

Perception and practices of antimicrobial stewardship by community pharmacists in Aden-Yemen.

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Abstract

Introduction: Antimicrobials are among the most widely used and misused medicines worldwide. Resistance to antimicrobials is an emerging global issue, mainly in developing countries. Antimicrobial stewardship (AMS) programs are therefore important, but their implementation in Yemen warrants investigation.

Objective: The study aimed to determine the perception and self-reported practices of AMS by community pharmacists in Aden, Yemen.

Methods: A descriptive, cross-sectional survey was conducted from February to May 2019 using pre-designed structured questionnaire. The Statistical Package for Social Science was used for data analysis version 22 (SPSS Incorporation, Chicago, IL, USA).

Results: Three hundred community pharmacists were audited, of which, 219 were males (73.0%) and 81 (27.0%) were females. Fifty-nine percent of the pharmacists were familiar with the vital role of AMS program and its importance in enhancing patient care. Less than half of the respondents (45.3%) strongly agreed and 50.7% agreed that the program should be incorporated at the pharmacy level. Less than half (42%) agreed and 20% strongly agreed that Pharmacists have a responsibility to take prominent role in antimicrobial stewardship and infection control programs in health system. However, the practice of AMS program was found to be inadequate. For instance, 19.7% often dispense antibiotics without a prescription.

Conclusion: The current study showed that pharmacists are adequately aware of AMS. Undesirably, however, practice of AMS was found to be inadequate. The study highlighted gaps in the perception and practice of community pharmacist and the urgent need to implement AMS program in community pharmacy.

Keywords: Community pharmacist, Pharmacy, Infection control program.

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Introduction

Antibiotics are among the most widely used and misused medicines worldwide. The last 50 years has been considered the golden period of antimicrobial agent invention and their extensive application in health centers and the community. However, their effectiveness has been collapsing because

of misuse, including over prescription for non-microbial infections, unsuitable use, dispensed by pharmacists as over-the-counter medicines, self-medication, and other irrational uses [1-8] that ultimately lead to global antimicrobial resistance. Reductions in newly synthesized antibiotics and the increased rate of multi-drug-resistant infections [9,10]

have led to antibiotic resistance, a serious health challenge that has alarmed and warranted considerable discussion and various initiatives by the World Health Organization (WHO) [11]. Worldwide mortality due to antibacterial resistance is predicted to exceed mortality due to cancers by 2050 [12].

A report from the WHO revealed that antimicrobial resistance leads to the development of microorganisms that cause antibiotics to be ineffective, thereby extending the period of contagion and ultimately causing hospitalization [13]. The frequency of infectious diseases is higher in developing countries than highly developed countries. Moreover, a record of the mortality rate due to antimicrobial-resistant bacteria does not exist in developing countries [14].

A close linkage exists between the prescribing patterns of physicians and antibiotic resistance. In a study conducted with 18 microbes, Yemeni dental patients were found to be resistant to ampicillin and metronidazole compared to Norwegians [15] while those from the Al-Hodeidah governorate were found to be chloroquine resistant [16]. In addition, the misuse of antimicrobials in oral diseases by dentists was primarily responsible for the prevalence of drug-resistant bacteria as confirmed in a study that evaluated the knowledge of Yemeni dentists when prescribing antimicrobials. The study found that ~84% of dentists might be prescribing an antimicrobial agent without clinical indications [17]. Another study conducted in the Hadramout Governorate (Yemen) on the rational use of antibiotics [18] found that they were overprescribed (66.2%), similar to that reported (58%) by Abdo-Rabbo et al. [19]. A 70% prevalence was also found for self-medication and antibiotic misuse among teachers that used non-prescribed antibiotic, an estimated half of which were inappropriate [20]. In a study performed in 2015 to explore the antibiotic prescribing patterns at outpatient departments in Aden (Yemen) hospitals, number of prescriptions including antibiotics was 84.2%, a value higher than that of previous studies [21].

Many studies indicated the irrational use of antibiotics in Yemen, thereby warranting urgent interventions to avoid future morbidity and mortality caused by antimicrobial resistance. AMS states the consistence interferences intended to standardize and improve the rational use of antibiotic by encouraging the selection of the ideal antimicrobial drug, dosage, treatment period, and route of intake [22]. The AMS program must be conducted in Yemen to regulate the prescribing pattern of antimicrobial agents for the prevention of a health disaster in the near future. To increase awareness, knowledge, and attitude toward the rational use of antimicrobial agents, all health workers must be included in this program.

Antibiotics misuse has led to antibiotic resistance and increased cost of treatment. For countries such as Yemen, where infectious diseases are among the top four causes of morbidity and the top ten causes of mortality, proper management of the antibiotic prescribing pattern is crucial for minimizing the risk, extent, and rate of antibiotic resistance.

To ensure that antibiotics are prescribed in a rational manner, the pharmacy department of healthcare facilities should conduct regular reviews on antibiotic use.

Increasing antimicrobial resistance is one of the pressing concerns globally. Injudicious use of antibiotics is one of the modifiable factors responsible for antimicrobial resistance. Given the widespread use of antimicrobials in community settings, pharmacists have an important role in ensuring they are used appropriately.

AMS is a term jointly used for various quality improvement activities related to antimicrobials. It mainly focuses on the appropriate and rational use of antimicrobials utilized for the prevention and treatment of infectious diseases. Due to the global increase in the number of cases and prevalence of multidrug-resistant bacteria, there has been a growing interest for the implementation of AMPs to address this situation and promote appropriate antimicrobial use to avoid more cases of antimicrobial resistance. In most European countries, AMS has been implemented to reduce the abuse and misuse of antimicrobials, and their associated risk of resistance and adverse events. Furthermore, the AMS program is dedicated to regulating antimicrobial usage to prevent resistance and reduce the burden on the health care system. Pharmacists play a vital role in combating and preventing infectious diseases, and their role in AMS has flourished significantly over the past few decades. However, in Yemen, the pharmaceutical regulatory body lack proper policies that implement best-practices regarding antibiotics dispensing as well as prescribing. This study aim was to assess the perception and self-reported practices of AMS by community pharmacists in Aden.

Materials and Methods

Study design and sampling

This descriptive, cross-sectional study was conducted for 3 months in Aden city. The self-administered questionnaire was designed after a thorough literature review of relevant published studies. The initial version of the questionnaire was subjected to content and face validity. For content validity, the questionnaire was sent to a panel of three subject experts for their opinion on its relativity and importance.

The final instrument consisted of 24 items, which were divided into three sections: the first section had five questions which explored the demographic information of the participants; the second section, consisting of eight questions, assessed the perceptions of participants on AMS as recorded on a 5-point Likert scale of Agreement: 1, strongly disagree; 2, disagree; 3, neutral; 4, agree; and 5, strongly agree; and the last section evaluated the practices of participants toward AMS by assessing their responses to 11 questions on a 5-point Likert scale level of frequency: 1, never; 2, rarely; 3, occasionally; 4, often; and 5, always. Reverse coding was performed for negatively-worded statements.

Data collection and management

Data were analyzed with Statistical Package for Social

Sciences software version 22 (SPSS Incorporation, Chicago, IL, USA). Descriptive analyses were employed to express data as frequencies and percentages. Frequencies and percentages were used to represent different responses for each variable while medians and inter-quartile ranges (IQRs) were used to represent ordinal variables. Kolmogorov-Smirnov and Shapiro-Wilks tests were carried out to test the normality of the data. Inferential statistics (Mann-Whitney and Kruskal-Wallis tests) were applied to detect the differences in median scores based on non-normal distribution of the data. A p-value less than 0.05 was considered statistically significant.

Ethical consideration

The study protocol was endorsed by the Ethics Research Committee of the Faculty of Medicine and Health Sciences, Aden University. Written informed consent was obtained from all participants who were willing to participate in the study after they were informed of the objectives, importance, and benefits of the research and that their participation is voluntary. They were assured that the data gathered will be handled with full confidentiality, and used only for the purpose of this research.

Results

Among the 300 participating community pharmacists, 219 were males (73.0%) and 81 (27.0%) were females. Most respondents (64.3%) were between 20–30 years old and more than half (54.7%) had a Bachelor’s degree in Pharmacy with 1-4 years of experience. The sociodemographic characteristics of participants are shown in Table 1.

Approximately 59% of pharmacists agreed that the AMS program will help to improve patient care and ~52.3% believed that such program will reduce the issue of antimicrobial resistance. To achieve a better understanding and improve the practice of pharmacists, most respondents believed that pharmacists should join various conferences, seminars, and

workshops on AMS program (56.3% of respondents agreed and ~30.7% strongly agreed). Likewise, approximately half of the participants (50.7%) were aware of the incorporation of community pharmacists in this program and 47.7% desired to receive training on antimicrobial use. Over half (52.3%) of participants did not agree or strongly disagreed with the statement that prescribing physicians are the only healthcare providers who need to understand AMS program and 42.0% believed that pharmacists should assume a prominent role in AMS program and infection control programs in the health system. The perception of participants regarding AMS program is illustrated in Table 2.

We sought to evaluate the self-reported practices of AMS program by community pharmacists in Yemen. Consequently, most pharmacists indicated that they always/ often dispense antimicrobials on prescription with complete

Table 1. Participant characteristics.

Characteristic	No (n=300)	%
Gender		
Male	219	73.0
Female	81	27.0
Age (in years)		
20 – 30	193	64.3
31 – 40	93	31.0
41 – 50	11	3.7
51 – 60	3	1.0
Qualification		
Diploma	131	43.7
Bachelors	164	54.7
Other	5	1.6
Experience (in years)		
< 1	37	12.3
1 – 4	138	46.0
5 – 9	85	28.3
10 or more	40	13.3

Table 2. Perception of participants toward AMS program.

Statement	Participant responses								Median (IQR)		
	Strongly disagree		Disagree		Neutral		Agree			Strongly agree	
	No	(%)	No	(%)	No	(%)	No	(%)		No	(%)
Improve patient care	1	(0.3)	3	(1.0)	4	(1.3)	115	(38.3)	177	(59.0)	5 (4-5)
Should be incorporated at community pharmacy level	0	(0)	3	(1.0)	9	(3.0)	152	(50.7)	136	(45.3)	4(4-5)
Reduces problem of antimicrobial resistance	0	(0)	1	(0.3)	10	(3.3)	132	(44.0)	157	(52.3)	5 (4-5)
Adequate training should be provided to community pharmacists on antimicrobial use	1	(0.3)	5	(1.7)	12	(4.0)	143	(47.7)	139	(46.3)	4 (4-5)
Relevant conferences, workshops and other educational activity are required to be attended by community pharmacist to enhance understanding of antimicrobial stewardship	5	(91.7)	11	(3.7)	23	(7.7)	169	(56.3)	92	(30.7)	4(4-5)
Individual efforts at antimicrobial stewardship has minimal impact on antimicrobial resistance problem	5	(1.7)	34	(11.3)	35	(11.7)	167	(55.7)	59	(19.7)	4(4-4)
I think that the prescribing physicians are the only professionals who need to understand antimicrobial stewardship	22	(7.3)	135	(45.0)	38	(12.7)	58	(19.3)	47	(15.7)	2 (2-4)
Pharmacists have a responsibility to take prominent role in antimicrobial stewardship and infection control programs in health system	4	(1.3)	60	(20.0)	49	(16.3)	126	(42.0)	61	(20.3)	4(3-4)

clinical information (43.3% and 33.0%). However, 47.3% occasionally dispensed antimicrobials without a prescription. Nonetheless, these pharmacists (55.0%) have adopted the good practice of never dispensing antibiotics for duration longer than what is prescribed by the physician. Collaborative working with other healthcare professionals for infection control and AMS program was always and often carried out by 34.3 and 31.7% of respondents. Notably, most pharmacists (74.3%) communicated with prescribers if unsure of the appropriateness of an antibiotic prescription. Furthermore, they often required additional clinical information (e.g., drug interaction, Adverse Drug Reaction (ADRs), allergy, etc.)

before deciding whether to dispense the prescribed antibiotic. Of note, only 18.3 and 17.3% of community pharmacists participated in antimicrobial awareness campaigns that promote the optimal use of antimicrobials. The response to questions related to educating patients on the use of antimicrobials, resistance-related issues, and asking patients about their knowledge of the prescribed antimicrobial and its usage reflected the knowledge and awareness of different aspects of antibiotic uses (Table 3). The association between participant characteristics and median scores of their perception and practices regarding AMS program is summarized in Table 4.

Table 3. Self-reported practices of AMS program by community pharmacists.

Statement	Never		Rarely		Occasionally		Often		Always		Median (IQR)
	No	(%)	No	(%)	No	(%)	No	(%)	No	(%)	
I dispense antimicrobial on prescription with complete clinical information	1	(0.3)	9	(3.0)	61	(20.3)	130	(43.3)	99	(33.0)	4 (4-5)
I dispense antimicrobials without a prescription	22	(7.3)	61	(20.3)	142	(47.3)	59	(19.7)	16	(5.3)	4 (4-5)
I dispense antimicrobial for durations more than prescribed by the physician on patient's request	165	(55.0)	59	(19.7)	48	(16.0)	17	(5.7)	11	(3.7)	5 (4-5)
I collaborate with other health professionals for infection control and antimicrobial stewardship	24	(8.0)	27	(9.0)	51	(17.0)	95	(31.7)	103	(34.3)	4 (3-5)
I communicate with prescribers if I am unsure about the appropriateness of an antibiotic prescription	24	(8.0)	53	(17.7)	96	(32.0)	50	(16.7)	77	(25.7)	3 (2-5)
I sought additional clinical information (E.g. drug interaction, ADRs, allergy, etc.) before deciding to dispense the antibiotic prescribed	5	(1.7)	33	(11.0)	75	(25.0)	85	(28.3)	102	(34.0)	4 (3-5)
I take part in antimicrobial awareness campaigns to promote the optimal use of antimicrobials	57	(19.0)	54	(18.0)	82	(27.3)	55	(18.3)	52	(17.3)	3 (2-4)
I educate patients on the use of antimicrobials, and resistance-related issues	7	(2.3)	21	(7.0)	56	(18.7)	53	(17.7)	163	(54.3)	5 (3-5)
I make efforts to prevent or reduce the transmission of infections within the community	9	(3.0)	17	(5.7)	67	(22.3)	62	(20.7)	145	(48.3)	4 (3-5)
I ask the patients about their knowledge of prescribed antimicrobial and its usage	23	(7.7)	40	(13.3)	78	(26.0)	80	(26.7)	79	(26.3)	4 (3-5)

Table 4. Association between participant characteristics and median scores of the perception and practices of AMPs by participants.

Characteristic	Median perception score	Mean rank	p-value	Median practice score	Mean rank	p-value
Gender*						
Male	4	150.67	0.948	4	155.13	
Female	4	150.04		3.5	137.97	0.117
Age (in years) **						
20 – 30	4	159.14	0.009	4	154.96	
31 – 40	4	133.02		3.5	143.31	
41 – 50	4	168.45		3	137.82	0.0662
51 – 60	4	71.00		3.5	133.17	
Qualification**						
Diploma	4	153.52	0.222	4	165.49	
Bachelor	4	146.52		3.5	138.70	
Other	5	202.00		4	144.70	0.025
Experience (in years) **						
< 1	4	167.27	0.253	3.5	143.99	
1 – 4	4	147.20		4	155.19	
5 – 9	4	154.21		3.5	146.09	0.805
10 or more	4	134.68		3.5	146.08	

* Mann-Whitney Test

**Kruskal-Wallis Test

Discussion

The current study is the first building block in the effort to initiate an effective AMS program in Yemen. Community pharmacists have an integral role in the development and application of this program on an international scale [23,24]. Hence, documenting their perception and self-reported practices in Aden regarding the program is a very important step in elucidating its potential.

Most participants in the present study were males (73%); ~64.3% belong to the age cohort, 20-30 years, and 46.0% had 1-4 years of experience in the field. Over half (54.7%) had a Bachelor's degree while 43.7% had a Diploma. Such finding indicated that most community pharmacists were in middle aged with adequate work experience and qualification.

Based on the perception of participants toward AMS, we found that community pharmacists were acquainted with the essential role of AMS as most strongly agreed on its importance in enhancing patient care (59%). Such finding was similar to that of other studies carried out in Ethiopia (54.7%) [25] and Punjab, Pakistan (67.5%) [26]. Furthermore, another study in Pakistan found a lower percentage (39.8%) [27] than the current study and relatively lower percentage than a comparable study in Malaysia where a slightly higher percentage of 88% [28] was reported. An Ethiopian study had 86.3% of participants agree with the essential role of AMS [29].

Nearly half of the participants (50.7%) agreed that the program should be incorporated at the pharmacy level and ~45.3% strongly agreed. These findings align with those of studies conducted in Punjab, Pakistan (49.8% strongly agreed [26] and 42.5% strongly agreed [27] in two studies in Pakistan). However, these percentages were lower in studies conducted in Malaysia (10.6%) [28] and Ethiopia (only 18%) [29]. Nonetheless, this finding acts as a good indicator of the relatively higher awareness of the effective function of community pharmacies in AMS among Yemeni pharmacists.

The contributors believed that the program will reduce the issue of antimicrobial resistance (52.3%). This result is comparable to the studies in Ethiopia (56.3%) [25], Punjab, Pakistan (55%) [26], Pakistan (47.0%) [27], and Malaysia (59%) [28]. A study carried out in Australia revealed that a close link exists between antimicrobial prescribing pattern and antimicrobial resistance [30]. Besides, studies conducted at four hospitals in Aden city revealed the irrational use of antibiotics [21]. Community pharmacists have a remarkable role in dispensing antibiotics in a random manner that is not based on scientific criteria. In the real world, such dispensing occurs with a lack of studies reflecting the number of antibiotics dispensed by community pharmacists on a routine basis.

The findings also indicate that pharmacists possess the knowledge and a responsibility to be involved in an effective AMP program. However, they must also have the desire to engage in different activities that support the program. Such

findings are similar to those of studies mentioned above [25-28]. Although the current attitude and knowledge of pharmacists and their collaboration with other health care practitioners could serve as a crucial aspect of the program, a recognized AMS program that is officially presented in community pharmacy does not exist in Yemen.

The findings from the dispensing pattern among community pharmacists revealed that nearly 33% and 43.3% of pharmacists always and often, respectively, dispensed antimicrobials on prescription with complete clinical information. These percentages are quite similar to that of the study in Malaysia (~43.6%) [28]; however, they are higher than those of the study conducted in Pakistan where percentages were 28.2% and 30.4% for always and often, respectively [27]. To add, the study in Pakistan revealed that there were no pharmacist that always dispensed antimicrobials on prescription with complete clinical information while 48.3% rarely performed such dispensing [26]. The percentage was also relatively low in the study in Ethiopia (7.2% and 10% for always and often, respectively). Although the percentage obtained in our study is relatively higher than other studies, it is still lower than the perspective (i.e., 100% always). Approximately 47.3% of pharmacists responded that they occasionally dispensed antimicrobials without a prescription. This percentage is comparatively higher than those reported in the Malaysia and Ethiopia studies with 5.3% and 5.4%, respectively [25,28]. Notably, slightly more than half of the participants (55%) never dispensed antimicrobials on patient's request, for durations more than that prescribed by the physician. This percentage reflects the commitment of pharmacists to abide by physician's instructions. The present study revealed that two-thirds of community pharmacists collaborated with other health professionals for infection control and AMS; the percentage is considered acceptable compared to that of the study conducted in Pakistan where percentage was 0.0% and 46.4% [26,27] and similar to a study in Ethiopia (63%) and Malaysia (63.8%) [25,28]. Likewise, the study indicated that there was relatively adequate communication between pharmacists and physicians for conformation on the appropriateness of an antibiotic prescription (42.4%); however, it was lower than the studies in Malaysia (89.3%) [28], Ethiopia (77.9%) [25], and Pakistan (55.2%) [27]. Community pharmacists considered clinical and safety parameters like drug interaction, ADRs, and allergy before dispensing the antibiotic prescribed (62.3%). Nearly one-third of participants (35.6%) only enrolled in antimicrobial awareness campaigns to promote the optimal use of antimicrobials, a percentage that is lower than the Pakistani (48.6%), Ethiopian (42.1%), and Malaysian studies [25,27,28]. It is however better than the study in Punjab, Pakistan where no pharmacists contributed to this program. Many pharmacists have considered educating patients on the use of antimicrobials and resistance-related issues to prevent or reduce the transmission of infections within the community and have questioned patients on their knowledge of prescribed antimicrobials and their usage.

Although initiating AMS is essential to avoid future disaster caused by antimicrobial resistance, the impact of this program is still unidentified in most countries across the world. As this study highlighted a particular sector of health workers, future comprehensive studies on the effect of this program among other health professionals and the application of this program to prevent future antimicrobial resistance should be conducted.

Limitations of the Study

As the target group was selected by convenience rather than by random sampling, this served as the main limitation of our study. Another major limitation was the inability to generalize our findings as the study was carried out among community pharmacists in Aden city only. Of note, some of the selected community pharmacists did not participate in this study.

Conclusion

Herein, we found that the awareness of community pharmacists regarding antibiotics is relatively adequate while their perception of AMS is optimistic. Regrettably, practices of AMS are lacking. The study highlighted some gaps in the perception and practice of community pharmacists, thereby demonstrating the urgent need of interventions for AMS, knowledge of its importance and benefits, and implementation of AMS program in community pharmacies.

Further studies that evaluate the knowledge and perceptions of community pharmacists regarding antimicrobial therapy and AMS program across Yemen are required. To add, educating and training pharmacists and healthcare workers on the AMS program are urgently needed.

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Conflict of Interest

All authors declare that they have no conflicts of interest.

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