The Prevalence of Prescribing Medications Associated with Geriatric Syndromes among Discharged Elderly Patients

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Original Article

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Introduction: A geriatric syndrome is a group of signs and symptoms that occur in older people and do not fit into a discrete disease. Several medications were reported to be associated with the incidence of geriatric syndromes. Objective: The objective of this study was to investigate the prevalence and pattern of medications associated with geriatric syndromes (MAGSs) among the discharged elderly patients (≥65 years old). Materials and Methods: This is a cross-sectional study that was conducted at a Malaysian teaching hospital from October to December 2018. The discharge medications of geriatric patients were reviewed to identify MAGSs using Beers criteria, Lexicomp drug information handbook, and the United States Food and Drug Administration (USFDA) drug inserts. Chi-square test was used to compare MAGS prescribed between categories. Spearman’s rank-order correlation was used to test the correlation between the presence of MAGS and the number of discharge medications. A binomial logistic regression was applied to determine the predictors of prescribing MAGSs. Results: A total of 400 patients (mean ± standard deviation [SD] age, 72.0 ± 5.0 years) were included, and 45.3% of them were females. The most common diseases were hypertension followed by diabetes mellitus. The mean ± SD number of discharge medications per patient was 4.2 ± 2.5. The MAGSs were prescribed in 51.7% of the patients, and 54 patients were discharged with more than one MAGSs. The most commonly prescribed MAGSs were opioid analgesics, vasodilators, and β-blockers, which are associated with falls, depression, and delirium. Polypharmacy was found in 138 patients, and it was significantly associated with the presence of MAGSs (P < 0.001). No significant differences were found in prescribing MAGSs based on the patients’ gender, race, and age. Conclusion: The prescribing of MAGSs occurred in half of the discharged elderly patients. Physicians should be aware of the medications that are associated with special side effects in the elderly patients, and should switch to safer alternatives when possible.

Keywords: Elderly patients, geriatric syndromes, medication prescribing

INTRODUCTION

Geriatric patients are more vulnerable to adverse drug reactions compared with younger adults. This is due to the differences in terms of physiology, comorbidity, and drug pharmacokinetics. “Geriatric syndromes (GSs)” refers to a condition that happens to geriatrics due to multiple underlying risk factors, which render a person vulnerable to situational challenges. A geriatric patient often has more than one GSs, including delirium, falls,
frailty, cognitive impairment, depression, and urinary incontinence. These syndromes negatively impact patients’ quality of life (QoL) and daily activities. In addition, they are associated with increased health-care utilization, functional decline, and even death.[2] Several studies revealed a high prevalence of GSs among older people. A study from Sweden reported a prevalence of some GSs as high as 84% among geriatrics.[3] In Thailand, the prevalence of GSs was found to be up to 50% of geriatric outpatients.[4] Data from Malaysia are very limited pertaining to GSs. The prevalence of falls reported in Malaysia was 4.1%, which is lower than that reported from other Asian countries such as Japan, Hong Kong, and China (11.1%).[5] Similarly, the prevalence of urinary incontinence was 9.9% among the geriatrics in Malaysia, which is much lower compared to other countries.[6] The lower prevalence might be due to underreporting of the actual situations in Malaysia. The common medications that are associated with GSs include antiepileptics, antipsychotics, antidepressant, antiparkinsonian, and opioid agonists.[2] These medications are classified as medications associated with geriatric syndromes (MAGSs). Some MAGSs are listed in the explicit criteria of potentially inappropriate medications (PIMs) such as the Beers Criteria[7] and the Screening Tool of Older Persons’ Prescriptions (STOPP) criteria.[8] However, PIMs are different from MAGSs in terms of safety and effective use in geriatric population. PIMs are medications that are unsafe in all older people or those with specific diseases, whereas MAGSs are medications that are appropriate to treat many conditions despite certain incidence or progression of attributable GSs.[2] It is important to identify MAGSs among the prescribed medications received by elderly patients to prevent or reduce risk of GSs. To the best of our knowledge, no study was available that reported the prevalence of MAGSs in Malaysia. This study aimed to investigate the prevalence and pattern of prescribing MAGSs among hospitalized geriatric patients at discharge.

MATERIALS AND METHODS

Design and setting

This was a historical cross-sectional study that took place in a Malaysian teaching hospital from October to December 2018. The electronic charts of discharged geriatric patients (≥65 years old) were retrospectively reviewed to retrieve discharge medications. Discharge medications were reviewed to identify medications associated with six common GSs (delirium, cognitive impairment, falls, loss of appetite, urinary incontinence, and depression). The list of MAGSs developed by Saraf et al.[2] was adopted to be used in this study. This list was developed based on literature, Beers criteria, Lexicomp drug information handbook, and the United States Food and Drug Administration (USFDA) drug inserts. Polypharmacy was defined as the concomitant use of five medications and above. The study protocol was approved by the International Islamic University Malaysia Ethics Committee (IREC-2018–249).

Sample size

The sample size was calculated by using the following formula: \( n = \frac{Z^2 \cdot P \cdot (1-P)}{d^2} \); where \( P \) is the expected prevalence, which was assumed to be 50%. Meanwhile, the level of confidence \( (Z) \) is 1.96 and precision \( (d) \) is 0.05. The sample size was determined to be 383 patients.

Statistical analyses

The data were analyzed using the Statistical Package for the Social Sciences software, version 24.0 (IBM, NY, USA, SPSS Statistics 24). Chi-square test was used to compare MAGSs prescribed between subgroups. Spearman rank-order correlation was used to test the correlation between the presence of MAGSs and the number of discharge medications. A binomial logistic regression was applied to identify factors associated with prescribing MAGSs. Sex, age, race, and the presence of polypharmacy were included in the logistic regression model.

RESULTS

Patients’ characteristics

A total of 400 patients were included with a mean ± standard deviation (SD) age of 72.0 ± 5.0 years. The majority of the patients were Malay (91.3%), and about half of the participants were females (45.3%). The most common diseases were hypertension, diabetes mellitus, and ischemic heart disease [Table 1].

Medication associated with geriatric syndromes

Table 1 presented that the mean ± SD of the number of discharge medications per patient was 4.2 ± 2.5. Polypharmacy was found in approximately one-third of the study population. The MAGSs were prescribed in 51.7% of the patients, and 53 patients were discharged with more than one MAGS [Table 1]. MAGSs prescribing was more prevalent in patients on polypharmacy compared with patients who were discharged with less than five medications \( (P < 0.001) \). However, the number of discharge medications was not correlated with the number of MAGSs at discharge \( (P = 0.433) \). In addition, no significant differences in the prevalence of MAGSs were found based on the patients’ demographic characteristics. For instance,
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54.3% of male patients and 48.6% of female patients were discharged with at least one MAGSs ($P = 0.255$). Likewise, age and race did not significantly affect the prevalence of prescribing MAGSs. The binominal logistic regression model statistically and significantly predicted the prescribing MAGSs ($\chi^2 = 41.231; P < 0.001$, adj. $R^2 = 0.131$). It revealed that only polypharmacy contributes significantly to prescribing MAGSs after controlling other covariables ($P < 0.001$).

Table 2 showed the pattern of MAGSs that were prescribed at discharge. The most commonly prescribed MAGSs were opioid analgesics, vasodilators, and $\beta$-adrenergic blockers. Among the prescribed MAGS, tramadol was the most prevalent medication as it was prescribed for 88 patients.

### DISCUSSION

This was a historical cross-sectional study that investigated the prevalence of prescribing MAGSs among discharged geriatric patients. It was found that more than half (51.7%) of the patients were discharged with at least one MAGS. This prevalence is slightly higher than that reported in the USA, which was 43%.[5] There were very few studies that have reported about MAGSs, whereas most studies reported were on PIMs.

The reported prevalence of PIMs in hospital settings varied and ranged between 21% and 79% depending on the countries and criteria used.[9] In Malaysia, the prevalence of PIMs was reported to be 22.3% at discharge.[10]

Opioid analgesics were the most commonly prescribed MAGSs. We found that about one-quarter of the patients were discharged with at least one opioid analgesic, which was higher than the finding reported from Canada (16.7%) at ambulatory setting.[11] On the contrary, our finding was comparable to that of a study from Australia (20.7%) that reported the prevalence of opioid analgesics among residents of aged care facilities.[12] Opioid analgesics have been associated with the incidence or progression of several GSs, and thus caution is required when these medications are prescribed for geriatrics.[2,13]

Vasodilating antihypertensive agents were the second most prescribed MAGSs in our study. Vasodilators were added to several explicit criteria of inappropriate prescribing (e.g., STOPP criteria) as they increase the risks of falls in geriatrics.[9] Several studies revealed that vasodilators were one of the top classes of PIMs used in other countries.[14,15] Another study from Malaysia highlighted a comparable result pertaining
Our findings showed that β-blockers were used in 12.5% of the study population for hypertension and other cardiovascular diseases. Historically, β-blockers were considered as the first class drugs to treat hypertension. Currently, the Malaysian guidelines recommend against initiating β-blockers for hypotensive patients without a compelling indication (e.g., heart failure or myocardial infarction). Therefore, the use of this class of medications as first line was dropped significantly in Malaysia compared with other countries. Previous studies have reported an association between the use of β-blockers and increasing depressive symptoms in geriatrics. However, this association remains controversial. Recent trials denied this association except for lipophilic agents. Hence, it is recommended to avoid lipophilic β-blockers in geriatrics as they were also associated with other side effects such as nightmares.

This study showed that the least prescribed MAGSs were antipsychotics and benzodiazepines. In contrast, studies from other countries found that antipsychotics and benzodiazepines were the most frequently prescribed MAGSs to geriatrics. This may be due to the restricted use of these medications in Malaysia as reported in the previous studies. It has been well-documented that the use of antipsychotics was associated with falls and cognitive impairment among geriatrics. The incidence of falls could be related to the underlying diseases or the adverse effect of the drug on gait and postural stability. Meanwhile, the association of antipsychotic with cognitive impairment may be due to inhibitory effects on dopaminergic, cholinergic, and histaminergic system.

This study showed that one-third of the patients were on polypharmacy. This prevalence is consistent with what other researchers found in Malaysia, using the same definition of polypharmacy. Polypharmacy was found to be significantly associated with prescribing MAGS. Patients who were on polypharmacy had higher prevalence of MAGSs than other patients. It has been reported that polypharmacy was a risk factor for inappropriate prescribing. It is foreseeable that increasing the number of prescribed medications will increase the possibility for one of them to be inappropriate or to be associated with prominent side effects in geriatrics. Polypharmacy in geriatrics is a known risk factor for adverse drug events, drug-drug interactions, and falls in elderly patients.
interaction, nonadherence, falls, and increased costs.[20] Nonetheless, polypharmacy is inevitable in most geriatric patients with multiple comorbidities. Therefore, the focus should be shifted to the appropriateness rather than just the number of the medications. The study found no correlation between age, race, and gender, and prescribing MAGSs. This is also in agreement with other studies, which assessed the predictors of inappropriate prescribing, where age and gender were not associated with an increase in prescribing PIMs.[9]

**Conclusion**

Prescribing MAGSs occurred in half of the hospitalized elderly patients, and it was associated with polypharmacy. On the contrary, factors such as age, gender, and race were not correlated to prescribing MAGSs. The most common MAGSs were opioid analgesics, vasodilating antihypertensive agents, and β-blockers. Physicians should be aware of medications that are associated with special side effects (geriatric syndromes) in the older people and to switch to safer alternatives when possible.

**Strengths and limitations**

This is the first study that explored the prevalence and pattern of prescribing MAGSs in Malaysia with a good number of patients involved. It is worth noting here that investigating the appropriateness of the prescribed MAGSs was beyond the scope of this study. Also, this was a single-center study, so it cannot be assumed that the findings represent the practice in all Malaysian hospitals. In addition, the study was limited by its cross-sectional design and the nonrandomized sampling technique. A larger multicenter randomized prospective study may be considered necessary in Malaysia to further investigate this issue.

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**Conflicts of interest**

There are no conflicts of interest.

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