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Evaluating polypharmacy and prescribing practices among geriatric patients: a cohort study from Oman

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ABSTRACT

Background: Polypharmacy and inappropriate prescribing are prevalent concerns in the geriatric population, often leading to adverse drug events and poor health outcomes. Older adults are particularly vulnerable due to multiple comorbidities and age-related physiological changes. *Aim:* To assess the prevalence of polypharmacy and inappropriate prescribing among geriatric patients at a tertiary hospital in Oman. *Methodology:* A retrospective cohort study was conducted by reviewing 100 prescriptions of geriatric patients. Data were extracted from electronic medical records using the TrakCare® system. Polypharmacy was defined as the use of five or more medications, and inappropriate prescribing was evaluated using the Beers Criteria. *Results:* The average patient age was 73.63 years, with no significant gender differences in age distribution. Cardiovascular and endocrine-metabolic disorders were the most common comorbidities. Most patients were prescribed 6–10 medications, with none receiving fewer than four. Patients aged 60–69 had the highest average number of medications. A significant gender difference was observed in inappropriate prescribing, with females receiving more inappropriate medications than males (*p*=0.028). *Conclusion:* The study highlights the high prevalence of polypharmacy and inappropriate prescribing in geriatric patients at Sultan Qaboos University Hospital (SQUH). These findings stress the need for individualized and cautious prescribing practices to improve medication safety in this population.

KEYWORDS

polypharmacy, geriatric patients, inappropriate prescribing, beers criteria, medication management

1. INTRODUCTION

The global population of individuals aged 60 years and above is growing rapidly [1]. This demographic shift presents complex healthcare challenges, particularly in managing chronic conditions that are common in older adults. These patients frequently have multiple comorbidities, requiring the use of several medications simultaneously—a practice referred to as polypharmacy [2].

While polypharmacy is often clinically necessary, it carries substantial risks. These include ad-

verse drug reactions (ADRs), drug-drug interactions, decreased adherence, and increased healthcare costs. Furthermore, it increases the likelihood of inappropriate prescribing—where medications are used despite their risks outweighing the benefits, especially in geriatric populations [3]. Tools such as the Beers Criteria, developed by the American Geriatrics Society, are widely used to identify potentially inappropriate medications (PIMs) in older adults. These guidelines provide evidence-based recommendations aimed at reducing the risk of harm from medications that are particularly problematic for elderly patients [2].

Despite the existence of such tools, inappropriate prescribing remains common. In addition to clinical complexity, prescribing quality in older adults is influenced by various socio-demographic and clinical factors such as age, sex, comorbidity burden, and access to healthcare services [4]. Understanding the prevalence and pattern of polypharmacy and inappropriate prescribing in geriatric populations is essential to improve medication safety and guide targeted interventions.

This study aims to assess the prevalence of polypharmacy and inappropriate prescribing among geriatric patients at a tertiary hospital in Oman. The findings are intended to inform safer prescribing practices and support the development of individualized pharmacotherapy strategies for this vulnerable group.

2. METHODOLOGY

2.1 Study site and design

This retrospective cohort study was conducted at the outpatient pharmacy department of Sultan Qaboos University Hospital (SQUH), a tertiary care institution in Oman. Data were extracted from the hospital's electronic medical record system (TrakCare®).

2.2. Study duration

Data were collected over a three-month period, from November 2023 to February 2024.

2.3. Study population

The study targeted elderly male and female patients diagnosed with one or more chronic diseases who visited SQUH during the study period.

2.4. Inclusion and exclusion criteria

Patients were included if they were aged 60 years or older and had been prescribed five or more medications during the study period, indicating a state of polypharmacy. Patients were excluded if their electronic files were incomplete or missing key demographic or medication data.

2.5. Sampling method

A non-probability convenience sampling method was used. From the list of patients who visited during the study window, 100 eligible records were randomly selected for review.

2.6. Data collection tool

A structured data collection form was used to record patient demographics, clinical history, and medication profiles. The form was piloted and refined before full data collection. The appropriateness of each prescribed medication was assessed using the 2019 American Geriatrics Society Beers Criteria, a widely used tool for identifying high-risk medications in older adults [5].

2.7. Ethical consideration

The study received ethical approval from the Research and Innovation Committee at the National University of Science and Technology (Approval No: EBS/PRES0601-COP/Msc/8/23-24), as well as from the Medical Research Ethics Committee of the Ministry of Health in Oman (Ref No: SQU-EC/300\2023, MREC# 3229).

2.8. Statistical analysis

All data were analyzed using SPSS version 28. Descriptive statistics summarized demographic and clinical variables. Categorical variables were presented as frequencies and percentages, while continuous data were expressed as means and standard deviations. The Chi-square test was used to examine associations between categorical variables, while independent t-tests compared group means. A p-value<0.05 was considered statistically significant.

3. RESULTS

Socio-Demographic Characteristics: The study included 100 geriatric patients, evenly divided by gender (50 males and 50 females). The mean age was 73.63 years (SD=7.12), with ages ranging from 60 to 97 years. Most participants were in the 70–79 age group, and those aged 80 and above formed the smallest group. Mean age differences between males (73.52) and females (73.74) were minimal.

Prevalence of Polypharmacy: Polypharmacy was common, with patients prescribed between 4 and 15 medications. The most frequent counts were six and ten medications (14% each), followed by eight and nine (13% each). No patient received fewer than four drugs. The mean number of prescribed medications was 8.5 (SD=2.649). Although males had a slightly higher average (8.58 vs. 8.42), the difference was not statistically significant (p=0.764).

Comorbidities and Age: Patients presented with 1 to 16 comorbidities. In the 60–69 age group, 15 patients had four comorbidities. The 70–79 age group represented 52% of the sample. A statistically significant positive correlation was observed between the number of comorbidities and medication count, indicating that polypharmacy increased with disease burden.

Appropriateness of Prescriptions: Using the Beers Criteria, 116 medications were evaluated.

Of these, 74 (64%) were deemed appropriate, while 42 (36%) were considered inappropriate. Among the inappropriate prescriptions, 17 involved medications that should be avoided entirely or due to significant drug interactions. Thirteen were related to drug-disease or drug-syndrome interactions. Seven required cautious use, and six needed renal dose adjustments. This indicates a high prevalence of potentially harmful prescriptions.

Inappropriate Medications by Gender: Inappropriate prescribing varied significantly by gender (p=0.028). As shown in Figure 1, the largest group included patients with 1–3 inappropriate medications (23 males and 24 females). Only three patients had no PIMs. The most concerning group—those with 7–11 inappropriate medications—included one male and eight females, suggesting that females were more likely to receive multiple inappropriate medications.
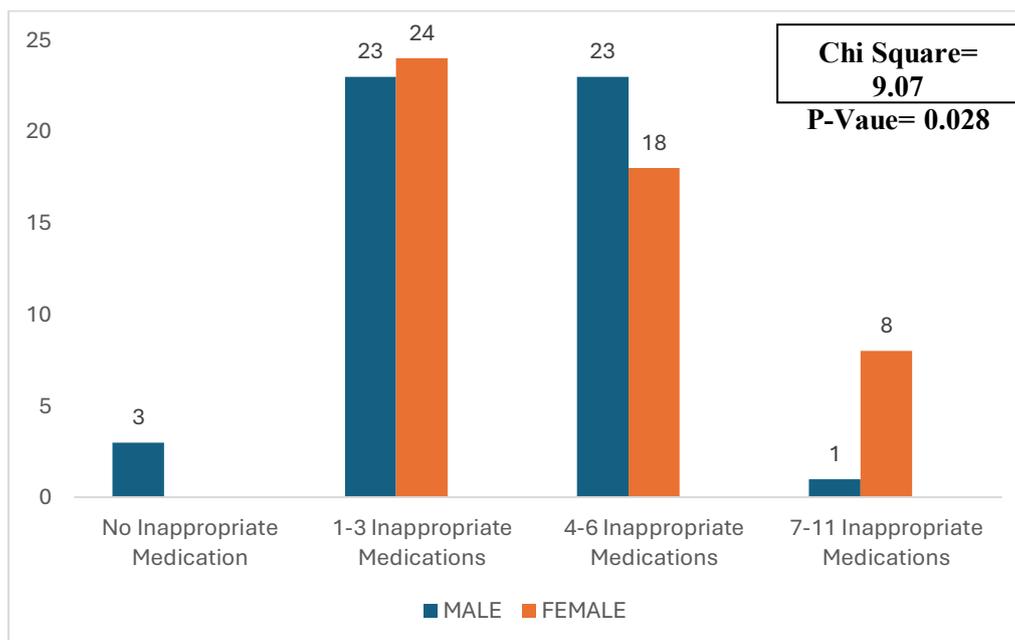

Figure 1. Distribution of inappropriate medication use by gender among geriatric patients.

4. DISCUSSION

The findings confirm that polypharmacy is common among older adults, with a mean of 8.5 medications per patient. This is consistent with existing evidence that links polypharmacy to increased risks of adverse drug events, hospitalization, and functional decline in elderly populations [6].

Although gender did not significantly affect the number of total medications, the number of inap-

propriate medications was higher among females. These results align with previous studies suggesting that older women are more likely to be prescribed high-risk medications, potentially leading to poorer outcomes [7].

A strong correlation was also found between the number of comorbidities and the extent of polypharmacy, supporting the notion that disease burden drives complex medication regimens [4]. The identification of 36% of medications as inap-

propriate is clinically significant. Most of these were either contraindicated or required close monitoring, reinforcing the need for careful medication review.

The use of Beers Criteria helped detect potentially unsafe prescriptions and should be considered standard practice. These findings support the implementation of regular medication reviews, sex-specific analysis of prescribing trends, and personalized treatment plans to reduce inappropriate medication use in older adults.

5. CONCLUSION

This study highlights the high prevalence of polypharmacy and inappropriate prescribing among geriatric patients at a tertiary hospital in Oman. Over one-third of medications did not meet established safety standards as defined by the Beers Criteria. The significant gender disparity in inappropriate prescribing further underscores the need for targeted interventions.

Routine application of tools like the Beers Criteria, combined with individualized care plans and deprescribing strategies, can enhance medication safety and optimize outcomes for older adults.

CONFLICT OF INTEREST STATEMENT
The author declares no conflicts of interest.

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