

## Are pharmacists' good knowledge and awareness on antibiotics taken for granted? The situation in Albania and future implications across countries

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### Abstract

**Objectives:** Irrational use of antibiotics is a major driver of antimicrobial resistance (AMR), exacerbated by dispensing of antibiotics without a prescription especially for typically viral infections. Such dispensing is common despite legislation. Pharmacists play a key role advising on medicines especially in countries where most patients seek pharmacist help as they cannot afford both physician fees and medicines. Consequently, the objective was to ascertain skills and knowledge of pharmacists regarding antibiotics when patients present to them with typically viral infections.

**Methods:** Qualitative cross-sectional survey among 370 community pharmacists in Albania. Topics carefully selected and validated. Main outcome measure was current knowledge of antibiotics and current legislation. **Results:** Variable knowledge regarding antibiotics among community pharmacists. 54% knew colds are caused by viruses and 93% that antibiotics are ineffective against influenza. However, 18% believed if colds last for more than 4 days an antibiotic can bring a patient back to work, and only 13% stated antibiotics are ineffective against viruses. Encouragingly, 92.5% knew penicillins can cause anaphylactic shocks, 74% that antibiotics kill bacteria that cause infections and only 7% that antibiotic misuse cannot cause AMR. However, 13% stated the main disadvantage of antibiotics is they are ineffective against viruses and 93% admitted they had no treatment protocols to consult in their daily work to direct patient care. **Conclusion:** Encouraging signs regarding pharmacists' knowledge of antibiotics in Albania; however, concerns. Instigating educational programmes among patients and pharmacists and greater enforcement of legislation should reduce AMR rates in Albania and across countries.

## 1. Introduction

Whilst antibiotics have been life saving, the threat of growing resistance rates is becoming a global public health challenge, enhanced by substantially increasing use of antibiotics (1-4). Antimicrobial resistance (AMR) increases morbidity, mortality and costs (1, 2), with ongoing global, regional and national initiatives to address rising AMR rates (1, 2). These include measures and initiatives to reduce inappropriate prescribing and dispensing of antibiotics for acute respiratory tract infections (ARIs), which are the most common infections in the community and with up to 95% viral in origin (2, 4-6).

Apart from increasing AMR, over use of antibiotics also increases adverse drug reactions (1). Over use of antibiotics can occur where there is self-purchasing of antibiotics, whether legal or not. Consequently, reducing inappropriate self-purchasing, which is common in many parts of the world (1, 3, 5-13), is essential to reduce AMR rates. There are particular issues in low and middle income countries where access to medical care can be limited, difficult to access and costly, and there can be concerns with physician trust (3, 5, 7, 14). As a result, encouraging patients to self-medicate or seek help from professionals such as pharmacists, thereby reducing physician fees (3, 9, 10, 15). Pharmacists are expected to play a key role with enhancing the appropriate use of medicines (3, 16, 17), which includes providing appropriate advice for minor ailments such as coughs and colds and reducing unnecessary self-purchasing of antibiotics that still occurs. This especially in countries such as Albania and the Republic of Srpska where pharmacists are seen as the most common source of information regarding medications (12, 18).

Concerns that patients are not getting the appropriate advice have resulted in key organisations urging pharmacists to undertake activities to reduce inappropriate dispensing of antibiotics (19, 20) (Table 1).

Table 1 - Suggested activities of pharmacists to reduce AMR (adapted from references [19,20])

FIP	<ul style="list-style-type: none"> <li>• Patients should be given proper counselling as well as provided with written information that is appropriate when dispensing antibiotics. This includes recommending treatments other than antibiotics for minor conditions such as a common cold or a sore throat</li> <li>• Pharmacists should encourage patients to comply with the full prescribed regimen when dispensed. They should also work with physicians to ensure patients complete their prescribed/ dispensed course of treatment</li> <li>• Pharmacists should also monitor the supply of antibiotics as well as become actively involved in promoting hygiene and infection control across health care settings</li> </ul>
WHO Europe	<ul style="list-style-type: none"> <li>• Pharmacists are seen as an essential player in the health system, which increasingly includes the funding of pharmaceutical care services</li> <li>• Whilst pharmacists increasingly take a role in providing relevant information to patients to enhance their compliance with a prescribed course of medicine, there is room to improve the extent and quality of information given to them</li> <li>• Pharmacists should encourage the prudent use of antibiotics, taking full advantage of their position as an effective liaison between prescribers and patients, as well as often being the first contact between patients and healthcare systems. As a result, help reduce AMR</li> <li>• Patients should be appropriately counselled on the need for and use of antibiotics particularly for minor ailments to reduce adverse effects as well as the consequences of incomplete dosing and growing AMR rates</li> </ul>

Studies have shown that total antibiotic use in Albania varied between 21 to 24 defined daily doses per one thousand inhabitants per day (DIDs) between 2011 and 2014 (17, 21), which was relatively high compared with a number of other Southern and Eastern European countries as well as former Soviet Union Republics (21, 22). This is not helped by high rates of self-purchasing of antibiotics in Albania (78% - 80%) despite current legislation (11). Having said this, currently one third of Albanians are not covered by health insurance. Consequently, whilst encouraging greater enforcement of the

legislation to reduce self-purchasing of antibiotics (11), it is important that pharmacists in Albania give appropriate advice when patients seek care for self-limiting ARIs (Table 1), building on examples in other countries (18). However, there are concerns about the level of education of pharmacists regarding antibiotics (23).

In view of this, there is an urgent need to research whether pharmacy professionals in Albania have the necessary skills to dispense antibiotics appropriately without a prescription. The findings will help shape future educational initiatives among pharmacists in Albania. In addition, whether there is a need to change or re-enforce current laws to improve future antibiotic utilization.

We believe this is the first time that such research activities have been undertaken among Balkan countries. Consequently, we believe our findings will be of interest to the authorities in Albania as well as other countries with similar rates of self-purchasing and co-payments. In view of this, the aim of this study is to analyze pharmacists' knowledge, perception and attitudes towards the dispensing antibiotics without a prescription in Albania.

## **2. Materials and Method**

### *2.1 Study design and setting*

A qualitative cross-sectional survey was conducted across all regions of Albania. The survey included only pharmacists practicing their profession in community pharmacies, who were members of regulatory bodies including the National Center of Licensing (24), which is obliged to register all pharmacies practicing in Albania (25).

### *2.2 Sampling*

A random sample of community pharmacists practicing were targeted. The sample size was determined based on a confidence limit of 95% and a precision measure of 5%, calculated with Open Epi Version 3.01. With the database of the Pharmacist's Order of Albania showing there were 2400 community pharmacists currently practicing, a sample size of 370 pharmacists was considered adequate for the study.

### *2.3 Questionnaire*

The questionnaire, which was created and analyzed in Epi Info 7.1.3.10 software, was based on a literature review of similar qualitative interviews. The initial content was subsequently validated among three pharmacists and one infectious diseases physician to make sure the questions were clear, meaningful and not too long. Following this, a pilot study was conducted among 20 pharmacists to identify any problems including any ambiguity or concerns with any question, and these were addressed before administering the final questionnaire. The study took place between January to June 2014.

The final list of topics, which were divided into different components, which included:

- Professional knowledge: questions were selected based on the most used antibiotic classes and the pharmacists' knowledge on the use and side effects of different antibiotics
- Regulation knowledge: Evaluation of pharmacists' knowledge of pertinent legislation regarding prescription procedures, if Albanian pharmacists had any information about treatment protocols and also regarding prescription regulations of executing and drug dispensing
- Attitudes regarding dispensing antibiotics without a prescription: Pharmacist's opinion and attitudes towards dispensing without prescription and understanding motives behind dispensing without prescription if this happens
- Opinion on the quality of prescriptions: Pharmacist opinion/judgment about the quality of prescription presented at their pharmacies.

The study was approved by the Faculty of Medicine, University of Medicine Tirana. The questionnaire was anonymous and verbal consent was elicited among all pharmacists before starting the questionnaire.

### 3. Results

#### 3.1 Pharmacist characteristics

A total of three hundred and seventy pharmacists took part in the study, with 319 pharmacists eventually completing the survey. The majority were female (88,4%) aged between 24 and 30 years (42.3%) or 31 to 40 years (32.3%) and from the capital town, Tirana (73.4%). Pharmacists with less than 5 years of experience were the largest group, comprising 31.3% of the participants.

#### 3.2 Pharmacist's knowledge about antibiotics and activities

Most pharmacists (74%) knew that antibiotics will kill the bacteria that cause infections, with 93% knowing that antibiotics were not effective against seasonal influenza with a similar number knowing that penicillins can cause anaphylactic shock (Table 2). However, only 13% stated that the main disadvantage of antibiotics is that they are ineffective against viruses. Other key components of knowledge including potential side-effects with antibiotics are captured in Table 3.

Table 2. Pharmacist's knowledge about antibiotics

	Total Frequency (n)	Percent
<b>Antibiotics are not affective against which of the following pathogenic agent?</b>		
Bacteria	14	4.4%
Fungi	102	32.0%
Parasites	120	37.6%
Viruses	83	26.0%
<b>Besides people, which animals are subject to exposure to antibiotics for therapeutic treatment purposes?</b>		
Rodents / laboratory rats	208	65.2%
Wildlife animals	8	2.5%
Farm animals	97	30.4%
Reptiles, cold-blooded animals	6	1.9%
<b>Which of the following does not represent a mechanism of action for antibiotics?</b>		
Damaging the bacteria DNA	83	26.0%
Inactivate the bacteria in the host tissues	176	55.2%
Prevents bacteria propagation	30	9.4%
Interferes with cell wall formation	30	9.4%
<b>Which of the following act by inhibiting protein synthesis?</b>		
Ciprofloxacin	76	23.8%
Flucloxacillin	36	11.3%
Chloramphenicol	107	33.5%
Trimethoprim	100	31.3%
<b>Which of these antibiotics is the main cause anaphylactic shock?</b>		
Amoxicillin	2	0.6%
Ceftazidime	13	4.1%
Gentamycin	9	2.8%
Penicillin	295	92.5%
<b>Antibiotic misuse cannot cause:</b>		
Serious side effects	17	5.3%
Stopping bacteria growing	183	57.4%
Antibacterial resistance	22	6.9%

Increase cost of treatment	97	30.4%
<b>The use of antibiotics is not effective in which of the following cases?</b>		
Seasonal flu	298	93.4%
Urinary tract infections	1	0.3%
Skin infections	19	6.0%
Ear infections	1	0.3%
<b>What is the main disadvantage of antibiotics, the elimination of which researchers are seeking solutions to increase their selectivity?</b>		
Antibiotics are ineffective against viruses	41	12.9%
Antibiotics have side effects	26	8.2%
Prolonged use causes antimicrobial resistance	122	38.2%
Cannot distinguish between good bacteria and bad	130	40.8%
<b>Which of the following is true?</b>		
Antibiotics have no side effects	16	5.0%
Antibiotics increase immunity	36	11.3%
Antibiotics cause diarrhoea and vomiting	32	10.0%
Antibiotics kill all bacteria that cause infection	235	73.7%
<b>Which of the following is true?</b>		
Augmentin causes hepatic disease in men	45	14.1%
New Classes of antibiotics are discovered every year	129	40.4%
Macrolides do not cause hepatotoxicity	127	39.8%
Hepatitis A is treated with ciprofloxacin	18	5.6%

### 3.3 Evaluation on legislation and guidance on antibiotic use

More than half of pharmacists knew that colds are caused by viruses and cannot be treated with antibiotics, although the majority (93%) had previously stated that antibiotics are not effective against seasonal influenza (Table 2). Few pharmacists (5%) believed that patients asking for antibiotics without a prescription does not affect the rate of growth of AMR (Table 3). However, 18% believed that if a cold lasts for more than 4 days an antibiotic can bring a patient back to work, with 13% believing a high temperature and sweating can be prevented by broad spectrum antibiotics (Table 3). A concern is that the majority of pharmacists (58%) admitted they were unaware of treatment protocols potentially involving antibiotics, with 93% admitting they had no treatment protocols to consult in their daily work (Table 3). 11% of pharmacists also believed antibiotics should be given without a prescription.

Table 3. Evaluation on treatment knowledge and dispensing

Questions and replies	Frequency (N)	%
<b>According to you, which among the following factors does not affect the rate of growth of antimicrobial resistance?</b>		
Not respecting physician recommendations when taking antibiotics	14	4.4%
Patient asks for antibiotics without prescription	17	5.3%
Patient does not take any antibiotics	263	82.4%
Patient chooses the preferred antibiotic	22	6.9%
<b>Which of the following options about inappropriate use of antibiotics is right?</b>		
When cold lasts more than 4 days, use of antibiotics can bring the patient back to work	56	17.6%
Colds are caused by viruses, and cannot be treated with antibiotics	173	54.2%
Money can be saved when using left-over antibiotics	35	11%
High temperature and sweating can be prevented if broad spectrum antibiotics are used	42	13.2%
<b>Do you know what treatment protocols are?</b>		
Yes	130	42.3%
No	184	57.7%
<b>Do you have the treatment protocols?</b>		
Yes	22	7%
No	294	93%
<b>Should antibiotics be given without prescription?</b>		
Yes	34	10.7%
No	283	89.3%
<b>A patient comes to your pharmacy asking for 3 tablets of co-amoxiclav what do you do?</b>		
It happened, I sold them advising them how to use the antibiotic.	106	33.2%
It happened, I didn't give them, warning about the effects	155	48.6%
It didn't happen but I would give them advising how to use the antibiotic.	35	11%
It didn't happen, but I wouldn't give them warning about the effects.	21	6.6%
<b>Are there antibiotics that can be given without prescription?</b>		
Yes	55	17.4%
No	262	82.6%
<b>A patient appears in your pharmacy to return some leftover antibiotics unused from a previous therapy:</b>		
It happened, but I didn't take them	248	77.7%
It happened and I took them	27	8.5%
It happened, but I wouldn't take them	10	3.1%
It didn't happen, but I wouldn't take them	32	10%

When asked how they would react if a patient presented to their pharmacy asking for 3 antibiotic tablets, for example 3 co-amoxiclav tablets, nearly half (49%) stated that such an event has happened but they didn't give the patient antibiotics explaining about their risks. However, a third had dispensed antibiotics advising patients on their use (Table 3). 78% stated that they would not take leftover antibiotics from previous treatment courses.

Over 70% of pharmacists agreed that if they did not give to the patient antibiotics without prescription, they will turn to the nearest pharmacy to get them.

### 3.4 Pharmacist's opinion and attitudes in critical antibiotics dispensing cases

The majority of pharmacists (81%) had concerns that antibiotics appear not to be prescribed in the right way, with the greatest threat coming from physicians (69%). There are also concerns with self purchasing based on current pharmacists' experience (31%) (Table 4).

Table 4. Pharmacist's opinion and attitudes in critical antibiotic dispensing cases

Questions and replies	Frequency (N)	%
According to the prescription coming to your pharmacy, are antibiotics prescribed in the right way?		
Yes	60	19.4%
No	257	80.6%
Analyzing the quality of the antibiotic prescriptions coming to your pharmacy, do you think that the bigger threat is due to:		
Giving antibiotics without prescription only based on pharmacists' experience	110	31.3%
Antibiotics prescribed (dose, form...) from general practitioners	219	68.7%

## 4. Discussion

We are aware that published studies have assessed community pharmacists' attitudes towards antibiotic dispensing, microbial resistance and their misuse, knowledge and attitudes towards URTIs as well as dispensing antibiotics without a prescription (3, 9, 26-28). However, we believe this is one of the first studies to comprehensively test pharmacists' knowledge regarding all aspects of antibiotic use across key domains, particularly important in countries with high rates of self-purchasing.

This study showed variable knowledge among community pharmacists. Encouragingly, the majority (93%) knew that antibiotics are ineffective against influenza and that penicillins can cause anaphylactic shock, with three quarters believing antibiotics kill bacteria that cause infections and just over half that colds are caused by viruses and should not be treated with antibiotics (Table 2). In addition, only 7% believed antibiotic misuse cannot cause AMR and 5% that antibiotics have no side effects. This compares favourably with Eslami *et al* where 86% of pharmacists in Iran gave correct responses when URTIs persist after 10 to 14 days and more than half believed most are viral in origin (6). However, an appreciable improvement when compared with pharmacists in India who had very limited understanding of AMR (14) and favourably with Vietnam where in only 36% of occasions did pharmacists provide advice on the management of ARIs in children in accordance with national guidelines (29), and generally drug sellers' knowledge of antibiotics and AMR was low (10). Similar concerns were also seen in China (3).

However, only a minority of pharmacists in our study stated antibiotics are not effective against viruses, their prolonged use causes AMR and that antibiotics cannot cause serious side-effects. The latter is perhaps not surprising as generally there was limit knowledge about the side-effects of antibiotics in our study. This is similar to Ahmad *et al* who also showed limited knowledge about antibiotics and AMR among pharmacy students (23), with similar concerns among pharmacy students in Pakistan (5).

Encouragingly, a high percentage of pharmacists stated they should not dispense an antibiotic without a prescription (Table 3), comparing favourably with other similar countries (3, 7, 14, 16, 29) However, there were concerns with a third of respondents admitted selling even just 3 co-amoxiclav tablets.

There are also concerns about the lack of any protocols among pharmacists to direct the treatment of patients with infections presenting to pharmacists in Albania. This is unlike the Republic of Srpska, Bosnia and Herzegovina, where 'The Guideline for counselling patients in the pharmacy' booklet was launched in 2013 to aid pharmacy personnel in making appropriate decisions and giving advice (18).

As a result, we believe there are a number of potential ways forward for the authorities and other key organisations in Albania to enhance the rational use of antibiotics. These include:

- Initiate campaigns to sensitize patients on the optimal use of antibiotics as well as educate them that ARIs are mainly viral in origin, similar to other countries (2, 4). This is particularly important for patients with lower and middle education as they are the most likely to try and self purchase antibiotics (12, 14, 16, 26). This year for the first time in Albania (2016/ 2017), a small campaign targeting pharmacists and patients has been undertaken in community pharmacies, including a poster with advice on how to use and dispense antibiotics
- Evaluating the impact of the current campaign targeting pharmacists and patients in Albania to guide future initiatives
- Appraising the content of current educational programmes among pharmacy students, as well as among community pharmacists in Albania to address information gaps highlighted in our study
- Develop treatment protocols with key stakeholder groups surrounding the optimal management of community infections
- Greater enforcement of the legislation regarding illegal selling of antibiotics without a prescription (3, 9, 11). This has worked well in other countries (2, 13), and could include fines for inappropriate dispensing as seen for instance in the Republic of Srpska (18). The new online prescription system, "e-Prescription" (30), coupled with the new fiscal reforms, should facilitate the tracking of antibiotics sold illegally in Albania, as well as track current prescribing practices to address concerns
- Further education among physicians to address concerns
- Reserve particular second line antibiotics for hospital use only

There are limitations with this study including the fact that not all pharmacists who agreed to take part completed the questionnaire. In addition, most respondents were from the capital city, Tirana. However, the majority of community pharmacists in Albania work in Tirana. In addition, we employed a robust methodology for the questionnaire and sample size. We accept though that pharmacists may not be fully truthful in their replies as the responses are declarative and not checked. Consequently, the findings may be worse than seen. Despite these limitations, we believe based on an 86% response rate that our findings are valid and may be of interest to countries outside of Albania with similar characteristics.

## **5. Conclusions**

There was variable knowledge about antibiotics among community pharmacists in Albania. This coupled with the lack of treatment guidelines, current high rates of self-purchasing of antibiotics, as well as concerns with physician prescribing habits, will increase AMR rates unless addressed.

Potential initiatives to improve future dispensing of antibiotics in Albania could include updating pharmacists' professional knowledge building on examples in countries including the Republic of Srpska. In addition, educating the public not to expect an antibiotic for self-limiting diseases, building on recent campaigns. Additional measures to reduce self-purchasing could also include fines for pharmacists for any illegal selling of antibiotics.

The vital role that antibiotics play in reducing morbidity and mortality, coupled with patient safety, should be at the forefront of interactions between patients and community pharmacists as part of ongoing antimicrobial stewardship programmes. Such considerations should reduce the need to dispense antibiotics for suspected viral infections. Such activities will maintain, or even grow, the position of community pharmacists as a key stakeholder in improving the health of patients in Albania. These are plans for the future.

## **Ethical considerations and conflicts of interest**

The questionnaire was anonymous and verbal consent was elicited among all pharmacists before starting the questionnaire. The study was performed voluntarily by the researchers with no external funding. Overall:

- Funding: None



- Conflicts of interest: None
- Ethical approval: Not required

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