A Study on Perceptions, Practices, and Experiences About Antibiotic Consumption and Antibiotic Resistance Among Various Stakeholders From the Catchment Area of an Urban Health Training Centre in Ahmedabad

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Abstract:

Introduction: Misuse or abuse of antibiotic consumption, leading to antibiotic resistance, is an emerging global public health issue. It is crucial to regulate the antibiotic usage by involving all stakeholders. **Objective:** To document the perceptions, practices, and experiences about antibiotic consumption and awareness of antibiotic resistance amongst doctors, drug dispensers, and end-users. Method: A qualitative study was conducted in the UHTC catchment area, Ognaj, Ahmedabad. A total of 26 In-depth interviews with stakeholders (10 Doctors, 8 Drug dispensers and 8 End users) were conducted using an interview guide. Various themes and sub themes were categorized manually, and verbatim were quoted, at the end of all the In-depth interviews, name of the antibiotics spoken was categories into Access, Watch and Reserve group as per WHO AWaRe classification and word cloud analysis was done. Results: Participated doctors had a wide range of qualifications and experience. It was found that doctors prescribe antibiotics mainly from the Access and Watch group (more from the Watch group). Drug dispensers were concerned about over-the-counter (OTC) dispensing and self-medication of antibiotics. However, they also shared the fact that the antibiotics are dispensed without prescriptions. End-users commonly sought antibiotics for minor ailments without prescriptions. Only one end user was aware of the implications of selfmedication and resultant antibiotic resistance. Conclusion: Most antibiotics prescribed by doctors and dispensed at chemist shops were from the Watch and Access groups, respectively. End users mainly purchased antibiotics from the Access and Watch groups. The findings highlight the urgent need for awareness sessions on antibiotic use and resistance for all stakeholders, along with stronger regulatory measures to control antibiotic sales by drug dispensers. Keywords: Anti-Bacterial Agents, Drug Resistance, Qualitative Research, Urban Population

Introduction:

The antibiotic consumption rate has dramatically increased in the twenty-first century, owing mostly to illogical prescriptions and inappropriate usage. Antibiotic resistance (ABR) is a longstanding concern.^[1]It has become a major global public health risk, particularly in developing nations.^[2] The highest consumption of antibiotics has been observed in India, China, and Pakistan.^[3] Since antibiotics are among the most commonly given drugs, there is a significant risk of drug misuse. An estimated 20-50% of the antibiotics that patients are administered are unsuitable.^[4] By 2050, ABR is predicted to cause 10 million fatalities if prompt action

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is not taken.^[5] Some of the main causes of ABR include inadequate infection control measures, excessive or underuse of antibiotics, and the accessibility of over-thecounter (OTC) medications.^[6]

Despite numerous antimicrobial stewardship initiatives, the body of evidence from India suggests that the use of antibiotics is still inappropriate.^[1,7] Healthcare providers (HCPs) are recognized as significant stakeholders in ABC control because they prescribe antibiotics and are trusted sources of medical information for patients. Thus, it is critical to investigate their perceptions, particularly in India, which has the greatest ABC.^[3] Additionally, no published study has examined how Indian healthcare providers view this occurrence. Similarly, pharmacists/drug dispensers play a significant role in the dispensing of antibiotics, necessitating context-specific research in this area. Research indicates that the public is crucial in reducing the increasing burden of ABR.^[8] The World Health Organization has classified antibiotics into three categories to regulate their usage: Access, Watch and Reserve (AWaRe). The goal is to increase the use of Access group antibiotics and reduce the use of the Watch and Reserve group antibiotics.^[9] Therefore, it also becomes crucial to understand prescription and consumer behaviour, and experiences, to determine the most commonly used and pattern of antibiotics by healthcare professionals and their awareness of Antibiotic Resistance (ABR).

In light of this, authors conducted a qualitative study to document the treatment providers and drug dispensers especially their experience with a client of over-the-counter purchase, and finally treatment seeking behaviour and experiences of clients.

Method:

This qualitative Study through face-to-face In-Depth Interviews (IDIs) of doctors, drug dispensers, and end drug users was conducted during April-May 2024 in the catchment areas of Urban Health Training Centre (UHTC) under the Medical College of Ahmedabad city.

Study tools and validation: An interview guide was developed through an extensive literature search and

brainstorming exercise for each stakeholder. All tools were validated during the validation workshop. The pilot study was conducted for the finalization of thematic guidelines and information was not included in the final study. Ethical clearance was obtained from the Institutional Ethics Committee (IEC) DHR Registration No. EC/NEW/INST/2023/3615 dated 12/09/2023). A total of 26 IDIs for 3 groups (doctors, drug dispensers & end users) were taken. A list of 35 doctors (Allopathic and AYUSH practitioners) working in this area was obtained from the urban health centre. For doctors, wide representation from private and government as well as qualification (BAMS, BHMS, DAMS, MBBS to superspecialists) was ensured, and as per availability and willingness to participate in the study after giving the brief of the study and appointment was taken. Similarly, a list of 38 Pharmacy owners/ assistants/ drug dispensers was obtained and thereafter 8 private drug dispensers, 2 from 4 different directions were interviewed. From the same drug dispensary, 8 exit IDIs were done who had taken antibiotics from the same drug dispenser. A team of trained investigators (two faculty members per team) conducted an IDI one of the team members was given the task of rapporteur to take field notes. Various theme/s and subtheme/s which emerged were categorized and analysed thematically. Verbal responses were noted during field notes and insights were compiled. Local language verbatims were translated via Google translator. At the end of all the In-depth interviews name of the antibiotics spoken was categories into Access, Watch and Reserve group as per WHO AWaRe classification. Word cloud analysis was done for drug dispensers and end drug users' IDIs.

Results:

Overall, a total of 26 IDIs to explore the perception, practice, experiences, and level of awareness about antibiotic resistance among stakeholders using thematic guidelines were conducted.

(1) Prescription Behaviour, experience, and knowledge about ABR amongst Doctors: A total of 10 doctors with a wide range of working experience (from a few months to 46 years), or in terms of qualification like traditional medicine/ AYUSH practitioners (BAMS, BHMS & DAMS) to allopathic (MBBS, MD, MS, Dentist) were interviewed. There were more male doctors than females (only 2). The reasons for prescribing antibiotics were (1) to treat infections like fever, Respiratory, and GIT infections to very severe cases (2) for fast recovery of patients and sometimes it was "a demand from the patient". They were prescribing antibiotics only when the case was either clinically confirmed or through investigations. Usually, only a single antibiotic was prescribed for a single illness but sometimes up to 3 antibiotics were prescribed for a single illness.As per WHO AWaRe classification analysis showed that antibiotics were more frequently prescribed from the "Watch" group than those from the "Access" group, especially for pediatric patients. In none of the cases, an antibiotic from the Reserve group was prescribed. Treatment providers were aware that many patients partially purchased prescribed antibiotics, due to financial constraints or lack of awareness about completing the course. Almost all of them were aware of antibiotic resistance and the reasons given were incomplete courses, self-medication, and irrational prescribing. They were also aware of its prevention like avoiding indiscriminate and prolonged use of antibiotics, prescribing first-line antibiotics wherever possible, introducing legislation to regulate antibiotic sales, and promoting sanitation and hygiene to prevent infections. (Figure 1)





*Number in bracket reflect number of respondants

A few of the statements are quoted below :

"Usually patient completes 50% TT & keep remaining medicine for reuse in future." (33 Y/ F/ BHMS)

"20% stop taking TT after the recovery, 80%complete TT, go to another doctor if do not get well." (42 Y/F/MBBS Govt)

"Patient usually stops treatment in between once they recover." (34 Y/M/Pediatrician)

"Generally, Patient partially purchases prescribed antibiotics and also uses same prescription in second illness episode through OTC." (34 Y/ M/ Pediatrician)

"After giving medicine, pharmacist does not explain duration of treatment." (42 Y/F/Govt MBBS)

"To prevent ABR, strict laws should be there against medicine dispensing." (74 Y/M/Pvt. MBBS)

(2) Experience sharing by drug dispensers: It was mainly regarding (1) most commonly prescribed antibiotics, (2) complete purchase of antibiotics as per prescription, (3) Over-the-counter (OTC) purchase, and (4) commonly dispensed antibiotic

A total of 8 male drug dispensers (pharmacists/ assistants/ shop owners) with work experience ranging from 3 months to 30 years, aged between 27- 61 years were interviewed. Half of the dispenser/s mentioned that the most commonly prescribed antibiotic/s by practicing doctor/s in the study area were Amoxycillin + Clavulanic acid and cefixime belonging to the Access and Watch group respectively. More than half of them shared their experience of partial purchase of antibiotic/s from the clients. (Table 1) None of them spoke of the sale of any antibiotic from the Reserve group. Initially, they (except 1) were hostile to accepting the practice of dispensing antibiotics over the counter. Half of the drug dispensers accepted dispensing antibiotics without prescription mostly for respiratory and gastrointestinal tract infections or fever. For paediatric cases, they said that they dispense antibiotics only with prescriptions. Some dispensers admitted selling antibiotics via WhatsApp prescriptions or leftover medicines. The most common adverse experience observed by them was related to gastrointestinal and giddiness. However, all of them

were dispensing over-the-counter antibiotics more so from the Watch group than the Access group (including pediatric cases) and none of them dispensed a reserve group of antibiotics. Amoxiclav, Ornidazole, Cefixime, Azithromycin, and Ofloxacin for adults, and Amoxiclav and Cefixime for paediatric were the most preferred antibiotics for self-medication from the Access and Watch group.Most commonly dispensed antibiotic was cefixime (from Watch group) followed by amoxycillin (Access group) (Table 1 & Figure 2) Half of the dispensers were aware of antibiotic resistance and the reasons mentioned by them for the antibiotic resistance were irrational use of antibiotics, self-medication, chronic use of antibiotics, and antibiotics given in viral illness. The need for creating awareness through CME, avoidance of irrational use of antibiotics, and legislation measures were suggested by them to prevent antibiotic resistance.

A few of the statements are quoted below.

1. "Sixty percent of customers come to buy medicine without prescriptions. For children they bring old prescriptions. Mostly they come for vomiting, diarrhoea, cough etc. At times they take OTC products and get cured as well. So, they have trust upon us."

(27 years male pharmacist with 5 years of experience)

2. "Customers come directly to us for medicine and get cured, so they trust us."

(42 years male pharmacist with 20 years of experience)

3. "It is easier for the customer to take the medicine directly from us and getting a quick response than wasting half a day for going to the doctor, sitting in long queues, paying consultation charges, thus saving both money and time."

(27 years male pharmacist with 5 years of experience)

4. "Patients are searching online by Google to find out what medicine to take for their illness.")

(28 years old male Pharmacist assistant with a mere 3 months experience)

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Theme/s	Subtheme/s	Response/s
Antibiotics dispense (1)	Commonly dispensed antibiotics	Access: Amoxiclav (8)
		Watch: Ornidazole (3),
		Cefixime (8), Azithromycin (4),
		Ofloxacin (3)
	Mode of dispensing antibiotics (2)	With prescription only. (6)
		Over the counter (4)
		Direct demand by client (2)
Experience of client with	Most commonly prescribed	Access: Amoxycillin+Clavulanic acid(6)
prescription (2)	antibiotics (1)	Watch: Cefixime (6), Azithromycin (4)
	Purchase of antibiotics as per	Client partially purchase (7)
	prescription (2)	
Experience with client of	Illness	Respiratory tract infection (4)
Over the counter (OTC)		Fever(2)
purchase(3)		GI infection (1)
• • • • •	Criteria for OTC	Dispense after asking for the weight and
		age of the patient. (3)
	Commonly dispense antibiotics in	For Adults:
	OTC as per AWaRe classification	Access: Amoxiclav (1)
	-	Watch 3): Cefixime (4), Azithromycin (3),
		cefpodoxime(1)
		For children :
		Access (Syp. Amox-clav)
		Watch (Syp. Cefixime)
	Experience	OTC are done rarely (3) , frequently (1)
		Aware of the consequences of OTC
		dispensing antibiotics (3). The most
		common Adverse events observed after
		dispensing OTC antibiotics. GI side effects (3)
		followed by giddiness (1)
Experience with clients	Antibiotics for self-medication	For adults:
who directly demand		Access: Amoxiclav (1),
antibiotics (4)		Watch: Ornidazole(1), Cefixime(4),
		Azithromycin(3), ofloxacin(1)
		For pediatric:
		Access: Amoxiclav (1),
		Watch: Cefixime (2)
Antibiotic resistance (5)	Awareness	heard about antibiotic resistance (4)
	Cause	- Irrational use of antibiotics (2)
		- Self-medication (2)
		- Chronic use of antibiotics (1)
		- Antibiotics given in viral illness (1)
	Suggestions	- Awareness CME for pharmacists
		should be planned (2)
		- Irrational use of antibiotics should be avoided (1)
		- Legislation for rational selling of antibiotics (1)



Figure 2: Word cloud analysis of the text findings of in-depth interviews with Drug Dispensers (N=8)

(Size of the font reflects the response which was repeatedly or frequently received from the respondent)

5. "At times customers come with old bottle of medicine and ask for the same one"

(28 years male pharmacist assistant with 3 months of experience)

6. "In entire day, 1-2 such customers come who directly ask for an antibiotic by name"

(61 years male pharmacist assistant with 30 years of experience)

(3) Antibiotic consumption experience sharing by end drug users

The third stakeholders were the clients who visited the chemist's shop to take antibiotics with or without a prescription. A total of 8 exit interviews were taken from the same chemist shops of those end users who had come to take antibiotics for common ailments such as fever, respiratory infection, Gastrointestinal infection and urinary tract infections to record the perception and experience regarding antibiotic consumption, purchase, and knowledge about antibiotic resistance. Most

common reason for visiting chemist shop for over the counter purchase of antibiotic was expenses incurred for consulting doctor followed by partial purchased of course of antibiotics. Most common reason for purchasing same antibiotic based on similar episode of diarrhoea.(Figure 3) Only half of them had antibiotic prescriptions with adequate dosing and duration, while the rest demanded drugs directly from the pharmacist or over the counter (OTC). The most preferred antibiotics were Augmentin, clindamycin, and ornidazole from the acces sgroup followed by Azithromycin, and cefixime from the watch group. Those who approached with a prescription were mostly unaware of the antibiotics prescribed. Awareness about antibiotic resistance was nil to minimal. Only one participant had heard of this and could identify irrational antibiotic use as one of the causes. The respondent suggested creating awareness through campaigns on TV and social media, to educate the public about responsible antibiotic use. (Table 2, Figure 3)

Theme/s	Subtheme/s	Resnanse/s
Treatment seeking	Antibiotic purchase for	Antibiotics were purchased for
behavriours	1	-Fever(3)
		- Respiratory tract infection (3)
		- GI infection (2)
		- UTI(1)
		- Painful lesion on leg(1)
	Source of information	- Half of the respondents came to purchase
		antibiotics with prescription only. (4)
		- Two Third of the respondent directly demanded
		antibiotics at store (3)
		- One was given antibiotics by OTC (1)
Experience of client	Client awareness about antibiotics	All respondents had prescription of antibiotic with
with prescription		proper dose and duration. (4)
		- Prescribed antibiotics as per AWaRe
		classification were:
		Augmentin (1), clindamycin (1), ornidazole (1)
		- Azithromycin (1), cefixime(1)
		3/4 clients were purchased antibiotics having
		prescription from allopathic doctor.(2)
		- One respondents had prescription from
		BAMS doctor.
	Purchase complete course	Most of the clients purchase complete course of
		treatment as per prescription except one.(3)
Experience of client	Demanded/OTC antibiotics	- Half respondent purchased Watch(2)
without prescription		group antibiotics without prescription.
		- All respondents without prescription purchased
		the incomplete course of treatment.(4)

Figure 3: Word-Cloud analysis of experience sharing by end drug users



(Size of the font reflects the response which was repeatedly or frequently received from the respondent)

A few of the interesting statements have been quoted below

1. "Medicine is the same, whether it is given by a chemist or a doctor. Our purpose is only to get well soon."

(28 years daily wager male)

2. "If I go to a doctor, he/ she will also prescribe the same medicine so why to pay extra money for that when I already know the name of the medicine".

(32 years, 12th passed businesswomen)

Discussion:

The prescription behaviour of any HCP depends upon his/her knowledge about indication of prescribing antibiotic/s, own attitude towards prescription and finally practice based on the experience of working and dealing with clients. Doctors primarily rely on knowledge acquired during their medical school education, often decades ago. To prepare appropriate interventions it is essential to know the enablers and driving force for writing appropriate prescriptions. The results of this study are compared to other relevant studies to contextualize the data within broader global and regional contexts. An unfortunate aspect associated with prescription writing is the nexus between pharmaceutical firms and pharmacists on the one hand and few of the doctors, on the other hand, to compensate HCPs in exchange for antibiotic prescriptions.^[10] Practitioners from alternative medicine such as Homeopathy also prescribe antibiotics (whatever the patient asks) based on their knowledge and experiences. At times these HCPs were found prescribing 2 or more antibiotics more so from the Watch group followed by the Access group. This was common in adults and children as stated by physicians and pediatricians. This is indicative of an over-reliance on broad-spectrum antibiotics, increasing the risk of resistance. This result is consistent with Khan et al. (2021)^[7], who found that Indian HCPs were inconsistent even though they were aware of antimicrobial stewardship initiatives. A study by Atif et al. (2021),^[3] similarly noted that inappropriate and overuse of broad-spectrum antibiotics is a key driver of resistance in India and other LMICs. Furthermore, with a history of eating outside food and for viral fever it

is advisable to wait and watch practice as shared by some physicians. The majority of drug dispensers said that patients purchase only partially of antibiotics prescribed, maybe to reduce the out-of-pocket expenses or to curtail the health facility visits as shared by a few clients specifically for childhood cases when health facilities are closed. Participants shared the fact that economic pressures and sociocultural factors influence HCP practices. Even with viral infections, doctors frequently give unnecessary antibiotic prescriptions in response to patient demand. The findings of Ahmed et al. (2020)^[4], which showed that such illogical prescribing is common in low and middle-income countries (LMICs) which significantly contribute to ABR, are consistent with this trend. Additionally, similar to the findings in the current study, a study by Laxminarayan et al. (2013),^[2] emphasizes that medical professionals in low-resource settings frequently give antibiotics empirically since diagnostic tools are either limited or not available.

Drug dispensers are essential to the pathway of antibiotic intake. Thematic analysis revealed that many of them sell antibiotics without a prescription. However, in the case of children, they were dispensing antibiotics as per weight bandage. This is consistent with the findings of García et al. (2011),^[6] who noted comparable patterns in developing countries where the sale of over-the-counter antibiotics is widespread as a result of lax regulatory compliance. This practice is especially alarming because it increases the risk of incorrect dosing and severe reactions in susceptible populations. These findings support Klein et al.'s (2018)^[11] observation that drug dispensers in LMICs frequently lack proper training and awareness of the consequences of illogical antibiotic dispensing.

Furthermore, the current study demonstrates the economic basis for over-the-counter antibiotic sales and partial purchase of antibiotics. Dispensers frequently cater to low-income customers who want quick relief over seeking expert medical help. This finding is consistent with Ahmed et al. (2020),^[4] who identified socioeconomic factors influencing self-medication and over-the-counter antibiotic use in resource-constrained areas.

The study's findings on end-users' perception showed a lack of knowledge about antibiotics and risk of developing resistance. The majority of respondents were unaware that their prescriptions included antibiotics, and many used self-medication based on previous experiences or advice from non-medical sources. This is similar with DeBaun et al. (2021),^[5] who emphasised the importance of public awareness efforts in overcoming information gaps that contribute to ABR. Notably, the study findings emphasize the tendency of end-users to cease antibiotics once symptoms have subsided, resulting in incomplete treatment regimens. This behaviour has been well recognized as a major contributory factor towards ABR. Noncompliance with prescribed antibiotic regimens is common in low- and middle-income countries, motivated by financial restrictions, a lack of knowledge, and overconfidence with partial recovery.^[3,4] The current study documents the sociocultural factors that influence antibiotic use. Some respondents, for instance, relied on family members' advice or earlier prescriptions, which reflected deeply ingrained behavior. According to Khan et al. (2020), ^[8] community and familial effects are important determinants of antibiotic usage in rural and semi-urban populations. This finding is consistent with their findings.

Under the recently launched National Program of Antimicrobial Resistance (NP-AMR), several strategies have been identified which include (1)improving awareness through IEC, (2) efficient infection prevention/ control practices, (3) evidence generation through robust surveillance, (4) promoting investments for research and innovations, and (5) strengthening India's leadership in AMR are the identified six strategies.^[12]

Limitation of study:

Due to the nature of the qualitative study, the responses might be influenced by the Hawthorne effect (changes in the behaviours/response of the studied pharmacists because they feel observed) and study has potential risk of few biases (subject & recall bias). Google Translator was used to translate local language text verbatim, which might have resulted in errors in expressing contextual meaning.

Conclusion and recommendation:

The study reveals a concerning pattern of antibiotic misuse which is on the increase and it seems that all 3 stakeholders are responsible for this trend. Inadequate awareness about antibiotic resistance in the community emphasizes how urgently awareness efforts concerning the risks of antibiotic resistance are needed for all parties involved. Training of HCPs to prescribe antibiotics should be strengthened through evidence-based treatment protocols. More stringent laws are needed to prevent the sale of antibiotics without a prescription.

The study also highlighted the current scenario and the challenges for reducing the misuse of antibiotics. Public awareness campaigns and strict laws to restrict the sale of over-the-counter antibiotics can be helpful in reducing the misuse of antibiotics and their resistance. **Acknowledgment:**

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