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Are primary care physicians familiar enough with potentially inappropriate medications in geriatric care? A cross-sectional study in the Eastern Province of Saudi Arabia

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Abstract:

BACKGROUND: Potentially inappropriate medications (PIMs) and polypharmacy constitute increasing healthcare costs and significant risk for adverse outcomes in older adults. The American Geriatrics Society Beers Criteria form a screening tool for the identification of PIMs and guidance for healthcare providers in prescribing appropriate medications. However, primary care physicians' knowledge of screening tools, of Beers Criteria, in particular, is not known. Therefore, this study was to investigate primary care physicians in the Eastern Province of Saudi Arabia and their awareness of Beers Criteria and knowledge of PIMs.

MATERIALS AND METHODS: This cross-sectional study was conducted among primary care physicians working in the Eastern Province of Saudi Arabia. Data were collected using an online self-administered questionnaire that consisted of sections on the general characteristics of respondents and their knowledge of Beers Criteria as a screening tool. Eight clinical-based vignettes concerning different therapeutic areas of medication use in the elderly were included, with a score of 1 and 0 for correct and wrong answers, respectively. Data presented as frequency and percentage. Chi-square test was used to determine the association between duration of practice and the level of awareness about Beers criteria.

RESULTS: Of the 121 physicians who returned completed questionnaires, 41.3% of respondents knew about Beers Criteria. Most respondents (52.9%) were confident in prescribing appropriately for elderly patients. The association between the duration of practice and confidence level was statistically significant ($P = 0.040$). Respondents showed an above-average knowledge of the clinical vignettes with a correct answer rate >50% in all clinical scenarios. Online search (84.2%) and physician colleagues' knowledge and experiences (39.2%) were the primary source of information reported by the respondents.

CONCLUSION: Awareness of Beers Criteria of primary care physicians in Saudi Arabia's Eastern Province is low. Therefore, our results will educate healthcare workers on the importance of Beers Criteria in Geriatric patients' prescriptions, in order to significantly improve the well-being of the elderly.

Keywords:

Beers Criteria, geriatrics, polypharmacy, potentially inappropriate medications

Introduction

Significant changes have been made in the past to improve the health of senior

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adults resulting in living to advanced old age. It is estimated that the number of people aged 60 years and above will grow by 56% between 2015 and 2030 worldwide.^[1]

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Correspondingly, it is expected that there will be an increase of over 25% of people aged 60 years and above in Saudi Arabia by the end of 2050. Nevertheless, the population aged 80 years or more is expected to rise by 4% by the end of 2050.^[1]

Recent studies have estimated that nearly 16% of the world's population is above 60 years old, with an expected rise of over 20% by the year 2050.^[2] Those aged 60 years and above are now the fastest-growing population globally.^[2] Potentially inappropriate medications (PIMs) are highly prevalent among geriatric patients (i.e. aged 60 years or more) in all clinical settings who experience multi-morbid illness, resulting in polypharmacy.^[3] Polypharmacy of more than five drugs impacts healthcare costs and hospital admission as a result of falls, fractures, organ failure, or harmful drug–drug interactions, leading to worsening health outcomes. Different criteria have been used in different regions of the world to detect PIMs and treatment omissions. An example is STOP/START criteria, first published by geriatricians from Cork University Hospital (Ireland) in 2008, and has since been widely used across Europe. Its main purpose was to detect PIMs and treatment omissions. The second is Beers Criteria published in 1991 by the American Geriatrics Society (AGS), which was the focus of our study since practice in primary healthcare centers (PHCCs) in Saudi Arabia is guided by American guidelines after modifications to national settings.^[4-6] The AGS Beers Criteria is an explicit list of PIMs to help healthcare practitioners prescribe medications appropriately.^[7] The 3-year-cycle AGS Beers Criteria 2019 update guides safe prescribing for the elderly.^[8] Inappropriate medications were defined as either ineffective or posing unnecessary risk.^[9] PIMs identified by Beers Criteria can have significant adverse effects in older adults owing to changes in their physiology and metabolism. International studies reveal a low awareness and knowledge of Beers Criteria and medication use in the elderly by healthcare workers, including physicians, pharmacists, and nurses. Most studies report moderate (30%–50%) to low (<30%) levels of awareness of healthcare workers of the Beers Criteria.^[10-12] Awareness seems to vary geographically, with some regions such as Europe and North America showing slightly higher levels than others. Low awareness could be due to the lack of specific curricula on geriatric pharmacotherapy and Beers Criteria in healthcare education. Busy clinical settings leave little time for continuous learning and the application of complex medication guidelines.^[10-12] This low awareness of Beers Criteria of healthcare providers worldwide is of serious public health concern. This can lead to prescribing PIMs, which lead to complications, drug–drug interactions, and worsened health outcomes for older adults resulting in a negative impact on healthcare costs and increased hospitalizations. This places significant strain on

healthcare systems and financial resources. Therefore, addressing the issue of low awareness of Beers Criteria is important for the improvement of the safety and quality of care for older patients, optimization of healthcare resource utilization, and enhancement of their overall well-being. Strategies such as widespread educational programs, decision support tools, and collaborative healthcare practices can play a key role in mitigating this critical public health concern.^[12-17]

As far as we know, there has been no study on the awareness of primary care physicians about PIMs using Beers Criteria in Saudi Arabia.^[7] A study conducted in Saudi Arabia revealed that more than 50% of older adults experience polypharmacy and the prescription of inappropriate medications. Therefore, educating primary care physicians about the importance of Beers Criteria in older adults' prescriptions will significantly impact the healthcare system and the well-being of the elderly.

Materials and Methods

The cross-sectional study was conducted from March 28, 2022, to June 2, 2022, using a self-administered questionnaire in English. Ethical approval was obtained from the Institutional Review Board Vide Letter No. IRB-2022-01-093 dated 24/02/2022, and written informed consent was taken from all participants in the study.

Considering the expected population proportion of 30%, 7% margin of error, and confidence interval (CI) 95%, the calculated sample size was 142. The link for the online questionnaire in Google Forms was shared with primary care physicians working in PHCCs through the in-charge of PHCCs. Physicians including residents and consultants working in the primary care setting in the Eastern Province of Saudi Arabia were included in the study.

The researchers adopted the questionnaire following a literature review of related studies conducted in Nigeria, Palestine, and Malaysia.^[9,11,12] Content validity was established by three experts in the field of family medicine and geriatrics, and alterations were made as necessary.

The final questionnaire consisted of two major sections: the first was on biodemographic information, clinical experience in prescribing for the elderly, and respondents' perception of factors affecting appropriate prescriptions for the elderly. The second section consisted of eight clinical vignettes on different clinical scenarios involving drug use in elderly patients. The questions were in the form of multiple choices; correct and wrong answers were given a score of 1 and 0, respectively. Frequently encountered therapeutic problems in elderly patients were the primary concern, such as problems of

the central nervous system (CNS) (Questions 3, 5, and 8), cardiovascular systems (Questions 1, 2, 6, and 7), and sleep disorders (Question 4). The respondents' knowledge was classified on a total score of 8 into very poor (score 0–2), poor (score 2–4), good (score 4–6), and very good (score 6–8).

The information collected from the study questionnaire was coded and analyzed using the Statistical Package for the Social Sciences, version 27 (SPSS, IBM Corporation, Armonk, NY, USA). The demographic data was described as frequencies and percentages. Chi-square test was used to determine the association between the duration of practice and the level of awareness about Beers criteria. All analysis performed at 5% level of significance.

Results

Table 1 shows the demographic features of the total 121 study participants who responded to the online questionnaire. One hundred and twenty-one physicians completed the entire questionnaire with a response rate of 99.2%. Most respondents (58.7%) were females enrolled in residency training programs (52.1%) in the Family Medicine Department (92.6%). Nearly half of the respondents (45.5%) had practiced for 1–5 years after obtaining a medical degree and 4.1% for more than 20 years.

The study explored the potential barriers to appropriate prescribing to the geriatric age group from the participants'

Table 1: Characteristics of primary care physicians working in the Eastern Province of Saudi Arabia (n=121)

Variables	N (%)
Gender	
Male	50 (41.3)
Female	71 (58.7)
Current position	
Consultant	26 (21.5)
GP	9 (7.4)
Resident	63 (52.1)
Senior registrar	22 (18.2)
Specialist	1 (0.8)
Specialty	
Family medicine	112 (92.6)
Internal medicine	8 (6.6)
Nephrology	1 (0.8)
Duration of practice (years since basic medical qualification MBBS/MD)	
1–5	55 (45.5)
6–10	31 (25.6)
11–15	29 (24)
16–20	1 (0.8)
<20	5 (4.1)

GP=General practitioner

perspective [Table 2]. While difficulty communicating with other physicians involved in patient care (33.9%) was suggested as the major barrier, a nearly equal percentage of participants (32.2%) suggested that the consumption of too many medications by patients was a significant factor.

Regarding the confidence in prescribing medications to elderly patients [Table 3], 52.9% answered yes to the question, "Do you have confidence in prescribing for elderly patients?." However, 34.7% of participants were unsure, and 12.4% of the respondents answered no to the aforementioned question. The association between duration of practice and confidence in prescribing for the elderly was studied and denoted $P = 0.040$, which was statistically significant.

As shown in Table 3, there was no significant relationship between the physicians' familiarity with Beers Criteria and duration of practice ($P = 0.155$); 41.3% of participants were familiar with Beers Criteria.

Table 4 presents the participants' awareness regarding the eight clinical vignettes on the appropriateness of medication use by the elderly. The mean of the correct answers in percentage was 64.5%. The highest value among study participants was on Question 8, which 75.2% of participants answered correctly, but 50.4% only answered Question 3 correctly, the lowest value. As shown in Figure 1, the study showed that participants' most frequently used drug information source is online search (84.2%), followed by physician colleagues' knowledge and experience (39.2%).

Discussion

This study's purpose was driven by the lack of similar studies in Saudi Arabia, specifically in the Eastern Province, that demonstrate primary healthcare physicians' awareness of PIMs listed in the Beers Criteria.

The study analysis showed that about half of the participants (46.3%) were unfamiliar with Beers Criteria,

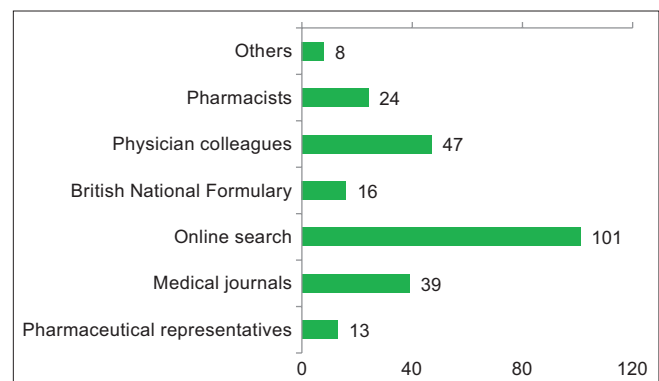


Figure 1: Source of drug information when prescribing for the elderly

Table 2: Barriers to appropriate prescribing in the elderly reported by primary care physicians working in the Eastern Province of Saudi Arabia

	Strongly agree N (%)	Agree N (%)	Neutral N (%)	Disagree N (%)	Strongly disagree N (%)
Lack of time in the office schedule	30 (24.8)	45 (37.2)	27 (22.3)	14 (11.6)	5 (4.1)
Lack of acceptable therapeutic alternatives	12 (9.8)	48 (39.7)	49 (40.5)	10 (8.3)	2 (1.7)
Potential drug interactions	29 (24.0)	63 (52.1)	21 (17.4)	7 (5.7)	1 (0.8)
Cost of medication to patient	5 (4.1)	20 (16.5)	43 (35.5)	39 (32.3)	14 (11.6)
Patient request to begin a specific medication	8 (6.5)	40 (33.1)	48 (39.7)	22 (18.2)	3 (2.5)
Lack of information about which medications a patient is already taking	19 (15.7)	50 (41.2)	25 (20.7)	21 (17.4)	6 (5.0)
Large number of medications a patient is taking	39 (32.2)	63 (52.1)	10 (8.3)	7 (5.8)	2 (1.6)
Unwillingness to discontinue a medication prescribed by another physician	20 (16.5)	55 (45.5)	31 (25.6)	12 (9.9)	3 (2.5)
Difficulty communicating with other physicians who participate in a patient's care	41 (33.9)	55 (45.5)	14 (11.6)	10 (8.2)	1 (0.8)
No feedback from the pharmacy	35 (28.9)	48 (39.7)	22 (18.2)	15 (12.4)	1 (0.8)

Table 3: Association between duration of practice and confidence in prescribing for elderly patients and awareness about Beers Criteria among primary care physicians working in the Eastern Province of Saudi Arabia

Duration of practice (years)	Confidence in prescribing for elderly patients			P-value	Awareness about Beers Criteria			P-value
	No N (%)	Not sure N (%)	Yes N (%)		No N (%)	Not sure N (%)	Yes N (%)	
1–5	8 (14.5)	26 (47.3)	21 (38.2)	0.040	31 (56.4)	8 (14.5)	16 (29.1)	0.155
6–10	5 (16.1)	11 (35.5)	15 (48.4)		10 (32.3)	6 (19.4)	15 (48.4)	
11–15	2 (6.9)	4 (13.8)	23 (79.3)		12 (41.4)	1 (3.4)	16 (55.2)	
16–20	-	-	1 (100)		-	-	1 (100)	
>20	-	1 (20)	4 (80)		3 (60)	-	2 (40)	
Total	15 (12.4)	42 (34.7)	64 (52.9)		56 (46.3)	15 (12.4)	50 (41.3)	

Table 4: Frequency of correct and in-correct answers for clinical vignettes by primary care physicians working in the Eastern Province of Saudi Arabia

Question number	Clinical scenarios	Correct N (%)	In-correct N (%)
1	A 79-year-old patient with a history of systemic hypertension is taking hydrochlorothiazide, atenolol, lisinopril, and α-methyl dopa. The blood pressure is now well controlled and you would like to discontinue a medication. The patient has no other medical problems. Which medication would you discontinue first?	88 (72.7)	33 (27.3)
2	An 85-year-old patient of yours has a history of recurrent atrial fibrillation. Which medication would you like to avoid due to its lack of efficacy in older adults?	65 (53.7)	56 (46.3)
3	A 75-year-old female patient presents to you with depression for which you would like to initiate treatment. The patient is neither hypertensive nor diabetic. Which medication would be your first choice to prescribe?	61 (50.4)	60 (49.6)
4	A 70-year-old patient is having trouble sleeping. You have already addressed sleep hygiene and potentially contributing medical conditions. You are going to prescribe a short course of treatment. Which medication would be your first choice to prescribe?	67 (55.4)	54 (44.6)
5	An 87-year-old patient has poorly controlled hypertension, a history of stroke, and dementia. The patient is already on multiple medications for hypertension. Which medication is most likely to cause CNS side effects in the elderly?	102 (84.3)	19 (15.7)
6	A 70-year-old man presented in the Emergency Department with clinical features of severely elevated (BP 200/130). Examination revealed no significant end-organ damage. Which of the following medications is contra-indicated in this patient?	71 (58.7)	50 (41.3)
7	A 68-year-old woman was admitted to the hospital with chronic congestive heart failure. She has also been on treatment for osteoarthritis. Which of the following drugs will be considered inappropriate for her treatment?	80 (66.1)	41 (33.9)
8	A 98-year-old grandmother presented in the hospital with a history of repeated falls (3 in the preceding 6 months). She has been on treatment for hypertension, osteoarthritis, senile dementia, and insomnia. Which of the following drugs may be considered inappropriate for her regarding the falls?	91 (75.2)	30 (24.8)

CNS=Central nervous system, BP=Blood pressure

and 12.4% were unsure if they were familiar with it. Moreover, we concluded that there was no relationship between the physicians' familiarity with Beers Criteria and duration of practice. This low level of awareness and application of the Beers Criteria in the practice of primary healthcare physicians raises the question of potential harm associated with inappropriate medication prescriptions for the elderly. Despite the moderate level of awareness of physicians, 52.9% of participants were confident in prescribing for the elderly. These results are in accord with previous studies such as that conducted on physicians and pharmacists in Palestine in which only 25% were aware of Beers Criteria, and 65% of participants were confident in prescribing for the elderly.^[11]

Similarly, previously reported studies on general practitioners in Australia, Germany, and Nigeria showed that despite their poor knowledge of screening tools, their confidence in prescribing appropriately was high.^[12-14]

In a previously conducted study, the use of inappropriate medications by the elderly was shown to be more than half the population in the Eastern Province of Saudi Arabia and was associated with approximately 5% of hospital admissions.^[15] PIMs were associated with falls, potential fractures, hypoglycemia, anticholinergic side effects, delirium, etc.^[16]

Therefore, our study examined the participants' awareness of PIMs through 8 clinical vignettes of commonly encountered medical conditions in the elderly in primary care. Clinical scenarios were formulated according to a literature review of similar articles that showed that polypharmacy and inappropriate prescribing was highly prevalent for the geriatric age group who suffer from cardiovascular, endocrine, and gastrointestinal disorders.^[9]

Most of the participants showed a high level of awareness in all the clinical vignettes, with the correct answer rate between 50.7% and 84.3%, indicating an above-average knowledge of appropriate prescription for the geriatric age group. More than 50% of participants were aware of nonsteroidal anti-inflammatory, alpha-2 agonists; compared to previous literature, the aforesaid medication classes were the most commonly prescribed PIMs by family physicians for the geriatric age group in Riyadh, Saudi Arabia.^[15]

Study respondents were more knowledgeable in therapeutic areas of frequently encountered medical issues such as hypertension, osteoarthritis, and congestive heart failure than such areas as depression, arrhythmias, hypertensive emergency/urgency, and sleep disorders, which <60% of respondents answered correctly.

As for the third clinical vignette, 50.7% answered the question correctly, which is considered the lowest value. A possible explanation is that although depression is considered highly prevalent in the elderly, it is commonly underdiagnosed or missed in older adults. On the other hand, 84.3% of respondents answered the fifth clinical scenario correctly, the highest value on the clinical vignettes. A possible explanation is the high prevalence of hypertension in Saudi Arabia. A recent meta-analysis done in Saudi Arabia showed that hypertension in Saudi 14-year-olds and above was 22.7% (95% CI: 18.95-26.60), which is significant.^[17]

Our findings are similar to a study conducted in Nigeria, in which respondents had an above-average knowledge of diabetes mellitus, hypertension, and osteoarthritis but had low scores to clinical scenarios on insomnia, arrhythmias, depression, and other CNS problems.^[14]

Our study highlights the importance of using clinical tools and guidelines in prescribing for the geriatric population. Clinical guidelines and, specifically, Beers Criteria are intended to support shared decision-making about pharmacological therapy in older adults in various clinical settings to optimize the quality of care.^[2]

Although this level of awareness is promising, our aim in publishing this study was to raise the level to the highest possible in all primary healthcare workers to minimize adverse drug reactions. It was also to integrate the Beers Criteria into the electronic healthcare system, thereby making it easily accessible and available. Conscious consideration of the number of medications and benefit/risk information, as well as the use of the Beers list, were associated with less polypharmacy and fewer PIMs as reported by a study conducted in University of Pittsburgh Medical Center.^[18,19]

Our study showed a relatively small sample size ($n = 121$) with low statistical power, so it is difficult to generalize the results to all primary care physicians in Saudi Arabia. A future study with a larger sample size in all ranks of practice may help to determine the area of need and incorporate relevant training into residency and postresidency programs. The survey was self-reported and therefore subject to recall bias and might thus not reflect actual practice. Nevertheless, since it was a cross-sectional survey determination of the cause-and-effect relationship between study variables was impossible.

The results of this study might inform healthcare professionals about the importance of Beers Criteria in geriatric patients' prescriptions and significantly impact the healthcare system and the well-being of the elderly. Educational strategies tailored to primary

care physicians should be established to enhance the knowledge and quality of prescribing.^[20,21]

Conclusion

Overall, international studies emphasize the need for enhanced education and training by integrating geriatric pharmacotherapy and Beers Criteria into healthcare curricula in all areas of the profession. User-friendly clinical decision support systems that readily integrate Beers Criteria and other relevant recommendations should be developed and implemented.^[22-25]

This study in Saudi Arabia found that the awareness and applicability of Beers Criteria by primary care physicians in the Eastern Province of Saudi Arabia is moderate. Awareness of Beers Criteria will improve the practice and knowledge of PIMs in dealing with geriatric patients. The results of this study might inform practitioners in healthcare about the importance of Beers Criteria in geriatric patients' prescriptions and thereby significantly impact the well-being of the elderly in the healthcare system.

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Conflicts of interest

There are no conflicts of interest.

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