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Original Article

Management of Acute Diarrhea in Community Pharmacists in Sana'a City, Yemen

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ABSTRACT

Background: Community pharmacists play a critical role in the management of acute diarrhea, especially in low-resource settings. However, evidence suggests that their counseling, medication-labeling, and dispensing practices particularly antibiotic use may not always align with best practice standards. **Aim:** To assess management of acute diarrhea in community pharmacists in Sana'a city, Yemen. **Materials and Methods:** A cross-sectional survey was conducted among 349 community pharmacy professionals in Sana'a city between December 2022 and January 2023. The questionnaire addressed demographic characteristics, type of pharmacy, and a 10 key practice items covering counseling content, labeling, patient history, explanation of therapy benefits/risks, and whether they dispense antibiotics for gastroenteritis. **Results:** Among 349 respondents, 99.14% were male. Independent pharmacies accounted for 57.31% of workplaces, and chain pharmacies 42.69%. Regarding practice; 76.5% wrote the medicine name on dispensed medicines, 71.6% included drug strength, and 55.6% informed patients about expiry dates. For counseling; 84.8% explained medicine name/indication/dosage/route; 84.2% explained dose, frequency and course duration; 72.2% explained time to effect; 82.8% discussed therapy duration. Only 69.9% asked about allergies or concurrent treatments; 71.4% discussed benefits/risks; and 64.2% reported dispensing antibiotics for gastroenteritis. **Conclusion:** The findings reveal that while a majority of community pharmacists in Sana'a report providing essential counseling and labeling information, substantial deficiencies remain particularly in allergy history taking, expiry-date communication, and widespread dispensing of antibiotics for acute diarrhea. These patterns raise concerns about patient safety and rational drug use.

Keywords: Acute Diarrhea, Antibiotic Dispensing, Community Pharmacy, Counseling Practices, Yemen.

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INTRODUCTION

Acute diarrhea remains a global public health issue, especially in less developed countries/communities, where healthcare system constraints often limit access to care, and many communities utilize pharmacists as their primary source of healthcare (Alfadl *et al*., 2018; Das *et al*., 2014). Diarrhea is responsible for a high number of deaths and illnesses globally, with the best available global estimates indicating 1.31 million yearly deaths due to diarrhea in people of all ages (Alnezary *et al*., 2024). In many developing areas with poorly developed health systems, pharmacists in the community are in a unique position to provide timely access to care by not only providing medicines but also providing education (e.g., patient counseling), evaluating the patient's status and directing the patient to an appropriate resource when necessary (Seston *et al*., 2001). Numerous studies have shown that there are significant gaps between the types of practices that would constitute best practice for managing infections due to diarrhea and what actually takes place in many Community Pharmacies (CPs). For example, in a systematic review that examined CPs in developing countries, it was demonstrated that a significant number of community pharmacists do not have any standardized policies regarding the management of diarrheal infections, resulting in inconsistent pharmacy practices, suboptimal patient assessments, and underuse of Oral Rehydration Salts (ORS) (Kanan *et al*., 2024).

In a simulation-based study (Anaam, 2024) in Yemen, though in questionnaires many pharmacists reported appropriate counseling, the real practice during simulated client visits was a different story: they were few that asked all the relevant history questions, and antibiotic use was widely recommended also when not justified. Studies from other countries also indicate

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ongoing challenges: in Pakistan only a very small proportion of treatments for pediatric diarrhea dispensed by pharmacies were compliant with standard treatment guidelines; antibiotics and antiprotozoals were widely misused, and oral rehydration therapy usage was minimal (Hussain and Ibrahim, 2012). In a recent simulated-patient study from Saudi Arabia, it was found that the provision of appropriate management of childhood diarrhea by community pharmacists was very low; high rates of antibiotic use and poor patient counseling were observed (Alnezary *et al.*, 2024). These are deeply troubling results, especially in nations like Yemen-where doctors are not always easy to come by, and pharmacies are frequently the first stop for healthcare. Unnecessary use of antibiotics for self-limiting diarrheal diseases, no assessment of the patients, and inadequate patient counseling are potential factors leading to avoidable disease burden, treatment failure and the larger problem of Antimicrobial Resistance (AMR) (Erku and Aberra, 2018).

Given this backdrop, we need to evaluate systematically how community pharmacists in Yemen manage acute diarrhea, considering their dispensing practices and the quality of patient counseling, labeling, and safety advices. Therefore, this study aimed to fill this gap by providing foundational snapshot but does not deeply explore the underlying determinants of these practice patterns among community pharmacists in Sana'a City, Yemen.

MATERIALS AND METHODS

Study Design and Setting

This study was a descriptive, cross-sectional survey targeting CP practitioners in the city of Sana'a, Yemen. The data were collected during a 1-month period from December 21, 2022 to January 22, 2023.

Study Population and Sampling

The study population consisted of all registered pharmacists working in CP (chain and nonchain) in the selected study areas in the Sana'a city. Convenience sampling method was used to enroll the participants. This method was deemed practical given the challenges of accessing a comprehensive national registry of community pharmacists for random sampling. The sample size was calculated using single population proportion formula. Assuming a 50% proportion of optimal practice (to maximize sample size), a 5% margin of error, and a 95% confidence level, the required sample size was calculated to be 385. For potential attrition, the survey was sent to 385 prospective subjects. During statistical analysis there were 36 participants excluded for noncomplete questionnaires.

Selection Criteria

Inclusion criteria

A pharmacist or a dispensing staff in the pharmacy who is licensed, presently employed in a CP in Sana'a City, had at least 1 year of experience and agreed to fill out the questionnaire.

Exclusion criteria: pharmacy staff who were not involved in dispensing medications (e.g., administrative staff), temporary staff not regularly practicing, or pharmacists who refused consent for participation.

Data Collection Tool and Procedure

Data were collected using a structured, self-administered questionnaire developed specifically for this study. The questionnaire was designed based on a review of relevant literature for the management of acute diarrhea in community settings. The content and face validity of the questionnaire were evaluated by a panel of three experts in clinical pharmacy and infectious diseases. Minor modifications to wording and question order were made based on their feedback. The final questionnaire was divided into two parts: (1) Demographic information that concerned about the gender of the participants and whether they had working in a chain or independent pharmacy. (2) The main body of the questionnaire included 10 closed-ended (yes/no) questions designed to assess particular dispensing and counseling practices for a hypothetical patient presenting with uncomplicated acute diarrhea. Questions addressed such critical areas as availability of drug information (name, strength, expiry), patient counseling on dosage and administration, explanation of treatment expectations, querying of allergies, discussion of benefits and risks, and whether antibiotics were dispensed.

Data Management and Analysis

The completed questionnaire was cross-checked for completeness. The data from the paper questionnaires were entered by hand. All data were processed and analyzed in SPSS program (version 25). Descriptive statistics were employed to describe all variables. Categorical variables (e.g., answers to yes/no questions, gender, type of pharmacy) are reported as counts and percentages and are tabulated. As the intention was to describe the typical patterns of practice in the sample, descriptive results are presented for the whole sample, and noncomparative inferential statistics were not calculated to compare groups. The analysis was performed to determine the percentage of pharmacists following each suggested practice specified in the questionnaire.

Ethical Considerations

Adherence to the Helsinki Declaration is required for inclusion in the journal. Ethical approval was obtained from Lebanese International University, School of Pharmacy, Department of Biomedical Sciences, Yemen. Verbal informed consent was taken from all the participants. The purpose of the study and

information about confidentiality and anonymity, and that participation was voluntary and they could withdraw from the survey were included in the cover letter of the questionnaire. No identifiable personal data were collected.

RESULTS

Demographic Characteristics of Pharmacy Professionals

The traits of the individuals involved in the study are summarized in the Table 1. A total of 349 respondents took part. There was a large disparity of gender in the pharmacy work force in Sana'a city, as was revealed by the results. Most participants were male (*n*=346, 99.14%), only 0.86% (*n*=3) of the sample were female professionals. This vast discrepancy shows a male workforce dominating in the practice of CP across the city. Concerning type of c CP, the respondents were working, 57.31% (*n*=200) worked at independent pharmacies which is the highest percent practice setting. Meanwhile, 42.69% (*n*=149) of workers were employed by chain pharmacies. This seems to mean; independent pharmacies are in the majority among CPs in Sana'a.

Assessment of Acute Diarrhea Management Practices

Table 2 demonstrates the practices of the pharmacy professionals on management of acute diarrhea. This was evaluated on the basis of 10 questions related to quality of counseling, medication labeling, safe practice and antibiotics dispensing.

Dispensing and Labeling Information

Writing the medicine name while dispensing drugs was reported by most of the respondents (*n*=267, 5% 76), whereas not writing the medicine name was reported by 23.5% (*n*=82). Similarly, 71.63% (*n*=250) of the pharmacy professionals reported stating the strength of the drug while 28.37% (*n*=99) did not state this important information. 55.59% (*n*=194) of the pharmacists have claimed that they inform the patients about the expiry date of the drugs and the other 44.41% (*n*=155) did not told the patients.

Medication Counseling and Patient Education

The results show a high level of patient counseling in general. 84.24% (*n*=294) of the respondents reported that they discuss the three aspects dose, frequency and duration with the patients, and 15.76% (*n*=55) he/she did not. A total of 84.81% (*n*=296) expressed that in their daily life they usually make a general/specific introduction including the drug name, indication, dosage, and route, with 15.19% (*n*=53) declined to that. A total of 72.21% (*n*=252) claimed to tell the patients when the drug would start working, while 27.79% (*n*=97) did not. Lastly, 82.81% (*n*=289) informed patients on how long the treatment was expected to last and 17.19% (*n*=60) did not inform patients on how long the treatment is expected to last.

Assessment of Patient History

As for whether they ask about allergies or other treatments, 69.91% (*n*=244) said they do, but 30.09% (*n*=105) still do not bother with basic safety questions. This represents an area in which safety practice may vary from one pharmacy to another.

Discussion of Treatment Benefits and Risks

In total, 71.35% (*n*=249) of pharmacy professionals stated that they have discussed benefits, adverse drug reactions, precautions, or contraindications with their patients. Yet, 28.65% (*n*=100) conceded they did not inform the patients, which means one-third of the patients did not get enough information about safe use of their medicines.

Antibiotic Dispensing for Gastroenteritis

One important issue that emerged related to antibiotics to patients with gastroenteritis. The practice was among 64.18% (*n*=224) of the sample, while a 35.82% (*n*=125) claimed that they do not sell antibiotics for those purposes. The high dispensing rate of antibiotics can suggest a potential problem of overuse or misuse of antibiotics for diseases which are commonly viral and self-limiting.

DISCUSSION

This study was conducted to evaluate the practice of community pharmacists toward the treatment of acute diarrhea in Sana'a, Yemen. The results showed a mixed compliance to good pharmacy practice: although a considerable number of pharmacists stated that they give advice and dose information on the label, there are significant gaps related to safety considerations (surveying for allergies or concurrent therapies) and a majority of patients with gastroenteritis are still prescribed antibiotics. In the following, we discuss these findings in relation to the literature, possible explanations and implications. A large number of pharmacists gave the key elements of counseling in this study: 84.81% indicated that they informed patients about drug name, indication, dose and route of administration; 84.24% of them informed patient about dose, frequency of administration and duration of therapy; nearly 82.81% of them told patient about duration of therapy. However, 69.91% of them inquired about

Table 1:Demographic characteristics of the pharmacy professionals (*n*=349).

Characteristic	No.	%
Gender		
Male	346	99.14
Female	3	0.86
Type of Pharmacy		
Chain	149	42.69
Independent	200	57.31

allergies or concurrent medication, and 55.59% told their customers about the expiry date. Taken together, these data indicate that although many pharmacists are invested in patient education and drug-use instructions, there are critical elements for safety and completeness of information on the medicines that seem to be frequently overlooked. These findings are only partly consistent with results from other contexts. For instance, a recent systematic review of CP interventions in diarrheal disease management in developing countries highlighted the opportunity to link pharmacists with information gathering and counseling, but also noted the existence of "critical inadequacies" and with the absence of standard guidelines contributing to a gap in practices (Kanan *et al*., 2024). This reiterates our finding that good intent is not enough, and that practice remains variable and inadequate in key aspects. Likewise, Nigerian community pharmacists dispensing for acute diarrhea in children, the authors observed a considerable gap between self-reported knowledge/attitude and practice; only 23% of simulated-client interactions during which an appropriate patient assessment had been made before product recommendation, and only 15% advised on oral rehydration therapy alone-several still supplied antibiotics and antidiarrheals in conditions of no dysenteric and noncholera watery diarrhea (Ogbo *et al*., 2014). These inconsistencies lustrate the Yemeni context in our study, where safe practice in reality may be far lower than the self-reported data would suggest. Thus, although the high level of reported counseling and labeling among the participants in this study is promising, the partial history-taking and the inconsistent supply of information on safety fit well with other observations of less-than-optimal pharmacy practice in developing countries. Such deficiencies may compromise the contribution of pharmacy in securing the rational use of medicines and patient safety. Among the most worrying results in our study was the fact that for 64.18% of respondents, gastroenteritis cases constituted an indication for us to dispense antibiotics. This is an issue as not all etiologies of acute diarrhea are treated with antibiotics (particularly when viral or self-limited), and unrestrained antibiotic usage could promote the development of AMR. This observation is similar with findings from other countries. such as a study in Pakistan on 371 CPs; in a simulated pediatric diarrhea situation, 14.0% of medications dispensed were antibiotics, and 8.4% were ORS-none of the courses of treatment was in accordance standard treatment guidelines, revealing widespread inappropriate use of antibiotics and under use of ORS (Hussain and Ibrahim, 2012). By contrast, a simulated-patient study from Saudi Arabia on 200 pharmacies concluded that only 14% of the pharmacists had a good diarrhea-management practice; suboptimal questioning and high antibiotic (metronidazole) dispensing were observed for all scenarios (Alnezary *et al*., 2024). The researchers urged for enhanced education, enforcement of standardized protocols, and regulatory supervision on sale of antibiotics to check such practices (Alnezary *et al*., 2024). In Yemen in particular, a recent study on over-the-counter antibiotic dispensing in CPs of Sana'a revealed that 73.9% of the pharmacists confessed to dispensing antibiotics without prescription to patients with symptoms-a higher proportion than found in many other studies- though

Table 2: Assessment of acute diarrhea management by community pharmacies in 10 questions were taken from the pharmacy professionals (*n*=349).

Characteristic	No.	%
Do you write medicine name?		
Yes	267	76.5
No	82	23.5
Do you mention drug strength?		
Yes	250	71.63
No	99	28.37
Do you say the expiry date to patient		
Yes	194	55.59
No	155	44.41
Do you say dose, dosing, frequency, course duration to your patient?		
Yes	294	84.24
No	55	15.76
Do you explain name, indication, dosage and route of administration to your patient?		
Yes	296	84.81
No	53	15.19
Do you explain the time for a medication to show an effect?		
Yes	252	72.21
No	97	27.79
Do you explain to your patients that how long the patient might be taking the medication regimen?		
Yes	289	82.81
No	60	17.19
Do you inquire about other allergies and treatments?		
Yes	244	69.91
No	105	30.9
Do you discuss benefits, adverse drug reactions, precautions or contraindications to your patient?		
Yes	249	71.35
No	100	28.65
Do you dispense antibiotics to gastroenteritis patients?		
Yes	224	64.18
No	125	35.82

98.3% were aware of the hazards of irrational antibiotic use (Saeed *et al*., 2025). This is symptomatic of wider problems: financial incentives, patient expectation, weak regulation, and poor understanding of or engagement with antimicrobial stewardship. Therefore, our results reflect a common global-and regional-issue where CPs tend to provide antibiotics for diarrhea without a thorough examination or consideration of treatment guidelines, disrupting good drug use practices and contributing to resistance in antimicrobial drugs. There are a number of reasons that could EXPLAIN the variation between reported practice and recommended best practice. The absence of standardized guidelines or protocols Is a major factor; as stated in a 2024 review, the lack of clear, national protocols for the management of diarrhea in many low and middle-income countries results in varied, and often suboptimal, practice (Kanan *et al*., 2024). Economic and social considerations are at play as well, and pharmacists are under increasing pressure to satisfy patient expectations-including requests for "strong medicine" such as antibiotics that offer quick relief, even when those wishes cannot, or should not, be fulfilled on clinical grounds, a dynamic that appears in places like Yemen (Saeed *et al*., 2025). In addition, deficiencies exist in pharmacist training or continuing education, and so the theory may be there but the practice of assessment, application of guidelines, communication and so forth may be nonexistent, particularly in high-pressure scenarios with heavy workload and time constraints. Weak regulatory systems and the lack of effective monitoring where dispensing of antibiotics without a prescription is prevalent further contribute to the perpetuation of such malpractices, almost unchallenged.

This work demonstrates a betterment CP in core aspects in acute diarrhea management, that is, the provision of adequate dispensing and counseling services, but it is still fragile with regard to nonguideline-based antibiotic provision, which could be easily exploited. Although pharmacists appear to be skilled at providing basic drug information, their implementation of necessary safety measures, such as covering the expiry date on drugs, is variable. The results reveal a significant gap in alignment with globally based evidence standards and local dispensing practice, particularly related to antimicrobial stewardship. Closing this gap is going to take a concerted effort that includes focused education, clear national guidelines of practice, and pharmacists having an enhanced role as stewards of the rational use of medicines. Future research should use either direct observation or mystery shopper methodology to confirm self-reported data and to further investigate, qualitatively, the factors influencing pharmacist decision-making in this setting.

Strengths and Limitations

The merits of this study include a good number of study subjects (349 pharmacists) and the participation of both independent pharmacies and chain pharmacies, which add to representativeness of the results about CP practice in Sana'a. In addition, this study enables a holistic evaluation of various aspects of pharmacy practice because it gathers detailed information about labeling, counseling and dispensing practices.

Yet, limitations are to be admitted. Firstly, self-report bias might have resulted the knowledge and practice to be overestimated, since pharmacists might tend to give socially desirable answers. Similar findings were also reported from simulation-based studies: for example, in Nigeria and Yemen, with simulation displaying significantly worse practice compared with questionnaire responses (Alfadl *et al*., 2018). Secondly, the study did not use a simulated-client approach; accordingly, the behavior of the sellers in the real world when under pressure or client demands may be different from what is reported. Lastly, the cross-sectional nature of the study may preclude examining trends over time and making inferences about causality.

CONCLUSION

This study highlights that community pharmacists in Sana'a City demonstrate moderate adherence to good practice in managing acute diarrhea, particularly in providing basic medication counseling and labeling. However, significant gaps persist in patient safety practices, history-taking, and rational medicine use, most notably the widespread and inappropriate dispensing of antibiotics for self-limiting diarrheal conditions. These practices pose risks to patient safety and contribute to antimicrobial resistance. Strengthening pharmacist training, implementing clear national guidelines, and enforcing regulations on antibiotic dispensing are essential to improve the quality of diarrhea management and support the role of community pharmacists as key providers of primary healthcare in Yemen.

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ABBREVIATIONS

AMR: Antimicrobial resistance; **CP:** Community pharmacy; **CPs:** Community pharmacies; **ORS:** Oral Rehydration Salts.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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