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Factors associated with the prescription of potentially inappropriate medications for older adults in a public hospital

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Abstract

Objective: To evaluate the factors associated with the prescription of potentially inappropriate medications for the older adult (PIM) in a public hospital. **Methods**: A prospective cross-sectional study was carried out, whose data were collected from the medical records of older adult patients, admitted to the medical clinic of a public hospital, by a trained researcher, not a member of the staff. The collection took place between November 2018 and January 2019. The medical records of patients aged over 60 years, who were using at least one allopathic in-hospital medication, with a minimum of 48 hours of hospitalization, were included. Illegible prescriptions, or those containing only herbal medicines and / or vitamin supplements, were excluded. The PIMs were classified according to the Beers Criteria, 2019 update. Descriptive analysis of the data was performed using frequencies, means and standard deviation and bivariate analysis using the Chi-square and Fisher's Exact tests, with a level of significance. $p < 0.05$, using the software and SPSS® v.21.0. **Results:** 42 medical records of the older adult were analyzed, where a 100% prevalence of use of PIM and polypharmacy was identified. The number of PIMs per patient was significantly associated with females ($p = 0.020$), with a higher prevalence of older adult women who used between 1 and 4 PIMs (64.1%); diagnosis ($p = 0.006$), with a higher prevalence of older adult people with circulatory tract diseases (54.5% using 1-4 PIM), endocrine, nutritional and metabolic diseases (85.7% using 1-4 PIM)) and diseases of the circulatory system (83.5% in use ≥5 PIM); polypharmacy ($p = 0.002$) with a higher prevalence of older adult people who used ≥10 medications (52%, in use ≥ 5 PIM). The main therapeutic classes of PIM were of the alimentary tract and metabolism (46%) and nervous system (22%). **Conclusion:** It is concluded that the prescription of PIM was very high, where all the older adult in this study were exposed, being significantly associated with the female gender, polypharmacy, and diagnoses related to chronic comorbidities. It is necessary to raise the awareness of the team to adopt safer strategies and practices in the use of these drugs in order to minimize the exposure of the older adult to possible risks.

Keywords: aged; potentially inappropriate medication list; chronic illness; hospitalization; adverse reactions related to medication.

Fatores associados à prescrição de medicamentos potencialmente inapropriados para idosos em um hospital público

Resumo

Objetivo: Avaliar os fatores associados a prescrição de medicamentos potencialmente inapropriados para idosos (MPI) em um hospital público. **Métodos:** Foi realizado um estudo transversal prospectivo, cujos os dados foram coletados nos prontuários de pacientes idosos, internados na clínica médica de um hospital público, por um pesquisador treinado, não integrante do quadro de funcionários. A coleta ocorreu entre novembro de 2018 a janeiro de 2019. Foram incluídos os prontuários de pacientes com idade a partir de 60 anos, que tivessem em uso de pelo menos um medicamento alopático intra-hospitalar, com mínimo de 48h de internamento. Foram excluídas as prescrições ilegíveis, ou que tivessem unicamente fitoterápicos e/ou suplementos vitamínicos. Classificou-se os MPI de acordo com os Critérios de Beers, atualização de 2019. Fez-se análise descritiva dos dados através de frequências, médias e desvio padrão e análise bivariada através dos testes Qui-quadrado e Exato de Fisher, com nível de significância $p<0,05$, utilizando o software e SPSS® v.21.0. **Resultados:** Analisou-se 42 prontuários de idosos, onde identificou-se prevalência de 100% de uso de MPI e polifarmácia. O número de MPI por paciente teve associação significativa com o sexo feminino ($p=0,020$), sendo maior a prevalência de idosas que utilizaram entre 1 a 4 MPI (64,1%); diagnóstico ($p=0,006$), sendo maior a prevalência de idosos com doenças do trato circulatório (54,5% em uso de 1-4 MPI), doenças endócrinas, nutricionais e metabólicas (85,7% em uso de 1-4 MPI) e doenças do aparelho circulatório (83,5% em uso ≥5 MPI); polifarmácia ($p=0,002$) com maior prevalência de idosos que usaram quantidade ≥10 medicamentos (52 %, em uso ≥ 5 MPI). As principais classes terapêuticas dos MPI foram do trato alimentar e metabolismo (46%) e sistema nervoso (22%).

Conclusão: A prescrição de MPI foi elevada, onde todos os idosos deste estudo foram expostos, estando significativamente associada ao sexo feminino, à polifarmácia, e a diagnósticos relacionados a comorbidades crônicas. É necessária a sensibilização da equipe para adoção de estratégias e práticas mais seguras no uso desses medicamentos no intuito de minimizar a exposição dos idosos a possíveis riscos.

Palavras-chave: idoso; lista de medicamentos potencialmente inapropriados; doença crônica, hospitalização; reações adversas e efeitos colaterais relacionados a medicamentos.

Introduction

Aging is accompanied by organic and functional changes, such as decreased bone and muscle mass, nervous system impairment and reduced sensory perception, these being some of the main aggravating factors for the onset of Chronic Non-Communicable Diseases (CNCDs).[1,2,3] According to the Brazilian Society of Geriatrics and Gerontology (*Sociedade Brasileira de Geriatria e Gerontologia*, SBGG),[4] nearly 30% of the or adults develop more than one CNCD, requiring the prescription of pharmacotherapies in a polypharmacy regime. This, in turn, implies the administration of multiple drugs, thus increasing the probability of adverse events.[5]

The high prevalence of chronic conditions, associated with the organic and physiological deficit inherent to the aging process, makes the increase in iatrogenesis common in the aged population, leaving them more susceptible to adverse drug reactions (ADRs).[6-8] In addition to this, in this epidemiological scenario, episodes of hospital admissions are also more frequent, increasing the demand for the use of more complex drugs[9,10].

In this context, it is observed that the use of potentially inappropriate medications (PIMs) for the older adults is common in primary care, but mainly in the hospital environment, being defined as those drugs "whose risk of use is greater than the clinical benefits provided, when safer and more effective alternatives are available".[11] A pharmacovigilance study, carried out in a Brazilian university hospital, identified that the therapeutic choice of inappropriate drugs induced the occurrence of ADRs in12.5% of the hospitalized older adults and that nearly85% of the prescriptions for these aged individuals contained polypharmacy schemes.[12].

The American Geriatrics Society (AGS)[13] organization, points out that ADRs generate a mean of 700,000 emergency visits per year, attributed to the misuse of the PIMs, which can be avoided with the use of tools that make choice of therapy more judicious, systematic and safe, such as the adoption of the Beers Criteria.[13-15]

When analyzing some profiles of PIM prescriptions already described by other authors, it was verified that, in a study carried out in Spain[16] with hospitalized older adults, the PIMs that indicated the highest prevalence and, consequently, triggered ADRs, were digoxin (20.3%), non-steroidal anti-inflammatory drugs (NSAIDs – 13.2%), benzodiazepines (10.6%), diuretics (8.6%), and antibiotics (4.6%). Similarly, in Brazil, a study[17] carried out in a hospital in the state of Minas Gerais, the most frequent PIMs were in the benzodiazepine class (24.5%), followed by digoxin (18.8%). These data signal the importance of systematic observation of the prescription of these medications by professionals, since hospitalized older adults are especially susceptible to the use of PIMs and to adverse events. As a result, the use of PIMs can be considered a public health problem that negatively impacts on the quality of life of the aged individuals and on the increase in the health costs[18].

In view of the need for caution in the use of PIMs, given the complications and clinically negative outcomes that result from them, especially with regard to the increase in the toxicity of the medications to the older adults,[19] it is necessary to expand knowledge about the main PIM prescription profiles targeted at this age group in the hospital setting, in order to seek the best strategies for intervention. Therefore, and given the above, it is encouraged that more studies be directed in this follow-up, mainly at regional levels, with the intention of understanding the needs and challenges in different scenarios. In addition, the fact of elucidating the factors that can contribute to the increased risk of complications for the older adults subjected to the use of these medications can assist health workers to direct behaviors that minimize the negative impacts caused by the incorrect use of medications.

In this perspective, the objective of this study was to assess the factors associated with the prescription of potentially inappropriate medications (PIMs) for the older adults in a public hospital, in addition to verifying the main therapeutic classes, medications involved, and the main diagnoses for which these medications were prescribed.

Methods

This is a prospective cross-sectional study that took place in a public hospital located in the Southwest Bahia, which covered the analysis of prescriptions contained in medical clinical (MC) records, from the female and male wards. The hospital was founded in 1947 and it is an open-door and medium- and high-complexity institution, whose main focus is to serve Urgencies and Emergencies, also being a reference in the Southwest region of Bahia, serving 27 municipalities, with 275 beds and specialties for medical clinic, clinical and surgical neurology, general surgery and orthopedics, pediatrics (urgency, emergency and ward), psychiatry and Intensive Care Unit (ICU)[20].

Data collection was initiated after authorization from the hospital management and the team's approval, being conducted by a previously trained researcher, not part of the staff, who made daily visits to the male and female MC wards, during a three-month period (from November 2018 to January 2019), in order to monitor changes in the prescription (inclusion or withdrawal of medications). It is worth noting that, in the data collection period, the hospital had not yet adopted effective practices related to the clinical pharmacy service.

The inclusion criteria adopted were all medical records of patients aged 60 years old or older[21] who were hospitalized for a minimum period of 48 hours in the MC and who had a prescription of at least one allopathic medication in the hospital environment. Unintelligible prescriptions were excluded, as well as those that only contained phytotherapeutic medications or vitamin supplements and nutritional prescriptions. A form structured by the researcher was used for data collection, which consists

of variables with information of the patient, the prescriber and the medications prescribed. From this collection tool, the agreement of the drugs that make up the list of PIMs and the Beers Criteria in its most updated version (2019) was analyzed, according to the AGS,[13] with the drugs used by these older adults in the hospital environment.

The Beers criterion is a list distributed into five categories, which encompass pharmacological classes and the description of the drugs, eventual risks of ADRs, as well as the use description, the following categories being assessed: potentially inappropriate medications for all the older adults, medications that must be avoided in certain clinical conditions, medications that must be used with caution in older adults, medications that induce potential clinically important drug interactions and that must be avoided, and medications that must be avoided or have their dosage reduced according to the patient's renal function.[13]

Thus, the dependent variable was the use of PIMs in line with the Beers criteria (2019),[13] adopting the drugs from all the lists in the aforementioned categories. This variable was categorized in this study according to the number of medications used by each older adult (1–4 PIMs/patient or ≥5 PIMs/patient), this criterion being defined according to a previous assessment of the number of PIMs used by each older adult, indicated in the database.

Regarding the independent variables, *sociodemographic* and *clinical* factors were listed, such as gender, age group, reason for hospitalization and diagnosis, these latter two based on the International Statistical Classification of Diseases and Related Health Problems (ICD-11)[22] and hospitalization period; *factors related to the medications*, with the prescription of fixed medications being observed - those prescribed under the "if necessary" observation were taken into consideration only upon confirmation of the administration in the medical record - as well as the prescriber's specialty and the occurrence of polypharmacy, assessed according to the daily observation of the number of medications prescribed on each hospitalization day from admission to discharge, obtaining a mean use value at the end of the research period, taking into account the prescription of five or more medications, as indicated by the World Health Organization (WHO).[7] Similarly, the drugs were classified according to the Anatomical Therapeutic Chemical (ATC) classification, in its level 1, as well as as determined by the WHO,[23] in addition to the specification of the doses and administration routes.

Data tabulation was performed in *Microsoft Office Excel*® 2013,[24] with subsequent statistical analysis by using the *Statistical Package for the Social Sciences* – SPSS software, version 21.0,[25] where descriptive analysis was performed, by means of the distribution of relative and absolute frequencies for the categorical variables; and, for the numerical variables, mean values and standard deviations were calculated. For the bivariate analysis, the chi-square association test and Fisher's exact test were used, with $p<0.05$ being considered as significance level.

This study was developed in accordance with the requirements of Resolution 466 of the National Health Council (*Conselho nacional de Saúde*, CNS), of December 12th, 2012;[26] this study being part of a larger project entitled "Pharmacotherapy follow-up and medication reconciliation in patients admitted to the Prado Valadares General Hospital, located in the municipality of Jequié-Ba", approved by the Research Ethics Committee (*Comitê de Ética em Pesquisa*, CEP) of the State University of Southwest Bahia (*Universidade Estadual do Sudoeste da Bahia*, UESB) under opinion number: 462,333 and CAAE: 21431313.5.0000.0055.

Results

Information was analyzed from the medical charts of 42 patients aged 60 years old or more, hospitalized in the medical clinic of a public hospital, referring to all the aged patients who were hospitalized in this sector during a three-month period. A total of 70 different medications were identified, used 462 times. There was 100% prevalence for the use of PIMs in the medical records analyzed, indicating that, among the 42 older adults, all used potentially inappropriate medications during hospitalization. Polypharmacy was also present in 100% of the prescriptions, where the use of at least 5 drugs was considered, according to the WHO,[5] with a mean of 11 medications per patient (SD ± 4.04), with variations between the minimum and maximum numbers, from 6 to 28, respectively.

Table 1 shows the description of the sociodemographic and clinical factors observed in the medical records, as well as the association between the number of PIMs prescribed and the study variables. In general, there was predominance of the female gender (92.9%) and of the age group corresponding to longer-lived aged individuals (42.9%), with a mean of 77.86 years old (SD ± 10.43), the minimum and maximum ages being 62 and 99 years old, respectively. The use of PIMs had a significant association with the female gender, with higher prevalence of aged women who used between 1 and 4 PIMs (64.1%). There were also associations with diagnoses (p=0.006), with emphasis on the prevalence of older adults with diseases of the circulatory system (54.5% in use of 1-4 PIMs), endocrine, nutritional and metabolic diseases (85.7% in use 1-4 PIMs) and diseases of the circulatory system (83.5% in use of ≥5 PIMs). In addition, a significant association was also observed between PIMs and the polypharmacy variable, with a greater number of PIMs in the prescriptions of older adults who had higher numbers of medications prescribed, that is, 52% of the aged individuals who used ≥10 medications had 5 or more PIMs in their prescription.

Table 2 shows the classification of the PIMs, according to the Beers Criteria and the description of the reasons that make them inappropriate, where 28 different drugs were identified, and used 169 times (36.6%) in the analyzed period. It was identified that 78.6% of the patients used a PIM regardless of the diagnosis, 33.3% of the patients used a PIM according to diagnosis or clinical condition, 28.6% of the patients were using medications that must be avoided or have their dosages reduced according to the renal function, 26.2% must use the PIMs with caution, and 4.7% of the patients presented clinically relevant interactions described in the AGS/Beers/2019 criteria. The medications for the digestive tract and metabolism stood out, with 46% of use, followed by the drugs acting on the nervous system, with 22%, metoclopramide (43%) and diazepam (32%) being the active ingredients that obtained the highest frequency among these classes, respectively. The most reported administration route was oral.

Table 1. Association between the number of PIMs prescribed with sociodemographic and clinical variables of aged patients admitted to the medical clinic of a public hospital. Bahia, Brazil, 2018-2019.

Information	Presence of PIMs	Number of PIMs/patient		p-value
		1 to 4 PIMs	≥5 PIMs	
Sociodemographic n (%)				
Female gender[1] (n=42)	39 (92.9)	25 (64.1)	14 (35.9)	0.020*
Age group (years old) (n=42)				0.146**
60-69	13 (31.0)	6 (46.2)	7 (53.8)	
70-79	11 (26.2)	9 (81.8)	2 (18.2)	
≥80	18 (42.9)	13 (72.2)	5 (27.8)	
Clinical n (%)				
Reasons for hospitalization, ICD-11 (n=23)[2]				0.435**
Nonspecific clinical signs, symptoms or findings	8 (19.0)	4 (50.0)	4 (50.0)	
Diseases of the circulatory system	8 (19.0)	6 (75.0)	2 (25.0)	
Diseases of the respiratory system	5 (11.9)	3 (60.0)	2 (40.0)	
Injuries, poisoning and certain other consequences from external causes	6 (14.3)	4 (66.7)	2 (33.3)	
Some infectious and parasitic diseases	2 (4.8)	2 (100.0)	-	
Others	3 (7.1)	1 (33.3)	2 (66.7)	
Not reported	19 (45.2)			
Diagnoses, ICD-11 (n=25)[2]				0.006**
Diseases of the circulatory system	11 (26.2)	6 (54.5)	5 (45.5)	
Endocrine, nutritional and metabolic diseases	7 (16.7)	6 (85.7)	1 (14.3)	
Diseases of the respiratory system	6 (14.3)	1 (16.7)	5 (83.3)	
Diseases of the digestive tract	3 (7.1)	2 (66.7)	1 (33.3)	
Nonspecific clinical signs, symptoms or findings	2 (4.8)	-	2 (100.0)	
Some infectious and parasitic diseases	1 (2.4)	1 (100.0)	-	
Neoplasms	1 (2.4)	1 (100.0)	-	
Injury, poisoning and certain other consequences from external causes	1 (2.4)	1 (100.0)	-	
Others	4 (9.5)	1 (25.0)	3 (75.0)	
Not reported	17 (40.5)			
Hospitalization time (days) (n=42)				0.676**
7-14	20 (47.6)	15 (75.0)	5 (25.0)	
15-21	13 (31.0)	8 (61.5)	5 (38.5)	
≥22	6 (14.3)	3 (50.0)	3 (50.0)	
Remained hospitalized[3]	3 (7.1)	2 (66.7)	1 (33.3)	
Polypharmacy (n=42)				0.002**
5-9 medications	17 (40.5)	16 (94.1)	1 (5.9)	
≥10 medications	25 (59.5)	12 (48.0)	13 (52.0)	
Prescriber's specialty (n=42)				0.608**
General Practitioner	40 (95.2)	27 (67.5)	13 (32.5)	
Others	2 (4.8)	1 (50.0)	1 (50.0)	

[1]Dichotomous variable for which data of only category were presented. [2]Some patients presented more than 1 reason for hospitalization and diagnosis. [3]Remained hospitalized after the 3 months of data collection. (*)Chi-square test; (**)Fisher's exact test.

Discussion

The main findings of this research point to a high prevalence of prescription and use of PIMs and polypharmacy (both 100%) in the medical records analyzed, regardless of the diagnosis, elucidating that the main factors that were significantly associated with the use of PIMs in this population were as follows: female gender (p=0.020), with higher prevalence of aged women who used between 1 and 4 PIMs (64.1%); diagnosis (p=0.006), with higher prevalence of older adults with diseases of the circulatory system (54.5% in use of 1-4 PIMs), endocrine, nutritional and metabolic diseases (85.7% in use of 1-4 PIMs) and diseases of the circulatory system (83.5% in use of ≥5 PIMs); and polypharmacy (p=0.002) with higher prevalence of older adults who used ≥10 medications (52%, in use of ≥5 PIMs).

These data bring about reflections on the profile of use of PIMs in this population, initially with regard to the general prevalence, when compared to other national and international studies, with fluctuations in the prescription rates of these medications. In Brazil, a study carried out in a public hospital in Porto Alegre-RS[27] showed that the use of PIMs was present in 91.9% of the prescriptions analyzed; in contrast, in another medium- and high-complexity hospital located in Southwest Bahia, prevalence was 18.2%;[28] on the other hand, in a Japanese hospital, the prescription of PIMs represented 77.2%,[29] while in a Spanish hospital, only 20.5% were identified.[30]

In opposition to these studies, it is believed that fluctuations in the prevalence of PIM prescription can indicate morbidities with unstable prevalence for each region, which suggests variations

Table 2. Characterization and classification of the PIMs according to the 2019 Beers Criterion of the American Geriatrics Society and to the Anatomical Therapeutic Chemical (ATC) Classification. Bahia, Brazil, 2018-2019.

ATC Classification/ PIM n (%)	Dose	Adm. route	Prevalence n (%)	Reason for being considered as PIM[2]	Category*
Digestive tract and metabolism, 77 (46.6)					
Metoclopramide	10 mg, 5 to 25 mg/ml	OR-IV	33 (42.6)	It can cause extrapyramidal effects, the risk can be greater in frail older adults and with prolonged exposure.	1
Omeprazole	40 mg, 40 mg/ml	OR-IV	22 (28.6)	Risk of infection by Clostridium difficile and bone fractures.	1
Ranitidine	25 mg/ml, 15 mg/ml	OR-IV	14 (18.2)	Change in mental state, high risk of delirium.	2
Scopolamine	20-500 mg/ml	IV	3 (3.9)	Highly anticholinergic, uncertain efficacy.	1
Scopolamine + Dipyrone	NI[1]	IV	3 (3.9)	Highly anticholinergic, uncertain efficacy.	1
Glibenclamide	5mg	OR	2 (2.6)	Greater risk of prolonged hypoglycemia, severe in older adults.	1
Nervous system, 37 (21.9)					
Diazepam	5-10 mg	OR	12 (32.4)	Increase in the risks of cognitive impairment, delirium, falls and fractures, among others.	1
Tramadol	100 mg/2 ml	IV	12 (32.4)	Hyponatremia or syndrome of inadequate antidiuretic hormone secretion. Use with caution.	2
Clonazepam	2 mg	OR	5 (13.5)	Increase in the risks of cognitive impairment, delirium, falls and fractures, among others.	1
Haloperidol	NI[1]	NI[1]	3 (8.1)	Increase in the risk of stroke and higher rate of cognitive decline.	1
Fluoxetine	20mg	OR	2 (5.4)	Risk of falls and fractures. It can be used with caution: monitor the level of sodium.	2
Phenytoin	100 mg	OR	1 (2.7)	It must be avoided, for presenting potentially important interactions, which potentiate its toxicity.	4
Risperidone	1 mg	OR	1 (2.7)	Increase in the risk of stroke and higher rate of cognitive decline.	1
Morphine	1 mg/ml	IV	1 (2.7)	Risk of falls and fractures. Drug interactions can potentiate its toxicity, risk of overdose.	2
Cardiovascular and hematopoietic system, 26 (15.4)					
Enoxaparin	40 mg/0.4 ml	SC	12 (46.2)	Increased risk of bleeding; it must be avoided or have its dosage reduced based on the renal function.	3
Acetylsalicylic acid	100 mg	OR	11 (42.3)	Risk of major bleeding because of aspirin, increases markedly in old age.	5
Cilostazol	100 mg	OR	2 (7.7)	Potential to increase mortality in older adults with heart failure. It must be avoided.	2
Warfarin	5 mg	OR	1 (3.8)	It presents potentially important drug interactions, which increase the risk of bleeding.	4
Cardiovascular system, 18 (10.7)					
Spironolactone	25 mg	OR	6 (33.3)	Increase in potassium; it must be avoided. Assess the patient's renal function.	3
Clonidine	100 mcg	OR	5 (27.8)	High risk of adverse effects on the CNS;3 it can cause bradycardia and orthostatic hypotension. Avoid.	1
Digoxin	0.25 mg	OR	4 (22.2)	High risk of toxic effects. Avoid.	1
Amiodarone	200 mg	OR	2 (11.1)	It has greater toxicity than other antiarrhythmic drugs. Avoid as first-line therapy for atrial fibrillation.	1
Methyldopa	NI[1]	NI[1]	1 (5.6)	High risk of adverse effects on the CNS;[3] it can cause bradycardia and orthostatic hypotension. Avoid.	1
Anti-infectious agent, 4 (2.4)					
Ciprofloxacin	500 mg	OR-IV	4 (100.0)	Increased effects on the CNS3 and rupture of the tendon. Assess the patient's renal function.	3
Hormone medications for systemic use, 3 (1.8)					
Prednisone	5 mg	OR	3 (100.0)	Change in mental state, high risk of delirium. Prescribe lower effective dose and for less time.	2
Respiratory system, 2 (1.2)					
Dexchlorpheniramine	10 mg	OR	1 (50.0)	Avoid due to the risk of confusion, dry mouth, constipation, and other anticholinergic or toxic effects.	1
Promethazine	NI[1]	NI[1]	1 (50.0)		1
Musculoskeletal system, 2 (1.2)					
Ketoprofen	50 mg/2 ml	IV	2 (100.0)	Increase in the risk of gastrointestinal bleeding or peptic ulcer in high-risk groups (> 75 years old); it can increase blood pressure and induce kidney injury. Dose-related risks. Avoid chronic use.	1

Administration routes: OR – Oral Route, IV – Intravenous, SC – Subcutaneous. [1]NI – No Information. [2]According to the Beers Criterion classification by the American Geriatrics Society (AGS), 2019, for the use of potentially inappropriate medications in older adults. [3]CNS – Central Nervous System. *Categories of the Beers Criterion (2019): 1- PIMs in longer-lived older adults; 2- PIMS in older adults due to drug interactions or syndromes that can exacerbate the disease; 3- Medications that must be avoided or have their dosage reduced according to the renal function; 4- Clinically important drug interactions that must be avoided; 5- Medications that must be used with care.

in the use of these medications, with regard to number and therapeutic classes, in addition to possible differences in the detection methods of the PIMs in each study, differences in sample size, in the complexity of the diagnoses, and hospital profile, among other factors. However, the possibility is not ruled out that these fluctuations can also have a direct relationship with the safety policies employed in each hospital with regard to the use of medications, as well as with peculiarities of the work process of the health professionals, mainly in relation to the non-performance of a clinical pharmacist to carry out pharmacotherapy follow-up in the sector.[31,32]

In relation to polypharmacy, previous studies corroborate with this finding, in which there were reports of prevalence values varying between 97.1% and 100%.[33,34] Although the practice of polypharmacy is quite used as a clinical measure, aiming at a better response and adherence to treatment, it indicates a threat to the health of the older adults, which can contribute to the high mortality rates.[35,7]

Among the factors that obtained a significant association with the use of PIMs in this population, it is worth noting that the proportion of women was essentially higher than that of men, which can explain the fact that females are more exposed to the use of PIMs in this study. However, other studies conducted with older adults also reported significant associations between the use of PIMs and the female gender, as described by Faustino, Passarelli and Jacob-Filho[36] (63.1%; p=0.018) and by Achterhof et al.[33] (60.4%; p=0.007). In general, it is suggested that the high rate of prescriptions and inappropriate use of these medication by women is higher both epidemiologically, due to the greater susceptibility to the onset of CNCDs, and in behavioral terms, due to their greater demand for health services, when compared men.[33,37]

Regarding the diagnoses, CNCDs are developed with increasing age, mainly those affecting the circulatory system and the endocrine, nutritional and metabolic diseases, such as Hypertension, Diabetes and other cardiovascular complications, which represent a mean of 80% in Brazil and induce an extensive and complex prescription for the older adults.[38,39] In this sense, the use of some PIMs in individuals with important organic changes inherent to age impact on the worsening of these diagnoses and affect the pharmacokinetic and pharmacodynamic processes, with the possibility of causing greater exposure to adverse events.[39]

It was observed that the predominance of the PIMs acting on the digestive tract and metabolism (metoclopramide, omeprazole, ranitidine) and on the nervous system (diazepam, tramadol, clonazepam) is in line with the findings of other studies.[27,40] These substances should be used with caution by the older adults, as they can cause extrapyramidal effects, bone loss and fracture, falls and delirium, in addition to the possibility of drug interactions,[41] further aggravating these patients' frailty condition.

In this context, it is necessary to prevent and reduce preventable harms caused to the patient's health, mainly by medications, since the WHO lists patient safety as a priority when launching the "Global Patient Safety Challenge – Medication Without Harms", which should serve as an instrument for health professionals to prescribe, dispense, administer and adequately monitor the patient, in order to avoid high-risk events.[5,42] In addition, it is worth noting the fact that safety in pharmacotherapy for older adults can be optimized to the extent the Clinical Pharmacist acts in an integrated manner with the health team, in order to contribute to attaining these goals. In this regard, positive results are already described, as in a study conducted in the Belo Horizonte-MG public hospital,[42] where nearly 87.5% of the patients who required pharmaceutical interventions had a reduction in the use of PIMs, from 30% to 20.8%, after hospitalization.

The main limitations of this study are incompleteness of information in some medical records and inability to deepen on possible clinical correlations from laboratory tests, which can interfere with the determination of some PIMs. The study design also did not allow establishing the temporality between the variables and the consequences of using the PIMs. As no other hospitals in the same region were assessed, these data cannot be generalized, although they can serve as a warning for the hospital to adapt some protocol changes aimed at patient safety, which can contribute to the prevention and reduction of the PIMs in the clinical practice.

Conclusion

The prescription of PIMs was high, evidencing that all the older adults analyzed in this study were exposed to this use, significantly associated with the female gender, polypharmacy prescriptions, and diagnoses related to chronic comorbidities. The main medications that corroborated with this alarming data were metoclopramide and diazepam.

Given this reality, it is possible to consider that there is a need to sensitize the team about the adoption of safer strategies and practices in the use of these medications, in an attempt to minimize exposure of older adults to possible risks. It is also suggested that the introduction of a clinical pharmacist in these spaces could add positive impacts in terms of reducing the use of PIMs in this population. In addition, it is believed that the discussions herein raised can foster the improvement of surveillance actions that culminate in a more rational management of the use of PIMs in the clinical practice, not only in the hospital environment, but also in various scenarios of health care for older adults.

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Collaborators

PMS, RLS, TSS and GLVJ participated in the conception and design of the project, as well as in data collection and tabulation. SPM, STS and CMG participated in data analysis and interpretation, as well as in writing the article. VJGL and STS participated in the relevant critical review of the intellectual content and in the approval of the final version.

Conflict of interest statement

The authors declare that there are no conflicts of interest regarding this article.

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