

**Pielęgniarstwo w opiece długoterminowej**  
**Kwartalnik międzynarodowy**

LONG-TERM CARE NURSING  
INTERNATIONAL QUARTERLY

ISSN 24502-8624

tom 7, rok 2022, numer 3, s. 49-59

DOI: 10.19251/pwod/2022.3(5)

e-ISSN 2544-2538

vol. 7, year 2022, issue 3, p. 49-59

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## **ANALYSIS OF SELECTED RISK FACTORS FOR FALLS AMONGST PATIENTS OVER 65**

**Analiza wybranych czynników ryzyka upadków u pacjentów po 65 roku życia**

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A - Koncepcja i projekt badania, B - Gromadzenie i/lub zestawianie danych, C - Analiza i interpretacja danych, D - Napisanie artykułu, E - Krytyczne zrecenzowanie artykułu, F - Zatwierdzenie ostatecznej wersji artykułu

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### **Abstract (in Polish):**

#### **Cel pracy**

Celem pracy była ocena czynników ryzyka upadków u osób po 65 roku życia.

#### **Materiał i metody**

Grupę badawczą stanowiło 115 losowo wybranych osób po ukończeniu 65 roku życia ze schorzeniami narządu ruchu. Badania przeprowadzono w Wojewódzkim Szpitalu im. Świętego Ojca Pio w Przemysłu w oddziale kardiologicznym, neurologicznym oraz rehabilitacji. Badanie zrealizowano metodą sondażu

diagnostycznego, techniką było badanie ankietowe, narzędziem badawczym był autorski kwestionariusz ankiety.

### **Wyniki**

Zdecydowana większość respondentów 72,7% potwierdza występowanie u siebie zaburzeń równowagi. Ponadto ankietowane osoby przyznają się również do innego typu ograniczeń, takich jak: zaburzenia słuchu (29,6%), osłabienie siły mięśniowej (27,8%), zaburzenia chodu (23,5%), zaburzenia widzenia (23,5%), zaburzenia pamięci (15,7%), ograniczenie ruchomości (14,8%), ograniczenie samodzielności w wykonywaniu czynności dnia codziennego (7,0%) oraz inne zaburzenia (0,9%). Ponad połowa ankietowanych osób odczuwa dolegliwości bólowe kręgosłupa (72,2%) oraz kończyn dolnych (67,0%). Według respondentów do upadku najczęściej dochodziło w domu podczas dnia. Wśród czynników ryzyka upadków u osób starszych w miejscu zamieszkania należy wymienić: śliskie podłogi (69,9%), dywany (55,7%) a także złe oświetlenie. W konsekwencji upadków część respondentów musiała ograniczyć swoją dotychczasową aktywność. W ramach prewencji upadków 21,7% badanych regularnie wykonuje ćwiczenia w warunkach domowych.

### **Wnioski**

Seniorzy doznający upadków to najczęściej osoby z dolegliwościami bólowymi narządu ruchu. Częściej upadków doznają osoby stosujące większą ilość leków oraz osoby stosujące leki obniżające wartość ciśnienia. Seniorzy w wyniku upadku doznają złamań oraz pojawia się u nich lęk przed kolejnym upadkiem. Respondenci nie stosują aktywności fizycznej jako prewencji upadków.

### **Abstract (in English):**

#### **Aim**

The aim of this study is to evaluate risk factors for falls in people over 65 years old.

#### **Material and methods**

The study group consisted of 115 randomly selected patients aged 65 years and older with musculoskeletal disorders. The study was carried out in the Regional Hospital of St. Padre Pio in Przemyśl in the cardiology, neurology and rehabilitation wards. The study was carried out using the diagnostic survey method, the technique was the questionnaire study, and the research tool was the original questionnaire survey.

#### **Results**

According to respondents, falls most often occurred at home during the day. Among the risk factors for falls in the elderly in the place of residence are: slippery floors (69.9%), carpets (55.7%) and poor lighting. As a consequence of the falls, some respondents had to limit their previous activity. In order to prevent falls, 21.7% of respondents regularly exercise at home. Among the risk factors of falls in the elderly at home there were: slippery floors (69.9%), carpets (55.7%) and bad lighting. As a consequence of falls some of the respondents had to limit their current activity. In order to prevent falls 21.7% of respondents regularly perform exercises at home.

#### **Conclusions**

Seniors who experience falls are most often people with pain ailments of the musculoskeletal system. People who take more medications and people who take medications that lower blood pressure experience

falls more frequently. Falling seniors suffer fractures and fear another fall. Seniors do not use physical activity to prevent falls.

**Keywords (in Polish):** upadki, złamania, lęk, niepełnosprawność, profilaktyka.

**Keywords (in English):** falls, fractures, anxiety, disability, prevention.

**Received:** 2022-09-26

**Revised:**

**Accepted:** 2022-11-18

**Final review:** 2022-11-17

### **Short title**

Ryzyko upadków po 65 roku życia

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## **Introduction**

Older people are likely to experience body changes that limit their fitness and function, contributing to an increased risk of falls [18]. According to the current World Health Organization (WHO) definition, a fall is an event as a result of which a person inadvertently ends up on the ground, floor or other lower level [9]. Falls do not include self-inflicted injuries, falls that occur while riding animals, falls from burning buildings, falls into water and falls from transport vehicles and machinery [18].

In the elderly, falls are a serious epidemiological problem. Poland ranks 7th among European Union countries in terms of their prevalence in people over 65 [16]. It is estimated that about 30-60% of people over the age of 60 fall at least once a year. 30% to 40% of elderly people living in a home environment have suffered a fall at least once. In hospitalized people of the same age, falls are found in about 60% of people. Epidemiological statistics indicate that falls are experienced by about 28 - 35% among people over the age of 65. The number of people over the age of 70 who have suffered falls increases from 32%- 34% [13]. According to statistics, the incidence of falls increases with age in people between 65 and 69 is 12%, in people over 89 it reaches up to 35.9% [7]. On average, 30% of people over 60 and 50% of people over 80 fall each year [20]. People with Parkinson's disease experience falls much more frequently, especially in the advanced stages of the disease [24].

Falls most often occur at home, with an estimated average of 60% of falls occurring in residential settings. Falls also occur in residents of nursing homes (50 - 67%) and 20% of hospitalized elderly patients. Some statistics indicate a much higher number of falls recorded during hospitalization [9]. The elderly experience falls as a result of slipping or tripping, while changing body positions, standing up, sitting

down and after exiting the restroom. 10% of falls are due to dizziness and fainting, while 30% are related to balance disorders [20]. Falls in the elderly most often occur at night (about 20% of falls on average) and in the morning [13].

The consequences of falls can be divided into health, social and economic. Health effects include fractures, injuries, which often lead to disability. In addition, as a result of falls, the elderly suffer bruises, minor subcutaneous hemorrhages, bodily injuries, scratches, sprains, dislocations or open wounds. Due to falls, patients are much more likely to require hospitalization. Falls and their associated consequences are responsible for 100% of periprosthetic fractures, 90 - 95% of fractures of the proximal end of the femur (this type of fracture is suffered by one in two people who fall and require long-term treatment and half become disabled) and 25% of spinal fractures, which are asymptomatic in 60% of cases [21]. Spinal fractures cause decreased height, worsening of thoracic kyphosis and cardiorespiratory failure. The elderly are 5 times more likely to be hospitalized as a result of a fall compared to patients of the same age who do not suffer falls. It is estimated that on average 50% of falls end in hospitalization [19].

The social consequences of falls include loss of dexterity and independence, often contributing to a deterioration in quality of life. As a result of falls, people become dependent on their surroundings, there are difficulties in performing complex and simple daily activities: cleaning, shopping, preparing meals. As a result of falls, elderly people experience loss of social and family roles. These people often require constant care [4]. Among the social consequences are the abandonment of physical activity and placement of the patient in a nursing home [19].

Frequent falls lead to the development of post-fall syndrome, which results in reduced independence, social and family functions, and significant dependence on others. Post-fall syndrome affects not only those who have suffered falls but also those who have a fear of falling and is included among the psychosocial consequences of falls [4]. Falls not only have consequences related to the patient's physical pain and suffering but are also reflected in the generation of high costs related to the treatment and care and rehabilitation of patients [19].

The aim of this study is to evaluate risk factors for falls in people over 65 years of age with musculoskeletal conditions.

## **Material and methods**

The study group consisted of 115 randomly selected people over the age of 65 with musculoskeletal disorders. The study was conducted between October 2019 and January 2020 at the Saint Padre Pio Regional Hospital in Przemyśl in the cardiology, neurology and rehabilitation departments, after obtaining permission from the Hospital Management. Each person was informed about the purpose of the study. Participation in the study was voluntary and anonymous. The study was conducted in accordance with the ethical standards set forth in the Declaration of Helsinki (64th WmA General Assembly, Fortaleza, Brazil, October 2013) and in accordance with Polish legal regulations. The application was approved by the Bioethics Committee of Collegium Masoviense (KBCM24/2019).

41.7% of the surveyed group were 65-70 years old. Another 32.2% of the respondents were 71-80 years old. The remaining respondents, meanwhile, were 81-90 years old (15.7%) and at least 91 years old (10.4%). The surveyed group was predominantly female accounting for 53.9% of the total respondents. More than half of the respondents (58.3%) live in cities, while the remaining 41.7% of the respondents are rural residents. Most of the respondents (65.2%) make their living based on the pension they receive. In turn, the remaining respondents work physically (20.0%) or mentally (14.8%). 42.6% of respondents

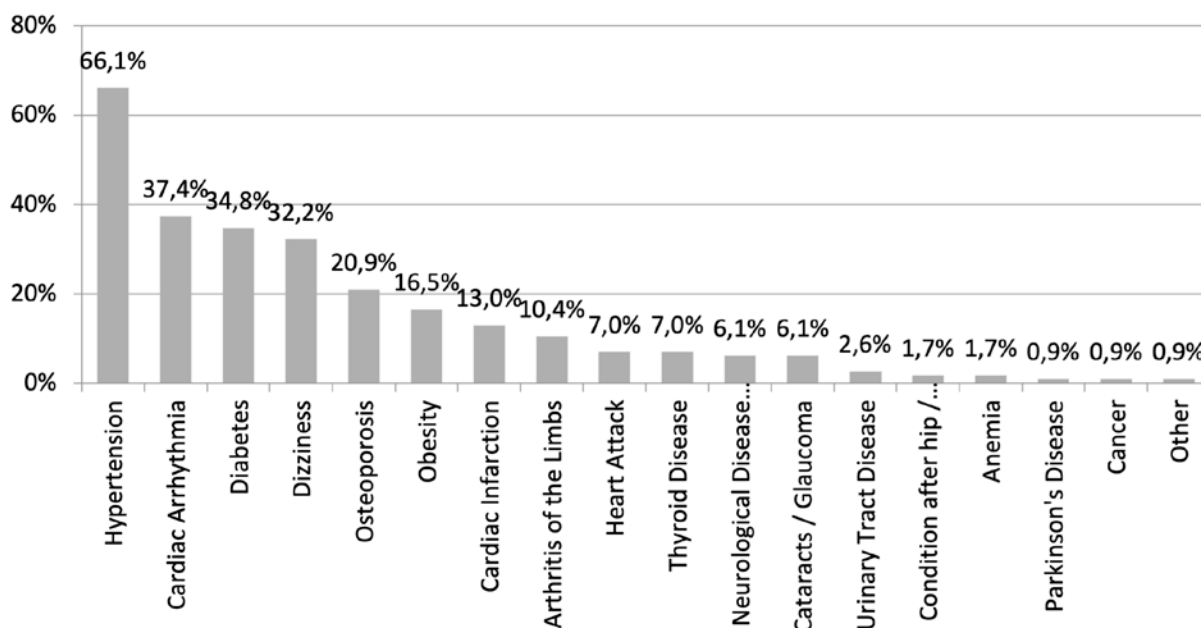
have secondary education, and another 23.5% of respondents have vocational education. The remaining respondents, in turn, have higher education (18.3%) or primary education (15.7%).

The study was carried out using the diagnostic survey method, the technique was a questionnaire survey, the research tool was the author's survey questionnaire, which consisted of 30 questions and a metric. Data analysis was carried out using descriptive statistics methods. Information on the number and percentage of variants of answers to individual questions from the survey was presented in graphical and tabular form. In addition, during the statistical analysis of the collected data, the  $\chi^2$  test of independence and the test for the structure index were used. Verification of statistical hypotheses was carried out at the significance level of  $\alpha=0.05$ .

## Results

The vast majority of people surveyed (74.8%) live together with their families, while the remaining 25.2% of respondents live alone. More than half of the respondents (69.6%) live in private homes. The remaining respondents (30.4%) live in a block of flats. 36.5% of respondents fell twice in the past year, while 35.7% of respondents fell once. The remaining respondents experienced three (20.0%) or at least four falls (7.8%) during this period.

Chronic diseases are treated for by all respondents. Health problems occurring more often than one in ten respondents were: heart rhythm disorders (37.4%), diabetes (34.8%), dizziness (32.2%), osteoporosis (20.9%), obesity (16.5%), heart failure (13.0%) and limb joint degeneration (10.4%). (Figure 1)



The vast majority of respondents, 72.7%, confirm the presence of balance disorders in themselves. In addition, respondents also admit to other types of limitations, such as hearing impairment (29.6%), muscle weakness (27.8%), gait impairment (23.5%), vision impairment (23.5%), memory impairment (15.7%), limitation of mobility (14.8%), limitation of independence in performing activities of daily living (7.0%) and other impairments (0.9%). More than half of the respondents experience pain in the spine (72.2%) and lower extremities (67.0%). In addition, respondents also complain of headaches (16.5%) and whole-body pain (13.0%).

For the majority of respondents (58.3%), the fall occurred at home. Another 40.9% of respondents experienced a fall outside the home, while the remaining 0.9% experienced a fall in the hospital. One in four respondents (25.2%) fell in a bedroom or room. For another 16.5% of respondents, the incident occurred in the bathroom. In addition, 14.8% of respondents fell in the kitchen, 0.9% fell in the basement, 0.9% fell elsewhere in the house, while the remaining 41.7% fell outside the home. Almost half of the respondents (46.1%) were able to pick themselves up after a fall and continue walking. One in four respondents (25.2%) needed help from others to get up. For 14.8% of respondents, a hospital stay was necessary, while the remaining 13.9% – emergency medical assistance.

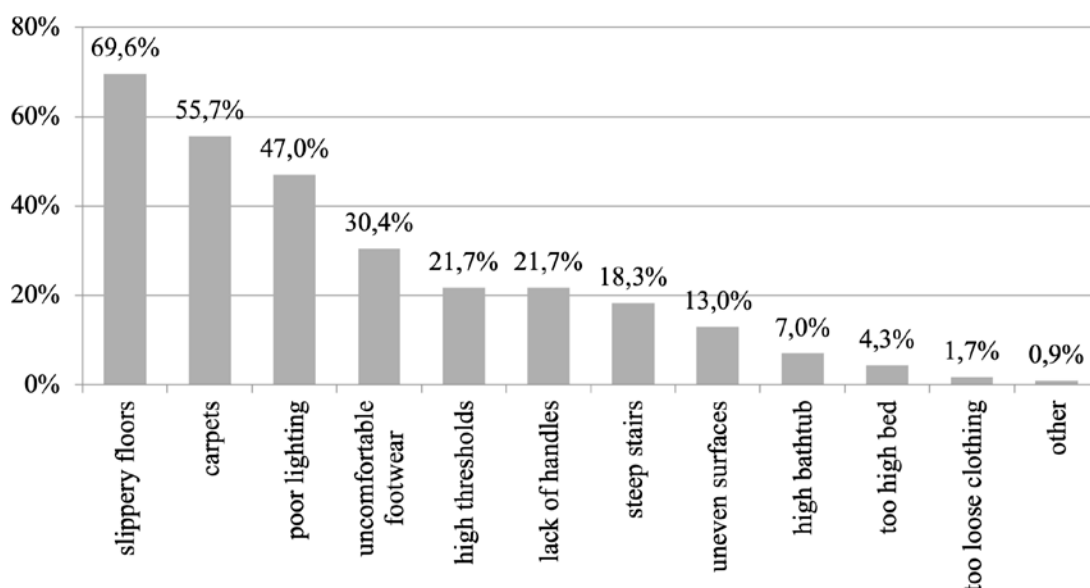
67.0% of respondents take 4-5 medications per day for the chronic diseases they suffer from. Another 13.0% of respondents take 6-8 medications per day for this reason. The remaining respondents, meanwhile, take even more: 8-10 (10.4%) or more than 10 per day (9.6%). The largest group of respondents (73.0%) take blood pressure-lowering drugs. More than half of the respondents (64.3%) also take painkillers. In addition, 43.5% of respondents take medications for heart disorders, 42.6% - for cholesterol, and 35.7% - for diabetes (Table 1).

**Tabl. 1 Number of falls by amount of medication used**

Number of falls in the last year	Number of medications taken per day			
	4-5 n = 77		6 or more n = 38	
	n	%	n	%
1	38	49,4	3	7,9
2	28	36,4	14	36,8
3 or more	11	14,3	21	55,3
Test of independence - probability level p	0,000			

Source: own

There are various risk factors for falls in the place where one lives. These are shown in Figure No. 2



The vast majority of respondents (80.9%) get around independently, with 11.3% using a cane or elbow crutch. The remaining respondents, however, move with the help of a third party (6.1%), with

the help of a balcony (0.9%) or in a wheelchair (0.9%). The consequences of the respondents' falls were most often bruises (48.7%). In addition, there were also abrasions (28.7%), fractures of the lower limb (25.2%), fractures of the hand (23.5%), fractures of the neck of the femur (16.5%), and subcutaneous strokes (11.3%).

As a result of the fall, 39.1% of those surveyed were forced to limit their physical activity. Another 28.7% of respondents had to undergo hospitalization. Other social consequences of falls occurring in the surveyed group were: fear of moving (27.0%), isolation (0.9%) and depression (0.9%). The most common form of physical activity in the surveyed group of people is walking. This answer was indicated by 67.8% of respondents. In addition, 5.2% of respondents bike, 4.3% do gymnastics, 3.5% swim, and 0.9% do Nordicwalking. The remaining respondents either do not engage in any physical activity (17.4%). After a fall, 43.5% of those surveyed felt fears about moving independently. In another 33.0% of respondents, such fears were rare. The remaining respondents do not confirm the occurrence of such conditions (22.6%). 75.7% of respondents began to avoid slippery surfaces after a fall. For 59.1% of respondents, a fall was a signal to change footwear to better-fitting shoes, and for 44.3% to use good lighting. In addition, the surveyed people, in order to prevent further falls: increased their physical activity (18.3%), eliminated carpets in their apartment (14.8%), installed handrails and handholds in their home (12.2%), started using a balcony or elbow crutches (11.3%), started avoiding steep stairs (10.4%), and diagnosed and treated their sight and hearing more often (4.3%). Nearly half of the people surveyed (45.2%) feel a constant fear of falling again, and another 33.9% experience such a condition from time to time. The remaining respondents have no fear of another fall (20.0%).

## Discussion

Falls among the elderly are considered one of the most important geriatric problems. The elderly fall very often in their homes, on the street, and in hospitals. Falls result in fractures, and often develop a fear of another fall which, as a consequence, in a seemingly independent person, makes him partially or completely dependent on others.

In the author's study, respondents experienced falls 2 - times during the year (36.5%), 35.7% fell once during the year and 7.8% of people fell, as many as four times during the past year. Similar results were obtained by Kumorek et al. [15] in a study conducted on a group of women over the age of 50. In her group of respondents, 30% of women fell at least once a year, 26% of respondents fell twice, while 5% of people fell four times during the year. Slightly worse results were obtained by Czerwinski et al. [2008] in a group of elderly people living in Krakow. 68% suffered one incident of falling during the year, 18% fell twice, while 14% of respondents fell 3 or more times. A study presented by Bojczuk et al. [6] shows that 8% of respondents fall very often, while 42% of respondents have experienced a fall within the past year. In a study by Ejsmont, Cybulski and Hryniewicz [10], 60.4% of respondents admitted to falling within the past year, 20.9% fell 2 times, and 6.9% of respondents fell 4 times. The results are comparable to those obtained in the author's study. It is noteworthy that most of the people surveyed are seniors who move independently, only 11.3% of the respondents move with the help of a cane or an elbow crutch. Undoubtedly, the risk of falling among the elderly increases in the absence of the patient's independence [2].

According to respondents, falls most often occurred at home (58.3%) the remaining 40.9% of respondents fell outside the home. A study presented by Kumorek et al. [15] shows that the elderly most often suffer falls at home (72%) and outside the home (28%). According to Yang et al. [25], 58% of people fall at home. A different distribution of falls is presented by Bojczuk et al. [6]. 31% suffered a fall in

a hospital or nursing home. 30% fell at home and 23% fell outside the home. According to Czerwiński et al. [8] 31.7% of respondents fell at home and 68.3% suffered a fall outside the home.

In our own study, falls in the home most often occurred in the room/bedroom (25.2%), 16.5% of seniors fell in the bathroom, and slightly fewer suffered a fall in the kitchen (14.8%). In a study by Czerwiński et al. [8] the most common falls according to 29.2% of respondents occur at home in the bedroom or room 29.2%, the bathroom (25%) and the kitchen (20.9%). A study presented by Szczerbińska shows that the elderly most often fall in their rooms (52.16%) and the bathroom (8.97%). According to Ejsmont, Cybulski and Hryniewicz [10], 2.33% of respondents fell in the bathroom.

Most of the falls occurred during the day (48.7%), 31.3% fell in the morning, and 19.1% of the subjects suffered a fall at night. In a study by Kumorek et al. [15] most people fell during the day (69%). In a study by Bojczuk et al. [6], 15% of people fell at midday, 12% in the morning and 8% in the evening. In Szczerbińska's study, most falls were reported between 5 a.m. and 1 p.m. (41.5%) and also in the evening between 5 and 8 p.m. (19.6%).

Respondents most often suffered falls in summer (40%), with slightly fewer people in winter (36.5%). For the incidence of falls in summer, the results were consistent with Kumorek et al. [15] and Czerwiński et al. [8] most falls occurred in summer (37.7%) and winter (19.7%). In a study by Ejsmont, Cybulski and Hryniewicz [10], snow and rain are additional causes of falls (20.93%).

Among the risk factors for falls in the elderly at home are: slippery floors (69.9%), carpets (55.7%) and also poor lighting (47%). Kumorek et al. [15] presented the factors of falls in their study as follows: slippery surfaces were the cause of falls among 38% of respondents. Bojczuk et al. [6] pointed to poor lighting (34%) as the most important factor contributing to falls. Szczerbińska [23], in her study, identified tripping (14.5%), slippery surfaces (9.93%), improper lighting (5.96%), and carpets present on the floor (4.3%) among the risk factors for falls. Czerwiński et al. [8] pointed to slippery surfaces as a factor in falls among the elderly (42.5%), while Ejsmont, Cybulski and Hryniewicz [10] found that 13.95% fell due to slippery surfaces, tripping over a carpet caused a fall in 4.65%, and poor lighting caused a fall in 2.33% of people.

Respondents in the self-report survey most often use full footwear (49.6%) but 32.2% of seniors move around in flip-flops or slippers. Half of the respondents believe that the footwear they use is uncomfortable. A study by Szczerbińska [23] identified mismatched footwear among 5.63% of respondents as a risk factor for falls. Ejsmont, Cybulski and Hryniewicz [10] showed that poor footwear is the cause of falls in 9.3% of the respondents.

More than half of the respondents are treated for hypertension. Every tenth person surveyed is also treated for cardiac arrhythmias (37.4%), diabetes (34.8%), and dizziness (32.2%). In the study presented by Kumorek et al. [15], the health causes of falls were dizziness 76.9%, while Szczerbińska [23] indicated that among the causes of falls, dizziness occurred in 15.56%, a drop in blood pressure values was diagnosed in 5.96%, while cardiac arrhythmias occurred in 0.33% of the subjects. Mazur and Pisany-Syska [17] found similar results in the study group, with 50.96% of respondents experiencing dizziness. In the study presented by Ejsmont, Cybulski and Hryniewicz [10], dizziness was indicated as a risk factor for falls by 13.95% of the respondents. In a study by Czerwiński et al. [8] also found 42.8% of surveyed seniors have problems with dizziness. The presented results of a study conducted by Białozewski et al. [5] indicated that 24% of the subjects who suffered falls had balance problems.

Multimorbidity at this age is associated with taking a lot of medication. 67% of the subjects acknowledged taking 4 - 5 medications per day, 13% use 8 medications per day. 73% of respondents said they take medications to lower blood pressure values. In the study presented by Mazur and Pisany-Syska [17], among the risk factors for falls, 60.92% of the respondents indicated taking too many medications



(more than 5). In a study by Kumorek et al. [15] 77% of the subjects took medications, in the period immediately before the fall, 48% of the subjects reported taking painkillers, cardiac and hypertension medications. Jankowska - Polańska and Uchmanowicz [12] found that the risk of falling significantly increases among those with the number of medications used and is high among those using four or more medications.

Among the risk factors, it is noteworthy that 72.2% of the seniors surveyed in the author's study suffered from back pain. In a study by Bojczuk et al. [6] 33% required hospitalization due to a fall, while 67% were hospitalized some time after the fall occurred. In a study by Szczerbinska [23], only 12.25% were able to lift themselves. In the same study, 10.93% of subjects required intervention in the ED, 6.95% required ambulance arrival, 3.31% required emergency room treatment in turn 4.64% required hospitalization and in a study by Kumorek et al. [15] 20% of respondents required medical attention.

In the study presented by Szczerbińska [23], the majority of falls resulted in hematomas (42.7%), abrasions occurred in 14.2% of the subjects. However, most of the injuries were to the lower (16.89%) and upper extremities (12.58%). As a result, surgery was required in 1.66%. A study by Bojczuk et al. [6] indicated that as a result of a fall, respondents most often suffered abrasions of the epidermis, bruises, scratches (59%), while 45% of respondents suffered bone fractures of the upper limb (69%) and lower limb (15%). In a study by Ejsmont, Cybulski and Hryniewicz [10], people most often suffered bruises (30.2%), abrasions and bruises (13.95%) after a fall. 6.98% suffered an upper limb injury in the study group, and the same number suffered a lower limb injury. In a study by Białoszewski et al. [5], a fracture of the forearm (24%) and femur (19%) was suffered as a result of falls.

In Szczerbińska's [23] study, anxiety resulting from a fall was reported by 1.39% of respondents. As a result of falling in the study presented by Bojczuk et al. [6] study, 56% of the respondents were forced to limit their physical activity and 67% of the respondents felt fear of another fall. Fear of falling was declared by 56.38% of the subjects presented by Skalska and Gałaś [22]. Presented by Białoszewski et al. [5], the results of the study indicated that those who had suffered falls significantly reduced their physical activity in each age group, in addition, 30% of the respondents felt a significant fear of another fall. A study conducted by Ejsmont, Cybulski and Hryniewicz [10] showed that as a result of a fall, 76.74% of the subjects required the assistance of a second person and 23.26% of the subjects required constant care from a second person, while 32.56% of the subjects were forced to significantly limit their physical activity.

In the study presented by Kostka [14], despite the fall, 36.7% of the subjects undertake regular physical activity 3 times a week, by performing aerobic exercises (walking, cycling). Białoszewski et al. [5] found that individual rehabilitation significantly reduces the risk of falls among the elderly. In contrast, the results of a study presented by Bojczuk et al. [6] showed that 60% of respondents believe that physical rehabilitation significantly prevents falls among the elderly, but 52% of respondents express a desire to take part in such rehabilitation, 14% of respondents would gladly choose marches, walks and hikes as a form of fall prevention. In a study by Ejsmont, Cybulski and Hryniewicz [10], 59.25% of seniors, as part of fall prevention, spent their leisure time actively for 30 minutes every day, 24.68% of the subjects even took the help of a physiotherapist, the remaining subjects avoided slippery surfaces and were careful when moving and changing body positions, in addition, some of the subjects used orthopedic equipment to facilitate movement when moving.

As a result of the fall, 75.7% of the respondents avoided slippery surfaces. 59.1% of respondents changed their footwear to better-fitting shoes after a fall. 44.3% took care of good lighting at home. In a study by Ejsmont, Cybulski and Hryniewicz [10], 55.81% were unable to eliminate the cause of their falls. 35.83% of respondents did not take measures to eliminate risk factors at all. 64.12%, as part of

prevention, avoided slippery surfaces, moved with the help of orthopedic equipment, and used non-slip socks.

In addition, our own study showed a correlation between experiencing fractures and experiencing anxiety levels and falling. Skalska and Gałaś [22] found that anxiety was significantly more often experienced by less able-bodied people and those with mood disorders. Confirmation of the author's results is provided by Białoszewski et al. [5], who showed a correlation between the consequence of fractures and the drug before falling again. In addition, in a study by Bojczuk et al. [6] showed that dangerous consequences such as fractures often occur as a result of falls.

A statistically significant relationship was shown between the fall suffered and the lack of taking up fall prevention in the form of regular physical activity. Kostka [14] showed that after a fall, seniors are least likely to perform resistance exercises, which are most recommended as part of fall prevention. Białoszewski et al. [5], on the other hand, found, based on their research, that a reduction in physical activity after a fall is responsible for the risk of another fall.

### Conclusions

1. Seniors who experience falls are most often those with musculoskeletal pain complaints.
2. Falls among the elderly most often occur at home, in a room or bathroom and were caused by slippery surfaces, poor lighting and the presence of carpets.
3. Falls are more common among those who use more medications and those who use blood pressure-lowering drugs;
4. Seniors are most likely to suffer fractures as a result of falls, and there is a fear of another fall;
5. Seniors do not use physical activity as fall prevention.

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