POTENTIAL INAPPROPRIATE DRUG USE AND RELATED FACTORS IN ELDERLY PATIENTS WITH POLYPHARMACY

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ABSTRACT

Introduction: *Explore the potential inappropriate medication (PIM) of elderly patients in a hospital and its related factors.*

Materials and methods: *A total of 560 elderly patients with chronic diseases in Chizhou People's Hospital were selected from October 2020 to December 2020 clinical pharmacy management system Potential inappropriate medication was evaluated by the 2019 Beers standard and the China PIM Judgment Standard.*

Results: *A total of 560 patients were collected, mean age (75.02±6.45) years, and mean length of hospital stay (9.84±3.96) For d, (10.75±4.18)Seed, a total of 370 patients developed PIM according to the Beers criteria, with the highest incidence of proton pump inhibitors. According to the PIM judgment Standard in China, there are 393 total one patient developed PIM, of which clopidogrel the highest incidence. logistic showed that according to the Beers criteria, age and type of medication are the factors affecting the occurrence of PIM. According to logistic, according to the China PIM Judgment Standard, the type of medication affects the occurrence of PIM.*

Conclusion: *The incidence of PIM was high in elderly patients with multiple drugs, and the main factors affecting PIM are age and type of medication. Clinical pharmacists should pay attention to the PIM caused by the elderly patients with multiple drugs in the review of prescription and medical orders, strengthen drug monitoring, and reduce the drug damage of the elderly patients with multiple drugs.*

Keywords: *Multiple medication for elderly, potentially inappropriate medication, criteria for potentially inappropriate medication for Chinese elderly, beers criteria.*

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Introduction

Due to the weakening of various body functions, the elderly are often accompanied by a variety of diseases and require a combination of drugs. The elderly are also more sensitive to drug metabolism, drug efficacy, and drug interactions. Potentially inappropriate medication (PIM) is more prominent[1, 2]. Studies have shown that most elderly people have multiple drugs through investigation, and at the same time, it is found that the incidence of PIM in this group of elderly people is high, which brings adverse effects to elderly patients and affects the physical and mental health of patients[3]. At present, many countries around the world have promulgated different evaluation criteria for potentially inappropriate drug use for the elderly, among which the Beers criteria are more commonly used[4, 5]. China has promulgated the "China PIM Judgment Criteria", mainly to reduce the occurrence of PIM in the elderly with multiple drugs[6]. This paper mainly collects the prescription information of elderly patients with chronic diseases in internal medicine, and evaluates the PIM situation based on the above two standards, aiming to reduce the risk of drug use in elderly patients with chronic diseases.

Materials and methods

General information

From October 1, 2020 to December 31, 2020, 560 medical records of elderly patients with chronic diseases in internal medicine were selected from the PASS clinical pharmacy management system of Chizhou People's Hospital, including 299 males and 261 females; age 65~97 years old, average age (75.02±6.45) years old; hospitalization days 3-29 days, average hospitalization days (9.84±3.96) days; drug types 5-28, the average drug types (10.75± 4.18) kinds.

Inclusion criteria:

• Discharged from hospital on 2020-10-1-2020-12-31;

• Age ≥65 years old;

• ≥5 types of medication during hospitalization (excluding traditional Chinese medicine preparations, sodium chloride, glucose;

• Clinical diagnosis includes common chronic disease diagnosis of cardiovascular and cerebrovascular diseases, diabetes, and chronic respiratory diseases.

Exclusion criteria:

• Hospitalization time ≤48h;

• Diagnosed with tumor or palliative treatment;

• Hospitalized twice or more within one month.

Methods

PIM criteria According to the "China PIM Judgment Criteria"[7] (2017 version) and the 2019 version of Beers criteria[8, 9], to evaluate the specific situation of PIM in elderly patients with chronic diseases in a hospital, and to explore the influencing factors of PIM occurrence.

Survey methods

The general data of 560 patients were recorded in Excel, including: gender, age, length of hospital stay, type of medication, clinical disease diagnosis, etc., and analyzed and evaluated according to the above two standards.

Statistical processing

The software SPSS 20.0 was used to analyze the data, the measurement data were expressed as mean ± standard deviation ($\bar{x}\pm s$), and the factors influencing the occurrence of PIM were analyzed by multivariate logistic regression analysis. $P < 0.05$ was considered statistically significant.

Results

Beers criteria and drug-related PIM

As shown in Table 1, based on the Beers criteria (2019 version), PIM was present in 560 patients, of which 370 (66.07%) were drug-related PIM, with a total of 513 cases. Among them, proton pump inhibitors occurred most frequently, followed by benzodiazepines sedative - hypnotics.

PIM name	Suggest	Strength of Evidence	Recommended strength	Frequency
Proton pump inhibitor	Avoid medication >8 weeks, except in high-risk patients, eg, due to discontinuation failure or failure of H2-receptor antagonist therapy	Powerful	Powerful	286
Alprazolam, Estazolam, Diazepam, Clonazepam	Avoid	Medium	Powerful	57
Nifedipine	Avoid	High	Powerful	43
Digoxin	Avoid as first-line therapy for atrial fibrillation, heart failure	For atrial fibrillation or heart failure: low, dose >0.125mg/d: moderate	Powerful	32
Indomethacin	Avoid	Medium	Powerful	Twenty one
Atropine	Avoid	Medium	Powerful	15
Amiodarone	Avoid as first-line treatment for atrial fibrillation unless patient has heart failure or left ventricular hypertrophy	High	Powerful	14
Metoclopramide	Avoid use, unless gastroparesis, not easy to use for a long time	Medium	Powerful	11
Ibuprofen	Avoid long-term use unless other alternatives are ineffective; patients may take gastroprotective drugs (proton pump inhibitors or misoprostol)	medium	Powerful	10
Glimepiride	Avoid	Powerful	Powerful	8
Phenobarbital	Avoid	High	Powerful	7
Trihexyphenidyl	Avoid	Medium	Powerful	3
Paroxetine	Avoid	High	Powerful	2
Anisodamine	Avoid	Medium	Powerful	1
Terazosin	Avoid use as an antihypertensive drug	Medium	Powerful	1
Amitriptyline	Avoid	High	Powerful	1
Chlorzoxazone	Avoid	Medium	Powerful	1
Total				513

Table 1: Beers criteria and drug-related PIM situation.

PIM situation related to disease according to beers criteria

As shown in Table 2, based on the Beers criteria (2019 version), 24 cases (4.29%) of disease-related PIM occurred, involving a total of 25 cases. The patients with heart failure had the highest frequency of using non-steroidal antiinflammatory drugs, with a total of 11 cases.

Beers and Disease-related PIM	Suggest	Strength of Evidence	Recommended strength	Frequency
NSAIDs for heart failure	Avoid or use with caution	NSAIDs and COX-2 inhibitors: low	Powerful	11
Chronic kidney disease grade IV and above (Ccr<30ml/min) using NSAIDs	Avoid	Medium	Powerful	4
benzodiazepines with a history of falls or fractures	Avoid use unless there is no safer alternative	High	Powerful	4
Syncope with anticholinergic drugs	Avoid	High	Powerful	3
Diltiazem for heart failure	Avoid or use with caution	Non-dihydropyridine calcium channel blockers: Moderate	Powerful	1
Delirium using antipsychotics	Avoid	Medium	Powerful	1
Antipsychotics for Parkinson's disease	Avoid	Medium	Powerful	1
Total				25

Table 2: PIM situation related to diseases according to Beers criteria.

PIMs that should be used with caution in the elderly according to beers criteria

As shown in Table 3, according to the Beers criteria (2019 edition), there were 185 cases (33.04%) of PIMs that should be used with caution in the elderly, with a total of 202 cases. Among them, the incidence of diuretics in the elderly was the highest, with a total of 175 cases.

Pim of beers criteria middle-aged and elderly should avoid drug interactions

As shown in Table 4, according to the Beers criteria (2019 version), among the elderly patients with chronic diseases in the department of internal medicine in this hospital, there were 14 cases (2.50%) of drug interactions that should be avoided, with a total of 16 cases . Cortisol combined with non-steroidal anti-inflammatory drugs occurred in 4 of 14 cases.

Beers Drug Caution in older adults	Suggest	Strength of Evidence	Recommended Strength	Frequency
Diuretics	Use with caution	Medium	Powerful	175
Rivaroxaban	Use with caution when treating VTE or atrial fibrillation in patients ≥75 years of age	Medium	Powerful	10
Dabigatran	Use with caution when treating VTE or atrial fibrillation in patients ≥75 years of age	Medium	Powerful	8
Carbamazepine	Use with caution	Medium	Powerful	5
Tramadol	Use with caution	Medium	Powerful	4
Total				202

Table 3: PIMs that should be used with caution in the elderly.

Beers Drug Interactions	Suggest	Strength of Evidence	Recommended Strength	Frequency
Cortisol combined with NSAIDs	Avoid, if necessary, take gastrointestinal protectants	Medium	Powerful	4
Combination of warfarin and amiodarone	Avoid if possible; monitor INR closely if concomitant	Medium	Powerful	3
Any combination of three or more CNS drugs	Avoid co-administration of three or more CNS medications; minimize the number of CNS medications	Agonist-like hypnotic or opioid combinations: High: All other drug combinations: Moderate	Powerful	3
Opioids in combination with benzodiazepines	avoid	Medium	Powerful	2
Opioid combined with gabapentin, pregabalin	Avoid; Exception: Conversion from opioid therapy to gabapentin therapy should be used with caution	Medium	Powerful	2
ACEI combined with ARB class	Routine use should be avoided in patients with chronic disease grade 3a and above	Medium	Powerful	1
Combining warfarin with NSAIDs	Avoid if possible; monitor INR closely if concomitant	Medium	Powerful	1
Total				16

Table 4: PIMs for Avoiding Drug Interactions.

PIM that should be reduced/avoided based on renal function in Beers criteria

As shown in Table 5, 11 cases (1.96%) of PIM should be avoided based on renal function in elderly patients, with a total of 11 cases; 6 cases (1.07 %) of PIM should be reduced based on elderly renal functio, with a total of 6 cases.

A total of 11 cases of spironolactone were used in elderly patients with chronic diseases in the department of internal medicine in this hospital with severe renal insufficiency (Ccr<30ml / min).

Beers-based renal function PIM	Suggest	Strength of Evidence	Recommended Strength	Frequency
Ccr<30ml/min use spironolactone	Avoid	Medium	Powerful	11
Ccr < 50ml/min with rivaroxaban	Non-valvular atrial fibrillation: Ccr15~50ml/min, reduce the dose; (Ccr<15ml/min, avoid; VTE prevention for knee replacement: Ccr<30ml/min, avoid, it is recommended to delete)	Medium	Powerful	3
Ccr<50ml/min use cimetidine	Reduce dose	Medium	Powerful	2
Ccr <60ml/min with pregabalin	Reduce dose	Medium	Powerful	1
Total				17

Table 5: PIMs that should be reduced/avoided in renal function.

The situation of pim related to drugs in the "china pim judgment criteria"

As shown in Table 6, based on the "Judgment Criteria for Potentially Inappropriate Drug Use in the Elderly in China ", PIM was present in 560 patients, of which 393 cases (70.18%) were drug-related PIM, with a total of 589 cases. Among them, the frequency of clopidogrel was the highest, followed by insulin, and the frequency of nifedipine (normal release dosage form) was the third.

Potentially Inappropriate Drug Name	Judgment Standard	Risk Intensity	Frequency
Clopidogrel	Class A warning drugs	Low	181
Insulin	Class A warning drugs	Low	70
Nifedipine	Class B warning drugs	Low	43
Theophylline	Class A warning drugs	Low	39
Alprazolam	Class A warning drugs	High	36
Cimetidine	Class B warning drugs	Low	36
Spironolactone	Class A warning drugs	Low	34
Warfarin	Class A warning drugs	Low	twenty two
Indomethacin	Class B warning drugs	High	twenty one
Amiodarone	Class A warning drugs	Low	16
Atropine	Class B warning drugs	High	15
Diazepam	Class B warning drugs	High	14
Ibuprofen	Class A warning drugs	Low	10
Concomitant use of ≥2 NSAIDs	Class B warning drugs	High	8
Phenobarbital	Class B warning drugs	High	7
Digoxin	Class A warning drugs	Low	5
Clonazepam	Class B warning drugs	High	5
Tramadol	Class B warning drugs	Low	4
Trihexyphenidyl	Class A warning drugs	high	3
Nicergoline	Class A warning drugs	Low	3
Morphine	Class B warning drugs	Low	3
Estazolam	Class A warning drugs	Low	2
Olanzapine	Class A warning drugs	Low	2
Clonidine	Class B warning drugs	High	2
Amikacin	Class B warning drugs	Low	2
Quetiapine	Class A warning drugs	Low	1
Amitriptyline	Class B warning drugs	High	1
Aripiprazole	Class B warning drugs	Low	1
Vancomycin	Class B warning drugs	Low	1
Anisodamine	Class B warning drugs	High	1
Chlorzoxazone	Class B warning drugs	Low	1
total			589

Table 6: Drug-related PIM in China's PIM Judgment Criteria.

"China pim judgment criteria" and pim status in disease states

As shown in Table 7, based on the "China PIM Judgment Criteria ", there were 103 cases (18.39 %) of PIM in the disease state, involving a total of 115 cases. Among them, the frequency of using clopidogrel and non-steroidal anti-inflammatory drugs while receiving anticoagulation therapy was the highest, with a total of 64 cases.

Potentially inappropriate medication in disease state	Judgment standard	Recommendations	Frequency
Concomitant use of clopidogrel, non-steroidal anti-inflammatory drugs	Class A	Use with caution, use non-drug therapy, switch to acetaminophen, and use in combination with gastric mucosal protectants	64
NSAIDs for heart failure	Class A	Avoid using	10
Renal insufficiency using NSAIDs	Class A	Avoid using	8
Anticholinergic drugs for benign prostatic hyperplasia	Class A	Avoid for men	7
NSAIDs for high blood pressure	Class A	Switch to acetaminophen or aspirin and monitor blood pressure closely	6
NSAIDs and glucocorticoids for peptic ulcer	Class A	Avoid long-term use	6
Benzodiazepines in chronic obstructive pulmonary disease	Class A	Use with caution	4
Benzodiazepines for falls or fractures	Class A	Avoid use unless other optional medications are not available	4
Psychotropic medication for Parkinson's disease	Class A	Avoid using	1
Diltiazem for heart failure	Class A	Avoid using	1
Osteoporosis using glucocorticoids	Class A	Use with caution	1
Glucocorticoids in diabetes	Class A	Use inhaled corticosteroids and monitor blood sugar closely	1
Thiazide diuretics for gout	Class A	Switch to other antihypertensive drugs	1
High blood pressure using reserpine	Class B	Switch to other antihypertensive drugs	1
Total			115

Table 7: "China PIM Judgment Criteria" and potential inappropriate drug use in disease states.

Multivariate logistic regression analysis of factors affecting the occurrence of PIM [Beers criteria (2019 edition)]

As shown in Table 8, taking the occurrence of PIM in elderly patients (No: 0, Yes: 1) as the dependent variable , and taking age , length of hospital stay, type of medication, and number of clinical disease diagnoses as independent variables, the results suggest that the type of medication and age are Risk factors for the occurrence of PIM ($P<0.05$).

Influencing factors	Regression coefficients	Wald value	OR value	*P*	95% confidence interval
Age	0.110	10.471	1.309	0.0 16	1.294 ~ 3.102
The number of days in hospital	0.04 5	0.309	0.431 _	0. 109	0.581 ~ 1.680 _
Type of medication	0. 199	12.359	1.610	0.001	1.790 ~ 3.941 _ _
Number of clinical diagnoses	0.0 63	0.7 13	0.697 _	0.0 83	0.940 ~ 2.009 _ _

Table 8: Analysis of factors affecting the occurrence of PIM.

Multivariate logistic regression analysis of factors affecting the occurrence of PIM ["China PIM Judgment Criteria"]

As shown in Table 9, taking the occurrence of PIM in elderly patients (No: 0, Yes: 1) as the dependent variable, and taking age, length of hospital stay, type of medication, and number of clinical disease diagnoses as independent variables, the results suggest that the type of medication is the occurrence of PIM risk factors (P<0.05).

Influencing factors	Regression coefficients	Wald value	OR value	*P*	95% confidence interval
Age	0.049	0.736	0.642	0.101 _	0.734 ~ 1.954
The number of days in hospital	0.0 37	0.317	0.503 _	0.105 _	0.568 ~ 1.675 _
Type of medication	0. 197	12.510	1.596	0.00 5	1.785 ~ 3.967
Number of clinical diagnoses	0.0 56	0.803 _	0.7 31	0.096 _	0.957 ~ 2.013

Table 9: Analysis of factors affecting the occurrence of PIM.

Discussion

Current status of polypharmacy PIM in the elderly

According to the relevant literature(10), the Beers standard, the Older Prescription Screening Tool (STOPP)/Elderly Prescription Omission Screening Tool (START) standard and the "China PIM Judgment Criteria" are currently used to evaluate the occurrence of PIM in the elderly. The incidence of PIM varies among different evaluation criteria and different populations. Li Yue et al.[11] used the 2019 version of Beers criteria to evaluate PIM in elderly hospitalized patients, and the incidence rate was 20.00%. The results showed that the incidence of PIM in rheumatology and geriatrics was higher, among which estazolam and alprazolam the highest incidence. Cai Jun et al.[12] used the Chinese PIM Judgment Criteria to evaluate elderly hospitalized patients, and the incidence of PIM was 77.10%. The drugs involved mainly included clopidogrel, insulin, quetiapine and zolpidem. Xu Shanshan et al.[13] used the 2019 version of Beers criteria and the "China PIM Judgment Criteria" to evaluate the incidence of PIM in elderly hospitalized patients in general medicine, and the incidence of PIM in both criteria exceeded 50%.

The research object of this paper is the elderly patients with chronic diseases in internal medicine who take multiple drugs, with 5 to 28 kinds of drugs, with an average of (10.75±4.18) kinds of drugs. according to the Beers standard, the incidence of PIM in elderly patients with multiple drugs is as high as 66.07%, and according to the "China PIM Judgment Standard", the incidence of PIM in elderly patients with multiple drugs is as high as 70.18% . Shu Bing et al.[14] used two standards to analyze the PIM situation of elderly patients with multiple drugs in cardiovascular medicine. The results showed that according to the Beers standard (2019 version), a total of 50.5% of patients had PIM, and the drugs with a higher incidence of PIM were: proton pump inhibitors, benzodiazepines, and amiodarone. According to the "Chinese PIM Judgment Criteria", a total of 66.5% of patients had PIM, and the drugs with higher incidence of PIM were clopidogrel, warfarin and amiodarone. This paper is based on the "China PIM Judgment Criteria" PIM incidence rate is similar to it , but the Beers standard study results are higher than it, which may be related to the higher frequency of using nifedipine tablets, nifedipine in these two standards The frequency of PIM is the same ranked third.

The results of this study showed that for elderly hospitalized patients with multiple medications, the incidence of PIM was higher in both criteria, and the "China PIM Judgment Criteria" was higher than the Beers criteria. Since the "China PIM Judgment Standard" has added the blood system drug clopidogrel, which is in line with the domestic drug use in the elderly, it is also the reason why its detection rate is higher than the Beers standard(15). It shows that the "China PIM Judgment Criteria" is more sensitive to the PIM existing in the prescription of elderly patients.

Beers Standard (2019 Edition) Medium and High Frequency PIM Analysis

Using the 2019 version of Beers criteria to evaluate the PIM in elderly patients with chronic diseases and polypharmacy in the hospital, the top three drugs related to drug-related PIM are proton

pump inhibitors, benzodiazepines, and nifedipine, among which proton pump inhibitors First, proton pump inhibitors were used in 286 patients in this study. Because most of the elderly patients with chronic diseases in the internal medicine department of this hospital have cardiovascular and cerebrovascular diseases, oral aspirin or clopidogrel, or the combination of the two drugs, often accompanied by gastrointestinal symptoms, use proton pump inhibitors to protect gastric mucosa and reduce digestion.

However, these drugs can participate in the absorption of magnesium, calcium and other elements in bone metabolism. Long-term use will reduce the survival rate of osteoclasts, and affect the absorption of calcium ions, which can easily affect bone density and cause fractures[16-19]. In addition, Clostridium difficile infection can be increased. Therefore, it is recommended to avoid medication for more than 8 weeks, except in high-risk groups or in patients for whom there is evidence that continuous treatment is required. Ranked second were benzodiazepines, with 57 cases of PIM. The results of meta-analysis by Liu Yun et al.[20] showed that the prevalence of sleep disorders in the elderly was as high as 47.2%, so elderly patients used such drugs more frequently. Benzodiazepines can increase the risk of cognitive impairment, delirium, falls, fractures and motor vehicle accidents in the elderly. Non-drug therapy should be the first choice for the elderly in the clinical treatment of insomnia. If it cannot be avoided, short-acting therapy should be preferred. Low-dose medication.

175 of PIM diuretics among middle-aged and elderly people using Beers criteria (2019 edition) with caution. Diuretics can promote the loss of potassium and sodium, and also have an impact on glucose metabolism . The risk of using these drugs in the elderly is that such drugs may aggravate or cause antidiuretic hormone secretion or hyponatremia syndrome. In elderly patients, starting or changing the dose Serum sodium levels should be closely monitored. According to Beers criteria, there were 24 cases of disease-related PIM in the elderly, including the highest 11 cases of heart failure using non-steroidal anti-inflammatory drugs, 4 cases of chronic kidney disease grade IV and above (Ccr <30ml/min) using NSAIDs and 4 cases of falls Or patients with a history of fractures use benzodiazepines, and elderly people with such diseases should avoid using them. If they are used in combination, they should always pay attention to the occurrence of adverse reactions[21]. In this study, NSAIDs were used most frequently in heart failure. Because the use of NSAIDs in patients with heart failure may promote fluid retention or aggravate heart failure, they should be avoided or used with caution.

Among the PIMs related to drug interactions, there were 4 cases of cortisol combined with non-steroidal anti-inflammatory drugs. Since the simultaneous use of the two can increase the risk of peptic ulcer or bleeding, they should be avoided as much as possible. Gastrointestinal protectants can be used in combination when necessary. Among the PIM based on renal function, 11 cases of spironolactone were mainly involved, suggesting that the monitoring of renal function in elderly patients should be strengthened in clinical practice, and the drug regimen should be adjusted in time.

Many PIM items are detected by the Beers standard. The rational use of the Beers standard and the full use of the hospital's pre-prescription review software can remind patients and doctors to use drugs with caution, and can proactively manage the multi-drug management of elderly patients, thereby reducing the use of drugs in the elderly. Risk and promote rational drug use in the elderly.

Analysis of medium and high frequency PIM in "China PIM Judgment Criteria"

The results of this study showed that, according to the "Chinese PIM Judgment Criteria", among drug-related PIM, the incidence of clopidogrel was the highest, with a total of 181 cases. Risk of thrombocytopenia, gastrointestinal bleeding due to this medicine. Zhang Chenyu et al.[22] conducted a clopidogrel signal mining study based on real-world data, and showed that the adverse reaction signals of clopidogrel involved 26 organ systems, and gastrointestinal bleeding accounted for the first number of reported cases, suggesting that in addition to paying attention to cardiovascular adverse reactions, Attention should also be paid to strengthening the monitoring of adverse reactions of the gastrointestinal system and nervous system.

According to the "China PIM Judgment Criteria" and PIM in disease state, there were 103 cases, including 64 cases receiving anticoagulation therapy while using clopidogrel, non-steroidal anti-inflammatory drugs, 10 cases of heart failure using non-steroidal anti-inflammatory drugs, Eight patients with renal insufficiency were treated with non-steroidal anti-inflammatory drugs. Among them, the frequency of using clopidogrel and non-

steroidal anti-inflammatory drugs while receiving anticoagulation therapy was the highest. Relevant cases were analyzed, and it was mainly used for patients with coronary heart disease after PCI. In this case, it should be used with caution, and if necessary, it should be used in combination with gastric mucosal protective agents.

The similarities and differences of PIM detection by two standards

In drug-related PIM, both alprazolam and nifedipine were detected in Beers criteria (2019 version) and "China PIM Judgment Criteria", among which nifedipine was the third most frequently detected, and alprazolam was detected in both. The frequency is in the top five. Nifedipine tablets are commonly used in hypertensive emergencies in our hospital because of their rapid onset of action and significant antihypertensive effect. However, it can cause low blood pressure, an increased risk of stroke and myocardial infarction, so it is recommended that older adults avoid it. Clinical pharmacists should pay attention to the clinical application of such drugs, strengthen communication with clinicians, and reduce the risk of drug use in the elderly.

PIM in specific disease states, both the Beers criteria (2019 edition) and the "Chinese PIM Judgment Criteria" detected the use of non-steroidal anti-inflammatory drugs for heart failure and the use of non-steroidal anti-inflammatory drugs for renal insufficiency. However, "China PIM Judgment Criteria" detected 64 patients who received anticoagulant therapy while using clopidogrel and non-steroidal anti-inflammatory drugs. This study shows that under certain disease states, the detection rate of elderly patients with polypharmacy using the "China PIM Judgment Criteria" is higher than that of the Beers criteria (2019 edition).

According to the "China PIM Judgment Criteria", the detection rate of PIM is 70.18 % higher than the Beers standard (2019 version) 66.07%, but the Beers standard covers a wider range of PIM , which also includes the use of drugs with caution in the elderly, drug interactions, and the elderly For items based on renal function, the Beers standard has the characteristics of being detailed and comprehensive, while the "China PIM Judgment Criteria" has the characteristics of convenience and less restrictive conditions. Both have their own advantages. In this study, two criteria were used as the evaluation basis to better evaluate the occurrence of PIM in elderly polypharmacists.

Influencing factors of PIM in elderly polypharmacy patients

Multivariate logistic regression analysis showed that the common influencing factors based on Beers criteria and "China PIM Judgment Criteria" were drug types, which were consistent with the research results of various scholars[23, 24]. It fully shows that the more types of drugs, the higher the possibility of PIM. Therefore, the combination of drugs for the elderly should be reduced in clinical practice, and the drugs should be simplified, thereby reducing the risk of drug use for the elderly and improving the quality of life of patients.

In conclusion, the incidence of PIM in elderly patients with polypharmacy is high, and the main influencing factors of PIM are age and type of medication. The combined use of two PIM screening tools can better evaluate the occurrence of PIM. Clinical pharmacists can focus on PIM-related content when performing prescription and medical order review, and embed the involved PIM, drug interaction and renal function test results into HIS. The system carries out early warning, and strengthens publicity and training to improve clinicians' awareness of PIM. When formulating an individualized drug treatment plan, priority should be given to choosing safe and effective drugs. When it is necessary to use it under special circumstances, drug monitoring should be strengthened to reduce drug damage in elderly patients with multiple drugs.

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