ISSN 2616-5791 Vol.4, Issue 6: 15-21, DOI: 10.25236/AJMHS.2023.040603

Research progress on drug-related falls in the elderly

Xiao Qian[1,a], Wen Xiulin[2,b,*], Wang Jingrong[1,a], Luo Liqun[1,a], Su Liuju[1,a]

[1]School of Nursing, Shaanxi University of Chinese Medicine, Xianyang Shaanxi, 712046, China
[2]The First Affiliated Hospital of Xi'an Jiaotong University, Xi'an, Shaanxi, 710061, China
[a]17792631559@qq.com, [b]332919997@qq.com
[*]Corresponding author

Abstract: *Falls are the leading cause of injury death in the elderly, and medication is one of the important adjustable factors that cause falls in the elderly. Strengthening medication management is of great significance to reduce the incidence of falls in the elderly. This paper systematically reviews the relevant literature from three aspects: the types of fall-related drugs in the elderly, the fall risk assessment scale and the prevention of drug-related falls, in order to provide a theoretical basis for the safe medication management of the elderly, improve the safety of medication in the elderly, and reduce the occurrence of drug-related falls.*

Keywords: *the elderly; safe medication; Fall; prophylaxis*

A fall is an unexpected fall to the ground or lower, and excludes external violence, loss of consciousness, hemiplegia and other intervention factors [1]. The annual fall rate of the elderly over 65 years old in China is about 30% [2]. Falls have become the leading cause of injury death for the elderly [3], and the occurrence of falls will not only cause a series of physical and psychological hazards to the elderly, but also bring huge economic burden to families and society. According to research data, China's annual medical expenses caused by falls are at least 5 billion yuan [4]. Falls in older adults are primarily influenced by physiological, sick, environmental, pharmacological, and psychological factors, of which medication is a potentially important and modifiable risk factor [5]. According to a cross-sectional study based on Medicare, the incidence of falls in people who did not use drugs was 5.42%, and the incidence of falls after medication was as high as 10.29%, which was 4.87% higher than that of people who did not take drugs [6]. Falls have become an important patient safety topic concerned by medical workers, and a large number of scholars at home and abroad have carried out research on the influencing factors and interventions of falls, but there are fewer reports on the fall of the elderly as the key population and drug falls as the main factor. Therefore, it is particularly important to further clarify the types, assessment scales and prevention and management measures of drug-related falls in the elderly.

1. Types of drugs related to falls

Older patients are at increased risk of falls when they cause side effects such as orthostatic hypotension, sedation, lethargy, confusion, unsteady pace, and cognitive impairment [7]. According to the 17th edition of "New Edition of Pharmacology", the types of drugs that may cause falls are mainly divided into 6 categories, including drugs acting on the central nervous system, drugs acting on the cardiovascular system, drugs acting on the digestive system, drugs acting on the urinary and reproductive systems, hormones and related drugs, and drugs that mainly affect allergic reactions and immune function. Among them, drugs that significantly induce falls in the elderly include anti-central nervous system drugs and multi-drug therapy [3].

1.1 Anti-central nervous system drugs

1.1.1 Antipsychotics

Antipsychotic drugs generally refer to drugs that can pass through the blood-brain barrier and directly act on the central nervous system, and adverse reactions such as tardive dyskinesia, dizziness, cognitive impairment, and orthostatic hypotension may occur during the process of taking them, which may increase the risk of falls [8]. It mainly includes typical and atypical drugs, typical drugs are (chlorpromazine, thioridazine, flufenazine, haloperidol, trifluoperazine, etc.); Atypical agents are

ISSN 2616-5791 Vol.4, Issue 6: 15-21, DOI: 10.25236/AJMHS.2023.040603

(quetiapine, clozapine, risperidone, olanzapine). Studies [9] found that 85.75% of the elderly have antipsychotic drugs at home. Tan Zhaohui et al. [10] studied the effects of hypotensive, hypoglycemic, anti-inflammatory and analgesic, psychotropic drugs on falls in the elderly, and the results showed that the OR of psychotropic drugs was 2.04, indicating that the risk was relatively large. Li Liuxiang et al. [11] conducted a retrospective cause analysis of 80 hospitalized patients who had falls, of which the age group of fall was 65-74 years old, and 9 cases of falls caused by taking antipsychotic drugs, accounting for 11.25%. Therefore, for patients who take antipsychotic drugs for a long time, doctors should start with a small dose and gradually increase the dose. Nursing staff should strengthen the health guidance of the control caregiver (name of the drug, dosage, side effects and symptoms), familiarize them with the symptoms related to easy falls and the time of occurrence, and call the medical staff as soon as symptoms appear.

1.1.2 Antidepressants

Depression is one of the most common problems in the elderly, with an overall prevalence of 11%~57% [12]. Common antidepressants include selective serotonin (5-HT) reuptake inhibitors (SSRIs), selective 5-HT and norepinephrine (NE) reuptake inhibitors (SNRIs), tricyclic antidepressants, and newer antidepressants. Common adverse reactions include gastrointestinal reactions, orthostatic hypotension, dizziness, sedation, and confusion [13]. Carvalho et al. [14] studied the use of venlafaxine and olanzapine in the elderly, resulting in an incidence of orthostatic hypotension of 50% and 7%, respectively. Liu Qing et al. [15] analyzed the results of the survey results of 4696 elderly people in a community and showed that the tricyclic antidepressants among antidepressants had an OR 2 for the first fall of the elderly. 2 indicated that the harm was greater, and the selective 5-HT reuptake blocker had an OR of 3.1 for falls and repeated falls in the elderly. Prompt medical staff to carry out first aid education measures for patients and their families to identify adverse reactions in a timely manner. If patients and family members are informed that orthostatic hypotension occurs when taking this drug, bed rest should be taken as much as possible to reduce activity. If orthostatic hypotension has occurred, lie down on the ground immediately for protection, and then notify medical staff in time. Although the above two studies have reported the occurrence of falls caused by taking antidepressants, there are no specific measures such as optimizing drug dosage and timing, and preventing adverse reactions, and a lot of research and exploration on the above issues are needed in the future to provide clinical reference with high-quality research results.

1.1.3 Antiepileptic drugs

Antiepileptic drugs have been reported in 9 percent of older adults in nursing homes [16]. Affected by age, drugs are metabolized slowly in the body, and the efficacy of drugs also changes, which also amplifies adverse reactions such as drug sedation, ataxia, dizziness, confusion and blurred vision, and fractures, thereby increasing the probability of falls [17]. Clinically, antiepileptic drugs are divided into traditional antiepileptic drugs (such as phenobarbital, benzodiazepines, phenytoin, carbamazepine and valproic acid) and new antiepileptic drugs (such as oxcarbazepine, lamotrigine, topiramate and levetiracetam). Ensrud et al. [18] evaluated the use of central nervous system medications in 8127 women aged 65 years and older, with a 28% incidence of one fall and an 11% incidence of two or repeated falls. Masud et al. [19] studied the correlation between central nervous system drugs and falls in 4696 men aged 60~75, and found that the OR values of single falls and repeated falls of antiepileptic drug users were 2.6 and 2.8, respectively. The above studies have proved that anti-epileptic drugs can increase the probability of falls through multiple perspectives such as large samples, different genders, and different drug types, but the disadvantage is that there is no in-depth study of how to reduce the risk of falls caused by anti-epileptic drugs, such as long-term use of antiepileptic drugs patients should be informed that there may be osteoporosis and fracture risk, bone density should be regularly monitored, and osteoporosis should be prevented. In addition, there are no large-sample studies reported in China, and the randomized controlled experimental research of large samples will be a direction in the future.

1.1.4 Sedative-hypnotic drugs

The study found [20], 58.01% of the elderly had experienced taking sedative hypnotic drugs. In 2011, the former Ministry of Health issued the "Technical Guidelines for Fall Intervention in the Elderly", which confirmed that long-term use of sedative-hypnotic drugs increases the risk of falls [21]. Commonly used sedative hypnotics include four major classes, namely barbiturates, benzodiazepines (BDZ) and non-benzodiazepines, and a new class of hypnotics. After taking it, 67.8% of the population experienced drowsiness, fatigue, dizziness, and 23.2% of the population produced adverse reactions such as gait instability and balance disorders, which caused the elderly to lose attention and lead to falls

ISSN 2616-5791 Vol.4, Issue 6: 15-21, DOI: 10.25236/AJMHS.2023.040603

[22]. Lin Jianyu et al. [23] showed that the incidence of adverse events of falls in elderly patients taking sedative hypnotic drugs was 12.5‰, which was higher than that of 1.3‰ without sedative hypnotics, and the common time period of falls was 24:00-6:00, and the most common occurrence places were bedside and bathroom. Neutel et al. reported [24] that the risk of falls was highest after two weeks of taking benzodiazepines. Perry et al. [25] followed 227 older adults for one year, and the highest risk of fall with a first use of benzodiazepines was 11.4. For patients with insomnia, psychological and behavioral interventions should be preferred and pharmacotherapy considered second. Patients should also be advised to take it after bedtime. The downside is that the effectiveness of specific cycles that lead to an increased risk of falls needs to be further demonstrated.

1.2 Multimedication

There is currently no consensus on the definition of multimedication, which is usually defined as the daily use of five or more conventional drugs, mainly over-the-counter drugs, prescription drugs, Chinese herbal medicines, and health supplements[26]. The elderly have more underlying diseases, so polypharmacy is common in the elderly group, and it is also an important drug factor that causes falls in the elderly [27]. In a survey of 13,869 community-based trends in prescription drug use among older adults over 65 years of age (1988–2010), the proportion of patients using multiple medications increased from 12.8 percent to 39.0 percent [28]; Wang Ru et al. [29] showed that in the elderly medication, the combination with high frequency of multi-medication was hypertension + coronary heart disease (4.00%), hypertension + coronary heart disease + diabetes (1.13%). In clinical practice, doctors and pharmacists should use drugs reasonably and appropriately and monitor drugs based on evidence-based prescriptions; The elderly population should clarify the types of polymedication, and identify and prevent adverse reactions caused by polymedication.

2. Drug-Related Fall Risk Assessment Scale

2.1 Morse fall assessment scale (MFS)

The Morse Fall Assessment Scale (MFS) is one of the primary tools for assessing fall risk [30]. The scale consists of 6 items, including history of falls, more than one medical diagnosis, use of walking aids, intravenous fluids or use of heparin, gait, and cognitive status. The scoring rules are as follows: each entry is scored from 0~25 points, and the total score is 125 points, the higher the score, the greater the risk of falling. The total score < 25 is low risk, 25~45 is medium risk, and >45 is high risk. The MFS scale has good reliability and validity, and the internal consistency Cronbacha is 0.16. At present, it has been translated and used in the United States, Canada, Sweden, Australia, and China and other countries and regions [31-33]. In 2012, Zhou Jungui et al. [34] sinicized the Morse scale, and the internal consistency Cronbach α coefficient of the Morse Fall Assessment Scale Chinese version was 0.086, consistent with the original author; the deletion of intravenous fluids or the use of heparin increased Cronbacha to 0.435. The item indicating that intravenous fluids or use of heparin has the lowest correlation coefficient with the volume scale, consistent with the results of the study of Susan et al. [35], and the analysis of the reason, only one drug factor is included in this scale, which shows that the scale lacks attention to drug factors, and it is recommended to add more comprehensive evaluation factors.

2.2 Thas Fall Risk Assessment Tool (Stratify Scale)

The Stratified Scale is a scale specifically developed to assess the risk of falls in older hospitalized patients. Includes 5 items: (1) during or during hospitalization (Yes=1, No=0); (2) irritability (yes=1, no=0); (3) visual impairment affects daily life functions (yes=1, no=0); (4) frequent toileting (yes=1, no=0); (5) Transfer and activity score of 3 points or more (Yes=0, No=1). The predictive validity of this scale is 93 percent sensitivity and 88 percent specificity [36]. It is widely used in China, Australia, Belgium, Canada and other countries [37]. In 2014, ZHU SE[38] sinicized the stratified scale. The reliability between raters of the Chinese version of the stratified scale was 0.951, the retest reliability was 0.885, and the internal consistency reliability was 0.523, indicating good reliability and validity.However, Yi Yanzhi et al. showed[39] that the Chinese version of the STRATIFY Fall Risk Assessment Scale showed low internal consistency when applied to adult patients in general hospitals (Cronbach's α coefficient value of 0.402). Analyzing the causes, this table is designed to consider only the intrinsic factors of falls, does not mention the classification of drugs, and cannot accurately identify high-risk patients with drug factors.

ISSN 2616-5791 Vol.4, Issue 6: 15-21, DOI: 10.25236/AJMHS.2023.040603

2.3 Hendrich II. fall risk model (HFRM)

The Hendrich II Fall Risk Assessment Scale is mainly composed of eight items, including gender, unconsciousness/behavioral impulsivity/disorientation, dizziness/vertigo, change in excretory pattern, depressive state, benzodiazepines, antiepileptic drugs, and stand-up and walking test (TUGT), with a total score of 16 points, greater than or equal to 5 points as high risk of falling, and the sensitivity value of the scale is 74.9%, and the specificity value is 73.9% [40]. In 2010, Zhang Congcong et al. [41] first sinicized the Hendrich II. fall risk assessment scale, and the sensitivity value of the scale was 72% and the specificity value was 69%, which was consistent with the conclusions of the original author. In 2012, Wang Shanshan et al. [42]] tested the reliability and validity of the Chinese Hendrich II. Fall Risk Assessment Scale, and according to China's national conditions, the "confusion" was modified to "consciousness disorder", and "one attempt can stand up" was revised to "one help can stand up". The results showed that the coefficient value between each sub-term and the total score was 0.163~0.839, and the Cronbach's α coefficient was 0.663, the CVI was 0.975, and the > reference value was 0.78, indicating that there was good reliability and validity. However, this scale only includes antiepileptic drugs and benzodiazepines, two drugs that are prone to falls, and there are still incomplete coverage and low sensitivity for drug risk assessment.

3. Precautions for drug-related falls

3.1 Reasonably select tools to accurately assess the risk of falling

Studies have suggested that fall risk assessment should be performed on an annual basis for older people over 65 years of age [43], as shown in Figure 1, from the evaluation process, all older adults should be screened for fall risk, asking for a history of falls, gait, and balance problems in the past 12 months, and for each patient who has had a fall, impaired balance, or difficulty walking, a professional assessment scale was used to assess their gait, balance, and mobility; For those who have one of the above, a professional will evaluate the medication (whether to take drugs related to falls, and more than 5 types of drugs taken). If the above conditions are not present, a multifactorial fall risk assessment is performed, and the main contents of the assessment include drug history, fall history, related disease history, physical function and structure, environmental factors, balance ability, gait, daily living ability, shoes and socks, cognition, nervous system function, etc. [44]. After the above assessment, if the patient has any drug-related fall factors, corresponding preventive management measures should be taken according to the use of the drug to reduce the fall.

3.2 Establish effective drug management programs to reduce drug harm

Huang Lianjiao et al. [45] established a project management team based on project management thinking (establishing the project name, project team members, setting project management target values, conducting feasibility analysis, formulating plans and specific implementation steps), and effectively reducing the adverse events of drug-related falls in hospitalized elderly patients. Some researchers have proposed [46] that doctors should reduce multi-medication when treating various diseases, and should try to start with the smallest dose when taking drugs. Zhang Qi et al. [47] carried out clinical pharmacist medication management for 36 patients, including the establishment of clinical pharmacists, improving the professional skills and level of clinical pharmacists, participating in ward rounds, monitoring various adverse reactions, and strengthening outpatient prescription intervention, and the total incidence of irrational drug prescription after intervention was reduced compared with the control group. Medication guidance for fall prevention can also be enhanced in older adults, such as older adults taking sedatives and sleeping pills who must be awake before they can go outside [48]. The above has achieved results in different degrees by carrying out medication management from multiple perspectives such as hospital evaluation, doctor adjustment, clinical pharmacist supervision and medication guidance for the elderly. But assessment, adjustment, supervision, guidance, etc. can only be used as part of a comprehensive pharmacological intervention. In the future, it is necessary to optimize the drug scheme research for different drug patients and establish the optimal drug plan.

3.3 Implement health education and raise awareness of fall prevention

BLarsson et al. [49] confirmed that regular health education for the elderly is effective in reducing the risk of falls. The "Home (Maintenance) Elderly Fall Intervention Guidelines" pointed out [50] that the

ISSN 2616-5791 Vol.4, Issue 6: 15-21, DOI: 10.25236/AJMHS.2023.040603

elderly should strengthen dietary nutrition, appropriate supplementation of vitamin D 15 μg (600 IU) per day, and tolerable maximum intake of 50 μg (2000 IU) per day can prevent osteoporosis and prevent falls. For those who are taking the above medicines, a fall prevention sign can be affixed to the medicine box. Through knowledge popularization, negative case publicity, video push, psychological counseling and other forms, health education interventions are carried out to the elderly and their families, identify their own factors of fall risk, master daily medication (dose, frequency, sequence, adverse reactions) and other methods, enhance the self-confidence of the elderly, and then improve the awareness of fall prevention and give full play to self-efficacy [51-53]. And now the emerging virtual technology is also applied to the fall of the elderly, Feng Lei et al. [54] will integrate the virtual technology somatosensory game into home dialysis management, by providing (rhythm boxing, bear children chase me, happy volleyball, dodgeball, game ellipsis) training forms, the results suggest that VR can give full play to the subjective initiative of patients, stimulate patients' interest and motivation to train, thereby reducing the risk of falls.

4. Conclusion

At present, there are few studies on drug-related fall intervention in the elderly in China, and the following problems were found during the implementation of this study: there are fewer multicenter large-sample drug-related fall studies. The existing drug-related studies have a small sample size and unclear effective management measures, and a large-scale multi-center cohort study on drug-related fall risk for the elderly population in China is needed in the future. Secondly, there is a lack of recognized, highly reliable and universal tools, although there are some assessment models and scales for the risk of falling in the elderly, but from the perspective of operability, simple and easy to operate, accurate and time-consuming assessment of the scale needs further research and discussion; Finally, the intensity and scope of outpatient and community-based interventions need to be strengthened. It is suggested that in addition to regularly carrying out publicity and education on the knowledge of fall prevention for the elderly, outpatient clinics and communities can also combine emerging technologies such as virtual technology to enhance the awareness of the elderly or strengthen supervision, so as to improve their own compliance.

References

[1] Bian Pingda, Qian Sufeng, Ying Qifeng, et al. Common causes of fall-related fractures in the elderly [J]. Chinese Journal of Osteoporosis and Bone Mineral Diseases, 2014; (2): 161-162.
[2] Lin S,Wang X,Wu GF.et al.Expert consensus on fall risk assessment in the elderly in China (draft)[J]. Chinese Journal of Geriatric Health Medicine, 2019, 17(04):47-48+50.
[3] Rankin A,Cadogan CA, In Ryan C, et al.. Core Outcome Set for Trials Aimed at Improving the Appropriateness of Polypharmacy in Older People in Primary Care[J]. J Am Geriatr Soc. 2018 Jul;66(6):1206-1212.
[4] Zhao Ming. Analysis of fall prevalence and risk factors in the elderly in two regions of Zhejiang Province [D]. Zhejiang University, 2017.
[5] Yan Yuqin, Zhang Ping. Research progress on risk factors for falls and intervention strategies in the elderly in the community[J]. Practical Geriatrics, 2018, 32(08):710-712.
[6] Watanabe Jonathan H. Medication Use, Falls, and Fall-Related Worry in Older Adults in the United States. [J]. The Consultant pharmacist: the journal of the American Society of Consultant Pharmacists, 2016, 31(7): 385-393.
[7] Wang Jiaqing, Liu Jing, Huang Jia. Drug Evaluation, 2012, 9(32):39-41.
[8] Xiao Li, Li Wei, Shao Liming. Chinese Journal of Medicinal Chemistry, 2016, 26(06):509-517.
[9] Zhang Min, Fan Zhenwei. Chinese Journal of Endemic Disease Prevention and Control, 2017, 32(11):1241-1242.
[10] Qin Zhaohui, Yu Pulin. Chinese Journal of Gerontology, 2009, 29(23):3099-3101.
[11] Li Liuxiang, Huang Minyi, Liang Jiayu. Analysis of fall-related factors and nursing countermeasures in hospitalized psychiatric patients [J]. China Practical Medicine, 2018, 13(35):182-184.
[12] Yu Chen and Allan Hicks and Alison E. While. Depression and related factors in older people in China: a systematic review [J]. Reviews in Clinical Gerontology, 2011, 22(1): 52-67.
[13] Lu Jing, Feng Xiaorong, Huang Yuan, et al. Research progress on clinical application of antidepressants in the elderly [J]. West China Journal of Pharmacy, 2018, 33(04):435-439.
[14] Carvalho AF, Sharma MS, Brunoni AR, et al. The Safety, tolerability and risks associated with the

ISSN 2616-5791 Vol.4, Issue 6: 15-21, DOI: 10.25236/AJMHS.2023.040603

use of newer generation antidepressant drugs: A critical review of theliterature [J]. Psychother Psychosom, 2016, 85(5): 270-288.
[15] Liu Qing, Dong Wenwei. Correlation between central nervous system medication and fall risk in the elderly [J]. Practical Drugs and Clinical Practice, 2015, 18(02):235-237.
[16] Johnell K, Fastbom J. Antiepileptic drug use in community-dwelling and institutionalized elderly: a nationwide study of over 1, 300, 000 older people. [J]. European Journal of Clinical Pharmacology, 2011, 67(10):1069-1075.
[17] Niu Qian, Liu Xiaohong. Research progress on the correlation between antiepileptic drugs and falls in the elderly [J]. Beijing Medical Journal, 2021, 43(06):535-538.
[18] Ensrud K E, Blackwell T L, Mangione C M, et al. Central nervous system-active medications and risk for falls in older women. [J]. Journal of the American Geriatrics Society, 2002, 50(10):1629–1637.
[19] T, Masud, M, et al. Central nervous system medications and falls risk in men aged 60-75 years: the Study on Male Osteoporosis and Aging (SOMA)[J]. Age & Ageing, 2012.
[20] Meng Weiping, Wei Hong. Investigation on sedative hypnotic medicinal use in retired elderly in Fuzhou City[J]. Journal of Pharmacoepidemiology, 2007(01):33-35.
[21] Yang Y, Sun Yange, Yan Yan, et al. Study on the use of sedative hypnotics in elderly patients with chronic diseases in the standardized management of the community[J]. Chinese Journal of General Practice, 2019, 22(13):1613-1617.
[22] Liu Jia, Feng Ruijuan, Cui Xingyue, et al. Knowledge and behavior investigation on the safe use of sedative hypnotic drugs in outpatient elderly patients[J]. Journal of Nursing, 2016, 23(18):56-58.
[23] Lin Jianyu, Zhang Ying, Sun Chao, et al. Analysis of causes and countermeasures of falls in elderly patients with sedative hypnosis drugs during hospitalization[J]. Chinese Journal of Geriatrics, 2017, 36(06):627-631.
[24] Neutel CI, Hirdes JP, Maxwell CJ, et al. New evidence on benzodiazepine use and falls: the time factor. Age Ageing. 1996 Jul; 25(4):273-278.
[25] Neutel CI, Perry S, Maxwell C. Medication use and risk of falls. Pharmacoepidemiol Drug Saf. 2002 Mar; 11(2):97-104.
[26] Masnoon N, Shakib S, Kalisch-Ellett L, et al. What is polypharmacy? A systematic review of definitions. BMC Geriatr. 2017 Oct 10; 17(1):230.
[27] Huang Yanan, Yang Xiaoxuan, Chen Xiao, et al. Research progress in the management of fall-related drugs in the elderly[J]. Chinese Journal of General Practice, 2021, 24(34):4409-4414.
[28] Charlesworth C J, Smit E, Lee D S H, et al. Polypharmacy among adults aged 65 years and older in the United States:1988—2010[J]. J Gerontol A Biol Sci Med Sc, 2015, 70(8):989-995.
[29] Wang Ru, Guo Daihong, Li Yuanyuan, et al. Investigation and analysis of polypharmacy therapy in 13175 outpatient elderly patients[J]. Chinese Journal of Drug Application and Monitoring, 2018, 15(04):223-226.
[30] Morse JM, Black C, Oberle K, et al. A prospective study to identify the fall-prone patient[J]. Soc Sci Med, 1989, 28(1):81—86.
[31] Eagle DJ, Salama S, Whitman D, et al. Comparision of three instruments in predicting accidental falls in selected inpatients in a general teaching hospital[J]. J Gerontol Nurs, 1999, 25(7):40—45.
[32] McCollam ME. Evaluation and implementation of a re-search-based falls assessment innovation[J]. Nurs Clin North Am, 1995, 30(3):507—514.
[33] McFarlane-Kolb H. Falls risk assessment, multitargeted intervention and the impact on hospital falls[J]. Int J Nurs Pract 2004, 10(5):199—206.
[34] Zhou Jungui, Li Yajie, Fan Jianzhong. Reliability and validity of Morse fall assessment scale Chinese edition in hospitalized elderly patients in China[J]. Chinese Journal of Rehabilitation Medicine, 2012, 27(03):244-247+284.
[35] Chow SK, Lai CK, Wong TK, et al. Evaluation of the Morse Fall Scale: applicability in Chinese hospital populations[J]. International Journal of Nursing Studies, 2007, 44(4):556-565.
[36] Oliver D, Britton M, Seed P, et al. Development and evaluation of evidence based risk assessment tool(STRATIFY) to predict which elderly inpatients will fall: case-control and cohort studies[J]. BMJ Clinical Research, 1997, 315(7115):1049-1053.
[37] Liu Lixiang, He Wenjing, Mo Beirong, et al. A systematic review of fall risk assessment tools in elderly hospitalized patients[J]. Chinese Journal of Nursing Management, 2019, 19(08):1146-1153.
[38] Vermilion. Reliability and validity evaluation of the application of the Chinese Thomas fall risk assessment tool in elderly hospitalized patients in China[J]. Chinese Journal of Practical Nursing, 2014, 30(33):67-70.
[39] Yi Yanzhi, Zheng Bowen, Tang Jingfang, et al. Clinical Application Of Chinese Version Of Stratify Fall Risk Assessment Form [J]. NURSING RESEARCH, 2018, 32(17):2764-2766.
[40] Hendrich AL, Bender PS, Nyhuis A. Validation of the Hendrich II Fall Risk Model: a large

ISSN 2616-5791 Vol.4, Issue 6: 15-21, DOI: 10.25236/AJMHS.2023.040603

concurrent case/control study of hospitalized patients. Appl Nurs Res. 2003 Feb; 16(1):9-21.
[41] Zhang Congcong. Chinese and reliability and validity evaluation of Hendrich fall risk assessment scale [D]. Peking Union Medical College of China, 2010.
[42] Wang Shanshan, Liu Yanhui, Huang Chunping. Reliability and validity of the Chinese edition of the fall risk assessment scale for elderly hospitalized patients[J]. Chinese Journal of Nursing, 2012, 47(10):927-929.
[43] Song Mi, Pi Hongying, Xu Yue, et al. Research on fall assessment tools for the elderly[J]. China Medical Herald, 2020, 17(34):60-63.
[44] Avin K G, Hanke T A, Kirk-Sanchez N, et al. Management of falls in community-dwellingolder adults: Clinical guidance statement from the academy of geriatric physical therapy of the american physical therapy association[J]. Physical Therapy, 2015, 95(6): 815-834.
[45] Huang Lianjiao, Chen Zhiqing, Qin Zhihui. Application of project management team in reducing falls caused by high-risk drugs[J]. Nursing Practice and Research, 2016, 13(18):128-130.
[46] Qin Zhaohui, Yu Lin, Wu Zhengzheng. Current status and progress of fall research in the elderly[J]. Chinese Journal of Geriatrics, 2005(09):711-714.
[47] Zhang Qi. Pharmacological intervention effect of clinical pharmacists in the management of clinical irrational drug use[J]. Continuing Medical Education, 2022, 36(02):97-100.
[48] Wang J, Chen Z, Song Y. Falls in aged people of the Chinese mainland: Epidemiology, risk factors and clinical strategies [J]. Ageing Research Reviews, 2010, 9(supp-S):S13-S17.
[49] BLarsson.*Guidelines for intervention in falls in the elderly at home (maintenance)[J]. Chinese Journal of Geriatric Health Medicine, 2018, 16(03):32-34.*
[50] Larsson TJ, HgvideML, SvanborgM, et al. Falls prevention through community intervention-a swedish example[J]. SafetySci, 2009:48(2):204-208.
[51] Zhang Chun. Investigation and intervention evaluation of the current situation of the elderly fall prevention in a college community in Guangzhou[J]. Modern Hospital, 2013: 13(9):152-154.
[52] Tao Yanling, Chen Juanhui, Guan Yumei, et al. Risk factors and prevention measures for falls in the elderly at home in the community[J]. Chinese Nursing Management, 2017, 17(7):910-914.
[53] Ye Lixiao, Deng Yinghong, Zhang Min. Causes of falls in elderly patients and cognitive investigation on fall prevention[J]. Jilin Medical Journal, 2013, 34(16):3196-3197.
[54] Feng Lei, Li Yunshu, Yang Jie, et al. Effects of motion sensing games based on virtual reality technology integrated into home dialysis exercise management on fall risk and quality of life of dialysis patients [J]. Chinese Journal of Blood Purification, 2021, 20(05):302-305+332.