







Use of potentially inappropriate medications by older adults in Primary Health Care: cross-sectional study

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Abstract

Objective: To verify the prevalence of potentially inappropriate medications (PIM) in use and possible associated factors in older adults and the agreement between two assessment tools in Primary Health Care (PHC) context. **Methods:** Cross-sectional study. The prevalence of older adults in use of PIM and associated factors were estimated. First of all was calculated the frequency of drugs, among those used, considered PIM. Classification as PIM was based on the 2019 Beers Criteria and the 2016 Brazilian Consensus on Potentially Inappropriate Medications 2016 (BCPIM) for the older adults. The agreement between the two classifications was also evaluated. Multivariate logistic regression models were estimated. Association was evaluated by Odds Ratio (OR). Kappa was calculated for agreement between both classifications. **Results:** The prevalence of older adults using MPI was 32.9%, according to Beers Criteria and 27.6% according to the BCPIM. The reports of diabetes (OR=1.96), depression (OR=2.25) and polypharmacy (OR=4.11) were associated ($p<0.001$) with the use of inappropriate medication, according to the Beers Criteria. Older adults who were very satisfied with their own health were less likely to use inappropriate medication both according to the Beers Criteria (OR=0.02) and the BCPIM (OR=0.09). Agreement between classifications was considered good ($k=0.75$, $p<0.001$). **Conclusion:** Reports of diabetes and depression, polypharmacy and negative self-rated health and satisfaction were associated with PIM's use. The associations were similar between the two classifications, indicating that both are relevant in identifying PIM use in older adults in the context of PHC.

Keywords: Older Adults.
Medication Prescription.
Primary Health Care.

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Funding:

1) Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq). N° do processo: CNPq – 447382/2014-4).

2) Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG). N° do processo: FAPEMIG – CDS-APQ-03665-16

The authors declare that there is no conflict in the conception of this work.

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Received: 24/05/2023
Approved: 28/06/2023

INTRODUCTION

The significant increase in the use of medicines in the older population is a worrying situation, which involves complex aspects, due to the morbidity and mortality associated with the use of some medicines for the treatment of common diseases in older adults¹. This age group is particularly vulnerable to the use of several medications, being susceptible to the manifestation of problems in drug therapy, such as undesirable effects, drug interactions and use of potentially inappropriate medications (PIM)².

PIMs are medications that present a high risk of adverse effects, or those used for an inappropriate period of time or without indication, in addition to drugs that are ineffective in treating older patients and those that should not be prescribed for older adults³. There is evidence that the use of PIM is associated with the occurrence of adverse events such as falls, fractures, hospitalizations, constipation, heart failure, depression, cognitive deficit and renal dysfunction^{4,5}. Some current studies, national and international, report that the prevalence of PIM use by older adults reaches percentages above 50% in most of the studied groups^{4,7}.

In order to reduce the negative outcomes related to the consumption of PIM by older adults, instruments were developed to identify these drugs, capable of helping professionals at the time of prescription⁸. The Beers Criteria are the most used tool in clinical practice since its first version, in 1991, until the most recent update, published in 2019⁹.

The Beers Criteria are guidelines formulated for greater safety at the time of prescription, based on a list of drugs that should be avoided for use in older adults, such as oral decongestants, theobromines, stimulants, benzodiazepines, anticholinergics and anticonvulsants. Such criteria help health professionals to make the best choice of medication by considering and strongly weighing the existence of better alternatives when prescribing new medications, in addition to identifying PIM. The criteria also adopt flowcharts for when it is necessary to interrupt or reduce the dose of PIM in occasional use^{9,10}.

Due to differences in drug availability and different prescription methods used, these instruments have been adapted in many countries. In 2016, the Brazilian Society of Geriatrics and Gerontology (SBGG) published the Brazilian Consensus on Potentially Inappropriate Medications for Older People (BCPIM), which aims to validate the content of the Beers Criteria (2012) and the Screening Tool of Older Person's Prescriptions (STOPP) (2006), to obtain national classification criteria for PIM¹¹. STOPP is a different tool from the Beers Criteria and depends on the user's clinical information for its complete use¹¹.

Based on the use of criteria for identifying PIM, epidemiological studies found a high prevalence of PIM use in different health care contexts: 84.5% in acute/intensive care, 70% in institutionalized older adults and 62.4% in older adults with non-institutionalized polypharmacy¹².

Primary Health Care (PHC) is the preferred gateway to the public health system. Research on the use of PIM in PHC is of great interest, as it is the scenario in which most drug prescriptions occur, in addition to coordinating and integrating the care provided to older adults in the Health Care Network. Therefore, in addition to prevalence studies and associated factors, there is a growing interest in intervention studies, which seek to recognize strategies to reduce the use of PIM in PHC¹³.

The use of medication in the older population is considered an important practice and should be investigated at all levels of health care. Due to its serious adverse events, research is essential to estimate the prevalence of older adults using PIM and factors associated with this use, according to the Beers Criteria (2019)⁹ and the BCPIM (2016)¹¹. It is also relevant to assess whether the BCPIM still reflects the 2019 Beers Criteria updates for the Brazilian population. Thus, the present study had two objectives: (1) to verify the prevalence of PIM use and its associated factors according to the Beers Criteria 2019 and BCPIM 2016; and (2) observe the agreement between the two evaluation criteria for the use of PIM among older adults in PHC.

METHOD

Population-based exploratory cross-sectional observational study with older adults covered by the Family Health Strategy (FHS) in the city of Alfenas/MG. At the time of data collection (between 2014 and 2016), this population was 4,005 individuals, which represented approximately 70% of the older population residing in the municipality. The number of older adults to be evaluated was defined based on a sample calculation based on a pilot study that considered $\alpha=0.05$ and power of 80%. To calculate the sample, the proportion of the older population of each of the 14 Basic Health Units (BHU) in the municipality was taken into account, in order to maintain the representativeness of the distribution of this population, based on the proportions and means of the variables of interest collected in a pilot study, with 10 seniors from each BHU. Thus, a minimum sample of 350 older adults was estimated. However, to ensure representativeness, especially in cases of exclusion or loss of information, a total of 571 older adults were initially selected to compose the sample. Participants were selected by drawing lots from a list that contained all older adults registered in each unit and their address. If the winner met the exclusion criteria or refused to participate, a new replacement draw was made.

Users aged 60 years or older and residing in areas covered by PHC in the city were included. Exclusion criteria were: bedridden older adults; with positive screening for cognitive impairment assessed by scores of less than 13 (illiterate or low schooling), 18 (medium schooling) and 26 (high schooling) on the Mini Mental State Examination (MMSE)¹⁴. For the analysis of this study, older adults with incomplete information for some variable of interest were excluded. Data collection was carried out at the home of the older adults drawn and included, by trained evaluators, at a time available to respond to the interview.

The following sociodemographic variables were considered as independent variables in this study: age, sex, color/race, marital status, education, family income, number of residents in the household, ability to read and write and own residence; health conditions: self-report of the presence of comorbidities (hypertension, stroke, diabetes, Parkinson's disease,

seizures, depression, vertigo, urinary and fecal incontinence, osteoporosis, arthritis, osteoarthritis and heart disease), functional capacity (how many activities they report being able to perform out of a maximum of eight: leaving home using transport, walking short distances, preparing meals, cleaning the house, getting dressed, going up and down stairs, getting in and out of bed, taking a shower), occurrence of falls in the last year, life habits (cigarette and alcohol consumption), self-assessment and health satisfaction (own and compared to other older adults). Regarding the use of medications, polypharmacy was evaluated based on recording the number of medications used, considering as polypharmacy the use of five or more medications¹⁵. The use of some classes considered more common was evaluated: benzodiazepines, diuretics, antiarrhythmics and psychotropics¹⁵. The checking of medications, their dosage and class was carried out by checking medical prescriptions and packaging during the interview.

The use of PIM was operationalized by classifying each participant as “uses at least one PIM” or “does not use PIM”, having as reference the “Beers Criteria”, version 2019⁹ and the BCPIIM, from 2016¹¹. The classification was made considering the PIM in any situation, regardless of clinical conditions that the individual could present. Thus, it was possible to assess the prevalence of older adults using PIM or not.

The classification of the drugs whose use was identified at least once by the older adults participating in the study was carried out. Each drug was classified as PIM (“yes” or “no”) also by Beers 2019⁹ and BCPIIM 2016¹¹. In this classification, drugs that appeared at least once as used were classified, regardless of the older adult who reported use.

The sample was described by mean and standard deviation values for continuous and discrete independent variables, and absolute and relative frequencies for categorical ones. The prevalences of older adults using PIM according to classifications were calculated by the proportion of the number of older adults using PIM and the total sample.

To verify the associations between the independent variables and the use of PIM, Logistic Regression models were built and the measures of association adopted were Odds Ratio (OR) with a

95% Confidence Interval (95%CI). In all models, the dependent variable was the use of PIM, with the older adult using the referred medication being considered as a reference. Each sociodemographic, clinical or medication-related characteristic was first inserted into a crude logistic regression model as an independent variable. Those that showed association in the crude models were included in the final adjusted regression model. The Hosmer-Lameshow test was used to verify the fit of the models, being considered a good fit when $p > 0.05$. The evaluation of the significance of all models was verified using the F test, which was considered significant at $p < 0.05$.

To assess the agreement between the classifications of the older adults who used or not PIM according to the Beers Criteria and the BCPIM, the Kappa test was performed, considering values above 0.80 = excellent; between 0.79 and 0.60 = very good; between 0.59 and 0.40 = moderate, below 0.39 = poor¹⁶. The significance of the Kappa test was verified by the X^2 test.

Considering the medication as the unit of analysis, the prevalence of PIM, according to the Beers and BCPIM Criteria, was calculated by the proportion of the total number of PIM registered according to each classification criterion and the total number of drugs in use reported at least once.

Analyzes were performed considering a significance level of 0.05.

The study was approved by the Research Ethics Committee of UNIFAL-MG (Opinion number 1,209,721). All participants signed the Free and Informed Consent Term (FICT).

RESULTS

Of the 571 older adults initially contacted, 29 were excluded for not scoring the minimum on the MMSE and 5 for being bedridden. Of the 537 included in the sample, 41 were not part of the present study because they did not have complete information about the medications used. The final sample consisted of 496 older adults, 62.3% women, mean age of 70.80 (± 6.71) years, most aged between 60-75 years (77.6%) and married (66.4%) (Table 1).

The most prevalent morbidity was arterial hypertension (77.2%). The mean number of morbidities was 3.81 (± 2.40) and the number of medications used was 3.96 (± 2.68). Regarding polypharmacy, 36.9% of older adults reported using more than five medications, with diuretics being the most used class (41.6%) (Table 2).

When classified by the Beers Criteria, 163 (32.9%) older adults used PIM, while 137 (27.6%) used PIM by BCPIM. Comparison of classifications by the Beers Criteria and BCPIM showed very good agreement ($k=0.75$, $p < 0.001$) (Table 3).

Table 1. Description of the sample according to sociodemographic characteristics, lifestyle and self-rated health, Alfenas (MG), 2016 (n=496 older adults)

Variable	Mean (\pm standard-deviation)	Frequency n(%)*
<i>Sociodemographic Variables</i>		
Age	70.80 (± 6.71)	
Age Group		
60 – 75 years / >75 years		385 (77.6%) / 111 (22.4%)
Sex		
Female/Male		309 (62.3%) / 187 (37.7%)
Education (Years)	3.67 (± 3.32)	
Ability to read and write		
Yes/No		330 (66.5%) / 166 (33.5%)

to be continued

Continuação da Tabela 1

Variable	Mean (\pm standard-deviation)	Frequency n(%)*
Marital Status		
Married/Unmarried**		327 (66.4%)/169 (33.6%)
Color/Race		
White/ Non-White***		315 (63.5%)/154 (30.5%)
Paid Work		
No/Yes		405 (81.7%)/91 (18.3%)
Own Income		
Yes/No		266 (53.6%)/230 (46.4%)
Retired		
Yes/No		355 (71.6%)/141 (28.4%)
Pensioner		
No/Yes		391 (78.8%)/105 (21.2%)
Money enough for expenses		
Yes/No		274 (55.3%)/222 (44.7%)
Family Income (salaries)	2.24 (\pm 1.44)	
Own Residence		
Yes/No		444 (89.5%)/52 (10.5%)
Number of people living home	2.74 (\pm 1.27)	
<i>Life Habits/Clinical Conditions</i>		
Cigarettes		
Does not Smoke/Smoke****		415 (88.4%)/54 (11.6%)
Alcohol Consumption		
Does not drink/Drink*****		392 (79.0%)/104 (21.0%)
Occurrence of falls		
No/Yes		362 (73.1%)/135 (26.9%)
Functional Capacity	7.59 (\pm 1.14)	
<i>Health self – assessment</i>		
General Health Self-assessment		
Good/More or less/Bad		265(53.5%)/213(42.9%)/18(3.6%)
Compared Health Self-assessment		
Good/More or less/Bad		374(75.4%)/100(20.2%)/22(4.4%)
Own Health Satisfaction		
Very/More or less/Little		381(76.8%)/103(20.8%)/12(2.4%)
Compared Health Satisfaction		
Very/More or less/Little		405(81.7%)/80(16.1%)/11(2.2%)

* Frequencies presented from the most frequent category followed by the least frequent in the sample;

** unmarried: single/divorced/widowed; *** non-white: black/brown/other;**** Does not smoke: never smoked/stopped smoking; ***** does not drink: never drank/stopped drinking

Table 2. Sample description according to multimorbidities and medications, Alfenas (MG), 2016 (n=496 older adults)

Variable	Mean (\pm standard-deviation)	Frequency n(%)*
<i>Morbidities</i>		
Arterial Hypertension		
Yes/No		383 (77.2%)/113 (22.8%)
Stroke		
No/Yes		466 (94.0%)/30 (6.0%)
Diabetes		
No/Yes		302 (60.9%)/194 (39.1%)
Parkinson's Disease		
No/Yes		486 (98.0%)/10 (2.0%)
Seizures		
No/Yes		480 (96.8%)/ 16 (3.2%)
Depression		
No/Yes		393 (79.2%)/ 103 (20.8%)
Vertigo		
No/Yes		316 (63.7%)/ 180 (36.3%)
Urinary Incontinence		
No/Yes		389 (78.4%)/ 107 (21.6%)
Fecal Incontinence		
No/Yes		489 (98.6%)/ 7(1.4%)
Osteoporosis		
No/Yes		404 (81.5%)/ 92 (18.5%)
Arthritis		
No/Yes		402 (81.0%)/ 94 (19.0%)
Osteoarthritis		
No/Yes		395 (79.6%)/ 101 (20.4%)
Heart Disease		
No/Yes		365 (73.6%)/ 131 (26.4%)
Number of Comorbidities	3.81 (\pm 2.40)	
<i>Medication</i>		
Number of Medication Used	3.96 (\pm 2.68)	
Polypharmacy		
No/Yes		313 (63.1%)/183 (36.9%)
Benzodiazepines		
No/Yes		450 (88.9%)/ 46 (11.1%)
Diuretics		
No/Yes		289 (58.4%) /207 (41.6%)
Antiarrhythmics		
No/Yes		445 (89.9%)/ 51(10.1%)
Psychotropics		
No/Yes		445 (89.9%)/ 51 (10.1%)

* Frequencies presented from the most frequent category followed by the least frequent in the sample;

Table 3. Kappa reliability index through comparisons Beers Criteria and the Brazilian Consensus on Potentially Inappropriate Medications for Older People (BCPIM) on the use of inappropriate medications by older adults, Alfenas (MG), 2016.

Use of PIM for older adults	Beers Criteria (2019)	BCPIM (2016)	Kappa
No	333 (67.1%)	359 (72.4%)	$k = 0.75$ (0.68-0.81) $p < 0.001$
Yes	163 (32.9%)	137 (27.6%)	Very Good*

* Classification according to Portney and Watkins¹⁶: above 0.80 = excellent; between 0.79 and 0.60 = very good; between 0.59 and 0.40 = moderate, below 0.39 = poor; p value determined by X^2 test for Kappa significance.

Table 4 presents the results of the crude and adjusted regression models used to evaluate the factors associated with the use of PIM, classified according to the Beers Criteria and BCPIM. All models were significant (F test $p < 0.05$). When considering the classification by the Beers Criteria, older adults who reported diabetes (OR=1.96, 95% CI 1.24 - 3.09), depression (OR=2.25, 95% CI 1.30 - 3.92) and polypharmacy (OR=4.11, 95% CI 2.50 - 6.85) were more likely to use PIM. The older adults were more or less satisfied (OR=0.06, 95% CI 0.01 - 0.43) and very satisfied (OR=0.02, 95% CI 0.01 - 0.19) with their own health compared to other seniors were less likely to use PIM.

When classifying the use of PIM according to CBMPI, it was evidenced that older adults who

reported depression (OR=1.83, 95% CI 1.04 - 3.20) and polypharmacy (OR=4.23, 95% CI 2.52 - 7.21) were more likely to use PIM. Regarding self-rated health, older adults who considered their health to be more or less (OR=0.22, 95% CI 0.04 - 0.93) and good (OR=0.21, 95% CI 0.03 - 0.97), in addition to older adults who were very satisfied with their own health compared to other older adults (OR=0.09 95% CI 0.01 - 0.50), were less likely to use PIM (Table 4).

Regarding the prevalence of PIM among the drugs reported by the older adults as used by the two classifications, 15.2% of the drugs were PIM according to the Beers Criteria and 16.6% according to the BCPIM. There was 94.3% agreement between classifications. (Table 5).

Table 4. Crude Regression Models and Adjusted Regression Model for Use of Inappropriate Medications by the Beers Criteria and Brazilian Consensus on Potentially Inappropriate Medications for Older People (BCPIM), Alfnas (MG), 2016.

Independent Variables	Crude Models			Adjusted Models**			
	Beers Criteria Odds Ratio	IC95%	BCPIM Odds Ratio	Beers Criteria Odds Ratio	IC95%	BCPIM Odds Ratio	IC95%
Age >75 years	0.87	0.55 – 1.37	1.08	0.67 – 1.71			
Sex Male	0.60	0.40 – 0.90*	0.78	0.51 – 1.17	0.58 – 1.12		
Arterial Hypertension Yes	1.65	1.03 – 2.69*	2.04	1.22 – 3.55*	0.88	1.17	0.65 – 2.16
Stroke Yes	1.02	0.44 – 2.19	1.31	0.48 – 2.46			
Diabetes Yes	2.93	1.99 – 4.33*	1.89	1.27 – 2.83*	1.96	1.83	0.68 – 1.80
Parkinson's Disease Yes	0.87	0.18 – 3.18	1.76	0.44 – 6.29			
Seizures Yes	2.72	0.99 – 7.74	2.09	0.73 – 5.73			
Depression Yes	2.87	1.84 – 4.49*	2.53	1.60 – 3.99*	2.25	1.83	1.04 – 3.20*
Vertigo Yes	1.25	0.85 – 1.84	1.61	1.08 – 2.42*		0.95	0.56 – 1.58
Urinary Incontinence Yes	1.29	0.82 – 2.01	1.29	0.80 – 2.04			
Fecal Incontinence Yes	0.81	0.11 – 3.82	0.43	0.02 – 2.56			
Osteoporosis Yes	1.11	0.68 – 1.78	1.18	0.71 – 1.92			
Arthritis Yes	1.19	0.74 – 1.90	1.37	0.83 – 2.21			
Osteoarthritis Yes	1.11	0.68 – 1.78	1.18	0.71 – 1.92			
Heart Disease Yes	2.05	1.36 – 3.10*	2.38	1.55 – 3.64*	1.24	1.29	0.75 – 2.19
Morbidities >5	2.21	1.49 – 3.26*	2.28	1.52 – 3.42*	0.71	0.91	0.50 – 1.63
Polyparmacy Yes	4.58	3.08 – 6.87*	4.55	3.03 – 6.95*	4.11	4.23	2.52 – 7.21*
Functional Capacity 7/8 ADL	1.04	0.56 – 1.99	0.87	0.47 – 1.70			
Occurrence of Falls Yes	1.73	1.14 – 2.61*	1.65	1.07 – 2.52*	1.41	1.23	0.74 – 2.02
Own Health Self-assessment More or less	0.38	0.13 – 1.10	0.15	0.04 – 0.43*	0.86	0.22	0.04 – 0.93*

to be continued

Continuation of Table 4

Independent Variables	Crude Models			Adjusted Models**		
	Beers Criteria Odds Ratio	IC95%	BCPIM Odds Ratio	Beers Criteria Odds Ratio	IC95%	BCPIM Odds Ratio
Own Health Self-assessment Good	0.23	0.08 – 0.62*	0.11	0.77	0.03 – 0.32*	0.21
Compared Health Self-assessment More or less	0.58	0.22 – 1.49	0.40	0.44	0.15 – 1.05	1.22
Compared Health Self-assessment Good	0.44	0.44 – 1.06	0.35	1.00	0.14 – 0.84*	2.02
Mais ou menos satisfeito com a saúde	0.17	0.03 – 0.64*	0.15	0.06	0.03 – 0.56*	0.32
Very satisfied with own health	0.14	0.03 – 0.51*	0.11	0.02	0.02 – 0.37*	0.56
More or less satisfied with compared health	0.06	0.01 – 0.37*	0.22	0.06	0.04 – 0.84*	0.22
Very satisfied with compared health	0.04	0.01 – 0.22*	0.12	0.02	0.02 – 0.42*	0.09
Hosmer-Lamashow				p = 0.690		p = 0.260

* significant $p < 0.001$; ** considering the associated variables in the crude models

Table 5. Kappa reliability index through comparisons Beers Criteria and the BCPIM on the use of inappropriate medications, Alfnas (MG), 2016.

Criteria	Number of Medication
Beers Criteria	No: 245 (84.8%)
	Yes: 44 (15.2%)
BCPIM	No: 241 (83.4%)
	Yes: 48 (16.6%)
Classification Agreement	No: 16 (5.5%)
	Yes: 273 (94.5%)

DISCUSSION

Given the importance of medication use in the daily lives of older adults, this study used two criteria, one international (Beers Criteria) and the other national (BCPIM), to assess the use of PIM in PHC. The use of a criterion that includes the drugs available in the country provides greater understanding to measure the use of PIM and develop educational strategies on appropriate and safe prescription of drugs¹⁷.

In this study, a prevalence of 32.9% (Beers Criteria) and 27.6% (BCPIM) of older adults using PIM in PHC was observed. Studies carried out in the PHC identified percentages of 50%, 44.8% and 20% of use of at least one PIM for at least one criterion^{7,18,19}.

When analyzing the reported drug use, 15.5% according to the Beers Criteria, and 16.6%, according to the BCPIM, were considered PIM. It can be inferred that a higher frequency of PIM according to the BCPIM may reflect adaptation to the drugs available in Brazil. These results indicate that the two criteria, applied together, are complementary and help the process of minimizing PIM prescription.

Based on the Nominal List of Essential Medicines (RENAME, in portuguese), a national study identified several drugs considered PIM according to the Beers Criteria and available in PHC pharmacies²⁰. However, many of them present safer options in RENAME itself²⁰.

Among older adults treated at a Reference Center for Health Care for Older People in the Midwest region of Brazil, a strong agreement was also observed

between the Beers Criteria (2015), where 56.9% of the older adults used PIM, and the BCPIM, in which the frequency of PIM use was 66.8%²¹. In the work by Almeida¹³, the agreement between the classifications of at least one PIM between the Beers Criteria (2015) and the BCPIM (2016) was also considered high. The classification of excellent agreement between the frequency of use of PIM in relation to the two classification criteria is due to the fact that the BCPIM was developed based on the previous version of the Beers Criteria²², and it has undergone few changes in its update⁹, the inclusion of Proton Pump Inhibitors >8 weeks being the most significant^{13,22}. However, this therapeutic class was already part of another classification also used as a basis for the BCPIM (2016), the STOPP version (2006)¹¹.

The prevalence of PIM use by older adults may vary according to different observation sites, characteristics of prescribers and individuals studied, in addition to the criteria employed¹³. A systematic review study with meta-analysis found heterogeneity between the results of cross-sectional studies that analyzed PIM, regarding sample selection and stratification, practice scenarios, data collection and validation of PIM instruments and criteria²³.

Among hospitalized older adults in the United States, with a median age of 77 years, PIM use, based on the Beers Criteria, exceeded 50%⁶. On the other hand, among older adults in the community in Rio Branco (AC), according to the BCPIM, the prevalence of use of at least one PIM was 25.9%²⁴. In China, 32.16% of the studied community-dwelling older adults used PIM according to the Beers Criteria (2019)²⁵.

A study carried out by Almeida²⁶ analyzed the data collected in two Basic Health Units (BHU) located in the East Region of Belo Horizonte and showed a frequency of PIM use of 53.7%, considering the Criteria of Beers (2015) and 55.9% for the BCPIM. In the study by Santos-García¹⁸, carried out in the PHC linked to a teaching hospital in Porto Alegre (RS), the use of at least one PIM was observed in 55.1% of the sample, according to the Beers Criteria, and 51.3% according to the BCPIM.

The positive report of diabetes was associated with the use of PIM only according to the Beers Criteria, and not when the classification was made by the BCPIM. The non-association with BCPIM can be explained by the non-inclusion of some medications used by older adults with diabetes as PIM, unlike what happens in the Beers criteria. Martins²⁷ identified a prevalence of PIM use of 48.3% using the Beers Criteria, with 21.3% of these drugs having a potential associated negative clinical result, and 14% of these outcomes corresponding to hypoglycemia, a common condition in patients with Type 1 diabetes. Parrela⁷, in a study with groups of older adults using PHC in Campo Grande (MT), found that the main PIM used was glibenclamide, an oral hypoglycemic agent with a high potential risk of severe prolonged hypoglycemia. For diabetes mellitus and hypertriglyceridemia there is an increased cardiovascular risk, which must be properly treated, without the use of PIM^{27,28}.

Positive self-assessment of health and satisfaction with one's own health compared were associated with a lower chance of using PIM in older adults, according to the Beers and BCPIM criteria. The regular use of medicines provides a less esteemed self-image and negative self-perception of health, indicating to the older adults that something is wrong, due to the daily use and purchase of drugs²⁹. Therefore, the present study confirms that a negative self-perception of health, often associated with the disease and the search for more health services, increases the chance of PIM prescription. This association is worrisome, since older adults with negative self-rated health probably have a significant health problem and are more exposed to PIM use, collaborating to worsen morbidity and mortality³⁰.

Positive reports of depression and polypharmacy were also associated with the use of PIM, considering the Beers and BCPIM Criteria. Analyzes based on the BCPIM, in hospital discharge prescriptions in a public hospital in Minas Gerais, found that the use of PIM at hospital discharge was associated with depression and polypharmacy¹⁷. In the work by Farias¹⁹, in PHC, the author observed, as well as in the present study, that the factors associated with the use of PIM were self-reported diagnosis of depression and polypharmacy, according to BCPIM (2016).

A statistically significant association between polypharmacy and PIM was also identified in the study by Passos³¹ with older adults assisted at the PHC in Rio de Janeiro, where 35.6% of the sample reported polypharmacy and, among the medications used, 19.2% were PIM, according to the Beers Criteria (2015). In Portugal, Castilho³² identified the prevalence of polypharmacy and the prescription of PIM. Polypharmacy was present in 62.3% of the sample, and 40.7% had at least one PIM prescribed. The association between polypharmacy and PIM is not surprising, as the occurrence of polypharmacy triggers a cascade of prescriptions, and several drugs included are considered PIM⁹.

Regarding the significant association between reports of depression and PIM use, it is known that depression is the fourth main disabling reason for social functions and activities of daily living in older adults, and can lead to the worsening of preexisting pathologies, due to consumption from PIM⁵. Bandeira³³ showed that more than half of the older women studied were using at least one PIM according to the 2019 Beers Criteria, associated with reports of insomnia and depressive symptoms. In that same study, a prevalence of selective serotonin reuptake inhibitors was observed, which represent the main class used in the treatment of depression. The consumption of this PIM can accentuate the symptoms of the syndrome of inappropriate secretion of antidiuretic hormone and favor falls and fractures, by producing ataxia and impairment of psychomotor function³³. The frequent use of antidepressants, antipsychotics or anticonvulsants in older patients contributes to this association, in addition to classes of drugs that act on the central nervous system, such as benzodiazepines and tricyclic antidepressants,

also frequently observed in the criteria for PIMs, and widely used by older adults in the treatment for depression¹⁸.

Negative self-assessment of health is consistent with depressive patterns, in which the older adults begin to identify themselves as inadequate, unwanted and incapable, with frequent frustrations and adversities³⁴, which results in greater consumption of drugs, increasing the chance of using PIM. In the present study, positive self-assessment and health satisfaction were associated with lower PIM use.

The study has limitations. The cross-sectional design may have underestimated the prevalence of PIM, as some drugs are considered PIM when used for a long period of time. The self-report of the clinical condition also does not allow detailing of the drug-disease interaction, which would result in a better judgment of the use as PIM by the Beers and BCPIM Criteria and its association with the investigated comorbidities. The exclusion of older adults with cognitive alterations may have left a potential group for the use of PIM out of the sample, but the fact that the information was collected by self-report limited their participation, prioritizing the quality of the data. As positive points, the research analyzed data collected in a representative way from older adults in the context of PHC and promoted valuable results for the improvement of treatment and prescription of medicines. The PHC stands out as a privileged field for the care of older adults, since it is the preferential gateway to the system, having direct contact with the profile of the older population in the territory, allowing the necessary subsidies to promote the integral health of this population group.

The use of PIM from PHC is relevant and can become a relevant public health problem. Studies carried out identify that the use of PIM prescribed in PHC is associated with admission to emergencies, adverse drug events, poor quality of life and hospitalizations³⁵. Therefore, it is essential that there are actions that contribute to a better safety in the prescription of drugs for the older population from the first level of care. The data found in this study may make health managers aware of the importance of reviewing medication prescriptions for the older population, seeking adjustments that allow for a more

rational prescription and a reduction in the risk of adverse effects caused by the administration of PIM.

CONCLUSION

The prevalence of older adults using potentially inappropriate medications was 32.9% according to the Beers Criteria and 27.6% according to the Brazilian Consensus. Self-reports of diabetes and depression, polypharmacy and negative self-assessment and dissatisfaction with health were associated with the use of these medications. The two classifications showed concordant results, proving to be adequate and complementary. However, it is important to highlight the need for constant updating of the BCPIM version, after all, new drugs are being incorporated with gains in effectiveness in pathological interventions, especially for the older population. PIM classification tools such as the Beers Criteria (2019) and BCPIM (2016) should be taken into account for a more rational and safe prescribing practice for older adults, especially in primary care, a level of care that promotes the monitoring of injuries and where such population is prevalent in the demands.

AUTHORSHIP

- Claudia O. Coelho – conception and design of the study; article writing; approval of the version to be published, responsible for all aspects of the work.
- Silvia Lanziotti A. da Silva – conception and design of the study; data analysis and interpretation, critical review of the article; approval of the version to be published, responsible for all aspects of the work
- Daniele S. Pereira – conception and design of the study; critical review of the article; approval of the version and be published.
- Estela Márcia S. Campos – conception and design of the study; critical review of the article; approval of the version to be published, responsible for all aspects of the work.

Edited by: Maria Luiza Diniz de Sousa Lopes

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