Understanding and Addressing the Determinants of Antimicrobial Medicine Abuse in Lebanon

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INTRODUCTION

Antimicrobial medications are a group of drugs used to fight different kinds of micro-organisms, collectively named as bacteria, viruses, fungi or parasites. These microorganisms can sometimes gain resistance to the drugs through mutations or gene exchange [1]. Misuse and abuse of antimicrobial drugs favor the spread of resistant microorganisms; thus, leading to exacerbation of the antimicrobial drug resistance (AMR) [2-3]. Forms of misuse include taking the wrong dose of the medications, taking a broad spectrum antibiotic when a more specific antibiotic should have been used, or even having antibiotics prescribed for viral infections [2-3].

Antimicrobial drug abuse and misuse contribute to huge disease and economic burden in developing countries, leading to higher economic costs, lower treatment efficiency and greater health risks [4]. Factors affecting patient's practices include policies' poor enforcement, undetermined pharmacist's scope of practice, physician's uncontrolled prescription patterns, and unaffordability of healthcare institutions [5]. Consequently, fears from reaching post-antimicrobial era have pushed this issue into the global agenda of World Health Organization [2]. In turn, it was determined that 'the way forward' to combat this issue requires the engagement of the different sectors and disciplines to implement and design a national plan that supports prevention healthcare and equitable and sustainable access to antibiotics [2]. This has pushed many countries to set incremental targets based on their priority needs in order to feed into WHO's objectives.

In the Eastern Mediterranean Region, some studies have been conducted to study the perceptions of either the healthcare workers or community members. For instance, pharmacists in Qatar expressed that patients often request antibiotics without medical prescription, take those medications to treat viral infections, and do not always show compliance with the recommended course [6]. From their point of view, main factors affecting the patient's attitudes and practices were the resolution of symptoms, the perception that overuse will lead to faster cure rate, the pressure placed on physician and pharmacists to prescribe or dispense antibiotic, lack of knowledge about updated guidelines, and the negative public perception of pharmacists [6]. On the other hand, healthcare unaffordability was reported as being a major reason that leads pharmacist to dispense antibiotics without medical prescription in Sudan [7]. In other contexts, particularly in Somali, locals considered that healing from illness requires mutually the antibiotic, one's natural immune system, together with the supernatural influence of Qur'anic prayer [8]. Accordingly, altering the common abuse and misuse patterns requires throughout consideration of both patients' background and their environmental conditions.

Pharmacists in Lebanon reported high rates of dispensing antibiotics without medical prescription especially in low socio-economic areas [9]. They claim the intention of assisting people who can't afford to pay for the medical consultation fees [9]. Those findings are consistent with another study which illustrates that about 42 % of the population in Beirut and its sunburn reported self-medication with antibiotics following pharmacist's advice [10]. Antimicrobial drug abuse and misuse are contributing to the high prevalence of resistant bacteria such as Shigella, Klebsiella pneumonia, and Escherichia coli [11-12]. These strains of bacteria among others constitute a major threat to the Lebanese population [11-12]. In light of the worsening of

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antimicrobial drug resistance trends, the ministry of public health issued a degree in 2015 (no 2363) to combat antimicrobial drug misuse and abuse. This degree stated that pharmacists dispensing any kind of antivirals or anti-bacterial medications without medical prescription will be penalized. However, antimicrobial abuse and misuse are still considered common in the absence of well-coordinated efforts to correct public's misconceptions and malpractices regarding antimicrobial drugs.

OBJECTIVES

The main aim of this research project is to improve the awareness of the community in Lebanon regarding the consequences of antimicrobial medicines abuse. This could be achieved through fulfilling the following specific objectives:

- To study the determinants of antimicrobial medicines' abuse in Lebanon.
- To develop a strategy that addresses the determinants of antimicrobial medicines' abuse in Lebanon.
- To implement a pilot intervention that aims at raising the awareness of the community regarding antimicrobial medicines' abuse.

METHODOLOGY

We conducted a qualitative study to obtain rich and detailed explanatory data highlighting factors that affect antimicrobial drug abuse and misuse. This study analyzed the problem in a comprehensive way from the perspectives of both health care professionals and community members. The results facilitated the development of an effective strategy that addresses the reported determinants of the abuse in Lebanon.

Study Design

Our research is composed of three phases, with each phase building on the other. The first phase is a cross-sectional study that evaluates the determinants of the antimicrobial medicines' abuse in Lebanon from different perspectives. A qualitative approach was adopted to gain insight on the factors that affect antimicrobial drug abuse and misuse in Lebanon. Specifically, in-depth interviews and focus groups were conducted as a method for data collection, allowing for an insider's view on the research topic. Such methods focus on obtaining information from the respondent's experience, perspective, and consciousness, which will help in viewing the issue from a multi-perspective lens.

A consent form in formal Arabic was prepared and written interview guide was formulated based on open-ended questions to guide the interview process and obtain information relevant to the research question. This guide was piloted with one health care professional and two community members and questions were adjusted in accordance with interview results.

Based on the results of these focus groups and interviews as well as literature review, an intervention was designed.

A general strategy to address the problem of antimicrobial abuse in Lebanon is developed based on the above.

Study Population and Sampling strategy

Lebanon is divided into 8 governorates (also called district or "Mohafazat") which are in turn subdivided into different sub-districts (Caza'). To select the municipalities, random sampling with a stratification of two degrees was initiated. The first random sampling aimed to select districts per governorate and the second degree of the sampling was used to choose random municipalities in the corresponding districts (see Appendix 1). Community members from the randomly selected governorates were invited to participate in the focus group discussions.
Health care professionals and stakeholders were also invited through their different professional orders to participate in the interviews.

Data collection

An email providing some details about the study and a poster to facilitate recruitment of community members was forwarded to the head of municipalities or one of the official members to facilitate the recruitment process. Those stakeholders were further asked to select adults aged 18 years and above of different educational and professional backgrounds, taking into consideration gender balance and different socioeconomic levels. Interested municipalities were asked to provide a suitable time for conducting the focus group by replying back to the email or through the phone. Due to logistic constraints, two municipalities had failed to capture enough participants and two others refused to participate in the study. Consequently, the research team had to substitute those villages with others within the same geographical districts.

Eventually, 12 focus group discussions were conducted with 6-12 participants each (total of 116 participants) All focus groups and interviews were preceded by a consent form in Arabic shared with the participant's right before the interview. A clear and detailed explanation was given to them about the study and its objectives.
All focus groups and interviews were in colloquial Arabic and recorded following the participant's agreement. The audio-recorded interviews were transcribed, word for word in the language used during the interview. The participants were further informed that their names will not be identified upon publishing unless they give their consent to put their names next to the provided information. Discussions revolved around the perceived factors behind antimicrobial abuse; the knowledge, attitudes, and practice regarding anti-microbial drugs; recommendations to address this abuse, and suggestions of educational message targeting the community. Interviews were conducted with health care professionals.

Data Analysis

These focus groups and interviews were subject to thematic analysis which is a method used to identify, analyses and report patterns within data [13]. Codes were developed on the margins of the written transcript followed by generating categories. These categories were transferred on a spreadsheet and then themes were identified and transferred onto the matrix. Furthermore, the recurring themes were analyzed in order to generate the final report.

Based on the results, a strategic plan was developed for interventions that the MOPH would be able to conduct in the future with a goal of primary prevention. This strategy encompassed policy

recommendations which were developed based on the participant's recommendations and a desk review regarding strategies to address antimicrobial abuse was done.

RESULTS

Although the majority of the participants identified different patterns of misuse and abuse, only four focus group discussions reflected that their respective communities comprehend the correct uses of antimicrobial drugs and apply this knowledge. Few participants were familiar with the concept of resistance to antimicrobial drugs and have stated that "misuse strengthens the microbe", "decreases immunity" or "increases the need for higher doses." Factors affecting antimicrobial abuse were divided into five categories: (1) patients' attitudes, (2) Lebanon's economic conditions, (3) patient-pharmacist relationship (4) mistrust in physicians and (5) healthcare-system related factors.

Patients' attitudes

Noticeably patient's misuse and abuse were frequently attributed to being a habit, routine, and a prominent culture. Many participants from different geographical areas in Lebanon correlated this haphazard use with the desire of the patients to heal 'faster', believing that antimicrobial drugs will relieve their symptoms without remarkable side effects. The argument many members raised was: "Why to wait for the symptoms to worsen where a 'harmless' pill (antibiotic) can solve the issue directly." Community members also reflected on the influence that social networks have on the issue of antimicrobial abuse, where a neighbor, family member or friend would prescribe the antimicrobial they have taken to those around them with similar symptoms. They further indicated that the lack of knowledge about antimicrobial resistance further increases the influence of social networks on the issue. Furthermore, the most common example provided by the participants in this study was related to mothers' tendency to provide their children with the same drug recurrently when having similar symptoms. Acquiring knowledge of best treatments from personal experiences with illness was reported as a justification for self-medication, especially in the absence of accessible and *affordable* healthcare institutions.

"Within us reside both a pharmacist and a physician… By our nature, we come to know the cure of some illness".

(Male participant from Saida Caza)

Economic status

Furthermore, a common and recognizable factor affecting patient's self-medication from the perceptions of community members and health professionals is to reduce treatment cost. Patient's financial constraints make it unfeasible to afford professional medical consultation fees. Community members also raised question marks regarding physician's choice of medication, stating that physicians would prescribe the "more expensive medication," reflecting the generic versus trade medications' cost difference. Members also expressed that their healthcare-seeking behavior would differ if they have healthcare coverage. Healthcare coverage schemes medications' would not refund medication fees unless accompanied by an official prescription. This further obliges those patients who have the coverage to visit their physicians unlike self-payers who find it easier and more cost-effective to visit the pharmacist in order to obtain the treatment.

The pharmacist is sometimes obliged to dispense one sheet out of the medication box; he thinks that unless he does that, the patient will remain ill".

(Male participant from Tripoli Cazaa).

Trusting the Pharmacist

People's attitude towards pharmacist's role in rationalizing antimicrobial drug abuse ranged between those who compared pharmacies to business models to others who revealed complete trust to pharmacists' academic and professional qualifications referring to them as "Doctors" or "Half doctors." Discussions, however, revealed the pattern of trusting pharmacists to be more prevalent than the latter. Members also expressed their assumed accuracy of pharmacist's diagnosis and their compassion with a person's "humble" economic conditions. Additionally, some mentioned that pharmacists have performed physical examinations, asked about the history of drug allergy, advised to conduct certain laboratory tests, or referred them to physicians. Perceiving the antimicrobial to be harmless and easily accessible had further played a key role in shaping public's attitude towards the pharmacists and the range of their role. Therefore, most have expressed complete satisfaction with the pharmacists' services, honored their image and described them as professionals providing patients with the efficient drug and the least price.

"He as a pharmacist has the knowledge to diagnose; he is authorized to do that after studying the chemical composition of the medications… unlike physicians, pharmacists don't market to medical companies and dispense their trade name medications".

(Female participant from Zahle Cazaa)

Mistrusting the Physicians

Some community members expressed lack of trust in physicians as a result of past personal experiences. The physician's negative image, according to some, is keeping the patients away from seeking the medical consultation. Examples that were mentioned were patient's dissatisfaction with the time their physician provided for the examination, making the diagnosis without ordering labs or other diagnostic tests/imaging, and recurrently prescribing the same antimicrobial drug. Both nurses and community members interviewed in this study blamed physicians accepting to prescribe/"market" drugs offered by pharmaceutical companies. Such companies were stated to provide financial and non-financial incentives to physicians to market their products. Although the quality of the medication was thought to be comparable, the price of the marketed drug was believed to be higher. Therefore, some stated that visiting the pharmacist to buy the medication directly saves physicians' consultation costs which were identified as 'additional' and 'unnecessary'.

"If we really want to talk about medical errors, a lot of doctors are not doctors; they bought their degrees through money…. but when I go to the doctor's office, I don't ask him about the school where he graduated" ".

(Male participant from Nabatieh Cazaa')

Health System related factors

The most commonly expressed health system related factor that worsens antimicrobial drug abuse and misuse was related to the pharmacist's unregulated scope of practice. Confusion regarding the role of pharmacists was not limited to the community members as some health

professionals were not aware of the presence of a law that penalizes the pharmacists for dispensing antimicrobial drugs without prescription. Ideally speaking, patients in a hierarchical health system would visit their respective professional practitioners and then intend to buy the prescribed medications from the pharmacy. However, in Lebanon, the majority of those who were aware that pharmacists are forbidden by law to dispense any kind of anti-viral or anti-bacterial drugs without a medical prescription reflected that the Lebanese socioeconomic situation forces these health professionals to empathize with people who can't afford medical consultations and breach the law.

"The government is the one permitting the pharmacist to dispense medications".
(*Participant* from Zahle Cazaa')

Perceived Solutions

Health care professionals and community members reflected upon the responsibility of all stakeholders to tackle this issue. When asked about possible recommendations, the most common answer was to propose health education campaigns, whether inside academic institutions, municipalities, social media, or any local institution.

One nurse expressed that the efforts to mitigate this issue remain individualized till now without any significant national intervention. As such, antimicrobial stewardship enforcement was recommended by both groups to optimize physicians' prescription patterns, encourage patients' education, and re-enforce the law that bans dispensing antimicrobial drugs without a prescription. Certainly, re-directing patient's use of antimicrobial drugs requires increasing the efforts to make healthcare more affordable and accessible, as voiced out by both groups as well. As such, targeting a decrease in antimicrobial drug abuse and misuse should be a continuum cycle of involving all the stakeholders, the Orders, physicians, nurses, pharmacists, hospital administrations, public health professionals, and community members.

"The strategy doesn't start down the road from the patient, but from the doctor himself and the ministry who should take the lead in making health more affordable and increasing its stewardship" Male participant from Abbasiye Caza

DISCUSSION

Interviews and focus groups identified several factors related to patients, physicians, pharmacists, and the current health system. The interconnectivity and complexity of those factors justify the wide prevalence of the various antimicrobial drug abuse and misuse patterns. In view of that, participants voiced out many recommendations to help mitigate the exacerbation of this problem in Lebanon.

Our study findings indicate that some community members actually realize the implication of antimicrobial abuse and misuse on human's health. Despite the fluctuations in the perceived severity of the antimicrobial abuse repercussions, less than half of the focus groups had an atmosphere that reflected on participants' perceived susceptibility to the abuse consequences. This variance in the perceived threat and its correlation with the difference in the individual's likelihood to misuse and abuse those medications is explained by health belief model [14]. Similar to the constructs of this model, participants' low perceived susceptibility to resistant infections in our study played a critical role in shaping their medication consumption patterns. The

aforementioned misuse and abuse patterns emulate an unsound culture of health. A clear illustration of this culture in our study is the justification of mother's misuse patterns with the argument of having experience with the drug usage. This is consistent with the systematic review done by Bosley et al. which states that many mothers living in Asia and the Middle East expected and purchased antibiotic directly from the pharmacy based on their past experiences [15].

This pervasive culture that encourages misuse of antimicrobial drugs is further worsened by patients' easy accessibility of medications; unaffordability of medical consultation and absence of enforced laws. Although these results are comparable to other studies in the Middle East, they further demonstrate an appealing and honored image of pharmacists from the perception of the community members [16]. In contrary to studies which illustrate that seeking pharmacists is a consequence of harsh economic conditions [8], our findings further prove that many participants believe that the academic and professional qualifications of those healthcare professionals authorize them to diagnose 'simple infections' and to dispense antimicrobial drugs without a prescription. The positive public perception of the pharmacists strengthens prior findings by Mouhieddine et al (2015) who confirmed that about half of citizens in Beirut purchase medications from pharmacies directly and believe that physician's consultation is not always necessary [17].

Perhaps in Lebanon, the poor relationship of *some* patients with their physicians is affected by the absence or low levels of health education provided to them. However, it is arguable that any misconception about the role of any practicing health professional is supporting a stronger image of the pharmacists. Knowing that those health professionals represent 'gateway' for many patients who can't afford general practitioners, it may be judicious to follow the steps that United Kingdom have proposed recently through a pharmacist-based AMR strategy [18]. The suggested plan was to allow pharmacists to implement immunization programs, provide simple diagnostic tools for identifying bacterial infections, advice patients with recurrent infections, among other tasks [18]. However, working cooperatively with the pharmacists to improve antibiotic use should certainly be accompanied by antimicrobial stewardship policies. Stewardship programs direct health care professionals into optimizing antimicrobial drug use within their institutions in order to reduce the negative outcomes associated with misuse and abuse [19]. In our contexts specifically, the implementation of such programs may help improve the trust between the patients and their providers, especially if they were knowledgeable about that a monitoring system is overseeing the practice of physicians.

This study further shows poor enforcement of the current law which penalizes dispensing antimicrobial drugs without a prescription. Many community members and nurses were unaware of any existing laws that govern antimicrobial prescription. Although the efficacy of enforcing such policies in improving antimicrobial drug use and its accompanying costs and outcomes is certainly incontrovertible, several studies claim that pharmacists are to be blamed for not applying it [5, 11]. However, looking into this issue from the lens of lay audience and nurses, we realize that public awareness about the legal aspect of such practices may be a possible influencer in future campaigns targeting misuse and abuse.

Winning the battle against antimicrobial resistance requires action at the highest levels to ensure proper stewardship. The Lebanese Ministry should take the lead in creating a national inter-sectorial task force and to allocate sufficient resources for the execution of interventions aiming to raise awareness on the issue of abuse and misuse.

POLICY RECOMMENDATIONS

In line with the findings of this study, any designed strategy should not be limited to patients but rather encompass recommendations that target physicians, pharmacists, nurses, media, as well as governmental organizations. Accordingly, efforts should be exerted to promote behavioral change through the inclusion of this subject in public communication programs, strengthening surveillance and research, enhancing primary prevention measures, optimizing antimicrobial medicine use, collecting relevant data, setting regulative policies, and encouraging the use of diagnostic tools [2].

Altering physician's prescribing habits adds significant value to initiatives that aim to combat antimicrobial drug abuse and misuse. To achieve this goal, one of the most effective interventions is distributing educational materials which target the physician's knowledge and aim to influence their overall prescribing habits [20]. However, improving the patient-provider communication scheme represents another promising tool [21]. This tool is essential in our contexts where several participants expressed dissatisfaction with physician's services. Therefore, improving physician's communication skills will help develop better patient-provider relationship and will pose a significant impact on their diagnosis which primarily depends on subjective data [21].

Likewise, reducing the overall occurrence of infections requires proper identification for the scope of practice of the Lebanese pharmacists [22]. Defining the role of those professionals will facilitate the enforcement of the Lebanese policy that penalizes dispensing antimicrobial drugs without medical prescriptions. Defining the role of pharmacists and launching national education campaign will altogether influence people's attitudes towards those professionals and their current practices.

Overall, an effective epidemiologically sound community-based surveillance is an essential component of any future strategy since it will contribute to understanding more about AMR and prioritizing the nation's objectives in combating it. An important step that can feed into the surveillance is launching an antimicrobial resistance office within the Ministry of Public. Comparable to United States ACT, this office may also be given the charge of obtaining human antimicrobial drug consumption data [23]. As such, it can play the role of focal point between the different departments inside the ministry and with other relevant sectors and institutions locally and internationally such as World Health Organization, the Lebanese Society of Infectious Diseases, Syndicate of Hospitals, Order of Nurses, Order of Physicians, Order of Pharmacists, Ministry of Social Affairs, Ministry of Environment, and research institutions.

In the last decades, antimicrobial drug resistance is becoming more recognized given the increase in the armamentarium of those drugs [24]. Perhaps, without intervening to alter these trends, the world will have to witness a post-antimicrobial era. As illustrated in this study,

"*everyone is responsible*" and perhaps the only way to witness a glimpse of hope would be to target all of the different stakeholders.

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Appendix

Appendix 1: Stratification Strategy

	Mohafazat (district)	Cazas (sub-district)	Sub-districts picked randomly	Total
1	Beirut	_	Beirut	0
2	Mount Lebanon	Jbeil	Maten & Chouf, Baabda	2
		Kserwen		
		Maten		
		Shof		
		Aley		
		Baabda		
3	North Lebanon	Tripoli	Batroun & Tripoli	2
		Miniyeh-Danniyeh District (Miniyeh)		
		Zgharta		
		Koura		
		Bsharre		
		Batroun		
4	Akkar	Akkar	Akkar	1
5	South Lebanon	Saida	Tyr & Saida	2
		Jezzine		
		Tyr		
6	Bekaa Valey	West Beqaa	Rachaiya & Zahle	2
		Rashaya		
		Zahle		
7	Baalback-Hermel	Baalback	Baalback	1
		Hermel		
8	El Nabatieh	Bint Jbeil	El Nabatieh & Bent Jbeil	2
		Hasbaya		
		Marjeyoun		
		El Nabatieh		

Appendix 2: A Proposed Strategy

Physicians	- Train physicians on good communicating skills techniques to address the benefits and risk of antimicrobial drug use with patients - Educate physicians on the newest guidelines related to infectious diseases through conferences, workshops and by giving printed education materials that they can refer to when needed - Set incentives for physicians to use generic drugs when possible and to properly prescribe antimicrobial drugs according to the newest guidelines and using delayed prescription - Supervise the work of physicians and ensure that they are basing their diagnosis on appropriate laboratory and radiological tests - Establish annually a forum for discussion about the issues related to antimicrobial drug abuse
Public	- Encourage patients to discuss with their physicians the pros and cons of antimicrobial use in order to ensure appropriate informed base health decisions. - Establish AMR task force that aims to encourage and plan for activities that raises awareness among the public on the appropriate use of antimicrobial drugs and the negative consequences of the abuse - Strengthen the law that restricts or bans traveling to Lebanon with antimicrobial drugs and without clear medical prescription and labeling on the medication box.
Pharmacists	- Establish a task force that monitors antimicrobial Use in pharmacies and dispensaries in accordance with the law number 2363 - Establish a clear scope of practice for the community pharmacist and ensure their active participation in committees, events, and strategies that target AMR
Nurses	- Empower nurses to be proactive in discussing antimicrobial drug therapy with the physicians and the patients - Including nurses as part of any multi-disciplinary team working to combat AMR
Ministry of Public Health	- Strengthen antimicrobial drug stewardship to ensure adequate provision of medications throughout Lebanon. - Increase collaboration between the Ministry of Public Health and the Lebanese Order of Physicians to assist physicians in establishing prevention and treatment guidelines and ensure easy accessibility to those guidelines through the ministries' website.

	- Ensure effective communication between the different departments in the Ministry of Public Health with other relevant sectors - Launch antimicrobial resistance office (ARO) within the Ministry of Public Health to strengthen surveillance and develop a network of sentinel surveillance. - Subject the pharmacists who dispense antimicrobial drugs without a medical prescription to strong penalties under the national law number 2363 - Support the introduction of electronic databases in local hospitals, laboratories, and primary healthcare centers in order to produce surveillance reports in a timely manner and support the identification of resistant trends among pathogens. - Set an obligation for anyone who dispenses antimicrobial drugs to document the used doses - Build a national referral laboratory testing for microbiological tests conducted in private laboratories. - Standardize microbiological methods, techniques, guidelines, and breakpoints that could feed into a national electronic surveillance system and conduct yearly analysis of those reports