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Beers criteria and potentially inappropriate medications in elderly: awareness, practice, knowledge and barriers among community pharmacists in Nigeria

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Abstract

Background: Potential inappropriate medications (PIMs) used in the elderly are an avoidable source of disease and death. Beers Criteria is among the commonly used measures that document PIMs. Community pharmacists' knowledge on PIMs and existing criteria are essential to moderate the use of PIMs which would enhance overall health outcomes and costs. This study investigates awareness, knowledge, practice, and barriers of PIMs among community pharmacists in Ibadan, Nigeria.

Methods: A cross-sectional study was carried out on 109 community pharmacists with the use of a self-administered questionnaire. Nine clinical vignettes based on the 2019 Beers Criteria were used to evaluate PIMs knowledge. Practice behavior regarding elderly clients was evaluated using a 5-point Likert scale with six items. Data were summarized by descriptive and inferential statistics.

Results: Respondents who knew guidelines that listed specific PIMs were (49; 47.1%), and of these, (21; 42.9%) were aware of Beers Criteria. From all the respondents, only 45 (41.3%) demonstrated good knowledge of Beers Criteria, while 82 (75.2%) narrated good practice when dealing with elderly clients in terms of asking suitable questions and contemplating their ages while dispensing medications. Major barrier identified was lack of knowledge of Beers Criteria (80; 73.4%). Pharmacists who were aware of Beers Criteria statistically had better knowledge than others ($p = 0.003$).

Conclusion: Beers Criteria awareness among community pharmacists is sub-optimal in Ibadan, Nigeria. Although practice when dealing with elderly customers was satisfactory, the knowledge was unsatisfactory. This underscores the need to intensify the awareness and use of guidelines that document specific PIMs such as Beers Criteria among community pharmacists.

Keywords: Potential inappropriate medications, Community pharmacists, Beers criteria, Elderly

Background

The older multi-morbid adult populace is increasing globally; with multi-morbidity as the leading cause of complicated polypharmacy, which is a risk factor for inappropriate prescribing and adverse drug reactions [1, 2]. Elderly patient (aged 65 and above) has the maximum risk of prescribing errors in primary practice [1]. Studies carried out in Nigeria have reported the use of potentially inappropriate medication among geriatric patients was high [3–6].

Medications are anticipated to be suitably recommended when they are based on factual scientific indications, usually well-tolerated, and cost-effective [7]. Polypharmacy, although unavoidable in elderly patients

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its unsafe effects could be decreased by a multi-professional assessment of the patient's circumstance and medications, removal of needless medications, and the utilization of precise and implicit criteria to assess elderly prescriptions [8–10]. Numerous criteria have been established to help health care professionals decrease inappropriate prescribing, but the most commonly cited tools are Beers criteria which include of medications the elderly should circumvent irrespective of patient's diagnosis (American Geriatric Society AGS, 2019) [11], and the screening tool of older persons' prescriptions or the screening tools to alert doctors to the right treatment (STOPP/START) criteria [12]. Beers criteria and screening tool of older persons' prescriptions (STOPP criteria) address potentially inappropriate medications (PIMs), while screening tools to alert doctors to the right treatment (START criteria) address potential prescribing omissions (PPO) [12].

Pharmacist-led patient counseling has been linked with better-quality health-related results, quality of life, drug knowledge, and decreased drug-related morbidity and mortality [13, 14]. An interdisciplinary approach to medication review by pharmacists was highlighted as a way of improving physician prescribing practices among older adults [3, 4]. In Nigeria where community pharmacies are generally the initial point of call for patients, there is a need for community pharmacists to be educated and aware of potentially inappropriate medications, and the various criteria to reduce potentially inappropriate medications use in a bid to reduce the dispensing and subsequent use of these medications.

Various studies in Nigeria have shown that potentially inappropriate medication is a major problem in health care [3–6], however, scarcity of data on knowledge, practice, and awareness of specific criteria for potentially inappropriate medication utilization in the elderly by community pharmacists in Nigeria still exists.

This study investigates awareness, knowledge, practice, and barriers of PIMs among community pharmacists in Ibadan, Nigeria. This will be an important first step to revealing what can be done to promote better knowledge and practice among community pharmacists on potentially inappropriate medication use.

Methods

Study design and settings

A cross-sectional study amid community pharmacists working in Ibadan between January and February 2021. Qualified participants were registered community pharmacists practicing in the Ibadan, who offered voluntary informed permission to participate in the survey.

Inclusion and exclusion criteria

Partaking pharmacists are required to possess at least one year of working experience in a community pharmacy. Non-pharmacist attendees, interns, and pharmacy students were excluded.

Sample size determination

The Pharmacists' Council of Nigeria, Ibadan, Oyo State chapter directory was used to determine the total number of community pharmacy premises registered in Ibadan. Using the Yamane sample size equation [15], a sample size of 104 was determined established on the projected populace of 140 registered pharmacy locations, using the assumption of a 95% confidence level and a 5% margin of error. An estimated 116 people made up the target sample group after modifying for a 10% non-response rate.

Sampling and data collection procedure

The sample method/approach utilized for partakers' registration was consecutive. Suitable community pharmacists were accosted by approaching each pharmacist in their individual pharmacy locations. A paper questionnaire was disseminated to 120 community pharmacists. The study aims were described to all pharmacist thereafter voluntary verbal informed permission was acquired to indicate intent to partake in the survey. All willing pharmacists completed the paper questionnaire on their own and returned it within 25–30 min of completion. Responses were guaranteed to be anonymous and confidential, and participation was fully optional. To guarantee that any pharmacist did not fill out above one questionnaire, processes were put in place. To prevent duplication, each questionnaire given to the pharmacist from each community pharmacy was coded. The minimum of one pharmacist per community pharmacy locations filled the questionnaire independently. Prior to commencement of the data collection process, the researcher gathering the data was trained about the instrument and proper ways of approaching the pharmacists and attaining their consent for completing the questionnaire. The respondents received no inducement for partaking in the study. Data were gathered from January to February 2021. Participants were educated about the study goals and requested to give their informed consent before filling in the paper questionnaire provided. The University of Ibadan/University College Hospital Institutional Ethical Review Board (UI/UCH IRB) granted ethical approval with approval number UI/EC/20/0523.

Data collection instrument, pretest, and content validation

The study questionnaire was established after the examination of germane literature and was adjusted to suit the local perspective [16, 17]. Pilot survey was conducted with 15 respondents among the community pharmacists, and internal consistency was revealed with a Cronbach alpha value of 0.72. These 15 community pharmacists were excluded from the study. A questionnaire was the data collection tool for the participants. The questionnaire used in this study comprised of seven sections: Section 1 acquired information on the respondents' social-demographic characteristics, years of experience, educational information, and other qualifications. Section 2 assessed the community pharmacists' confidence and counseling practices concerning the elderly. Section 3 evaluated community pharmacists' practice of Beers Criteria for potentially inappropriate medication use in the elderly. Section 4 investigated the awareness of community pharmacists on the different criteria for potentially inappropriate prescribing in the elderly. Section 5 assessed community pharmacists' knowledge of Beers Criteria for potentially inappropriate medication use in the elderly. Knowledge of PIMs itemized in Beers Criteria were evaluated using nine clinical vignettes according to the 2019 report of Beers Criteria (the newest version of the criteria) [11]. Section 6 explored possible barriers to the practice of Beers Criteria for potentially inappropriate medication use in older elderly. Section 7 assessed the practice behavior of community pharmacists toward elderly consumers using 6 items with a 5-point Likert scale ranging from 1 = "Strongly Disagree" to 5 = "Strongly Agree."

Data analysis

Data entering, cleansing, and analysis were done using Statistical Package for Social Science SSPS (version 23). Descriptive statistics including frequency and percentage were used to describe the socio-demographic characteristics of the respondents. Pearson Chi-square and contingency coefficient statistics were utilized to evaluate the association between categorical variables such as demographic characteristics, years of experience, respondents' awareness of criteria for potentially inappropriate medications, and respondents' practice and respondents' knowledge of Beers Criteria. The level of significance was set at $p < 0.05$. The overall score, in this study, by respondents in the knowledge domains established mainly for this study, was translated into a percentage for uniformity in the scores, with a score greater than 80% (7 out of 9) signifying good knowledge, and a score less 80% signifying poor knowledge. For the 5-point Likert scale response with 6-item statements on practice, a total score of 24 (80%) from the maximum achievable score of 30 was classified as 'good practice,' while a practice score of < 24 was classified as 'poor practice.' The binary classification was modified from Bloom's cutoff criteria and other related studies [18, 19].

Results

There were 120 copies of questionnaire administered to community pharmacists, out of which 109 were filled completely and returned, giving a response rate of 90.8%. More than half (61; 56.0%) were female, (73; 67.0%) were aged between 20 and 29 years. The majority of the respondents (101; 92.7%) held only a Bachelor of Pharmacy degree. About three-quarter of the respondents (78; 71.6%) have been working for more than 5 years post induction with (51; 46.8%) having more than one year experience working as a community pharmacist. See Table 1.

Overall, 82 respondents (75.2%) have satisfactory practice score of 80% and above. A total of 70 (62.2%)

Table 1 Socio-demographic characteristics of community pharmacists ($n = 109$)

Characteristics	Frequency (%)
Sex	
Male	48 (44.0)
Female	61 (56.0)
Age(years)	
20–29	73 (67.0)
30–39	31 (28.4)
40–49	2 (1.8)
50–59	2 (1.8)
60 and above	1 (0.9)
Qualifications	
B. Pharm	101 (92.7)
Masters	4 (3.7)
Pharm D	3 (2.8)
Ph.D.	1 (0.9)
Number of years of experience post induction	
1–5	31 (28.4)
6–10	60 (55.0)
11–15	10 (9.2)
Above 15	8 (7.3)
Years of practice in community settings	
< 1	58 (53.2)
1–5	42 (38.5)
6–10	5 (4.6)
11–15	1 (0.9)
More than 15 years	3 (2.8)

B. Pharm = Bachelor of Pharmacy, Pharm D = Doctor of Pharmacy, Ph.D. = Doctorate in Clinical Pharmacy

Table 2 Community pharmacists' practice to reduce potentially inappropriate medications use in elderly ($n = 109$)

Variables	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)
I always ask elderly patients for their ages	4 (3.7)	15 (13.8)	33 (30.3)	38 (34.9)	19 (17.4)
I always ask patients especially elderly patients for their medical history	1 (0.9)	1 (0.9)	2 (1.8)	56 (53.2)	47 (43.1)
Patients' age is always a key factor for me when dispensing medications especially elderly patients	0 (0.0)	3 (2.8)	18 (16.5)	42 (38.5)	46 (42.2)
I always look for drug interactions especially drug-disease interactions when recommending and dispensing medications to elderly patients	1(0.9)	0 (0.0)	2 (1.8)	57 (52.3)	49 (45.0)
I regularly refer to other resources like BNF, Emdex when providing care to patients especially elderly patients	1 (0.9)	5 (4.6)	11 (10.1)	47 (43.1)	45 (41.3)
I have confidence in the care I provide for elderly patients	1 (0.9)	1 (0.9)	1 (0.9)	55 (50.5)	51 (46.8)
Knowledge of Beers' criteria					
Good practice (≥ 80%)			82		75.2
Poor practice (< 80%)			27		24.8

Maximum obtainable score = 30; % individual score = score obtained by an individual ÷ by total obtainable score × 100. Strongly agree (SA) = 5, Agree (A) = 4, Neutral (N) = 3, Disagree(D) = 2, Strongly disagree (SD) = 1

counseled more than 20 patients per day. More than half 57 (52.3%) of the respondents ask patients for their ages, while 103 respondents (94.4%) ask elderly patients for their medical history. Details in Table 2.

As shown in Fig. 1, the commonly used sources of information by respondents are Medscape (76; 69.7%), reference books (58; 53.2%) and drug leaflets (49; 45.0%).

Only 49 respondents (47.1%) had knowledge of guidelines that listed specific PIMs, and of these, only 21 (42.9%) were aware of Beers Criteria. Majority had not heard of the criteria and never used before. Less than a quarter 19 (18.3%) have had previous training or knowledge about potentially inappropriate medications use in the elderly. See Table 3.

Most community pharmacists 90 (82.2%) knew aspirin 325 mg daily may exacerbate existing ulcers or cause new additional ulcers, more than half 76 (69.7%) knew corticosteroids plus NSAIDs should be avoided because it increases the risk of peptic ulcer disease or Gastro-Intestinal bleeding, and 74 (67.9%) knew long-acting

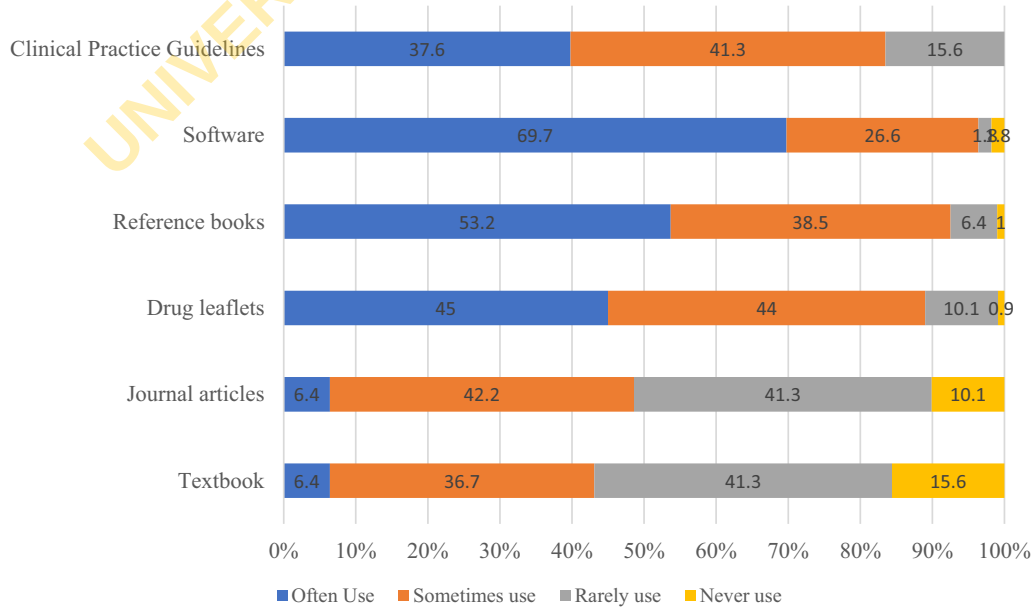

Fig. 1 Common resources used by community pharmacists in their care for elderly patients

Table 3 Community pharmacists' awareness on the different criteria for potentially inappropriate medications in elderly ($n = 104$)

Variables	Response	Frequency (%)
Have you had any previous training or knowledge on potential inappropriate medication use for elderly patients and its reduction using any of the criteria (e.g., Beers' criteria)?	Yes	19 (18.3)
	No	85 (81.7)
Do you know any criteria used to reduce Inappropriate medications?	Yes	24 (23.1)
	No	80 (76.9)
Which of the following criteria for potentially inappropriate medication use in elderly have you heard of?		
Beers criteria	Yes	21 (20.2)
	No	83 (79.8)
STOPP and START	Yes	10 (9.6)
	No	94 (90.4)
Medication appropriateness index	Yes	18 (17.3)
	No	86 (82.7)
Please indicate below how often you use criteria for Potentially Inappropriate Medication Use in Older Patients		
Beers' criteria	Often use	6 (5.8)
	Sometimes use	3 (2.9)
	Rarely use	10 (9.6)
	Know of but never use	19 (18.3)
	Never heard of resource	66 (63.5)
STOPP and START	Often use	4 (3.8)
	Sometimes use	5 (4.8)
	Rarely use	11 (10.6)
	Know of but never use	13 (12.5)
	Never heard of resource	71 (68.3)

sulfonylurea (glimepiride, glyburide) should be avoided due to their risk of prolonged hypoglycemia. In all, less than half 45 (41.3%) of community pharmacists had good knowledge of clinical vignettes of the Beers Criteria, scoring less than 80%. Details are given in Table 4.

Various barriers to the use of Beers Criteria to identify potentially inappropriate medications use among the elderly were reported by community pharmacists, such as lack of knowledge of Beers Criteria (80; 73.4%), patients being impatient (61; 56.0%), and excess workload (55; 50.5%). See Fig. 2.

Respondents with a degree higher than Bachelor of pharmacy degree had good knowledge (57.1%) compared to community pharmacists with only Bachelor of pharmacy degree but difference was not significant ($p > 0.05$), and there was a weak positive correlation coefficient. There is a statistically significant association between awareness of the Beers criteria for potentially inappropriate medication and practice of community pharmacists ($p = 0.003$) and a weak positive correlation coefficient. See Table 5.

Discussion

Potentially inappropriate medications (PIMs) used among the elderly are a common health care challenge that can lead to increased health care costs, morbidity, and mortality. In Nigeria, several studies have evidenced a high occurrence of potentially inappropriate medication use among the elderly using Beers criteria and STOPP and START as a measuring tools [3–6]. This necessitates having health care professionals decrease the incidence by having adequate knowledge of the criteria, careful medication review, and patient education. Detailed geriatric protocols like Beers Criteria can considerably assist in the recognition of PIMs. Acquaintance with Beers Criteria among community pharmacists can consequently aid decrease prevalence of PIMs. From the best of our understanding, this is the first study in Nigeria evaluating awareness, knowledge, practice, and barriers to the use of potentially inappropriate medications and existing criteria among community pharmacists in Ibadan.

Community Pharmacists in this study had satisfactory practice with elderly patients through often questioning to evaluate the appropriateness of medications and those who were cognizant of Beers Criteria for potentially inappropriate medication had better practice than their counterparts. Approximately 50% of community pharmacists in this study do not ask for the patients' age, conflictingly most respondents conveyed they frequently contemplate their clients' age when endorsing and supplying medication. A possible justification for this inconsistency could be that community pharmacists assume their customers' age from their physical look, these results correlate with that reported in a study in Malaysia [16]. Majority of respondents from this study reported high confidence

Table 4 Community pharmacists' knowledge of beers criteria for potentially inappropriate medications in elderly ($n = 109$)

Variables	Response categories	Frequency (%)
Metoclopramide should be avoided unless for gastroparesis with duration not exceeding 12 weeks except in rare cases because it can cause extrapyramidal side-effects Correct answer: Yes	Yes No I don't know	60 (55.0) 6 (5.5) 43 (39.4)
Proton-pump Inhibitors should be used for a maximum of 8 weeks in elderly patients except for high-risk patients, erosive oesophagitis, and pathological hypersecretory condition Correct answer: Yes	Yes No I don't know	62 (56.9) 13 (11.9) 34 (31.2)
Sertraline would increase the risk of delirium Correct answer: Yes	Yes No I don't know	63 (57.8) 7 (6.4) 39 (35.8)
SSRI can increase the risk of falls and should be avoided unless safer alternatives are not available Correct answer: Yes	Yes No I don't know	64 (58.7) 9 (8.3) 36 (33.0)
Benzodiazepines can increase the risk of falls and fractures in elderly patients Correct answer: Yes	Yes No I don't know	72 (66.1) 9 (8.3) 28 (25.7)
First Generation anti-histamines (Chlorpheniramine) can increase the risk of anticholinergic effects in elderly patients Correct answer: Yes	Yes No I don't know	63 (57.8) 5 (4.6) 41 (37.6)
Corticosteroids plus NSAIDs should be avoided because it increases the risk of peptic ulcer disease or Gastro-Intestinal bleeding Correct answer: Yes	Yes No I don't know	76 (69.7) 7 (6.4) 26 (23.9)
Aspirin 325 mg daily may exacerbate existing ulcers or cause new additional ulcers Correct answer: Yes	Yes No I don't know	90 (82.6) 1 (0.9) 18 (16.5)
Long-acting sulfonylurea (glimepiride, glyburide) should be avoided due to their risk of prolonged hypoglycemia Correct answer: Yes	Yes No I don't know	74 (67.9) 12 (11.0) 23 (21.1)
Score distribution ($n = 109$)	Frequency (n)	Percentage (%)
0	3	2.8
1	2	1.8
2	4	3.7
3	6	5.5
4	10	9.2
5	22	20.2
6	17	15.6
7	24	22.0
8	14	12.8
9	7	6.4
Knowledge of Beers' criteria		
Good knowledge ($\geq 80\%$)	45	41.3
Poor knowledge ($< 80\%$)	64	58.7

Each question was allotted a score of one. For each respondent, the total of questions answered correctly was gotten and divided by the total number of questions (9) and then, multiplied by 100 to get the respondents percentage of questions answered correctly

in the care they provide for the elderly which is like findings in an Italian study among physicians [20]. This can be because they use residual knowledge from pharmacy school or various other resources apart from the explicit geriatric guidelines.

This study showed that most community pharmacists in spite of encounters with a substantial quantity of elderly customers are oblivious of Beers Criteria. This finding is comparable to previous studies carried out in Malaysia among hospital, clinical pharmacists, and community pharmacists where more hospital and clinical pharmacists were more acquainted with Beers criteria than their community counterparts [8, 16]. This can be because the hospital and clinical pharmacists have a considerably greater amount of older patients with numerous comorbidities and medications and are more exposed to various parts of elderly care as part of their practice.

The knowledge score of community pharmacists in this study was unsatisfactory and community pharmacists who were cognizant of Beers Criteria had better

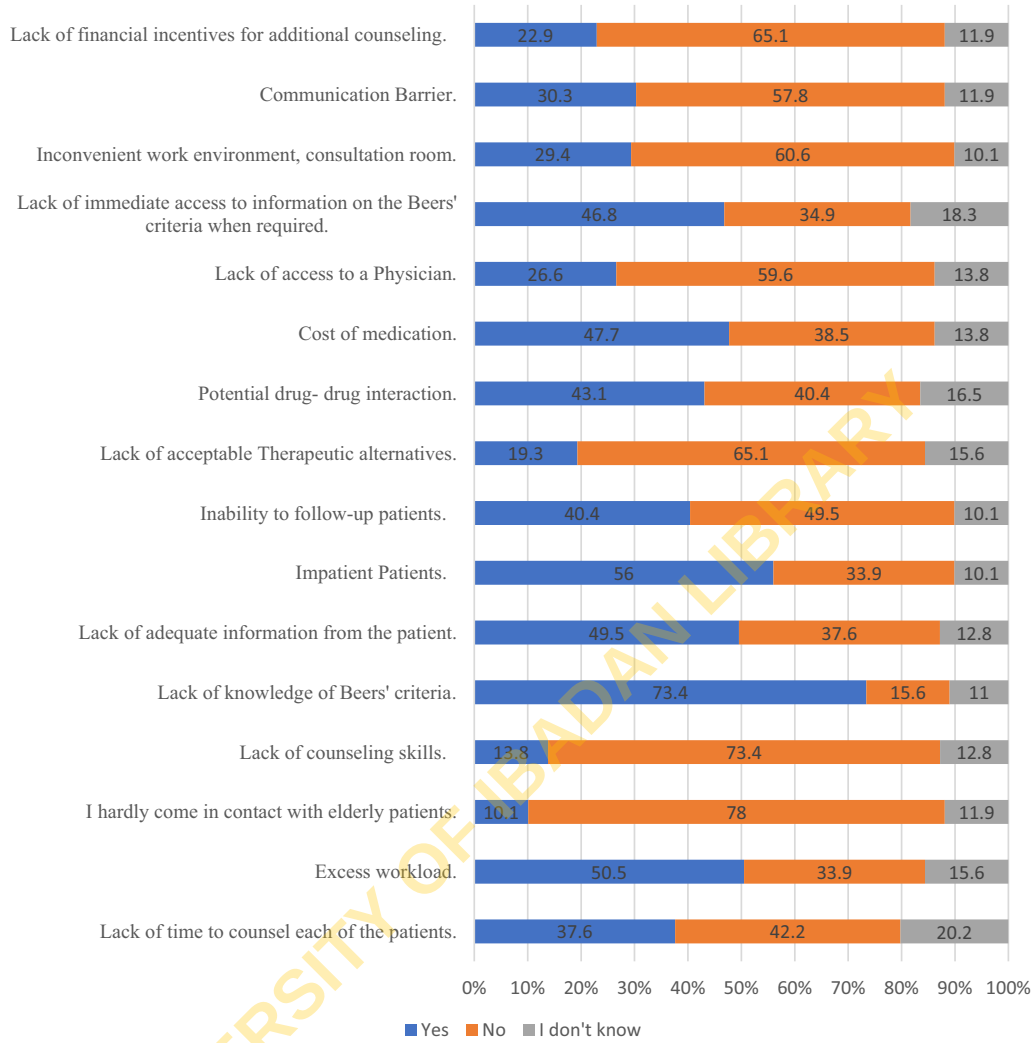

Fig. 2 Barriers to Community Pharmacists' use of Beers Criteria for Potentially Inappropriate Medications in Elderly ($n = 109$)

knowledge and significantly better practice than those who were not aware signifying the need for the awareness and training of community pharmacists. This finding is like that in earlier studies which also demonstrated possible progress which might result from the improved distribution of these elderly-specific guides with regards to recognition of potentially inappropriate medications [16]. Community pharmacists with more experience had improved knowledge of potentially inappropriate medications to a certain level, this can be due to encountering a variety of elderly patients in their career. From an analysis of the individual questions, community pharmacists had satisfactory knowledge of common therapeutic areas like hypertension, diabetes, and less knowledge of psychiatry, and this can be because these are the therapeutic areas that they come across regularly and have mastered the medications used in such areas [21].

Barriers to practice listed by the community pharmacists in this study are lack of possible drug-drug interactions, price of medication to patients, inadequate understanding of potentially inappropriate medications, more time required to consult the criteria, lacking communication, and inadequate of formal education on prescribing protocols which are similar to those listed in the literature [20–24]. It is well established that polypharmacy is common among elderly patients in Nigeria [10] and increases the danger of potentially inappropriate prescribing, adverse drug events, and drug-drug interactions. Despite, being inevitable in elderly patients, its harmful effects can be reduced through multi-professional appraisal of the patient's circumstance and medications, withdrawal of needless medications, and the use of precise criteria for prescribing in elderly [8, 9]. In addition to those listed in the literature, other barriers listed

Table 5 Factors Associated with Knowledge (on Beers' Criteria) and Practice of Community Pharmacists to prevent potentially inappropriate medications use among elderly ($n=109$)

Variables	Poor knowledge *n* (%)	Good knowledge *n* (%)	Poor practice *n* (%)	Good practice *n* (%)
Qualifications				
Bachelor of pharmacy	61 (57.7)	41 (42.3)	25 (23.7)	77 (76.3)
Other qualifications	3 (42.9)	4 (57.1)	2 (28.6)	5 (71.4)
	[$\chi^2=0.776$, $C=0.003$, $p=0.378$]		[$\chi^2=0.058$, $C=0.081$, $p=0.810$]	
Years of practice				
Less than one	35 (58.9)	23 (41.1)	14 (25.0)	44 (75.0)
1–5	27 (61.5)	15 (38.5)	11 (23.1)	31 (76.9)
6–10	1 (20.0)	4 (80.0)	2 (40.0)	3 (60.0)
11–15	0(0.0)	1 (100.0)	0 (0.0)	1 (100.0)
More than 15 years	1 (33.3)	2 (66.7)	0 (0.0)	3 (100.0)
	[$\chi^2=5.912$, $C=0.155$, $p=0.206$]		[$\chi^2=1.997$, $C=0.133$, $p=0.736$]	
Heard of Beers' criteria				
Yes	10 (47.6)	11 (52.4)	0 (0.0)	21 (100.0)
No	54 (59.0)	34 (41.0)	27 (30.1)	61 (69.9)
	[$\chi^2=1.321$, $C=0.006$, $p=0.250$]		[$\chi^2=8.565$, $C=0.134$, $\mathbf{p=0.003}$]	
Heard of STOPP and START criteria				
Yes	5 (40.0)	6 (60.0)	2 (10.0)	9 (90.0)
No	59 (58.5)	39 (41.5)	25 (25.5)	73 (74.5)
	[$\chi^2=0.888$, $C=0.015$, $p=0.346$]		[$\chi^2=0.285$, $C=0.043$, $p=0.593$]	
Heard of medication appropriateness index criteria				
Yes	11 (50.0)	7 (50.0)	4 (22.2)	14 (77.8)
No	53 (40.7)	38 (59.3)	23 (24.4)	68 (75.6)
	[$\chi^2=0.051$, $C=0.071$, $p=0.821$]		[$\chi^2=0.075$, $C=0.021$, $p=0.784$]	
Number of patients above the age of 65 years seen in a day				
1–20	56 (55.4)	41 (44.6)	25 (25.0)	72 (75.0)
21–40	7 (87.5)	1 (12.5)	1 (12.5)	7 (87.5)
41–50	1 (50.0)	1 (50.0)	1 (50.0)	1 (50.0)
51–60	0(0.0)	1 (100.0)	0(0.0)	1 (100.0)
Greater than 60	0(0.0)	1(100.0)	0(0.0)	1(100.0)
	[$\chi^2=5.680$, $C=0.293$, $p=0.224$]		[$\chi^2=2.040$, $C=0.097$, $p=0.728$]	
Knowledge of beers criteria				
Poor knowledge (< 80%)			17 (25.4)	47 (74.6)
Good knowledge (> 80%)			10 (22.2)	35 (77.8)
			[$\chi^2=0.267$	$p=0.605$]

χ^2 = Chi-square, significant p value < 0.05, C = contingency coefficient

The bold is to indicate it is statistically significant

in the study by community pharmacists are inadequate information on patients and the inability to follow-up with patients. In Nigeria, community pharmacists do not have the means to medication archives of patients and must rely on patients' accounts which can lead to inadequate information from patients and may hinder their follow up.

This study identified the most common sources of information used by community pharmacists during their daily practice, these were reference books and software which is similar to other studies carried out among community pharmacists in Nigeria [24, 25]. In addition to those listed above, drug leaflets were also a common source of information, this can be because drug dosage information can be easily found on drug leaflets.

Overall, the findings of our report signify that although awareness of Beers Criteria was sub-optimal amid community pharmacists in Nigeria, most exhibit reasonable practice behavior while offering care to elderly customers. The limitation to this opinion was

the report depended on self-responding, which might not be considered factual practice. Nonetheless, the knowledge grades detected indicate most community pharmacists exhibit sub-optimal knowledge of PIMs in the elderly, though this emphasizes the opportunity for development. Since awareness of Beers Criteria in this study was linked with better knowledge of PIMs and good practice behavior, the advantages of enhanced distribution of the elderly protocols are clear. This study was carried out in one area in Nigeria, thus there should be caution in generalization of the results.

Proposals underscoring the responsibility of community pharmacists in identifying PIMs would be beneficial but must be combined with additional recognized plans targeted at both undergraduate education and mandatory continuing professional development for practicing pharmacists [26].

Limitations of our study include reliance on community pharmacists' reports of the use of protocols and barriers to the use of protocols. Though the Beers criteria can assist in detecting poor prescribing practices, substantial evidence to illustrate that they reliably decrease the prevalence of adverse drug events, unjustified health care resources utilization, or mortality is lacking.

Conclusion

Although the practice of community pharmacists that participated in this study was satisfactory, their knowledge of Beers' criteria was sub-optimal. Thus, creating awareness among community pharmacists and training community pharmacists on potentially inappropriate medications and Beers' criteria through different routes like undergraduate pharmacy education, the Mandatory Continuing Professional Development (MCPD), seminars, workshops, etc., will be beneficial.

Abbreviations

ADRs: Adverse drug events; BPharm: Bachelor of Pharmacy; MPharm: Master of Pharmacy; NYSC: National Youth Service Corps; Pharm D: Doctor of Pharmacy; PhD: Doctorate in Clinical Pharmacy; PIMs: Potentially inappropriate medications; PPO: Potential prescribing omissions; START/STOPP: Screening tool of older persons' prescriptions or the screening tools to alert doctors to right treatment; UCH: University College Hospital.

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Author contributions

WAS had the original idea, developed the study protocol, drafted the manuscript, contributed to the data collection and data analysis. AF developed study protocol and contributed to the data collection and data analysis. All authors contributed to the preparation of the manuscript, read, and approved the final version.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Ethics approval for the study was obtained from the joint University of Ibadan/University College Hospital Institution Review Board with approval number UI/EC/20/0523. Informed consent, in accordance with the approved study protocol by the Ethics committee, was obtained from individual pharmacists after explaining the objectives and procedure of the study to participants individually. Only the consented participants within the study period were enrolled. The study was carried out by following the principles outlined in the Helsinki Declaration of 1964.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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