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Antimicrobial Stewardship: Knowledge and Attitudes of Pharmacy Staff on Antibiotic Dispensing Patterns, Use and Resistance in Benin

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Abstract

Background: One of the key drivers for the emergence and spread of antimicrobial resistance (AMR) is non-prudent antibiotic use, which results in selection pressure toward relevant bacteria. Pharmacy staffs have pivotal roles in facilitating the prudent use of antibiotics through antimicrobial stewardship programs. Due to limited information in Benin, this study assessed the knowledge and attitudes of pharmacy staffs on antibiotic use and resistance. **Materials and Methods:** This cross-sectional study was conducted among 159 pharmacy staffs using a structured questionnaire from August 2018 to December 2018 in Benin. Data analysis was done by using Stata version 13.0. **Results:** Of the 159 participants, 54.8% knew the definition of antibiotic therapy and 66.9% knew the definition of probabilistic antibiotic therapy. The majority (88.1%) of the participants thought that the choice of antibiotics was made according to the pathology, while 60.4% thought that it depended on the pathology and the germ involved. 49.02% of dispensers in pharmacies stated that half of the patients had requested treatment without providing a prescription at the pharmacy. The top three antibiotics that were dispensed without a prescription include amoxicillin (98.1%), cloxacillin (76.7%) and metronidazole (57.2%), all from the Access group of antibiotics. **Conclusion:** These results underscore the need for educational and training interventions targeting specific professional groups. There is an urgent need for regulatory measures and public awareness through improved antimicrobial stewardship to limit this practice.

Keywords

Antibiotic Resistance, Antimicrobial Resistance, Antimicrobial Stewardship, Attitudes, Benin, Knowledge, Perceptions, Pharmacists, West Africa

1. Introduction

Antimicrobial resistance (AMR) is a threat to public health across the world [1] [2] [3] [4], and has been exacerbated by the inappropriate use of antimicrobials [1] [5] [6]. Nowadays, the misuse and overuse of antibiotics are a common concern in almost all corners of the world, including in West Africa [7]. The adverse result of this problem is the emergence of drug-resistant bacterial strains [8] [9] [10] [11], with increased implications on morbidity, mortality, and the global economy [1] [5] [9] [10] [12]. If AMR is not addressed, it will lead to the death of more than 10 million people annually by the year 2050 [2] [10] [13] [14]. Additionally, if not combated, AMR will shave off 3.4 trillion US dollars (USD) from the gross domestic product (GDP), USD100 trillion will be spent for not tackling this crisis at present, and this problem will lead 24 million more people into extreme poverty [15] [16]. Therefore, it is critical to understand the knowledge of pharmacy staffs on antimicrobial use (AMU) and AMR.

Studies have reported that AMR has been worsened by the inappropriate use of antibiotics in humans [10] [17] [18] [19] [20]. Subsequently, the inappropriate use of antibiotics in food-producing animals also contributes to the development of AMR [21]-[28]. Evidence has shown that most antibiotics are prescribed and dispensed empirically [6] [29] [30] [31]. Dispensing of antibiotics without a prescription is among the major drivers of AMR [32] [33]. Consequently, self-medication with antibiotics continues to be a burden in healthcare systems worldwide [34]. This suggests the need for interventions to reduce the inappropriate use of antibiotics.

Significant evidence has suggested that the knowledge and attitudes of pharmacy professionals and other healthcare workers (HCWs) can play a key role in managing the growing threat of AMR [35] [36] [37] [38]. This is because pharmacy professionals that have good knowledge and positive attitudes towards AMU and AMR usually promote good dispensing practices and rational use of antibiotics [39] [40] [41]. The occupation of pharmacy professionals is increasingly becoming patient-centered thereby making pharmacy professionals the most accessible HCWs [42] [43] [44]. As a result, pharmacy professionals can interact with clients directly and advise them on the appropriate use of antibiotics [44]. Additionally, pharmacy professionals are involved in providing information concerning the use of medicines to the public [45]. Their high levels of accessibility make them ideally placed to provide timely and appropriate advice on the prudent use of antibiotics [42]. In a bid to provide appropriate healthcare, an evidence-based approach is needed [46] [47] [48]. This scientific and ethical

obligation is threatened by self-medication and pressure on pharmacy professionals [49] [50]. Self-medication has been worsened by patients' demand for medicines without prescriptions, thereby increasing the risks of AMR development in those that have this tendency [51]-[57].

Due to the escalating cases and deaths associated with AMR, strategies have been formulated across the world to address this problem [58]-[68]. The strategies are meant to reduce the inappropriate use of antimicrobials and increase the discovery of new antimicrobials [69] [70]. The Global Action Plan (GAP) on AMR was developed in 2025 to help the global community address AMR [71]. The GAP promotes tackling AMR across the One Health ecology (humans, animals, agriculture, and the environment), increasing awareness and knowledge of AMR, promoting hygiene and prevention of infections, increasing surveillance, and promoting research and global collaborations [71] [72]. Besides, some countries have developed National Action Plans (NAP) on AMR to help tackle this problem by adopting the objectives and activities provided in the GAP [73]-[79]. Pharmacy professionals are critical in ensuring that the strategies that address AMR are developed and implemented [80]. This is because pharmacy professionals are custodians of all medicines and participate in strategies that optimize AMU [81]-[85].

Furthermore, there is a need to increase global awareness campaigns on AMR, promote hygiene and infection prevention practices, reduce the unnecessary use of antimicrobials in humans, animals, and agriculture, improve the surveillance of AMU and AMR across all One Health sectors, promote the use vaccines and alternatives compared to using antimicrobials, develop new rapid diagnostic tools, improve incentives for people working in infectious diseases, finances for the new development of antimicrobials, and global coalition for real action to combat drug-resistant infections [70]. The above-mentioned strategies tend to promote antimicrobial stewardship (AMS) across all sectors [58] [59] [76] [78] [86] [87] [88] [89] [90]. To optimize the rational use of antibiotics through AMS, the WHO developed the Access, Watch, and Reserve (AWaRe) classification of antibiotics in 2017 [91]. The AWaRe framework aims to promote AMS activities such as adherence to treatment guidelines [63] [64] [66] [92] [93].

Bearing this in mind, the objective of this study was to assess the knowledge and attitudes of pharmacy staffs in Benin concerning antibiotic therapy, as well as to identify their perception of dispensing antibiotics without prescriptions and understand their motivations and the factors underpinning this practice.

2. Materials and Methods

2.1. Study Design, Site, and Population

This cross-sectional study was conducted from August 2018 to December 2018 in community pharmacies of Cotonou and Bohicon, Benin. These two cities were selected for their very strategic geographical location. Cotonou is the economic lung, cosmopolitan pole and showcase of Benin whereas Bohicon is a

crossroads town where certain economic activities are reportedly flourishing. The study was targeted at pharmacists, assistant pharmacists, pharmacy students and pharmacy assistants involved in dispensing medicines including antibiotics to patients. To be eligible, every participant had given informed consent and worked in community pharmacies in the selected cities. The study excluded all pharmacy workers that were not available during the data collection period.

2.2. Sample Size Estimation and Sampling Criteria

The sample size was estimated using Cochrane's formula as explained by Charan and Biswas [94]. With no previous study done in these two cities, we assumed a prevalence of 50% and a margin of error of 5%, resulting in a sample size of 385. However, we were able to locate 60 community pharmacies of which 55 were from Cotonou and 5 were from Bohicon. Overall, 159 pharmacy professionals practicing in the 60 community pharmacies were enrolled in this study. All the participants were selected using the convenience sampling method.

2.3. Data Collection

Data collection was done using a pre-tested questionnaire that was adapted from a previous study [95]. For each pharmacy, a team of four (04) people was responsible for conducting the survey. The data collection staff included pharmacy and physician students who had previously received adequate training on the subject and the questionnaire. The objective of the study was explained and the topics covered by the questionnaire were announced to the responsible pharmacists or assistant pharmacists to obtain their permission to survey in their pharmacy. After the authorization and consent of the pharmacy managers, the same procedure was carried out with the pharmacy staff. The questionnaire was sent individually to the participant in a single visit. The data collection form was filled in by collecting socio-demographic characteristics, knowledge of both antibiotic therapy and antibiotic dispensing and opinion on antibiotic resistance from the participants. The duration of each step depended on the availability of pharmacy staff. The participants were reassured of the absolute confidentiality and anonymity of the information collected.

2.4. Data Processing and Analysis

The collected data were entered in Microsoft Access version 2016 for processing and analyzed using Stata version 13.0. Pearson's Chi-square or Fisher's exact test was used for the comparison of qualitative variables and Student's test or analysis of variance (ANOVA) for the comparison of quantitative variables. The significance level was set at 95% confidence level and $p < 0.05$.

2.5. Ethical Approval

Ethical clearance to conduct the study was obtained from the Faculty of Health Sciences of Cotonou, University of Abomey-Calavi, Benin. Informed consent

was obtained from all participants. Those who did not give consent were not included in the study. All ethical and professional considerations were followed throughout the study to keep the data strictly confidential. Names of drug outlets and dispenser identifiers are kept confidential. The results of the survey are presented in aggregate form only and all results at personal or pharmacy level are confidential due to the use of anonymous coding.

3. Results

3.1. Socio-Demographic Characteristics of Participants

One hundred and fifty-nine (159) pharmacy staffs practicing in 60 pharmacies completed the self-administered questionnaire with the majority being female (64%) and 66.9% aged between 25 and 35 years. More than half (74.5%) of the participants were pharmacy assistants. The majority (43.4%) of the pharmacy assistants had a partial high school education (43.4%) (Table 1).

3.2. Provider Knowledge of Non-Prescription Dispensing

Overall, 74.6% of pharmacists answered correctly to the definition of antibiotic therapy compared to 48.7% of accurate answers among auxiliaries. Additionally, 54.8% (86) of participants knew the definition of antibiotic therapy (Figure 1). There was a significant difference between auxiliaries and pharmacists ($p < 0.05$).

Analysis of Figure 2 shows that 94.9% of pharmacists correctly answered the definition of probabilistic antibiotic therapy compared to 58.1% of auxiliaries.

Table 1. Socio-demographic characteristics of the participants.

Characteristics	Variables	Percent (%)
Gender	Female	64
	Male	36
Age	<25 years	13.2
	25 - 35 years	66.9
	35 - 45 years	10.3
	≥45	9.6
Level of education	Complete primary	1.4
	Partial secondary	43.4
	Complete secondary	26.6
	University	28.7
Level of training of the agents interviewed	Auxiliary	74.5
	Assistant pharmacist	19.1
	Pharmacist degree holder	3.8
	Pharmacy student	2.6

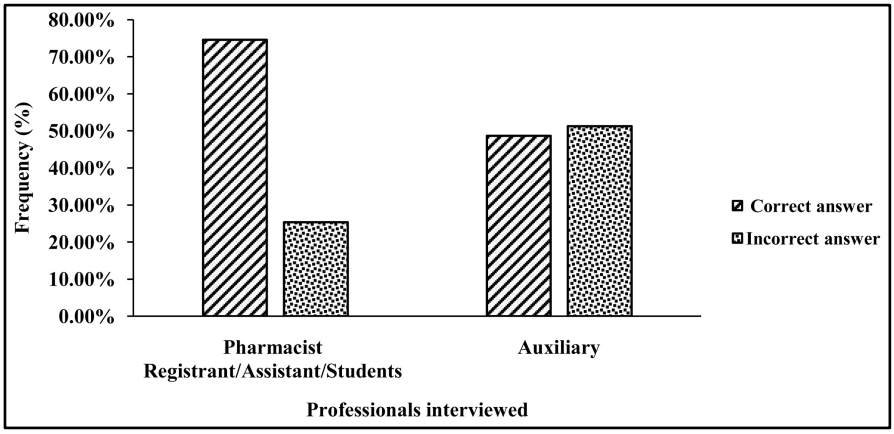

Figure 1. Comparative responses between auxiliaries and pharmacists on the definition of antibiotic therapy.

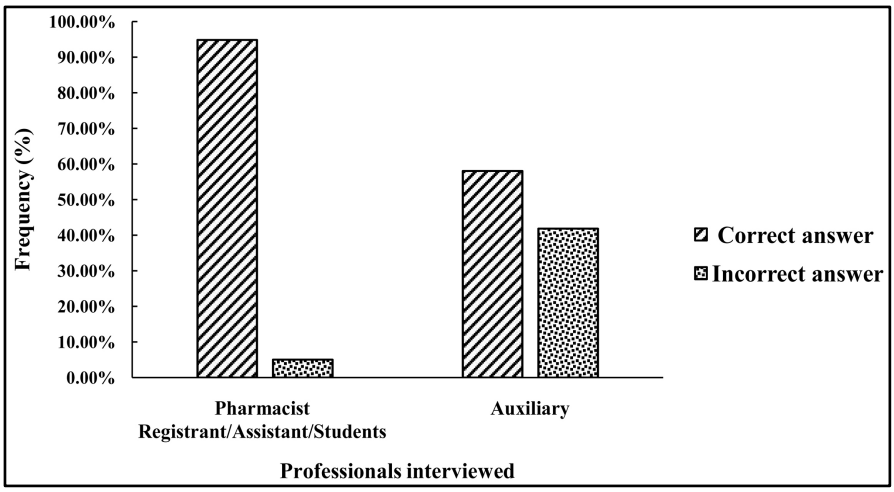

Figure 2. Comparative responses between auxiliaries and pharmacists on probabilistic antibiotic therapy.

Overall, 66.9% of the participants answered correctly to the definition of probabilistic antibiotic therapy (Figure 2). There was a significant difference between auxiliaries' staff and pharmacists ($p < 0.05$).

3.2.1. Criteria for Initiating Probabilistic Antibiotic Therapy in Community Pharmacies

The choice of antibiotics was made based on some criteria. The majority (88.1%) of the agents surveyed think that the choice of antibiotics is made according to the pathology, while 60.4% think that it is based on the pathology and the germ involved. Other criteria were also mentioned (see Table 2).

3.2.2. Common Conditions for Which the Participants Recommended Probabilistic Antibiotic Therapy

Probabilistic antibiotic treatment can be instituted when patients present with urinary tract infections (96.7%), angina (95.8%), wounds (93.3%), skin infections (91.6%), diarrhoea (90.7%) and cough (89.9%) (Table 3).

Table 2. Opinion of the participants on the criteria for choosing an antibiotic for probabilistic antibiotic therapy.

Conditions for initiating probabilistic antibiotic therapy	Response	Frequency (%)
Pathology	Yes	88.1
Pathology and germ involved	Yes	60.4
Experiences with other patients	Yes	25.2
Cost of the antibiotic	Yes	20.7
Antibiotic desired by the patient	Yes	15.1
Available stock that needs to be used up quickly	Yes	3.1
Expiry date close	Yes	3.1

Table 3. Conditions requiring probabilistic antibiotic therapy according to the participants.

Pathologies requiring probabilistic antibiotic therapy	Response	Frequency (%)
Urinary tract infections	Yes	96.7
Angina	Yes	95.8
Wounds	Yes	93.3
Skin infections	Yes	91.6
Diarrhoea	Yes	90.7
Cough	Yes	89.9
Sinusitis	Yes	79.4
Otitis	Yes	78.5
Ringworm	Yes	70.0
Rhinitis	Yes	68.0
Tooth decay	Yes	63.9
Fever	Yes	39.1
Peptic ulcer	Yes	37.3
Malaria	Yes	24.1

3.2.3. The Proportion of Clients Seeking Treatment at the Pharmacy without a Prescription

Figure 3 shows the responses of providers about an estimate of the daily proportion of patients seeking treatment without a prescription. 49.02% of pharmacy providers reported that half of the patients seek treatment without a prescription at the pharmacy.

3.2.4. Antibiotic Therapy Training

Overall, 73.5% of participants reported having received specific trainings or courses on antibiotic therapy, including 43.1% of pharmacists or assistants,

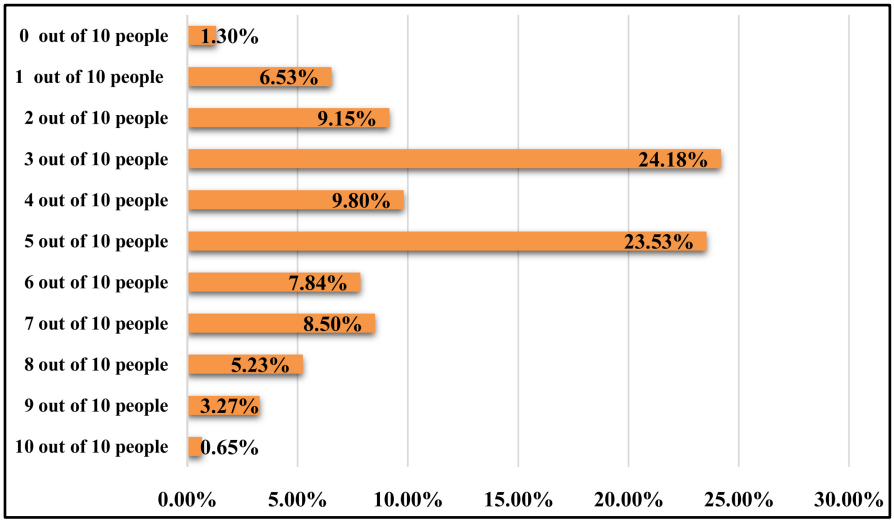

Figure 3. Daily Proportion of clients requesting treatment antibiotics without any prescription per day as reported by participants.

33.6% of bacteriologists and 23.3% of Medical Delegates.

3.2.5. Reasons for Seeking Advice in the Pharmacy without Medical Prescriptions

The symptoms for which patients seek advice in the pharmacy without firstly consulting a doctor were listed among the participants. The most common symptoms for which patients seek advice at the pharmacy without prior medical consultation according to pharmacy professionals were fever (100%), headaches (97.3%), stomach aches (94.7%) and Tiredness (98%).

3.2.6. Frequency of Antibiotics Dispensing without a Prescription

Figure 4 shows the frequency of dispensing antibiotics without a prescription on a scale of 0 to 10 people. Thus, 76.5% of interviewees reported dispensing an antibiotic without a prescription to half of their patients. More than 75% of providers said they refuse to dispense some antibiotics without any prescription. The main reasons for refusal were misuse of antibiotics, no indication for the use of the antibiotic, contraindication to the use of the antibiotic, and no qualification to dispense certain antibiotics.

3.2.7. Antibiotics Used for Self-Prescription According to Interviewees

The main antibiotics dispensed without prescriptions were amoxicillin (98.1%), cloxacillin (76.7%), metronidazole (57.2%), ciprofloxacin (50.9%), penicillin (44.0%), amoxicillin-clavulanic acid (35.8%), erythromycin (32.1%) and doxycycline (22.6%).

3.2.8. Illnesses Treated Frequently with Antibiotics in the Pharmacy and Conditions under Which Patients Request an Antibiotic

Urinary tract infections, coughs, sore throat, skin infections and diarrhoea were the most common conditions under which patients requested antibiotics (Table 4).

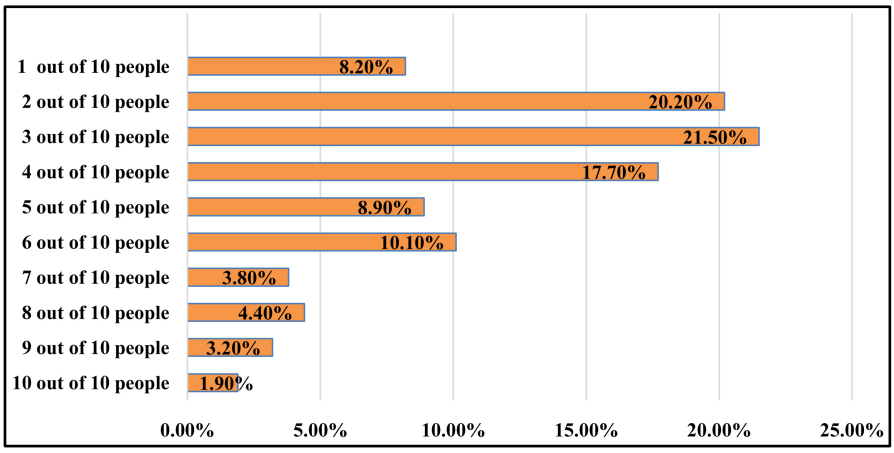

Figure 4. Frequency of antibiotics dispensing without any prescription by participants.

Table 4. Illnesses treated with antibiotics in the pharmacy and conditions under which patients request antibiotics.

Illnesses treated with antibiotics in the pharmacy and Conditions under which patients request antibiotics	Responses	Frequency (%)	
		Illnesses frequently treated in pharmacies with antibiotics	Conditions under which patients request antibiotics
Cough	Yes	91.6	89.2
Wound	Yes	85.2	84.8
Urinary tract infections	Yes	82.6	94.9
Angina	Yes	81.9	89.2
Skin infection	Yes	78.7	82.9
Sinusitis	Yes	55.5	62.6
Ringworm	Yes	54.2	-
Otitis	Yes	44.5	48.7
Rhinitis	Yes	44.5	47.5
Tooth decay	Yes	39.3	47.5
Fever	Yes	28.4	53.2
Peptic ulcer	Yes	18.7	21.5
Malaria	Yes	16.1	24.1
Diarrhoea	Yes	-	72.2
Chickenpox	Yes	-	41.8
Measles	Yes	-	27.2
Stomachache	Yes	-	19.6

3.2.9. Antibiotic Therapy Duration According to the Pathology

Interviewees were asked to suggest the duration of antibiotic therapy for some proposed conditions or symptoms. Overall, the average duration of antibiotic

therapy for common conditions according to the interviewees varied between 7 and 10 days. Table 5 shows the results.

3.2.10. Perceptions of Participants on Conditions Treated Using Antibiotics

For some of the pathologies or symptoms, patients requested antibiotics. Angina is treated with Pen V (65.73%), azithromycin (17.83%) and erythromycin (13.54%). Diarrhoea is treated with tinidazole (63.97%), metronidazole (46.29%) and cotrimoxazole (17.42%). Dental caries were treated with metronidazole (33.71%), amoxicillin (13.68%) and amoxicillin-clavulanic acid (7.16%). According to the participants, rhinitis is treated with amoxicillin (14.15%), azithromycin (11.54%) and erythromycin (11.46%). Cough is treated with erythromycin (28.65%), cotrimoxazole (27.74%) and amoxicillin (27.59%). Urinary infections are treated with norfloxacin (50%), doxycycline (40.50%) and ciprofloxacin (39.23%). Skin infections are treated with griseofulvin (31.94%), cloxacillin (31.25%) and doxycycline (29.75%). Wounds are treated with cloxacillin (36.98%), amoxicillin-clavulanic acid (10.38%) and amoxicillin (7.55%). Otitis is treated with cefixime (13.56%), azithromycin (12.59%) and amoxicillin (11.32%). Sinusitis is treated with amoxicillin-clavulanic acid (19.50%), azithromycin (16.08%) and cefixime (14.83%). And eventually, ringworm is treated with griseofulvin (56.02%), doxycycline (4.96%) and cloxacillin (3.13%).

3.2.11. Conditions and Factors Influencing the Choice of Antibiotics

The duration of the illness (76.6%) and clinical signs (75.9%) were the most important factors that influenced the choice of antibiotics to dispense. The severity expressed by the patient (51.9%) and the severity perceived by the provider (63.6%) also influence the choice of antibiotics. According to the participants,

Table 5. Duration of antibiotic therapy according to the condition.

Treatment duration according to pathology (in days)	Mean (SD)	Median (days)
Angina	6.6 (±2.1)	7
Tooth decay	7.6 (±2.3)	7
Diarrhoea	6.8 (±2.8)	7
Urinary tract infections	9.8 (±4.2)	10
Skin infection (abscess)	8.6 (±8.9)	7
Wounds	9.3 (±4.7)	7
Sinusitis	10.2 (±4.6)	10
Coughs	6.8 (1.7)	7
Otitis	6.9 (±1.9)	7
Ringworms	37.8 (±29.1)	30
Acute respiratory tract infections	8.5 (±4.3)	7

SD = Standard Deviation (Ecart-type)

the financial capacity and type of pathology (50.3%), the type of pathology (42.9%) and the financial capacity of the patient (6.8%) are the conditions that can determine their choice of antibiotics to be dispensed.

3.2.12. Awareness of Participants on Adverse Effects of Antibiotics

Overall, 61.6% of the participants claimed to be aware of the adverse effects of antibiotics. But in practice, only 15.9% of the agents were familiar with the adverse effects of antibiotics. Additionally, 34.6% of the participants claimed to inform patients of adverse effects while 13.5% of the participants never did so. Furthermore, 32.7% of participants said they sometimes informed patients of adverse effects while 19.2% of participants rarely did so.

3.2.13. Participants' Knowledge of Antibiotic Resistance

Overall, 63.4% of participants had correctly defined AMR. According to the participants, failure to comply with the duration of antibiotic therapy (96.2%) and the abusive use of self-medication antibiotics (94.9%) were the causes of antibiotic resistance. Poor quality medicines (63.1%) and poor hygiene (16.6%) are also causes of antibiotic resistance. 71.70% of the participants had no idea of the current extent of resistance.

4. Discussion

This study assessed the dispensing patterns of antibiotics in Benin, with findings indicating a high sale of antibiotics without prescriptions. Antibiotics are used as the frontline in the human battle against bacterial infections [96] [97]. However, the inappropriate use of these drugs has seriously threatened their efficacy [98]. Health professionals play a pivotal role in addressing AMR, particularly those who deal most frequently with antibiotics. Like other professionals, pharmacists are involved in routine work with antimicrobial use [99]. Thus, it is important to identify and characterize barriers to prudent antimicrobial use, at the levels of capabilities, opportunities, and motivations. This will help in providing interventions designed to influence the behaviors of pharmacists toward better use of antibiotics, thereby mitigating antimicrobial resistance.

In our study, the average age of the pharmacists was 31.2 years old, with extremes of 21 and 45 years old. Most of the surveyed dispensers (64%) were female subjects with a sex ratio of 1:1.77. The survey unveiled that the majority (74.5%) of the providers were auxiliaries. Our results can be compared with those obtained by Hadi *et al*. in Saudi Arabia [100]. People participating represented 1.5% of the participants and auxiliary staff 59.3%. This high proportion of auxiliary staff in pharmacies probably reflects the poor dispensing quality. A similar trend of auxiliary staff (50%) was found in a study that was conducted in India [42].

More specifically, in our study, 74.6% of pharmacists had a correct answer compared to 51.3% of auxiliary staff. Regarding the definition of probabilistic antibiotic therapy, more than half of the participants (66.9%) had a correct an-

swer. In detail, 94.9% of the pharmacists had a correct answer compared to 58.1% of the auxiliary staff. This discrepancy can be accounted for by the difference in initial professional training, and the level of education (varying among the auxiliary staff). Our study showed that 63.4% of pharmacists had a good knowledge of AMR that was related to their professional experience. Similar results have been reported in other studies [80] [101]-[106]. The similarities regarding knowledge of AMR can be attributed to the adequate knowledge of antibiotics that pharmacists acquire during their academic training and professional practice. Unfortunately, the implementation of this good knowledge may be very poor [104]. In Thailand, different results were reported, showing that most pharmacists had inadequate knowledge [107]. Good knowledge of antibiotic use and resistance prevents pharmacists from dispensing antibiotics inappropriately, which is an improvement in the fight against antibiotic resistance [108]. Contrastively, inadequate knowledge leads pharmacists to dispense antibiotics irrationally, which escalates AMR [109].

Our study found that the common conditions that were treated using probabilistic antibiotic therapy were urinary tract infections (UTIs), angina, wounds, skin infections, diarrhoea and cough. Additionally, probabilistic therapy was high in our study. In Saudi Arabia, the overuse of antibiotics for the treatment of UTIs was reported [110]. This is in contrast to a study that was done in Jordan where probabilistic therapy was highly reported commonly with sore throat infections [95] and other respiratory tract infections [52]. Additionally, a study in Tanzania found that the most common condition treated with antibiotics was cough and urinary tract infections [111]. The consequences of probabilistic therapy include the occurrence of adverse effects and the emergence of AMR.

Moreover, the results obtained show a lack of information on antibiotic resistance among pharmacy professionals. This explains the lack of discipline observed during the dispensing of antibiotics without a prescription. Our results are contrary to those obtained by Barker *et al*. [40]. These authors found that pharmacy workers lacked formal clinical training and adequate knowledge of antibiotic resistance. These findings have some implications for the perpetuation of antibiotic abuse and increasing endemic levels of resistance worldwide. Continuing pharmacy education requirements, standard in many countries globally, are a natural extension of pharmacy training that could bridge the knowledge gaps that many licensed pharmacists report. Their enactment should be seriously considered by national lawmakers and pharmacist organizations [40]. Most of the dispensers had limited knowledge of bacterial resistance to antibiotics.

Our study found that most antibiotics that were dispensed without a prescription included amoxicillin, cloxacillin, and metronidazole. These findings indicate that the most prescribed were from the WHO Access group of antibiotics [63] [91] [92]. These findings corroborate results from other studies which found high dispensing of amoxicillin without a prescription [17] [49] [52] [112] [113] [114] [115]. This dispensing pattern could be due to a wider range of

symptoms that can be treated with amoxicillin including upper respiratory tract infections. These findings indicate the need for enhanced antimicrobial stewardship in community pharmacy practice [32] [58] [78] [86] [104] [116].

The present study found that 49.02% of pharmacy staff reported that half of the customers requested antibiotics without a prescription. Our study also revealed that 76.5% of participants reported dispensing antibiotics without prescriptions to half of the customers. Additionally, our findings indicate a high prevalence of accessing antibiotics without prescriptions and self-medication. This is a global problem and a major driver of AMR [117] [118]. Self-medication practices have been reported globally [119] [120] [121] [122]. Dispensing of antibiotics without a prescription has been reported in other countries including 100% in Zambia [17], 100% in India [42], 92.3% in Tanzania [111], 91% in Vietnam [123], 88.4% in China [124], 74.3% in Jordan [95], 61% in Sri Lanka [49], 58% in Ethiopia [125], and 50.9% in Bangladesh [112]. This is because customers are willing to use pharmacists for their personal health problems because of their accessibility, personal relationships and knowledge of medications. Patients do not yet have a deeper understanding of how pharmacists can provide care through a variety of patient care services. This finding is consistent with the results of other studies. According to Smith *et al*., patients simply do not seek information about medication advice from community pharmacists [126]. The reason for this is the unclear perception of pharmacists in their role as non-dispensers. The traditional model of pharmacy dispensing is a directed demand model downstream of providers with prescriptive authority [127]. Patient demand for antibiotics, inadequate funds to seek medical consultation, previous use of antibiotics, too much hospital waiting time, good knowledge of medicines among pharmacy personnel, and lack of monitoring of antibiotic dispensing are also the driving factors nonprescription sale of these drugs [128] [129].

The gaps identified in knowledge, attitudes, and dispensing patterns of antibiotics among community pharmacy dispensing personnel require heightened educational interventions and antimicrobial stewardship programs [58] [66] [78] [86] [130]-[136]. Additionally, there is a need to promote behaviour change regarding antibiotic dispensing, use, and requests or demands from clients [137]-[144]. These strategies will help increase the awareness of AMR and reduce the overuse and misuse of antibiotics.

5. Conclusion

This study found a high rate of dispensing antibiotics without a prescription in community pharmacies in Benin. This dispensing practice is not consistent with the theoretical knowledge of pharmacy professionals. Efforts are needed to improve pharmacists' awareness of appropriate antibiotic use and resistance. Regulatory action and public education are important to limit this practice. Periodic educational intervention programs regarding antibiotic use and resistance need to be promoted to focus on pharmacy practice. The results of this study can

contribute to the improvement of antibiotic use through needed interventions. Policymakers, clinicians, and professional organizations can be informed of the status quo of pharmacists in moving toward better behaviour to support prudent antimicrobial use through the capabilities, opportunities, and motivations of this study's model.

Limitations of the Study

This study was conducted in some cities in Benin. Therefore, the generalization of the findings must be done with caution.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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