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- Barış GÜRPINAR¹ ID
- Hülya TUNA DONAT² ID
- Nursen İLÇİN² ID

CORRESPONDANCE

¹Barış GÜRPINAR
Phone : +905333106587
e-mail : baris.gurpinar@izmirekonomi.edu.tr

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¹ Izmir University of Economics,
Physiotherapy and Rehabilitation, İzmir,
Turkey

² Dokuz Eylül University, Faculty of Physical
Therapy and Rehabilitation, İzmir, Turkey

ORIGINAL ARTICLE

EVALUATION OF FALL PRESENTATIONS IN PATIENTS OVER 65 YEARS OF AGE ADMITTED TO THE EMERGENCY DEPARTMENT OF A HOSPITAL IN TURKIYE

ABSTRACT

Introduction: Falls are a major cause of mobility and mortality among older adults. Regional monitoring and analysis of the risks and outcomes associated with falls are important for developing preventive approaches.

Materials and Method: This cross-sectional analysis retrospectively reviewed the electronic medical records of older adults (aged ≥ 65 years) who presented to the emergency department of a university hospital in Izmir, Turkey between January 2019 and January 2020. Information regarding pre-fall, fall-related, and post-fall treatments was analyzed.

Results: Over one year, 2,037 older patients (68.4% [n=1,349] women, with a mean age of 80.65+7.50 years) presented to the emergency department because of falls. Unfortunately, many important pieces of fall-related data were not routinely recorded at the institution. According to the available records, the majority of the patients were physically active (84.4%), lived independently (53.6%), and most frequently fell as a result of tripping or stumbling (88.1%). Of the patients, 74.9% were discharged; however, no information was available regarding whether they were informed about fall prevention before discharge. Head trauma was the most common cause of admission (n=415), and hip fractures were the leading surgical causes (n=175). The presence of chronic disease ($p=0.910$), age ($p=0.274$), and sex ($p=0.304$) did not affect the risk of fractures after falling.

Conclusion: Fall prevention is a more feasible and efficacious strategy than addressing the resultant complications. The current practice of analyzing the fall risks of individuals who present to emergency department with falls and directing them to preventive programs is insufficient to address this issue.

Keywords: Geriatrics; Falls; Health Services Administration; Emergency Health Services.



INTRODUCTION

Fall-related injuries represent one of the most common problems related to older patients in hospital emergency departments (EDs) (1, 2). One-third of individuals aged >65 years fall at least once a year, and this proportion reaches 50% among 80-year-olds (3). Fall-related injuries in older adults often cause minor soft tissue injuries, likely because of the low energy of the exposed trauma. Serious injuries (e.g., hip fractures, subdural hematomas, serious soft tissue injuries, and head injuries) develop in 10% of older individuals who fall, which may require hospitalization (4). Approximately 36–44% of patients who present to EDs because of falls experience subsequent adverse events within the following year—including recurrent falls, additional ED visits, or death (5).

Studies have shown that declines in functional capacity in older adults after their first fall can lead to repeated cycles of falls and other self-inflicted injuries. The negative physical and psychological effects of reduced functional ability can make older individuals more dependent in terms of performing their activities of daily living, and lead to an increased risk of falls (6).

Identifying the environmental and personal factors that contribute to falls and implementing appropriate measures to address these are crucial to fall prevention. Multiple studies have highlighted that a prior history of falls represents the most significant consideration when assessing the risk of future falls among patients (7).

The majority of risk factors that result in falls are preventable, as they are associated with individual or environmental factors. Studies have indicated that, among the factors leading to falls in those aged >65 years, the incidence rate of balance disorders is 10–25%, whereas the incidence rate of accidents or environmental factors is 30–50% (8, 9). Identifying the risk factors and taking appropriate measures can reduce the occurrence of falls.

Emergency services should be considered an important step in fall prevention. The occurrence of a fall should not be ignored and should be considered a risk factor for future falls (10, 11).

Regularly collecting fall-related data, which tends to be overlooked by many healthcare systems, can reveal the true incidence of falls and fall-related injuries. This can lead to a better understanding of the root causes of rehospitalization related to falls (12, 13). These insights highlight the importance of adopting a proactive approach to preventing repeated hospitalizations among older individuals who fall.

The objective of this study was to analyze data related to the causes of falls and subsequent post-fall conditions experienced by older individuals who reported fall-related injuries to a hospital ED in Turkiye. This study aimed to provide evidence that can be used to recommend relevant precautions against this occurrence.

MATERIALS AND METHOD

This cross-sectional analysis retrospectively reviewed electronic medical record data from older individuals aged ≥ 65 years who sought treatment for fall-related injuries at the ED of Dokuz Eylul University Hospital (DEUH) in Izmir, Turkey, between January 2019 and January 2020.

Before data collection, ethics committee approval (decision dated 06.10.2021 and numbered 2021/27-05) was obtained from the university's Non-Interventional Clinical Research Ethics Committee.

Between January 1, 2019, and January 1, 2020, the ED records of DEUH were analyzed using Probel, a patient registration system. We examined the records of patients aged ≥ 65 years who reported incidents of falls—which were documented as Code 4 in the emergency records. Complaints of falls, traffic accidents, syncope, and forensic cases (e.g., brawls, assaults, and similar incidents) were excluded.

Table 1. The Data Collected

Place of residence
Home Alone
At home with first degree relatives
At home with a carer
Care Home
Physical condition before the fall
Physically active
Walking with supervision
Walking with assistive device
Immobile
Fall Mechanism
Stumbling / stumbling
Dizziness
Syncope
Acute stroke
Falling out of bed
Fall location
Room
Bathroom
Stairs
Out of home
Chronic diseases
Cardiovascular
Dementia/Alzheimer's
Musculoskeletal system
Eye
Metabolic
Neurological
Lung disease
Injury due to fall
No injuries
Minor head trauma
Major head trauma
Soft tissue injury
Hip / femur fracture
Fracture/dislocation of lower limb
Upper extremity fracture/dislocation
Thoracic trauma
Spinal fracture
Conclusion
Day of hospitalisation in the emergency department
Discharge to ward (number of hospitalisation days)
Discharged home
Exitus
Surgery
Yes
No

Data such as age, sex, place of residence, physical condition, presence of chronic diseases, mechanism of the fall, location of the fall, injuries sustained as a result of the fall, direction of emergency discharge, number of hospitalization days, surgeries, number of follow-up outpatient visits after the fall, and presence of recurrent falls were documented (Table 1).

Income level was determined according to the social insurance with which each patient was affiliated. Social security institution (SGK) was recorded as a labor-pensioner, insured self-employed (Bagkur) tradesman, or employer pension (ES) fund as a civil servant pensioner. The highest income level in ES was considered Bagkur, and the lowest was SGK.

Statistical Analysis

The data were analyzed using SPSS 21 software. The Shapiro-Wilks test was used to determine the normality of the distribution of quantitative data. Data distributions with skewness and kurtosis values between -2 and +2 were considered normal. Data are expressed as means, standard deviations, minimum and maximum values, and percentages. The Chi-squared test was used to analyze the association of fracture occurrence with age and the presence of chronic disease, after missing data were removed. Logistic regression was used to analyze the association with sex. Statistical significance was set at $p < 0.05$.

RESULTS

In 2019, 2,037 individuals aged >65 years were admitted to DEUH with a complaint of falling. Their mean age was 80.65±7.50 years, and 68.4% (n=1,349) were female. A total of 34.8% were registered to the ES, 47.9% were registered to SGK, and 17.3% were registered to the Bağkur social insurance systems.

In the anamnesis records of 81.4% (n=1,658) of the patients, place of residence was not mentioned.

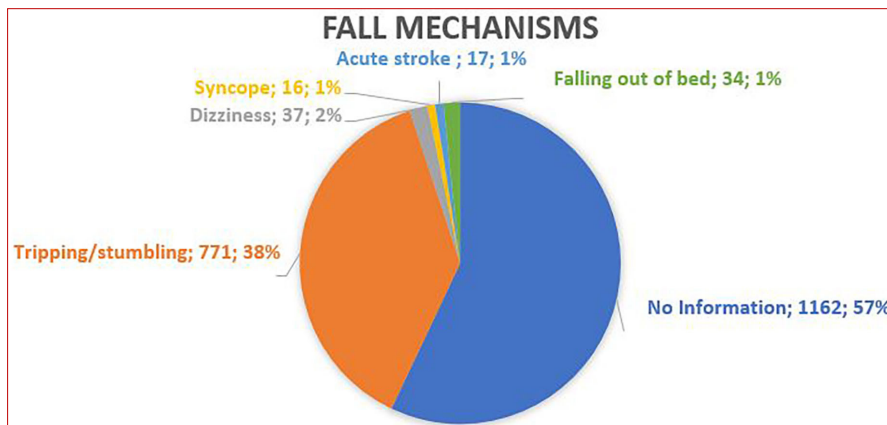


Figure 1. Fall Mechanisms of all patients

Of the 379 patients who provided this information, 53.6% lived independently at their homes, while 44.6% lived in care homes. The pre-fall physical levels of 73.6% of the patients were not assessed. Among the 537 patients who provided this information, 84.4% were physically active, 9.5% were supervised, and 6.1% used assistive devices.

When fall mechanisms were analyzed, 57% (n=1,162) of the patients did not provide any information regarding how the fall occurred (Figure 1). Of the 875 whose fall mechanisms were

known, tripping or stumbling represented the most common cause of falls by a significant margin (Figure 2). In 580 (29%) of the 2,037 total cases, information was obtained regarding where the falls occurred. Of these, 38.4% fell in regular rooms, 12.9% fell in bathrooms, 22.2% fell while using stairs or steps, and 26.4% fell outdoors.

Of the total cohort, 51.4% (n=1,046) of the patient records provided no information regarding chronic diseases during their medical anamnesis. Of the 991 with chronic diseases, 46.0% had one,

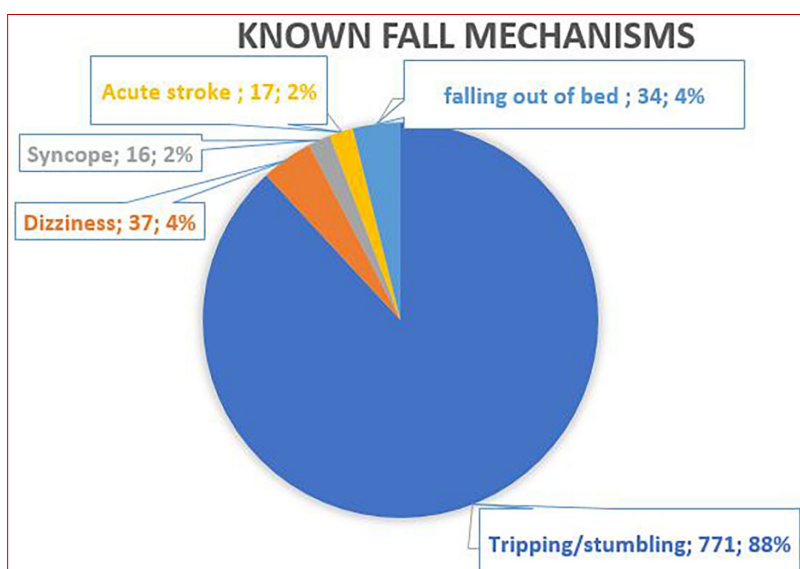


Figure 2. Known Fall Mechanisms

Table 2. Results of Falls

	Injury due to fall n (%)	Surgery due to injury n (%)
No Data	75 (3,7)	
No injury	198 (9,7)	
Minor Head Trauma	403 (19,8)	1 (0,3)
Major Head Trauma	12 (0,6)	
Soft Tissue Injury	215 (10,6)	
Hip/Femur Fracture	393 (19,3)	175 (46,9)
Lower extremity Fracture /subluxation	152 (7,5)	65 (17,4)
Upper extremity Fracture /subluxation	352 (17,3)	102 (27,3)
Thorax Fracture	189 (9,3)	
Vertebrae Fracture	48 (2,4)	30 (8,0)
Total	2037	

39.1% had two, 12.1% had three, 1.6% had ≥ 4 , and 1.2% had no known diseases. The most common diseases were cardiovascular (41.7%) and metabolic (25%).

The distribution of injuries resulting from falls is shown in Table 2. Information regarding the injury was not recorded in the system in 75 (3.7%) of the cases. When mild and major injuries after falls were evaluated together, head trauma was observed to be the most common injury during AS admissions.

A total of 4.4% of the patients were discharged from the institution without receiving treatment. Of the remaining patients, 74.9% were discharged after the intervention, 1.7% were admitted to the ED, and 19.0% were admitted to other wards.

Of the total 2,037 patients, 18.3% (n=373) underwent surgeries. When the reasons for these surgeries were analyzed, 46.9% (n=175) had hip fractures, 27.3% (n=102) had upper-extremity fractures, 17.4% (n=65) had lower-extremity fractures and dislocations, 8.0% (n=30) had spinal fractures, and 0.3% (n=1) had minor head trauma.

Data regarding chronic diseases in the 48.8% of the patients who underwent surgeries were not recorded. According to the data obtained, 41.3% of the patients who underwent surgery had 1–2 chronic diseases, whereas 9.9% had ≥ 3 .

After surgery, older individuals were hospitalized for an average of 5.32 ± 2.87 days and had an average of 4.30 ± 7.03 hospitalization days and 5.40 ± 7.57 outpatient clinic visits within the first year postoperatively. In the nonsurgical cases, the mean number of hospitalization days was 0.79 ± 1.33 . The mean number of days of re-hospitalization within the first year after the fall was 3.26 ± 6.35 days, and the mean number of outpatient visits was 5.31 ± 7.33 .

Because of a lack of sufficient data, analyses of the factors related to post-fall fractures could only be performed by age, sex, and presence of chronic diseases. When the relationship between the 991 cases with chronic disease data and fracture formation was analyzed, we observed that the presence of chronic disease did not affect the risk of fracture formation ($p=0.910$). Similarly,



no association was observed between fracture occurrence and age ($p=0.274$) or sex ($p=0.304$).

DISCUSSION

The demographic transition toward aging populations has highlighted the issue of falls among older adults, resulting in a significant public health concern (14). In this context, it is important to understand the demographic profiles and prior fall histories of patients who are injured by falls. Examining prior fall history is crucial for risk analysis; however, it is important to consider the characteristics of those who have fallen, to prevent similar future injuries.

This study aimed to analyze the risk factors and post-fall medical conditions of individuals >65 years of age who presented to the ED of a Turkish university hospital in 2019 because of falls. We accessed the necessary information from the patients' electronic medical records.

Over the year, 2,037 individuals >65 years of age presented to the ED for injuries related to falls.

Our study revealed an average age of 80.65 among the patients. Consistent with the relevant literature, the results of our study indicated a concentration of falls occurring within the age range of 75–85 years (15). Similarly, the results of our study are consistent with those in the literature, showing that women have an increased risk of falling (16). Studies on the occurrence of fractures following falls have indicated that lean mass is an important factor in the prevention of fractures. As lean mass decreases with age—particularly in women—this population becomes more prone to fracture formation (17). In contrast to the findings of previous studies, the results of our study indicated that age and sex were not significant factors related to the occurrence of fractures.

The presence and nature of chronic illnesses are associated with an increased risk of falling. Comorbidities affecting the cardiovascular system, cognitive functions, and pain increase the risk of

falls (18). Our study revealed that comorbidity data were not consistently recorded for older patients who presented to the ED because of falls. Approximately half of the admitted patients had information on chronic diseases of which 98.8% had ≥ 1 chronic disease. The most prevalent chronic diseases are typically related to the cardiovascular system. The risk of falls increases with the number of chronic diseases a patient has (18). In this study, 46% of the participants had one chronic disease, 39% had two, and 12% had three. The available data were insufficient to determine the relationship between the number of chronic diseases a patient has and their risk of falls. Longitudinal studies are warranted to determine this risk; therefore, no conclusions can be drawn regarding this issue from the current data. The results of our study showed that, contrary to the literature (19), the presence of chronic diseases did not affect the risk of fractures after falls.

The risk of falling is affected by the places where individuals live. Single individuals face a higher risk of falling than those living with their families. Furthermore, staying in institutions long-term increases the risk of falling (20).

The results of our study indicate that a significant proportion of individuals who were admitted to the ED because of falls did not have their residential information recorded in the emergency service records. Upon examination of the records at a 20% rate, no significant difference was observed between those who were living independently at home and those who were residing in care facilities (21).

To develop effective prevention strategies, it is imperative to recognize the multifaceted nature of falls among older adults. Understanding the mechanisms underlying falls enables more expedient clinical assessments and analyses of the risks related to falls. The most common causes of falls are loss of balance and dizziness, while the second most common cause is falling from stairs or steps

(14). Our data indicate that the practice of recording the causes of falls is not common in Türkiye. In 57% of the cases in which our patients presented to the ED with a complaint of falling, the cause of the fall was not determined. The most common causes of falls were tripping and stumbling, with a significant difference in prevalence. When individuals who present with falls are registered in hospital systems, falls attributed to neurological and cardiopulmonary issues are categorized differently. In our study, the data associated with these codes were not analyzed. This may explain the high incidence of data about tripping and stumbling.

Head trauma was the most common injury seen among our patient cohort, although only one of these cases required surgical intervention. The most common injuries that required surgical treatment were hip and lower-limb fractures. Given that such injuries typically occur after high-severity and risky falls, individuals need to seek immediate medical attention in the event of a fall. Moreover, it may be more common for individuals to present to the ED after high-severity falls. Studies have indicated that the incidence of intracranial hemorrhage after falls is increasing. Although data on this subject are insufficient, it has been concluded that intracranial hemorrhage is seen in 1 of every 20 older individuals admitted to the ED after falls (22).

While 75% of our patients were discharged following an emergency service intervention, 18.3% underwent surgeries. The most common indication for surgery was hip fracture. Hip surgery was performed in 8.6% of the patients who presented with complaints of falling. Erkal et al. reported that nearly half of the older individuals who underwent surgery exhibited cognitive impairments (23). While falls themselves can have negative effects, surgeries to treat fall-related injuries can have profound impacts on quality of life and functionality.

Pierrie et al. reported that individuals who sustain hip fractures after falls typically have higher care and treatment requirements during the year

preceding the fracture. However, a considerable proportion of these individuals do not receive guidance on fall prevention (24), and it is difficult to determine the relationship between the data obtained in our study and the risk factors of chronic disease requiring surgery, owing to the incomplete nature of the data (almost 50%). Data analysis revealed that all patients who underwent surgery had at least one chronic disease. Prospective studies must be designed to ensure the clarity of data to facilitate the interpretation of the relationship in question.

The follow-up of older people at high risk of falls by different health professionals significantly reduces the risk of falls. In their study, Goldberg et al. showed that the risk of falls decreased when the older who visited the ED for falls were referred to physiotherapists and pharmacists, and it was argued that this method feasibly prevented falls (2, 3). The identification of falls and fall prevention programs provided in emergency services are not sufficient to prevent falls. Falls should be analyzed as a multifactorial condition, for which interdisciplinary practices targeting patient-oriented approaches are recommended (25).

While falls significantly affect the quality of life and health-related expenditures in older adults, it is important to characterize this issue in studies conducted across multiple health systems. Older individuals who present to EDs as a result of falls should be evaluated and provided with targeted guidance (1, 25). From this perspective, the data collected from the ED in this study may not be sufficient for understanding and preventing falls.

Addressing falls among older patients admitted to the EDs of district hospitals requires a holistic and integrated approach that includes evidence-based interventions, patient participation, community participation, and interdisciplinary cooperation. To establish this approach, it is necessary to understand the current situation related to falls and determine the associated risk factors through cross-sectional



studies. The most important conclusion that can be drawn from our study is that the ED is an important step in developing preventive health strategies; however, the current medical practices in Turkiye did not allow for the collection of sufficient data to evaluate this approach.

A significant contribution of this study is the identification of critical gaps in data recording and management within the ED setting. Our study highlights the frequent lack of detailed information on fall mechanisms, chronic diseases, and post-discharge outcomes. This finding underscores the need for improved data collection practices in emergency healthcare settings, which can enhance the quality of future research and interventions. However, the study is limited by incomplete data, a retrospective and cross-sectional design. Despite these limitations, the identification of systemic issues in data recording highlights important areas for improvement in emergency care and fall prevention strategies. It is recommended that prospective studies be planned to investigate preventive measures, with the objective of establishing causal relationships and providing actionable recommendations.

The authors declare that they have no conflict of interest.

REFERENCES

1. Galet C, Zhou Y, Eyck PT, Romanowski KS Fall injuries, associated deaths, and 30-day readmission for subsequent falls are increasing in the elderly US population: a query of the WHO mortality database and National Readmission Database from 2010 to 2014. *Clin Epidemiol* 2018;10:1627-1637. (DOI: 10.2147/CLEPS181138)
2. Vaishya R, Vaish A Falls in older adults are serious. *Indian J Orthop* 2020;54: 69-74. (DOI: 10.1007/s43465-019-00037-x)
3. Khattak HG, Arshad H, Anwar K, Majeed Y Fall prevalence and associated risk factors in geriatric population. *Age (Dordr)* 2021;60(64):65-69. (DOI:10.53350/pjmhs211592161)
4. Mojtaba M, Alinaghizadeh H, Rydwik E Downton Fall Risk Index during hospitalisation is associated with fall-related injuries after discharge: a longitudinal observational study. *J Physiother* 2018;64(3):172-177. (DOI:10.1016/j.jphys.2018.05.005)
5. Salari N, Darvishi N, Ahmadipناه M, Shohaimi S, Mohammadi M Global prevalence of falls in the older adults: a comprehensive systematic review and meta-analysis. *J Orthop Surg Res* 2022; 17(1), 334. (DOI: 10.1186/s13018-022-03222-1)
6. Xing L, Bao Y, Wang B et al. Falls caused by balance disorders in the elderly with multiple systems involved: Pathogenic mechanisms and treatment strategies. *Front Neurol* 2023;14:1-8. (DOI:10.3389/fneur.2023.1128092)
7. İlik O, Damar HT, Karayurt O Fall behaviors and risk factors among elderly patients with hip fractures. *Acta Paul Enferm* 2017;30(4): 420-427. (DOI: 10.1590/1982-0194201700062)
8. Baixinho C, Dixe MDA Identification and information of fall risk factors at elderly admission in nursing homes. *GARJMMS* 2017;6(6): 131-136.
9. Jehu DA, Davis JC, Falck RS et al. Risk factors for recurrent falls in older adults: A systematic review with meta-analysis. *Maturitas*, 2021;144: 23-28. (DOI: 10.1016/j.maturitas.2020.10.021)
10. Vu HM, Nguyen LH, Nguyen HLT et al. Individual and environmental factors associated with recurrent falls in elderly patients hospitalized after falls. *Int J Environ Res Public Health* 2020;17(7): 2441-2451. (DOI: 10.3390/ijerph17072441)
11. Ahmed T, Curcio CL, Auais Met al. Falls and life-space mobility: longitudinal analysis from the international mobility in aging study. *Aging Clin. Exp. Res.* 2021;33:303-310.
12. Davenport K, Alazemi M, Sri-On J, Liu S Missed opportunities to diagnose and intervene in modifiable risk factors for older emergency department patients presenting after a fall. *Ann Emerg Med* 2020;76(6): 730-738. (DOI:10.1016/j.annemergmed.2020.06.020)
13. García-Martínez A, Gil-Rodrigo A, Placer A et al. Probability of new falls and factors associated with them in aged patients treated in emergency departments after falling: data from the FALL-ER registry. *Emergencias* 2022;34:444-451
14. Ang GC, Low SL, CH How Approach to falls among the elderly in the community. *Singapore Med J* 2020; 61(3): 116-121 (DOI:10.11622/smedj.2020029)

15. Bergen G, Stevens MR, Burns ER Falls and Fall Injuries Among Adults Aged ≥65 Years — United States, 2014. *MMWR Morb Mortal Wkly Rep* 2016;65:993–998. (DOI: 10.15585/mmwr.mm6537a2)
16. Su FY, Fu ML, ZhaoQH, Huang HH, Luo D, Xiao MZ Analysis of hospitalization costs related to fall injuries in elderly patients. *World J Clin Cases* 2021 Feb 26;9(6): 1271–1283. (DOI:10.12998/wjcc.v9.i6.1271)
17. Bergh C, Wennergren D, Möller M, Brisby H Fracture incidence in adults in relation to age and gender: A study of 27,169 fractures in the Swedish Fracture Register in a well-defined catchment area. *PLoS One* 2020;15(12): e0244291 (DOI: 10.1371/journal.pone.0244291)
18. Xu Q, Ou X, Li J The risk of falls among the aging population: A systematic review and meta-analysis. *Front Public Health* 2022;10: e 902599. (DOI: 10.3389/fpubh.2022.902599)
19. Bisciotti A, Bisciotti A, Bisciotti GN The risk of fracture following a fall in elderly subjects and the role of physical activity: a systematic review. *Med Sport* 2022;75(1): 158-86. (DOI: 10.3389/fpubh.2022.902599)
20. Gupta DD, Kelekar U, Rice D Associations between living alone, depression, and falls among community-dwelling older adults in the US. *Prev Med Rep* 2020;20: 101273 (DOI: <https://doi.org/10.1016/j.pmedr.2020.101273>).
21. Tsai YJ, Yang PY, Yang YC, Lin MR, Wang YW Prevalence and risk factors of falls among community-dwelling older people: results from three consecutive waves of the national health interview survey in Taiwan. *BMC Geriatr* 2020;20: 1-11.(DOI: 10.1186/s12877-020-01922-z)
22. de WitK, Merali Z, Kagoma YK, Mercier E Incidence of intracranial bleeding in seniors presenting to the emergency department after a fall: a systematic review. *Injury* 2020;51(2): 157-163. (DOI: 0.1016/j.injury.2019.12.036)
23. Erkal E, Karacabay K Examination of the factors affecting the cognitive levels and recovery status of geriatric patients undergoing surgical intervention. *Turk Geriatri Derg* 2023; 26(4):394–403. (DOI: 10.29400/tjgeri.2023.367)
24. Pierrie SN, Wally MK, Churchill C, Patt JC, Seymour RB, Karunakar MA Pre-hip fracture falls: a missed opportunity for intervention. *Geriatr Orthop Surg Rehabil* 2019;10(DOI: 10.1177/2151459319856230)
25. Harper KJ, Arendts G, Barton AD, Celenza A Providing fall prevention services in the emergency department: Is it effective? A systematic review and meta-analysis. *Australas J Ageing* 2021;40(2): 116-128.(DOI: 10.1111/ajag.12914)