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Factors associated with the use of potentially inappropriate medications by older adults with cancer

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ABSTRACT

Objectives: To determine the frequency and the factors associated with the use of potentially inappropriate medications (PIMs) by older adults with cancer at an onco-haematology ambulatory clinic of a teaching hospital in Brazil.
Material and Methods: Patients aged 60 years or older (n = 160) subjected to parenteral antineoplastic chemotherapy from May to December 2015 and treated with one or more medications in the ambulatory clinic were interviewed. Data on medications, comorbidities, oncological diagnosis, and functional status were recorded. Functionality was determined using the Vulnerable Elders Survey (VES-13). PIMs were determined using the 2015 Beers Criteria. Logistic regression was used to determine the factors associated with the use of PIMs.
Results: A total of 78 (48.1%) older adults used at least one PIM. The PIMs to be avoided by older adults were proton pump inhibitors (33.3%), antiemetics (10.5%), long-acting benzodiazepines (10.5%), and antidepressants (7.6%). Multivariate analysis indicated that PIMs were associated with the use of five or more medications (odds ratio, 3.14; 95% confidence interval, 1.4–6.6), after adjusting for the number of medications, number of comorbidities, depression, and arthritis/arthrosis.
Conclusion: The frequency of use of PIMs by older adults at the investigated ambulatory clinic was high. Polypharmacy was positively associated with the use of PIMs.

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1. Introduction

A new era in cancer care is underway in many countries owing to demographic transitions. The continued growth in the proportion of ageing population in these countries has resulted in a large number of older adults with cancer. As a consequence of the increase in ageing population and life expectancy, the number of older patients who require cancer management is increasing [1–3].

Older adults have an increased prevalence of comorbidities that can affect cancer prognosis and treatment tolerance [3]. Comorbidities contribute to the use of multiple medications, which can lead to increased adverse drug events [4–8]. Age-associated changes in pharmacokinetics and pharmacodynamics have a significant impact on the clinical pharmacology of antineoplastic agents and also of drugs used to treat comorbidities [1,2,5].

Drug therapy, comorbidities, and the physiologic status of older adults may influence the selection of and tolerance to cancer treatment. Moreover, the biology of certain cancers and their responsiveness to therapy change with the patient's age [3]. In treating older adults with cancer, age-related issues should form the basis for the development of guidelines that address special considerations in oncology for older patients [2,3].

Medications can be defined as potentially inappropriate for older people when the risks of adverse events outweigh the clinical benefits, particularly when safer alternatives exist [9,10]. Inappropriate prescribing to older patients has become an important public health issue [4–6,9,10]. The use of polypharmacy and potentially inappropriate medications (PIMs) are relevant pharmacotherapy problems, particularly in older adults, including patients with cancer [3–8]. In older adults, these problems are associated with adverse medication events, falls, fractures, disorientation, cognitive impairment, worsening of the quality of life, hospitalization, and mortality [1,3–8].

The prevalence of the use of PIMs in older adults with cancer ranges from 21% to 51% [3,5,10–15], and the explicit criteria used previously were the 2003 and 2012 Beers Criteria, 2008 Screening Tool for Older Person's Prescription (STOPP), and Healthcare Effectiveness Data and Information Set and Drugs to Avoid in the Elderly (HEDIS-DAE) [5,10,12–14,16]. The Beers Criteria were updated by the American Geriatric Society in 2015 [9]; however, studies involving the use of PIMs in older adults with cancer using this version have not been published to date. In addition, we have not been able to identify any investigations on the prevalence of use of PIMs in older patients with cancer in Brazil. The purpose of this study was to investigate the frequency of

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use of PIMs in older adults in an onco-haematology ambulatory clinic and the factors associated with their use.

2. Methods

2.1. Study Design and Patients

This cross-sectional study evaluated older adults in an onco-haematology ambulatory clinic of a teaching hospital in southeastern Brazil. The convenience sample consisted of 160 patients, who were enrolled from May to December 2015. The patients were identified from the institution's computerized scheduling system for parenteral chemotherapy. The patients were interviewed before chemotherapy. To be included in the study, patients were required to have met the following criteria: age ≥ 60 years, a diagnosis of neoplasia, treatment with medications classified as L01 (antineoplastic agents) or L02 (endocrine therapy) according to the *Anatomical Therapeutic Chemical* code classification system [17], and use of one or more medications prescribed to supportive care or diseases other than cancer.

2.2. Data Collection

Socio-demographic variables and prescribed and non-prescribed medications were recorded during the patient interview. Older adults were asked to report all medications in use in the last 30 days. The antineoplastic medication and medication used for supportive therapy were recorded in the chemotherapy prescription. The medical record included clinical variables related to cancer and co-morbidities. Information about medications used to treat co-morbidities was also noted in the medical record.

2.3. Variables

The dependent variable was the use of PIMs by older adults. The 2015 American Geriatric Society Beers Criteria for PIM Use in Older Adults were used to identify PIMs. This included medications to avoid for many or most older adults outside of palliative care and hospice service [9].

Independent variables were divided into socio-demographic, clinical, pharmacotherapy, and functionality data. Socio-demographic data included sex and age (≥70 years and <70 years). Clinical data included the type of neoplasia and self-reported comorbidities. Pharmacotherapy data included polypharmacy (five or more medications used daily, concomitantly, and according to medical prescription), and over-the-counter medication. In addition, the type of cancer was identified for characterization of the sample. With regard to functionality data, the Vulnerable Elders Survey (VES-13) was used to evaluate the risk of functional decline in 12 months (scores 0–2 versus 3–10), in which higher scores indicated higher vulnerability [11,18]. The VES-13 used in this study was validated in Brazil in a sample of patients with cancer, and showed adequate psychometric properties [18].

2.4. Data Analysis

The data collected were entered into a database created using EpiData 3.1 software. Descriptive analysis was performed by determining the frequencies and percentages of the categorical variables, and measures of central tendency (mean and median) and dispersion (standard deviation and interquartile range [IQR]) were determined for quantitative variables. The association between PIMs and independent variables was analysed using the chi-squared test or Fisher's exact test. The confidence interval used was 95%, and the significance level was 0.05. The independent variables with p-values ≤ 0.25 in the univariate analysis were included in the logistic regression model. The variables with p-values ≤ 0.05 remained in the final model. The likelihood ratio test was used to compare the models. The adequacy of the final models was evaluated using the Hosmer-Lemeshow test. The magnitude of the association between dependent and independent variables was estimated using the odds ratio (OR) with the interval of 95% of confidence (IC95%) in both univariate and multivariate analysis. Statistical analysis was performed using the *Statistical Package for Social Sciences* (SPSS) software version 21.0.

2.5. Ethical Approval

The Research Ethics Committee of the University approved the research and the older adults who agreed to participate in the research signed a free and informed consent form.

3. Results

The 160 older adults included in the study had a median age of 67.5 years, with an IQR of 10, and 57.5% of the study sample comprised women. The most prevalent comorbidities were hypertension (33.9%), diabetes (13.1%), arthritis/arthrosis (10.6%), and depression (10.2%). The median number of self-reported comorbidities was two. The most prevalent cancer types diagnosed were breast (28.1%), colorectal (22.5%), and lung (7.5%) (Table 1).

The median number of medications used daily was three, with a 25th percentile of one and 75th percentile of four, and the maximum number of medications used was eight. The prevalence of polypharmacy was 26.2%. The median number of medications used by the patients, including antineoplastics, was nine, with a 25th percentile of seven and a 75th percentile of 11. Twenty-two older adults (13.8%) reported over the counter medication. The number of older adults who used at least one PIM was 78 (48.1%), and the maximum number of PIMs used was four. Among the 78 older adults, 50 (64.9%) used one PIM, 21 (27.3%) used two PIMS, five (6.5%) used three PIMS, and one (1.3%) used four PIMS. The PIMs most commonly used by the

Table 1
Clinical characteristics of the 160 older adults in the study.

Characteristic		Value
Score from the VES-13 [median (interquartile range)]		1.5 (0–5)
Type of cancer		
Solid tumours		
Breast	n (%)	45 (28.1)
Colorectal	n (%)	36 (22.5)
Lung	n (%)	12 (7.5)
Stomach	n (%)	11 (6.9)
Prostate	n (%)	10 (6.3)
Oesophagus	n (%)	7 (4.4)
Others	n (%)	35 (21.9)
Haematologic neoplasias		
Myelomas	n (%)	2 (1.2)
Lymphomas	n (%)	1 (0.6)
Leukaemias	n (%)	1 (0.6)
Number of comorbidities [median (interquartile range)]		2 (1–3)
Hypertension	n (%)	109 (33.9)
Diabetes	n (%)	42 (13.1)
Arthritis/arthrosis	n (%)	34 (10.6)
Depression	n (%)	33 (10.2)
Thyroid diseases	n (%)	19 (5.9)
Others	n (%)	85 (26.3)
Pharmacotherapy		
Number of medications per patient [median (interquartile range)]		3 (3)
Patients using over-the-counter medications	n (%)	22 (13.8)
Patients using polypharmacy	n (%)	42 (26.2)
Patients using potentially inappropriate medications for older adults	n (%)	78 (48.1)
Number of potentially inappropriate medications for older adults per patient n (%)		
1		50 (64.9)
2		21 (27.3)
3		5 (6.5)
4		1 (1.3)

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