitted to the geriatric department at the time, 24 had fractures of the femoral neck (18 women and 6 men), 18 sustained a broken femoral bone (15 women and 3 men), 6 suffered broken ribs (3 men and 6 men), and 21 experienced multiple contusions (9 women and 12 men) that required further hospital observation. Table 2 shows the number of patients, their age, main statistical data, and injuries sustained.

Table 2. Injuries sustained by the patients of the geriatric department as a result of falls

Gender*	Injury	Number of patients N	Mean patient age	Age std. deviation	Max patient age	Min patient age
M	Multiple contusions	15	73.75	14.73	90	58
M	Fractured humeral bone	6	63.83	9.78	74	55
M	Fractured lumbar spine	0	–	–	–	–
M	Fractured femoral bone	3	50.00	1.00	51	49
M	Fractured femoral neck	6	69.5	8.29	77	60
M	Fractured radial bone	0	–	–	–	–
M	Fractured ribs	6	55.50	0.55	56	55
M	Fractured pelvis	0	–	–	–	–
M	Fractured thoracic spine	0	–	–	–	–
F	Multiple contusions	9	81.89	10.94	93	68
F	Fractured humeral bone	9	70.78	7.63	81	63
F	Fractured lumbar spine	6	85.50	6.02	91	80
F	Fractured femoral bone	15	82.20	6.36	93	74
F	Fractured femoral neck	18	77.33	9.76	87	62
F	Fractured radial bone	3	86.67	2.30	88	84
F	Fractured ribs	3	95.33	1.52	97	94
F	Fractured pelvis	3	84.67	0.57	85	84
F	Fractured thoracic spine	3	65.67	2.08	68	64
Injuries suffered as a result of falling		N = 105	\bar{x} = 74.47	S = 5.82	Max = 97	Min = 49

* M (males) N = 36, F (females) N = 69.

Most female patients were found to have suffered fractures of the femoral neck, femoral bone, and humeral bone, which made up over 60% of all injuries recorded in this group. In male patients these injuries constituted 42% of all cases. Approximately 41.6% of men sustained multiple contusions which were serious enough to justify hospitalization. In women, contusions were diagnosed in about 13% of all instances. Figure 2 shows numbers of injuries in each patient age group.

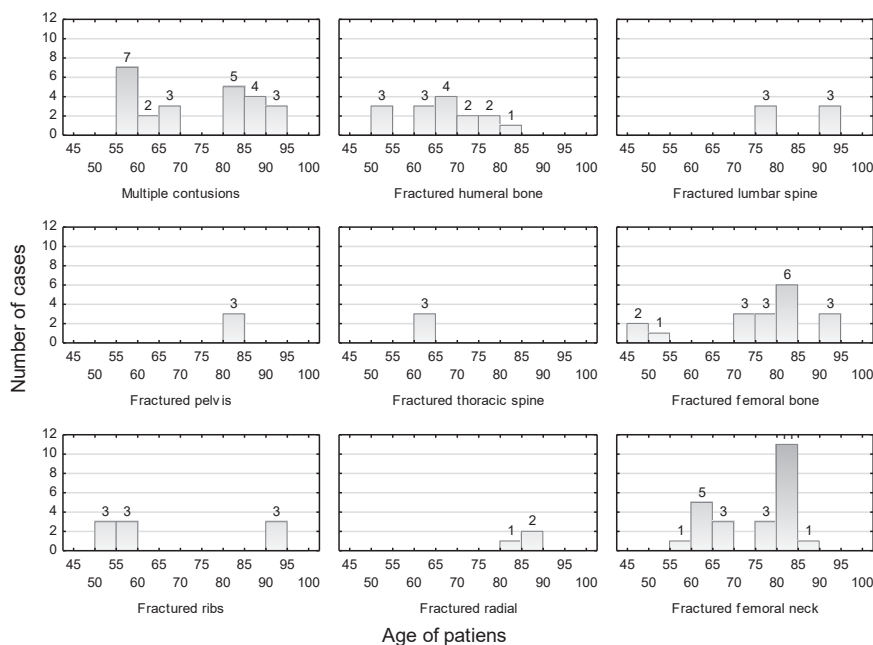


Figure 2. Numbers of fall-related injuries sustained by female and male patients combined, divided into age group

As can be seen, senior patients relatively rarely sustained a fractured pelvis (3 cases), fractured humeral bone (3 cases), or fractured thoracic spine (3 cases). All patients however experienced a great deal of suffering, stress, and discomfort during treatment and required rehabilitation once discharged from hospital. Admittedly, data presented in this paper should be treated as a case study of a specified period at one geriatric department in one of Berlin hospitals. It should also be noted that although a mild winter with very little snowfall and a relatively warm spring were factors encouraging Berliners to move about their city, the outbreak of the Covid-19 pandemic did not invite seniors to venture outdoors, hence so many injuries that occurred at home.

Discussion

Health is becoming an asset that, to a large degree, determines the quality of life of every individual (Rudawska, 2009). But, from a broader perspective, longer lives in good health of larger groups of people put a growing strain on modern health care systems, calling for rationalization of treatment costs, availability of medical services, and implementation of advanced medical procedures.

In their twilight years many people must cope with chronic diseases that adversely influence the comfort and quality of their lives. According to the WHO, about 30% of individuals over 65 years of age suffer from at least one chronic condition. Costs of their treatment constitute approximately 70% of all budget expenses allocated to health care (Juszczuk, Lubliński, 2013). Falls can happen at any stage of one's life but the risk of a person falling and suffering an injury increases with age. Seniors 65+ tend to fall quite often and quite often sustain injuries that are very expensive to treat. This, on a national scale, is becoming a growing social problem, all the more so because populations in many countries are aging and the trend is on the rise. The consequences of falls are many – apart

from physical pain and mental discomfort that the patients must often endure, there are also substantial financial outlays that have to be paid. It is therefore of utmost importance that measures are taken in order to minimize the risk of senior citizens falling. A prerequisite for effective injury prevention is identification of why these injuries occur in the first place because falling, next to car accidents, is a frequent cause of unintentional death. Moreover, elderly patients must cope with several coexisting risk factors.

In fall prevention, physical activity of senior citizens and their awareness of potential fall hazards around them play a critical role. In order to be effective exercise must develop four primary parameters of physical fitness: circulatory-and-respiratory efficiency, muscular strength and endurance, flexibility, and balance. Fall prophylaxis should be a multi-level process, with correct rehabilitation being the foundation of all preventive endeavors (Bartoszek et al., 2016).

Regular physical activity of elderly people should therefore include the following:

- (1) aerobic (endurance) exercises that improve aerobic capacity, for example walking, dance, swimming, jogging, cycling;
- (2) strength-building (resistance) exercises that strengthen muscles, for example: workouts with dumbbells or with other similar equipment; an alternative option can be climbing the stairs or digging the garden;
- (3) stretching exercises that improve blood flow in the locomotor system and flexibility;
- (4) balance and coordination exercises that help develop overall fitness and mobility, for example: walking backwards, walking on tiptoes or heels, and standing up from the sitting position (Gębka, Kędziora-Kornatowska, 2012).

The World Health Organization recommends that physical activity classes for senior citizens should meet the following criteria: (1) be held individually and in groups, (2) offer a diversity of (3) regular exercises that (4) are enjoyable and relaxing for them (WHO, 2020).

Efforts to prevent elderly people from falling should also take into account possible home rearrangements, for example redesigning their living areas to better fit age-related limitations of the residents. Stairs, steps, and thresholds, for example, are typical spatial hazards. Rugs, especially soft ones that tend to roll up, need to be removed, just as electric cables stretched across the floor or any other objects lying there and posing a tripping hazard. It may sometimes be necessary to install automatic front door openers and appropriate indoor lighting, the latter both in areas that are used by all residents of a building, such as staircases, and inside individual apartments. Kitchens usually need additional illumination of surfaces on which seniors prepare their meals and ceiling lamps in bedrooms should be checked to make sure they do not emit a dangerously dazzling light. Finally, bathtubs should be replaced with showers fitted with a seat and a handle that a senior can always hold on to for balance. The bathroom floor cannot be slippery.

Other measures that can prove effective in helping to minimize the risk of seniors falling and getting hurt can take the form of local authorities, supported by state authorities, organizing comprehensive home aid for senior and lonely citizens, such as bath assistance, dressing assistance, bringing meals home, etc. Municipalities could also dedicate selected public transport services (minibuses) to elderly passengers and locate bus stops near their homes, or organize classes to teach people suffering from impaired vision to move about with a walking stick safely, or distribute walkers to people with limited locomotion, or hire and pay fitness assistants, i.e. trainers who would supervise senior citizens exercising for minimum 30 minutes a day. Local authorities should also make sure that roads and pavements are free of mud and snow in the autumn and winter seasons.

The aging process can be slowed down by lifestyle (exercise included), nutrition, and human-friendly environment (Zabielska et al., 2019). This is why physical activity of senior citizens, if based on natural and moderately strenuous movement allowing them to remain in optimal physical condition through the correct choice of exercise, should be seen as a prophylactic and therapeutic anti-aging factor (Kawa, Kowza-Dzwonkowska, Schenk, 2016). Education of elderly people who are particularly vulnerable to falls and injuries is critical. Awareness of risk factors and ways to eliminate them coupled with promotion of healthy lifestyles and physical activity is bound to reduce the number of patients with injuries that make it difficult for them to recover to a good quality of life. Additional investments in the surroundings and the environment where senior citizens live and spend their time is another necessary measure that will help diminish the frequency of falls.

A detailed risk analysis and an assessment of all accompanying factors and individual limitations of the patient, full medical records, and well-planned preventive actions based on information about the patient and their family will reduce the number of elderly people suffering from fall-related injuries and diminish costs of geriatric patients medical care. Measures undertaken for that to happen though must integrate health care (emergency health care, basic health care, and specialist health care) with welfare aid (long-term care, home care, education) in order to improve the effectiveness of the health care (Leutz, 1999). Fall- and injury-prevention programs and healthy lifestyle promotion campaigns should be interdisciplinary and multi-level in character (Tinetti et al., 1994). Once prepared, individual care plans should always remain open to modification because patients' needs may evolve over time and so the manner in which care is provided should change as well (Goodwin, Senola, Thiel, 2013).

Conclusions

Patients are often expected to change their lifestyles, from the simplest to the more complex daily routines, as a token of cooperation with their doctors and an important contribution supporting the therapeutic process (Krot, Rudawska, 2019). Prophylaxis and promotion of healthy behaviors of the citizens are becoming increasingly important factors that allow changing people's lifestyles into less risky ones. This in turn has a positive impact on the finances and functioning of the entire medical care system. Research referred to in this article indicates that there is an area within the system in which potential savings can be sought. Over 34% of patients hospitalized at the geriatric department were treated for injuries sustained in falls. The most frequent consequences of these accidents were: fractures (humeral bone, forearm, spine, pelvis, femoral bone), intracranial hematomas, soft tissue injuries and burns (Coutinho, Fletcher, Bloch, Rodrigues, 2008; Nowicki, Rzońca, Rudnicka-Drożak, Młynarska, Chemperek, 2015). Treatment of patients with such diseases is long and expensive and does not guarantee a return to full physical fitness. Also, patients who need to be immobilized can develop complications which ultimately lead to deep vein thrombosis, bed sores, lung inflammation, urinary tract inflammation, hypothermia, dehydration and joint contractures, reduced bone mineral density, and other conditions (Mazur, Pisany-Syska, 2017) that, in order to be treated, need substantial resources in the form of medical staff and funds. Fall-related injuries influence everyday life of members of the family and caretakers of the patients as well (Kamińska, 2013). Additionally, there would be direct savings that could be obtained from the reduction of numbers of patients, who need treatment of fall-related injuries (Figure 2). The research should be expanded to include further potential savings from there being no post-injury complications.

Diverse, often innovative, health care models, including elements of coordination of information flow between health care providers can be another method of improving the quality of life of seniors. This coordination

of activities by many health care providers reduces numbers of seniors that require hospitalization. Patients can stay at home longer and the numbers of individuals admitted to geriatric department drop in a visible way (Kodner, Spreeuwenberg, 2002). All of the above-mentioned elements and factors that come together to create a broadly understood concept of senior citizens fall prophylactics can also help the labor market to grow by creating a demand for certain professions (Karkowski, 2015). It is desirable that an integrated medical care system be set up, one in which prophylactics, diagnostics, treatment, rehabilitation and care are seen as a single, intertwined collection of measures geared towards health maintenance of patients and betterment of their quality of life (Rudawska, 2014). The consequences of falls can be very serious, ranging from general contusions to complicated fractures of the humerus, femur, spine, pelvis, head injuries and others. If the prophylaxis of falls could eliminate or at least reduce the number of geriatric ward patients, this would be a significant step towards improving the quality of life of a significant number of seniors.

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