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Research Article

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Determinants of Clinician and Patient to prescription of antimicrobials: case of Mulanje, Southern Malawi

Morris Chalusa[1, 2*], Felix Khuluza[3], Chiwoza Bandawe[4]

[1]*Pathology Department, College of Medicine, University of Malawi, Blantyre, Malawi*

[2]*Mulanje District Hospital, Ministry of Health, Malawi*

[3]*Pharmacy Department, College of Medicine, University of Malawi, Blantyre, Malawi*

[4]*Department of Mental Health, College of Medicine, University of Malawi, Blantyre, Malawi*

[*]Corresponding author

Morris Chalusa, Pathology Department, College of Medicine, University of Malawi, Blantyre, Malawi and Mulanje District Hospital, Ministry of Health, Malawi.

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Abstract

Background: *Antimicrobial resistance is an emerging problem in low- and middle-income countries. The problem is exacerbated by inappropriate prescription of antimicrobials. Factors leading to overuse or inappropriate prescription of antimicrobials by the cadre of medical assistants, clinical technicians and clinical officers have received limited attention. This study investigated factors that influence prescription behaviours of antimicrobials among clinical officers in various health facilities in Mulanje district, Southern Malawi.*

Methods: *In-depth interviews (n=18) and focus group discussions (n=2) were conducted with COs from four health facilities in Mulanje district. Purposive sampling was done to arrive at a sample size of 30 health cadres.*

Results: *Participants pointed out that patient preferences, belief and clinicians' inadequate education on this issue were among the factors that contribute to inappropriate antimicrobial prescription. 75-% of clinicians showed lack of knowledge on the definition of antibiotic and antimicrobial resistance.*

Conclusion: *Inappropriate use of antimicrobials is facilitated by prescribing decisions made by clinicians who are greatly influenced by their patients. Interventions aimed at improving antimicrobial prescription should target both clinicians and patients.*

Keywords: Antimicrobial Resistance, Antibiotics, Clinician, Patient, Prescription

Introduction

Antimicrobial resistance (AMR) is a great public health challenge which is accelerated by inappropriate use of antimicrobials [1]. Overprescribing of antimicrobials is associated with increased risks of prolonged hospital stay, self-medication of self-limiting conditions, amplified frequent admission to hospital and causing severe infections [2]. Globally, at least 700,000 people die each year of drug resistance illnesses because of infections such as bacteria, malaria, Tuberculosis and HIV / AIDS [3]. A study conducted in Malawi reported that there is a decrease in bacterial bloodstream infection which has been accompanied by a rise in antimicrobial resistance involving all bacterial bloodstream infection pathogens [4]. A recent study done in Malawi found out that Gram-positive pathogens are resistant to empiric, first-line antimicrobials [5].

Patient-pressure and customer-satisfaction are considered to be major factors for inappropriate antibiotic prescription [6]. In hospital settings, the cadre of Clinicians also known as Clinical Officers (COs) is tasked with prescription of medicines to patients. COs are licensed medical practitioners with an initial three-year training and one year internship [7]. According to Mangione (2019), clinicians are more likely to prescribe antibiotics if they perceive that parents who have brought sick children to the hospital want antibiotics if they ask about the treatment plan [6].

Much of the global overuse of antimicrobials occurs in low - and middle-income countries (LMICs), topped by the BRICS (Brazil, Russia, India, China and South Africa) nations where there is enormous use in both animal and human sectors [8]. A study conducted in Sudan, Guinea-Bissau, Central African Republic and Democratic Republic of Congo found out that patient demand for antibiotics contributed to antibiotics prescription [9].

In Sub-Saharan Africa, one factor contributing to AMR is misuse of antibiotics. However, improvements in malaria diagnostics and the recognition that malaria transmission is decreasing globally have highlighted the lack of tests for other infections and many patients who test negative for malaria are treated with antibiotics indiscriminately [10]. This is where the focus on prescribing habits of clinicians has to be looked at as it may inadvertently contribute to AMR.

Some of the barriers to prudent prescribing of antibiotics by general practitioners (GPs) are known, and these are: patients demanding antibiotics, prescribing antibiotics to save time due to the perception that it takes longer to explain why antibiotics are not needed, concerns that the patient may not return for follow up, uncertainty in the diagnosis where antibiotics may be warranted, concerns about possible complications, preservation of the doctor-patient relationship, and knowledge and attitudes to AMR [11].

Szymczak explained that clinicians identify patient pressure and demand for antibiotics as a major barrier to more judicious prescribing [12]. Brookes-Howell, et al. described how clinicians spoke of familiarity with the patient, which helped clinicians in their decision on whether or not to prescribe antibiotics [13]. Patient pressure and expectation were cited among the reasons for prescribing antibiotics 'unnecessarily', in particular where a shortage of consulting time meant that the doctor felt unable to adequately explain why antibiotics were inappropriate [14].

Physicians' express desire for a quick fix, the problem of diagnostic uncertainty and the fact that explaining why antibiotics are not necessary is too time-consuming and unrewarding [15] were reported as being the basis of antibiotic misuse. Patients' lack of knowledge also drives their demands for antimicrobials [16].

Doctor's communication skills are the core clinical skills in the practice of medicine, with the ultimate goal of achieving the best outcome and patient's satisfaction which are essential for the effective delivery of health care [17].

Communication skills and diagnostic uncertainty rank among the principal indirect factors influencing antibiotic prescription [15]. In a study conducted in Malaysia, the majority of the respondents agreed that too many antibiotic prescriptions, using too many broad spectrum antibiotics and excessive use of antibiotics in livestock were leading contributors to AMR. In the same study, another group felt that too long durations of antibiotic treatment, too low dosing of antibiotics, poor hand hygiene and not removing the focus of infection are among the major factors contributing to AMR [18].

However, improving clinician's communication skills helps to bridge the gap between physician's and patient's expectations [19]. Antimicrobial prescription can also be reduced in settings where there is one-on-one patient-directed education in the workplace [20].

The present paper was aimed at identifying determinants of decisions in antimicrobial prescription among clinicians in health care settings. Since a previous study on antimicrobial prescription focused on physicians and Medical doctors, it was necessary to also get views from Clinical Officers, Clinical Technicians and Medical Assistants, particularly in Sub Saharan Africa who are at the frontline in providing health services in primary and secondary health care settings [21].

Methods

Study Design, Sample size and Recruitment of participants

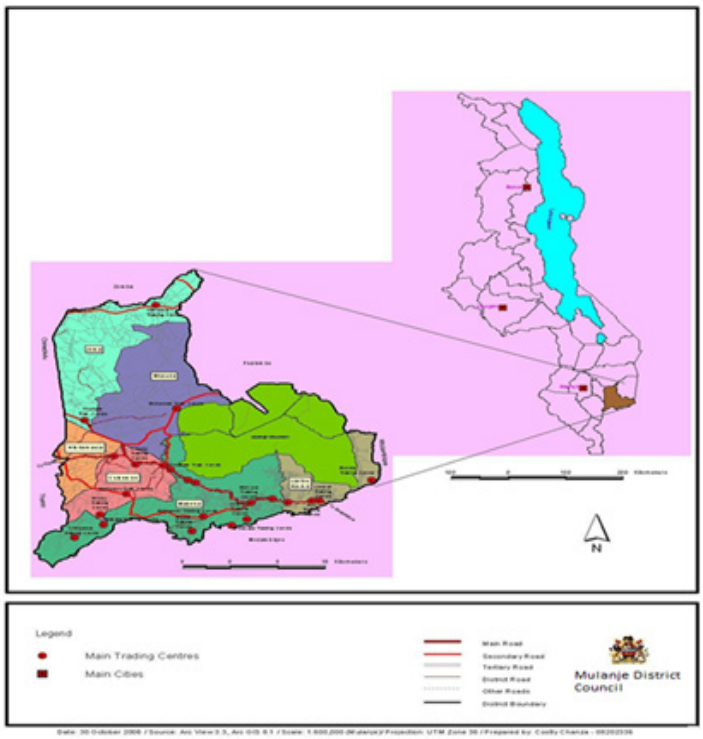
This was a qualitative study aimed at exploring clinicians' views and experiences about prescribing AMRs. The research question we tackled was: 'What factors determine the Malawian clinician's decision to inappropriately prescribe Antimicrobials?'. We used in-depth interviews and focus group discussions with clinicians working at the district hospital and health centers in Mulanje district, Southern Malawi. In-depth interviews and focus group discussions were chosen because they provide much more detailed information and they allow for a more relaxed atmosphere. They were also chosen because responses can be clarified and expanded upon with probing question and interviewees can react and build upon each other's response to provide information or ideas that, on their own individually, they might not have provided.

Clinicians who completed their internship were selected for inclusion. We recruited clinicians from two hospitals, and two health centers. There were 30 clinicians who took part in the study. Purposive sampling was utilised. This is appropriate in qualitative research, where the aim is not to obtain a statistically representative sample and make statistical inferences from the results, but rather to obtain an information rich sample and make logical inferences from that sample [22]. Recruited clinicians were given a consent form to read and sign, once they had agreed to take part in the study.

We collected data between May and June 2019. Clinicians' qualifications ranged from Certificate, Diploma to Degree in Clinical Medicine. All participants were assured of privacy and confidentiality, thus, only the team that was involved in data collection had access to the information. Codes were used instead of names. Ethical approval was sought from Malawi College of Medicine Research Ethics Committee and granted with approval number P.04/19/2656. Permission to collect data in the study health facilities was provided by Mulanje District and Mulanje Mission Hospital Directors respectively. Prior to recruitment of clinicians, communication about the study was sent to the health facility Officers-in-charge.

Data collection

Before beginning data collection, we created a semi structured, open – ended interview guide based on literature review on factors that promote inappropriate antimicrobial prescription and piloted with two practicing clinicians. The piloting data was not included in the analysis [23, 24].



Data analysis

Transcripts were coded using a blend of deductive (codebook based on main interview questions) and inductive coding (emerging from the data). All English transcripts (n=30) were thematically analysed by the primary investigator (MC) and then an independent (CB) researcher with expertise in qualitative research. Analysis began soon after data collection to get familiarization, which involved reading the transcripts repeatedly and noting down ideas.

The information which is pertinent to participants' determinants of antimicrobial prescriptions was identified and coded based on a deductive and inductive approach. These codes were collected into sub themes and themes. The first author subsequently discussed the coding, sub-themes and themes with two independent researchers to enhance data reliability. Themes were reviewed by co-authors (CB and FK). Discrepancies were resolved by reaching a consensus.

The first author then presented the findings to the study participants and obtained their feedback to ensure that their perspectives were accurately and clearly represented.

Results

Participants' demographic characteristics

There were 17 male and 13 female participants. Their educational backgrounds ranged from Medical Assistant (Certificate in Clinical Medicine), Clinical Technician (Diploma in Clinical Medicine) and Clinical Officer (Degree in Clinical Medicine). All participants (n = 30) reported that they had prescribed antimicrobials in the previous year.

		Medical assistant (n=11)	Clinical Technicians (n=16)	Clinical Officer (=3)	Overal total (n=30)
Sex	Male	4	12	1	17
	Female	7	4	2	13
Type of facility	MMH		7	2	9
	MJDH	10	10	1	21
Professional qualification		10	16	4	30
Professional experience (years)	< 1	5	2		7
	> 1	6	13	4	23

Main themes

Seven main themes influencing antimicrobial prescribing emerged from the semi-structured interviews. Quotations from the interviews are included where relevant to illustrate a point.

Theme 1: Patients' Preferences

To explore why clinicians give over their prescribing decision power to patients, the interviewer asked them about determinants of antimicrobial prescription in health care settings. Most clinicians mentioned that some patients force clinicians to prescribe antimicrobials while other patients come with their own diagnosis to the hospital. The clinicians added that a patient's signs and symptoms and a patient's preference for antimicrobials are significant determinants of antimicrobial prescriptions. Most clinicians reported that patients preference on antimicrobials was a factor that contributed to inappropriate prescription of antimicrobials.

"Okay, it's about the patient preferences, okay, it's just like there are a lot of antibiotics but patients may choose that "I like this antibiotic when I take it I feel good, I recover from my complaints and my disease", could be just patient expectation according to clinical condition of her disease" (Clinician # 5).

"aah sometimes aah patient do have their preferences on which drugs antibiotics to be prescribed to them that they feel is best for them not the condition they have, what's best for them" (Clinician # 6).

Theme 2: Belief about Efficacy

Most patients believe that intramuscular injections, IM and IV antibiotics work better than per os (PO), so, if you give them PO antibiotics, they believe that you have not helped them. They believe that if you give them antibiotics they will dramatically change for the better within two days.

"Patients' understanding of antimicrobials is that the belief that

antimicrobials, especially injectable heal any form of severe illness. Even if it is not a bacterial infection, they still think that if you give them IV [Intravenous] antimicrobials, they are going to recover" (Clinician # 7).

Clinicians also reported that prescribing antibiotics occurs even in suspected cases of viral infections or mere cough because patients and guardians believe their patients will improve only after taking antibiotics and that any form of illness can be cured with antibiotics. Thus, patients show a lack of knowledge on antimicrobials that can be used to treat a bacterial infection or a viral infection.

"I think they feel that for them to get well then they have to take a certain type of antimicrobial. Whether you find that the malaria test is negative then they still have the feeling that for them to get well they have to take antimalarial, or for them they just have a viral infection like cough or whatever or just a flu. They believe that for them to get well they have to take antibiotic like amoxicillin" (Clinicians# 12).

Clinicians reported that patients believe that having a cough means one needs antibiotics. This belief prevents proper antimicrobial prescription in a health care setting.

Theme 3: Negative attitude of patients towards clinicians who do not prescribe antimicrobials

Most of the clinicians reported that when they refuse to prescribe antimicrobials, patients think that they do not know their work; they are sometimes referred to as not being good doctors because of denying them what they want. In other words, the patients have a negative attitude towards such clinicians.

"Well, when you refuse they think maybe you are not a good clinician. You don't really know your work or else you haven't helped them. They would prefer to go to another clinician or else to go to another hospital where they feel they can be helped. They feel that you haven't helped them" (clinician #12).

Almost all clinicians reported that such patients think of them as being incompetent when they refuse to prescribe antimicrobials to them. What the patients do in such circumstances is to go to another clinician.

"They do just think that am not a medical practitioner, that am not well equipped with knowledge and they go for another clinician" (Clinician # 4).

Theme 4: Educating the patients

As one way of reducing inappropriate antimicrobial prescription, the majority of Clinicians reported the need for patients' education during patients' clinic visits. Clinicians suggested that the following should be done during clinician-patient interaction in health care settings: educating patients on the dosage, how to take the drugs and for how long as well as any side effects. This needs to be properly communicated in addition to when to return to the hospital if there is no improvement.

"First, we need to explain why we are giving those drugs, frequency, route, and duration. And they should not share with someone else because it's only for him or them that have attended the service and the drug is prescribed only for him. I think about the problems people still share drugs somewhere behind. You should build a good relationship between you and the patient and make sure when you have given the drug they should come back for feedback" (Clinician #11).

Patient education is a factor that can lead to a reduction in unnecessary antimicrobial prescriptions. This important theme of educating the patients is however restricted by the reality on the ground as shown in the next theme.

Theme 5: Limited time /Clinicians being overwhelmed

Clinicians stated that limited consultation time between clinician and patient was one of the factors that lead to inappropriate prescription of antimicrobial. It emerged that there is limited time a clinician can spend with an individual patient because of large numbers of patients visiting a health care setting which is a big challenge that affects clinicians. There is a lack of comprehensive history taking on patients because of having to spend minimal time with each one of them. Some clinicians may see as many as 50 patients per day.

"We can spend 2 minutes with each patient because we have long lines in outpatient departments and sometimes there is one clinician or two, so if you take much time with patients, they start complaining that you are wasting their time. It affects a lot because we need to have more time with our patient and they should talk more of their complaints but with the complaints that I said that we are few Clinicians, we spend aah not enough time with the patient, so the patient does not share more of their complaints that they have come with on that particular day" (Clinician #1).

The underlying factor is handling a long queue of patients in outpatient departments and huge workload. This results in unnecessary antimicrobials prescription in health care settings in order to relieve pressure in the outpatient department.

Lack of enough time is a barrier for proper history taking, physical examinations, investigations and counselling. Furthermore, because of having fewer clinicians, antimicrobials are being prescribed in order to see more patients within a short period of time and this results in no explanation to patients on what they are suffering from and the importance of adhering to medications.

Theme 6: Hindrance / Obstacle to antimicrobial prescription

The study also investigated problems of antimicrobial prescription in cases where this is the appropriate decision. Clinicians stated that they do face problems and challenges in prescribing some antimicrobials because of their unavailability in the health care settings. The findings revealed that frequent unavailability, shortages and antibiotics being sold on the open market are problems since people can go and buy without a prescription from a clinician.

"One of the challenges mostly (silence) its aah repetitive usage of single antimicrobial, even in the same patients or in most outpatients seen or even inpatients, so it's mostly certain antibiotic dominate over other antibiotics, so that's one of the challenges simply because it has developed some resistance simply because of overuse and it has caused most of the unfavorable side effects and which are most difficult to treat so are some of the challenges

we have met so far" (Clinician # 7).

Clinicians reported that a shortage of certain antimicrobials makes them prescribe the same antibiotics, even in cases where they believe it is not the best option, not indicated or not the strongest one.

"Your choices may be out of stock in a particular pharmacy and that can affect your prescription as well. And the other thing is, you are not quite sure what you are treating. So you just prescribe but then you are not really sure like blinded and treating blindly" (Clinician # 12).

Theme 7: Clinician Lack of Knowledge on antibiotic and antimicrobial resistance

Besides all that, participants showed that they had minimal understanding of antibiotics and antibiotic resistance. Four clinicians correctly defined what antibiotic and antimicrobial resistance is, which represents 13 %. 6.5 % correctly defined antibiotic resistance whilst only 3% correctly defined antimicrobial resistance. Clinicians were also using antibiotics and antimicrobial resistance interchangeably. In this study, clinicians did not define properly what antibiotics are and what antimicrobials are. Below is an illustration.

Definition of Antimicrobial resistance: Antimicrobial resistance means the causative organisms, the bacteria have developed a mechanism or a resistance to that antimicrobial which means you might give antimicrobial which previously could work or the bacteria could respond or could be sensitive to that antimicrobial but now in the later stage or after a certain period of time the bacteria will develop another mechanism against that antimicrobial" (Clinician # 7).

Discussion

Medical Assistants, Clinical Technicians and Clinical officers are an important group in prescribing antimicrobials in Sub Saharan African countries including Malawi. They are frontline health workers in primary and secondary health facilities in Malawi. They are more likely to prevent inappropriate prescription of antimicrobials and educate patients if they have enough knowledge and are aware of antimicrobial resistance. This study yields important findings regarding factors influencing clinicians to give over their prescribing decision power to patients during consultation. The allocation of more health workers and providing patient education during consultation is crucial and paramount to improve antimicrobial prescription.

The study identifies an important area that needs to be addressed when developing education interventions regarding interactions between clinician and patients. The study has demonstrated that only few clinicians were aware on the definition of antibiotic and antimicrobial resistance.

The majority asserted that some factors influence clinicians to give over their prescribing decision power to patients. Key among the factors are preferences, beliefs and efficacy of antimicrobials, negative attitude of patients towards clinicians, limited time /Clinician being overwhelmed as well as hindrance / obstacle to antimicrobial prescription. However, there is a significant gap on the definition of antibiotic and antimicrobial resistance among Clinicians which needs to be bridged, and that can result into appropriate antimicrobial prescription.

Preference

The present study confirmed that patient preference is a factor that influences clinicians to give over their prescribing decision power to patients and it determines inappropriate antimicrobial prescription in health care settings. These findings are supported by several studies in developed countries [11, 25-28]. In the USA, a similar study to the current one found out that parental pressure was influencing clinicians to prescribe antibiotics [12]. This is also reflected in a similar study, in which, one of the reasons for the prescription of antimicrobials is patient demands or attitude [29]. A study done in Egypt also reported that preferences of caregivers and patients were among of the factors that contribute to antibiotics prescriptions [28].

Belief about efficacy

Our study also found out that belief about efficacy among patients in antimicrobials is contributing to inappropriate prescriptions in health care settings. These findings corroborate the findings from other studies.

It is reported that patients have a belief in certain antimicrobials over others when they visit health care settings. Clinicians in this study cited that patients' demands and preferences for injectable or intravenous antimicrobials over oral ones contribute to inappropriate prescription. Similar findings from developed countries also reported that patients believe in antimicrobials when they visit health care settings, and even when they have a viral infection, they will demand antibiotics to avoid repeated consultations [30-33].

The current findings are also supported by another study which found out that patients come to a hospital with common cold and then demand intravenous antibiotics [34]. The current study findings also corroborate other studies which reported that there is belief that intravascular antibiotics are better than oral antibiotics and that, both doctors and patients encourage prescription of intravenous antibiotics [28,29,33-35].

Negative attitude of patients towards clinicians

Our findings about negative attitude of patients towards clinicians who refuse to prescribe antimicrobials is similar to other study findings which found out that clinicians were prescribing antibiotics in fear of losing patients' trust [36]. The results also show that patients would change physicians when antibiotics are not prescribed. This is also reflected in similar studies that reported that even when patients do not need medication, doctors prescribe antibiotics to maintain a good patient-doctor relationship [37-39].

A study done in Malaysia found out that a few participants indicated that they would make their expectations explicit and request antibiotics from their physician even when they had viral infections, as they believe the medicine promotes rapid recovery. They also said they would consult another physician if their request was not granted [40].

Educating patients

This study also revealed that clinicians were influenced to prescribe antimicrobials because of patients' lack of education on medications. In general, the health systems in Malawi are considered in-

adequate to meet the ever increasing health demanding population in health care settings as health care and clinician-patient ratios still need to improve. Clinicians reported that they do not have enough time to counsel and educate patients during consultations because of demands on their time due to large patient numbers.

In a review conducted by Ayukekbong et al.[41], it was found out that, because of high patient-doctor ratio in most developing countries, doctors are overwhelmed and, as a result, there is often inadequate time for meaningful education and communication with the patient on drug adherence guidelines and consequences of poor or non-adherence to the guidelines.

The current results corroborate a study done in North Carolina that revealed that clinicians should provide information in a manner that is easy for patients to understand as to why an antibiotic is not needed to treat a particular illness as well as how to appropriately use antibiotics in their treatment as and when they are prescribed [42].

Providing education at all levels, that is, community, healthcare setting and individual, is essential to ensuring rational use of antibiotics and suppressing inappropriate use. Public education campaigns are effective in changing attitudes and knowledge regarding antibiotic use and resistance. Fletcher-Lartey and Machowska [22,39] found out that consumer education, such as discussion and explanation, was the common strategy reported by participants to manage patients' expectations and demand for antibiotics.

Findings in this study are all consistent with other studies done in Belgium, England and France which reported that mass media interventions such as national TV campaigns and campaigns through other forms of mass media have been shown to reduce antibiotic prescribing for Acute Respiratory Tract Infection but argued that this strategy works best when targeting both healthcare professionals and the public [43]. It is recommended that care providers, dispensers and patients need to be educated on how the use and misuse of antimicrobials may contribute to the development of resistance [41]. It is cited that lack of communication skills is a factor that promotes unnecessary antimicrobial prescription [44].

Limited -Time /Clinician being overwhelmed

The findings also reveal that limited time act as a barrier to proper antimicrobial prescriptions. Clinicians reported that they prescribe antimicrobials in order to handle long queues in the outpatient department. Several studies support the fact that clinicians spend less time with patients because of work overload.

It is reported that clinicians prescribe medications in order to end the consultation and the clinicians themselves also reported that they prescribe under pressure when factors other than clinical presentation pushed them into prescribing even when they believe antibiotics are not needed [32].

In a study conducted in Karnataka state in South India, physicians agreed that they have too much work because of staff shortages and nearly half of them said that their patients ask them to prescribe antibiotics [48].

In this current study, clinicians do not perceive that limited time and inadequate number of clinicians is a facilitator for inappropriate prescription of antimicrobials.

Hindrance / Obstacle to antimicrobial prescription

Several factors exist such as unavailability of antimicrobials or their shortage, as well as antibiotics being sold on the open markets all of which are barriers to proper antimicrobial prescriptions since people can go and buy antimicrobials from pharmacies and open markets without a prescription from a clinician. One of the barriers to appropriate antibiotic prescriptions is inappropriate antibiotic use which has resulted from lack of access to and affordability of antibiotics due to inadequate government funding in developing countries [50].

In another study, it is also reported that those who were on medical aid were more likely to receive an antibiotic than those not on medical aid [46].

A study done by Baubie, et al. [51] also reported that high physician workload and high antibiotic use in the community were major barriers to antimicrobial stewardship implementation and lack of patient or client understanding of antibiotics, and difficulty in making diagnoses were barriers to proper antimicrobial prescription [52].

The current study is also supported by another study done in India which shows that selection of particular antibiotics also depends on their availability at the public health center and this is a barrier to prescribers [48]. The above study findings also corroborate other results, which report that clinicians felt that some antibiotics available in their hospital are of poor quality and less effective or that the required ones are not available and the patient gets antibiotics directly from shopkeepers without prescriptions [24]. Similarly, a study done in South Asia reveal that common challenges to proper antimicrobials prescription were poor dispensing, poor quality antibiotics, less effective ones in hospital, insufficient history taking and sale of antibiotics that have no proper dosage or are clinically inappropriate [53].

In fact, a study done in India found out that one of the obstacles to the appropriate use of antibiotics is poor quality of antibiotics and less effective ones in hospitals [24].

Clinician Lack of Knowledge on antibiotic and antimicrobial resistance

Furthermore, we need to educate clinicians on antibiotic and antimicrobial resistance. Overall, participants had minimal understanding of antibiotics and antimicrobials resistance. In this study, clinicians pointed out that overuse, poor adherence, and self-medication were causes of antibiotic resistance. In a study done in France and Scotland, the clinicians had knowledge of antibiotics resistance [54].

But, overall, in the current study, clinicians knew the causes of antimicrobial resistance and had knowledge which is similar to the findings of a study done in Saud Arabia on rural and urban physicians which pointed out that inadequate prescription, use of antimicrobials without prescription and noncompliance of patients are the most important factors contributing to the development of bacterial resistance to antibiotics [54,55]. Studies done in Sudan and Ghana also found out that a number of factors were mostly perceived by the majority of physicians as very important causes

of antibiotic resistance such as overuse in the population and hospitals, self-medication, uncompleted antibiotics therapy, inappropriate empiric choice and low antibiotics dosage use in animals as well [56,57].

Nicholson et al. [58] similarly reported that factors contributing to antibiotic resistance are: wide spread use of antibiotics, overuse of a broad-spectrum of antibiotics, inappropriate use, inadequate hand washing and use of antibiotics in animals.

In a similar study done in Ghana among prescribers, causes of antibiotics resistance identified include antibiotics over-prescription, irrational prescription of antibiotics and patients' noncompliance to medications [59].

Strength and Limitation of the study

This is the first study done in Malawi among clinical officers on antimicrobial prescription. The study managed to capture a wide range of determinants of inappropriate antimicrobial prescription. Sample size in qualitative research is determined by data saturation and it is a gold standard in a qualitative study however (n=30) were all interviewed. The study had high levels of participation which might show that research participants were interested in antimicrobial resistance and they were willing to participate in the study. This study was only done in one district, Mulanje, Southern Malawi, so it is a snapshot of Mulanje district as such the result cannot be generalized. Another limitation is non-random sampling. Finally, private clinicians were not interviewed which is also one of the limitations of the study.

Conclusion

This study sought to assess determinants of antimicrobial prescription among clinicians in Mulanje, Malawi. Based on the findings in this study, the following are key conclusions that contribute to the evidence of determinants of antimicrobial prescription. This is one of the first few studies in southern Malawi and will contribute to evidence based targeted interventions to address the problem of inappropriate antimicrobial prescription in health care settings.

Although clinicians were aware of the causes of antimicrobial resistance, they showed lack of knowledge on antimicrobial resistance. Lack of patient education, limited time and work overload are among the factors that promote inappropriate prescription of antimicrobials.

Supplementary information

Author Contributions: MC, CB and FK wrote the Manuscript, MC, CB and FK design the research and finally MC, CB and FK analyses the data.

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Disclosure

The authors report no conflicts of interest in this work.

Ethics approval Ethics

Ethics approval was obtained from the Malawi College of Medicine Research Ethics Committee under approval number (ID P.04/19/2656).

Availability of data and materials

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

Consent for publication

Not applicable

Abbreviations

AMR: Antimicrobial resistant; ABR: Antibiotic resistant; LMICs: Low Middle Income Countries; BRICS: Brazil, Russia, India, China and South Africa, SDM: Shared Decision Making.

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