Original Article

Frequency of Potentially Inappropriate Medications in Iranian Elderly Hospitalized Patients

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Abstract

Background: Potentially inappropriate medications (PIMs) should not be prescribed to the elderly due to low effectiveness and adverse drug reactions. This study was conducted to determine the frequency of PIMs in the elderly admitted to educational hospitals in Kerman, in 2023.

Methods: This cross-sectional study was conducted on 1500 elderly patients hospitalized in educational hospitals. The data collection forms were completed according to the health information system (HIS) of the hospital, which includes the patient's age and gender, drug information, and the name of the hospital and ward. PIMs prescriptions were assessed according to Zhan's criteria. Statistical analyses were performed using SPSS version 20.0. The results were presented as mean ± standard deviation (SD) and frequencies (percents).

Results: Nearly 17.8% (n = 267) of patients were treated with at least one PIMs included in the Zhan criteria. Among 331 PIMs used for patients, 43.5% (n = 144), 23.3% (n = 77), and 33.2% (n = 110) of drugs were classified as always avoid, rarely appropriate, and some indication, respectively. Sedative-hypnotics, opioids, and antihistamines were the most prevalent PIMs with 29.5% (n = 98), 25.4% (n = 84), and 23.3% (n = 77) frequency. Approximately 71.4% (n = 10) of patients who were admitted to the Oncology ward, and 38.9% (n = 33) of patients who were admitted to the Critical Care Unit were treated with at least one PIMs.

Conclusion: Today PIMs are a problem for elderly patients. Paying attention to PIMS in oncology, and critical care unit wards is important. More attention should be paid to sedative-hypnotics, opioids, and antihistamines as the most frequently prescribed PIMs.

Keywords: Aged, Potentially inappropriate medications, hospitalization

Introduction

The elderly population is increasing worldwide. It is estimated that the elderly population in the world will reach more than one billion people by 2050 (1). Chronic diseases are common in the elderly. Therefore, they experience treatment with multi-drugs and its side effects (2).

Some drugs are considered inappropriate for the elderly. Potentially inappropriate medications (PIMs) should not be prescribed to the elderly due to low effectiveness, adverse drug reactions, and severe side effects (3). Diagnosing adverse drug reactions in elderly patients is challenging because they often present with nonspecific symptoms including constipation, lethargy, dizziness, confusion, falls, and depression (4).

There are various tools for screening PIMs. In 1991, Beers published the first specific criteria for identifying PIMs use in nursing home residents. Considering some limitations in the Beers standard, Zhan formulated a new standard by forming a panel. After that, many other criteria such as Screening Tool of Older Persons' Prescriptions (STOPP), Screening Tool to Alert to Right Treatment (START), and Medication Appropriate Index (MAI) were also designed (5).

The retrospective cohort study on elderly patients in outpatient departments at hospitals in Thailand in 2015, showed that 63.98% of patients received PIMs (6). The results of a retrospective cross-sectional study at a Hospital in Saudi Arabia estimated the prevalence of PIMs as 66.25% in elderly patients (7). The study was conducted on hospitalized elderly people in India. The prevalence of using PIMs according to the Beers criteria was reported as 33.2% (8). The results of a study among elderly patients referred to pharmacies in Tehran estimated the prevalence of PIMs as 26.0% according to the Beers' criteria. Diclofenac, alprazolam, chlordiazepoxide, and clonazepam were the most common PIMs, respectively (9). The results of a cross-sectional study in Rasool-e-Akram hospital of Tehran showed that 22.3% of elderly

patients admitted to the internal medicine ward received PIMs according to Beers' criteria. (10).

Population aging is a health challenge in the world and Iran. On the other hand, prescribing some drugs to the elderly threats the health of patients. Therefore, compliance with the standards of drug prescription in this age group is very important. This study was conducted to determine the frequency of PIMs in the elderly admitted to teaching hospitals in Kerman, in 2023.

Methods

This cross-sectional descriptive study was conducted on 1500 elderly patients (over 60 years old) hospitalized in educational hospitals (Afzalipur, Shahid Bahonar, and Shafa hospitals) in Kerman in 2023. According to previous studies that reported the frequency of inappropriate drug use as 31% in the elderly (11) and considering α: 0.05, β: 0.1 and d: 0.04 and using the following formula, the sample size was calculated 1403 and in order to increase the statistical power of the study, finally 1500 people were included in the study.

The inclusion criteria were determined as age > 60 years. Patients with incomplete electronic information were excluded from the study. Patients were selected using Quata sampling method based on the number of elderly patients admitted in each ward of hospital.

The data collection forms were completed according to the health information system (HIS) of the hospital, which includes the patient's age and gender, drug information, and the name of the hospital and ward. After collecting the data, PIMs prescriptions were assessed according to Zhan's criteria. Dr. Zhan organized an expert panel in 2000. According to the Zhan's criteria, PIMs in elderly patients were classified into three groups including always avoid, rarely appropriate, and some indications (12).

The results were presented as mean ± standard deviation (SD) for quantitative data and frequencies (percents) for qualitative data using SPSS version 20.0.

Results

Out of the 1500 records of patients, 55.5% (n = 832) were men, and 3.5% (n = 52) did not have insurance. The mean ± SD of participants' age was 69.90 ± 7.79 years. Nearly 17.8% (n = 267) of patients were treated with at least one PIMs included in the Zhan criteria. Among them, one PIMs was found in 76.0% (n = 203), two PIMs were detected in 19.9%, (n = 53), and three or more PIMs were found in 4.1% (n = 11) of patient's records.

Totally, 331 PIMs were used for patients. Considering the classification of Zhan, 43.5% (n = 144), 23.3%, (n = 77), and 33.2% (n = 110) of drugs were classified as always avoid, rarely appropriate, and some indication, respectively.

Considering pharmaceutical categories, sedative-hypnotics, opioids, and antihistamines were the most

prevalent PIMs. (Table 1)

Among inappropriate drugs, pethidine, chlordiazepoxide, hyoscine, chlorpheniramine, and indomethacin were the most prevalent PIMs, respectively (Table 2).

Among patients who were admitted to different wards of hospitals, patients who were admitted to the oncology ward (71.4%), and critical care unit (38.9%) had the most percent of prescribing PIMs. Patients who were admitted to the rheumatology ward (3.1%), and Endocrinology ward (3.3%) had the less percent of prescribing PIMs (Table 3).

Discussion

This study was conducted to determine the prevalence of PIMs in a sample of elderly hospitalized patients. The frequency of using inappropriate drugs in the present study was significant, especially in the oncology and CCU wards. Sedative-hypnotics, opioids, and antihistamines were the most common pharmaceutical categories prescribed for patients in hospitals.

It was found that 17.79% of the patients received at least one PIMs based on the Zhan criteria, which was the same as the results of previous studies with various patient populations estimating a prevalence of 16.3% (13), 21%-29% (14), 21%-58% (15), and 28.8% (16) for PIMs. This difference between studies could be due to different settings, study designs, and different instruments. Despite nearly three decades of scientific attention paid to PIMs in the elderly, approximately 18 in 100 elderly patients in Iranian hospitals received PIMs in 2023. It shows that the physicians do not understand the importance of avoiding PIMs in the elderly, completely. Holding retraining courses for physicians working in hospitals can solve this problem.

In this study, among patients who received PIMs, 24% of them received more than one PIMs. One study estimated the prevalence of using PIMs among elderly patients in Tehran, Iran, in 2014, as 15.38% (13). In these two studies, the Zhan criteria were used to detect the PIMs. Therefore, it can be concluded that the prevalence of using more than one PIMs in a patient is higher in Kerman hospitals. Drug-drug interactions may occur in these patients. A clinical pharmacologist should be present in hospitals and check these interactions.

This study showed that according to the three

Table 1. Frequency of different PIMs according to the pharmaceutical category (N = 331)

Pharmaceutical category	Number	Percent
Opioids	84	25.4
Sedative-Hypnotic	98	29.5
Antihistamines	77	23.3
Anticholinergics	40	12.1
NSAIDs	27	8.2
Muscle relaxers	4	1.2
Antidepressants	1	0.3

Table 2. Frequency of different PIMs according to the generic name (N = 331)

Drug name	Number	Percent
Pethidine	84	25.4
Chlordiazepoxide	54	16.3
Hyoscine	36	10.9
Chlorpheniramine	35	10.6
Indomethacin	27	8.3
Thiopental	23	6.9
Diphenhydramine	23	6.9
Diazepam	19	5.7
Promethazine	14	4.2
Methocarbamol	4	1.2
Cyproheptadine	3	0.9
Oxybutynin	3	0.9
Hydroxyzine	2	0.6
Phenobarbital	2	0.6
Amitriptyline	1	0.3
Dicyclomine	1	0.3

Table 3. Frequency of PIMs prescribing in patients according to different wards of hospitals (N = 1500)

Hospital ward	Treatment with PIMs No. (%)	
	Yes	No
Ear, Nose and Throat	5 (25.0)	15 (75.0)
Cardiology	20 (11.9)	148 (88.1)
Rheumatology	1 (3.1)	31 (96.9)
Ophthalmology	11 (12.5)	77 (87.5)
Intensive Care Unit	10 (27.8)	26 (72.2)
Critical Care Unit	33 (38.9)	81 (71.1)
Neurology	21 (18.8)	92 (81.2)
Gastroenterology	49 (27.2)	131 (72.8)
Endocrinology	1 (3.3)	29 (96.7)
Emergency	27(7.9)	313 (92.1)
Gynecology and Obstetrics	2 (25)	6 (75)
Infectious diseases	38 (25.3)	112 (74.7)
Surgery	23 (26.1)	65 (73.9)
Orthopedic surgery	10 (12.5)	70 (87.5)
Urology surgery	5 (25)	15 (75)
Oncology	10 (71.4)	4 (28.6)
Neurosurgery	1 (5)	19 (95)

classifications of Zhan criteria, the frequency of "always avoid" drugs was more than other groups. Inconsistence to our study, in the study among elderly outpatients in Tehran (13), and in the Uintaite state (17), the frequency of prescription of "always avoid" drugs was lower. Due to the dangerousness of prescribing "always avoid" drugs, the high frequency of their use in hospitals can threaten the health of the elderly. Hospitals should regularly and systematically monitor doctors' medication orders and use incentive mechanisms to promote correct prescribing.

The findings of this study showed that sedative-hypnotics, opioids, and antihistamines were the most pharmaceutical categories prescribed for patients in hospitals. A study among hospitalized elderly patients in Japan showed that PIMs related to benzodiazepines are the most frequent PIMs (18). The results of a systematic review showed that the drugs related to the central nervous system and cardiovascular disease, benzodiazepines, analgesics, and nonsteroidal anti-inflammatory drugs were the most prevalent PIMs in the elderly population (19). A study in teaching hospitals of Ilam city in Iran (2022) finds Pain Relievers as the more frequent PIMs in elderly patients (20). In two other studies among Iranian elderly patients, benzodiazepines (10,21), antipsychotics (21), pain relievers, and antidepressants (10) were the most frequent PIMs. Sedative-Hypnotics are associated with sedation, cognitive and psychomotor impairment, and delirium which increases the risk of morbidity and mortality in elderly patients (22).

The findings of this study showed that the oncology and critical care unit had the highest frequency of PIMs, and the rheumatology and endocrinology wards had the lowest. In Saboor and colleagues' research in 2018 in Tehran, the orthopedic ward had the highest, and the internal ward had the lowest amount of PIMs prescribed (9). Oncology and critical care unit wards are two wards where patients with advanced and complex diseases are hospitalized. Providing a pharmacological recommendation, and suggesting similar alternative drugs can be helpful in these wards.

Among the strengths of the current study, we can mention the high statistical population (1500 people) compared to similar studies, as well as the use of HIS hospital system data, which is accurate and reliable. Only one tool was used to investigate PIMs in this study. Therefore, conducting more studies using several tools to measure PIMs and using newer tools seems necessary. The present study only examined the frequency of PIMs in the elderly hospitalized in Kerman hospitals, so it is suggested to conduct more studies on the elderly referring to clinics and outpatient centers.

Conclusion

PIMs are still frequently experienced by elderly patients in Iranian hospitals. Specifically, physicians in the surgical ward, Critical Care Unit, and infectious diseases ward need to be more aware of PIMs. More attention should be paid to sedative-hypnotics, opioids, and antihistamines as the most frequently prescribed PIMs.

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