Ф А 2.2.1-32-367

MINISTRY OF HEALTH OF UKRAINE

NATIONAL UNIVERSITY OF PHARMACY

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QUALIFICATION WORK

on the topic **«ANALYSIS OF THE REASONS FOR IRRATIONAL USE OF ANTIBIOTICS IN THE WORLD»**

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Kharkiv-2024 year

ANNOTATION

The qualification work presents the results of the analysis of the problems of antibiotic resistance, due to the excessive and irrational use of antibiotics. An analysis of the classification database «AWaRe» was carried out depending on the conditions of their application. An analysis of the legislation on antibacterial drugs was carried out, as well as a sociological survey of pharmacy visitors. The work is presented on 51 pages and consists of 3 sections, general conclusions and a list of references, which consists of 42 sources. The results of the research are illustrated by 8 tables and 20 figures.

Key words: antibiotics, antibiotic resistance, classification, pharmacy, pharmacist, client.

АНОТАЦІЯ

В кваліфікаційної роботі представлени результати аналіза проблем антибіотикорезистентності, через надмірне і нераціональне використання антибіотиків. Проведен аналіз класифікаційної бази даних «AWaRe" залежно від умов їх застосування. Проведено аналіз законодавства Мороко щодо антибактеріальних препаратів, а також соціологічне опитування відвідувачів аптек. Робота представлена на 51 сторінках та складається з 3-х розділів, загальних висновків та списку використаної літератури, що складається з 42 джерел. Результати досліджень проілюстровані 8 таблицями та 20 малюнками.

Ключевые слова: антибіотики, антибіотикорезистентность, классификация, аптека, фармацевт, клієнт.

CONTENTS

ABBREVIATIONS

AwaRe - Access, Watch, Reserve

AMC - Antimicrobial medicines consumption

AMU - Antimicrobial medicines use

AMR – Antimicrobial resistance

EML - essential medicines list

EMA - European Medicines Agency

EU - European Union

GLASS - Global Antimicrobial Resistance Surveillance System

HIV - Human immunodeficiency virus

LMIC - Low - and middle - income countries

MP - Medical Products

NHS - National Health System

NCDs - Non-communicable diseases

PC - Pharmaceutical Care

SDGs - Sustainable Development Goals

USA - United States of America

WHO - World Health Organization

INTRODUCTION

Relevance of a subject. The discovery of antimicrobials was one of the most important pieces of information for medicine in the 20th century. These drugs have made it possible since the 1940s to effectively control and treat diseases previously considered fatal (including tuberculosis, bacterial pneumonia and sepsis), which has led to significant improvements in survival and patient health. The widespread use of antibiotics has become a powerful weapon against infectious pathogens and has made bacterial diseases curable. However, every year the ability of the human body to resist microbes decreases due to a decrease in their sensitivity to antibiotics.

The magnitude of the problem has attracted the attention not only of health professionals such as doctors, pharmacists and scientists, but also of all humanity. After all, antibiotic resistance poses a threat to the effective prevention and treatment of patients with infections, the number of which is constantly growing.

New antibiotics are still being developed, but unfortunately, none of them will be effective against the most dangerous forms of antibiotic-resistant bacteria. According to the researchers, within 6 months after the release of a new antibiotic on the market, a resistant bacterium appears to it [31]. Therefore, it is very important that the population and health workers have the level of knowledge that would allow them to understand the full danger of the irrational use and prescription of antibiotics and take this problem responsibly.

At the end of 2022, the UN General Assembly stated that antibacterial resistance had become a serious threat to human health. According to WHO estimates, if the necessary measures are not taken, then by 2025 a significant part of antimicrobials will lose their effectiveness, and by 2050, mortality due to antibiotic resistance could reach 10 million people annually [42].

To achieve the put purpose the following **tasks** of the research were definite:

- to analysis of the current situation with the circulation of antibacterial drugs;

- to study of the role of the pharmacist in promoting the judicious use of antibiotics and preventing antimicrobial resistance;
- to analysis of modern problems of dispensing antibiotics from pharmacies in Morocco.

The subject of the study: consumption level of antibacterial drugs in the world, scientific information about classification of antibiotics, opinion of pharmacy consumers regarding irrational use of antibiotics and tendency to self-medicate with antibacterial drugs.

The objects of the study. Special literature, international legislative framework and regulations of Morocco regulating the sale of antibiotics from pharmacies. Reports and analyzes are presented on the WHO and FIP websites, as well as on the websites of other international organizations and agencies. Questionnaires that were used in a sociological survey of the population.

Methods of researches: historical, logical, statistical, survey, structural analysis.

The practical value of the work. The results study of consumption of antibiotics in different countries and survey results pharmacists can be used in the study of antibiotic resistance.

Scientific novelty. Research carried out at a sufficient level using appropriate methods research.

Structure and volume. The qualification work consists of the introduction, three chapters, conclusions and the list of references.

CHAPTER 1. ANALYSIS OF THE CURRENT SITUATION WITH THE CIRCULATION OF ANTIBACTERIAL DRUGS

1.1 Definition of antibiotics, their classification

Antibiotics became the biggest therapeutic advance in medicine in the second half of the 20th century [8]. They have been able to save countless lives that were threatened by previously fatal infections. Antibiotics come from the Greek word (vital) - substances of various chemical nature, produced by microorganisms (bacteria and fungi), capable of killing or suppressing the growth of other microorganisms or malignant tumors of a multicellular organism.

Regarding the origin of antibiotics, there are two opposing opinions. Some scientists believe that bacteria need antibiotics as a means of combating competitors. After all, most antibiotics are produced by microorganisms living in the soil. According to other scientists, antibiotics are waste, metabolic errors, of which bacteria have a lot. Antibiotics include substances of natural and artificial origin with antibacterial properties.

Historical reference

In 1942, Selman Waxman coined the term "antibiotic" for substances that are produced by microorganisms and inhibit the growth or kill other microorganisms, even in low concentrations. Hence, the term antibiotic is used to refer to antimicrobial agents or substances derived from natural or synthetic sources that attenuate the growth or kill microorganisms through specific interactions with bacterial targets without harming the eukaryotic host that contains the pathogen.

Various studies on antibiotics and their effects in treating the dreaded infections began in the late 1800s. French physician Ernest Duchesne noted that mold from the genus Penicillium inhibits the growth of bacteria. The first antibiotic, penicillin, was isolated by A. Fleming in 1929 from the microscopic fungus *Penicillium notatum [8]*. On an industrial scale, the substance began to be produced during World War II.

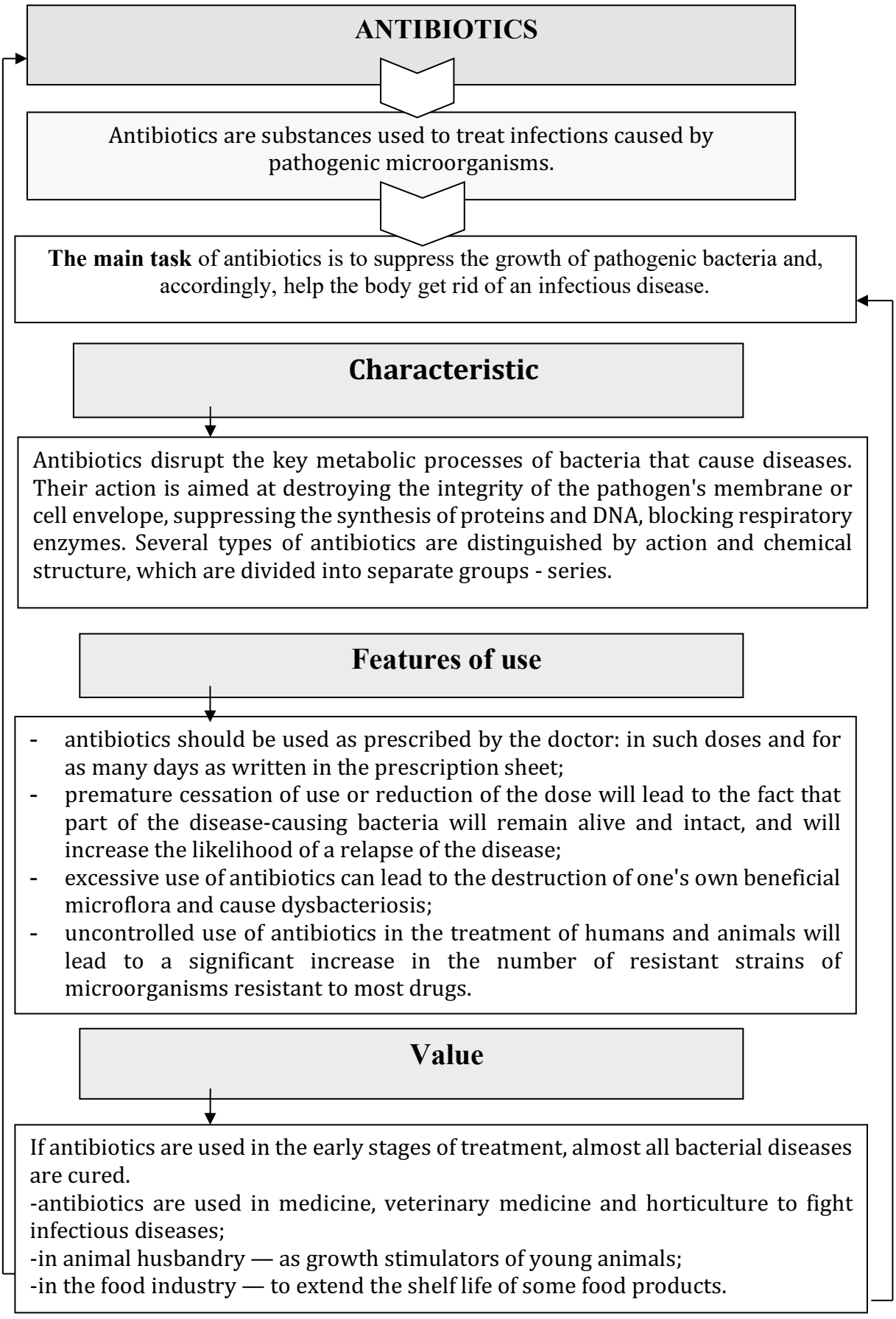

Fig.1.1 Characteristics of the main parameters of antibiotics

Categories of antibiotics

Antibiotics are antimicrobial substances that resist bacteria. They are antibacterial agents and are widely used to prevent and treat bacterial infections. Formally, the term "antibiotics" refers only to those substances that are produced by microbes. Therefore, antibacterial or antimicrobial agents such as sulfonamides, quinolones, and trimethoprim are not antibiotics. Antibiotics kill bacteria and prevent them from multiplying and spreading in the body. However, they are not effective against viral infections.

The classification of antibiotics is based on various criteria. Antibiotics are grouped into classes based on their chemical structure. However, antibiotics in each class often affect the body differently and are effective against different bacteria. There are different classes or groups of antibiotics that depend on their chemical structure. Some classes of antibiotics include the following in table 1.1.

Table 1.1

Classification of antibiotics by chemical structure

Class	**Examples**
Penicillins	amoxicillin (Amoxil)
Macrolides	azithromycin (Zithromax) and erythromycin (Ery-Tab)
Cephalosporins	cephalexin (Keflex) and cefdinir (Omnicef)
Fluoroquinolones	ciprofloxacin (Cipro) and levofloxacin (Levaquin)
Beta-lactams with increased activity	amoxicillin/clavulanate (Augmentin)
Urinary anti-infectives	nitrofurantoin (Macrobid)
Lincosamides	clindamycin (Cleocin)
Tetracyclines	minocycline, rolitetracycline, and doxycycline
Sulfonamides	sulfamethoxazole (Bactrim, Septra, Sulfatrim)
Glycopeptides	vancomycin (Firvanq), teicoplanin (Targocid), telavancin (Vibativ), ramoplanin
Aminoglycosides	gentamicin (Garamycin), amikacin (Arikase), tobramycin (Tobrasol), neomycin (Neosporin), and streptomycin (Agrimysin-17)

This list is not exhaustive — there are other classes and brand names. In addition, penicillins, cephalosporins, and other antibiotics can be considered as subclasses of beta-lactam drugs.

Another important factor in the classification of antibiotics is their impact on antimicrobial resistance.

According to the nature of the effect on the bacterial cell, antibiotics are divided into:

1. Bacteriostatic – inhibit the growth and reproduction of bacteria;

2. Bacteriolytic – destroy bacteria with the destruction of their cell wall. At the same time, a large amount of toxins are released in the bacterial habitat.

3. Bactericidal antibiotics – bacteria die, but the cell wall is not destroyed.

By the mechanism of action:

a) stop the synthesis of the cell wall of microorganisms (β-lactams, vancomycin);

b) disrupt the function of cell membranes (polymyxins, antifungals, aminoglycosides, cyclic lipopeptides);

c) inhibit the synthesis of protein and nucleic acids (tetracyclines, macrolides, lincosamides, aminoglycosides, oxazolidinones);

d) inhibit RNA polymerase (ansomacrolides).

The classification of antibiotics is also based on the susceptible bacteria against which they are effective.

Antibiotics can be classified **according to their spectrum of action**, namely whether they are narrow, broad, or extended-spectrum drugs. Narrow-spectrum drugs (e.g., penicillin G) affect predominantly gram-positive bacteria. Broad-spectrum antibiotics, such as tetracyclines and chloramphenicol, affect both gram-positive and some gram-negative bacteria. An extended-spectrum antibiotic is an antibiotic that which, as a result of chemical modification, affects additional types of bacteria, usually gram-negative.

In 2017, the WHO Expert Committee on the Selection and Use of Essential Medicines developed a new classification of antibiotics (Access, Watch, Reserve)

“AwaRe” as a tool to support antibiotic management efforts at the local, national and global levels [23]. The “AwaRe” classification is intended as a tool for monitoring antibiotic consumption, setting targets, and monitoring the effects of management policies that aim to optimize antibiotic use and curb antimicrobial resistance.

According to “AwaRe”, antibiotics are classified into three groups: access, surveillance, and redundancy, taking into account the impact of different antibiotics and classes of antibiotics on antimicrobial resistance, emphasize the importance of their correct use. It is updated every 2 years [23]. WHO experts have divided antibiotics into three categories, and also made recommendations on the conditions for prescribing drugs for each of them. In the first stage, the categorization concerned only antibiotics, which are used to treat the 21 most common common infections. The main purpose of the changes is to ensure the availability of the necessary antibiotics and to promote their correct selection for the treatment of infections.

WHO has set a target that at least 60% of global antibiotic consumption at the national level should be in the access group [23,32].

Access antibiotics have a narrow spectrum of action, lower cost, a good safety profile in terms of side effects, and generally a low potential for resistance. They are often recommended as an empirical first- or second-line treatment option for advanced infections.

WHO recommends ensuring that access group antibiotics are available at all times to treat a wide range of infections.

Watch for antibiotics that are broader-spectrum antibiotics and are recommended as the first choice for patients with more severe clinical manifestations or infections in which pathogens are more likely to be resistant to Access antibiotics.

The watch group included antibiotics recommended as first- and second-choice drugs for the treatment of a limited number of infections.

Reserve antibiotics, which are the last choice antibiotics used to treat multidrug-resistant infections. Antibiotics of the reserve group are also called "last

resort" and should be used only in the most severe cases, when all other possibilities have been exhausted. For example, to treat life-threatening infections caused by multidrug-resistant bacteria. This classification can be used to indirectly indicate the expediency of using antibiotics. The use of drugs in the group should be carefully monitored and identified as priority goals of antibiotic therapy programs.

The latest version of the “AwaRe”classification database was updated in 2021 to indicate the pharmacological classes of antibiotics, the codes of the anatomical-therapeutic-chemical classification (ATC) and the status in the WHO list of essential medicines. It includes an additional 78 antibiotics that were not previously classified and now has 258 [26].

1.2 Analysis of the reasons for unreasonable use of antibiotics in the field of health care

Public health is a special value of modern society and one of the key tasks for the healthcare system. Not only the well-being of the population depends on its health, but also the quality of life of future generations. Between 2000 and 2021, healthy life expectancy increased by more than 8% globally, with the largest increase mainly due to progress in reducing child mortality and controlling infectious diseases [28]. Reducing the burden of mortality from infection is an urgent global public health priority. Today, infectious diseases have no geographical or political boundaries and are a global threat that puts every country and every person at risk. Food, livestock, pets, and the microbes they carry are exchanged as cultures from all regions of the world are studied.

Infectious diseases continue to burden populations around the world. If we consider the main causes of mortality, then in recent years we can note the transition from infectious causes to noncommunicable diseases (NCDs).

Globally, five of the top 10 causes in 2000 were infectious and four were NCDs. In 2021, seven of the top ten causes were NCDs, and the remaining three were contagious [37]. Thanks to effective communicable disease prevention or

treatment, as well as populations surviving to older ages, where NCDs become the predominant risk, NCDs already accounted for nine of the top 10 causes in 2021 [9,13,30,41]. The only contagious disease that is one of the ten largest in the world is lower respiratory tract infections (tabl.1.2).

Table 1.2

Leading infectious causes of death in the world, 2021

Rank	**Cause**	**Estimated Number of Deaths**
1.	Lower respiratory infections	7,926,000
2.	Tuberculosis	5,124,000
3.	HIV/AIDS	2,866,000
4.	Diarrheal diseases	2,001,000
5.	Malaria	1,130,000
6.	Meningitis	1,002,000
7.	Encephalitis	823000
8.	Measles	745000
9.	Pertussis	485000
10.	Typhus	395000
11.	Syphilis	290000

A 2021 WHO study estimated the number of deaths associated with drug-resistant infections and sepsis and found that infections remain one of the leading causes of death worldwide (fig.1.2) [15].

Understanding the global burden of common bacterial pathogens (both susceptible and antimicrobial-resistant) is essential to identify the biggest public

health threats. Most governments in the world spend about 1% of their gross domestic product on research and development of new antibacterial drugs. Today, antibiotics are prescribed to treat diseases of the genital and ENT(ear nose and throat) organs, urinary and digestive systems, as well as the respiratory tract.

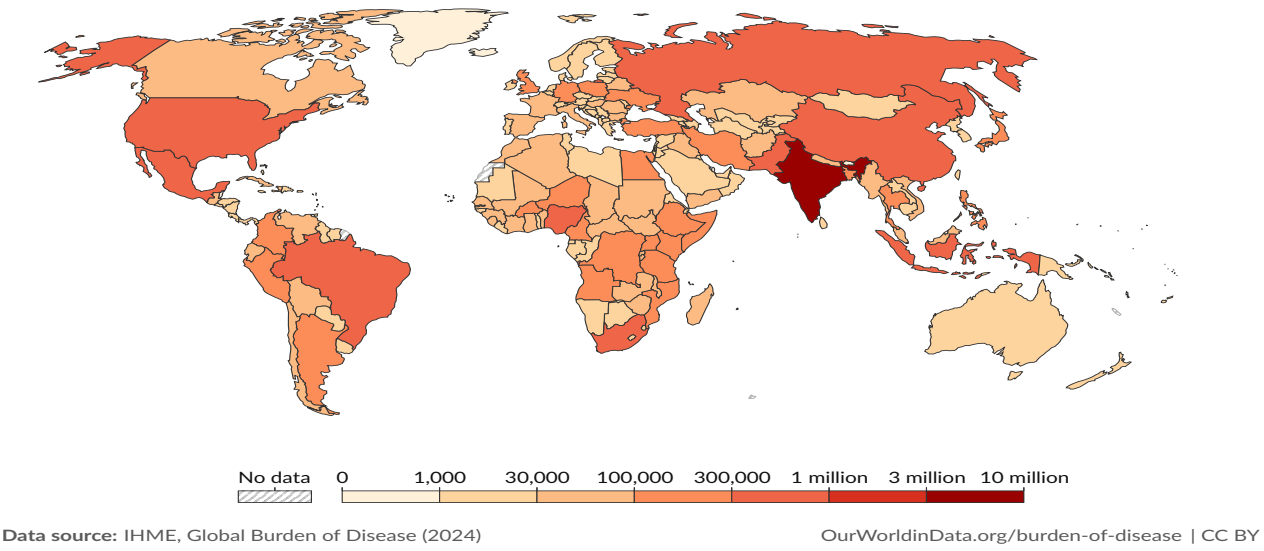

Fig.1.2 Mortality from infectious diseases, 2021. Estimated annual number of deaths from HIV/AIDS, diarrhea, malaria, respiratory infections, and all other communicable diseases [17].

The development of new antibiotics is of global importance. This process does not end as the evolution of microbes continues uninterruptedly, and drug resistance will arise as a result of natural selection.

Antibiotics are drugs that are undoubtedly effective in the treatment of infections of bacterial etiology. At the same time, according to the World Health Organization, antibiotic resistance is considered one of the main threats to public health.

In OECD countries and the European Union (EU), almost one in five infections is caused by bacteria resistant to specific antibiotics, and the proportion of resistance is expected to continue to rise unless effective measures are taken [30].

Antimicrobial resistance (AMR) appears when a microorganism develops resistance to an antimicrobial that was previously an effective treatment, and it continues to be one of the most important challenges for health services worldwide.

The use of antimicrobials is a key factor in the development of antimicrobial resistance. The more antimicrobials are used, the more likely you are to develop antimicrobial resistance. This poses a threat to patient safety by reducing the range of antimicrobials available to successfully treat infections and increases morbidity and mortality associated with infections caused by multidrug-resistant organisms.

The Global Antimicrobial Resistance Survey estimates that 1.28 million deaths in 2019 were the direct result of antibiotic-resistant bacterial infections [30,38]. These studies show that antibiotic resistance is already a leading cause of global mortality, on a scale similar to major infectious diseases such as HIV or malaria. One in five deaths from resistant bacteria occur in children under 5 years of age. The burden of antibiotic resistance falls disproportionately on low- and middle-income countries (fig.1.3).

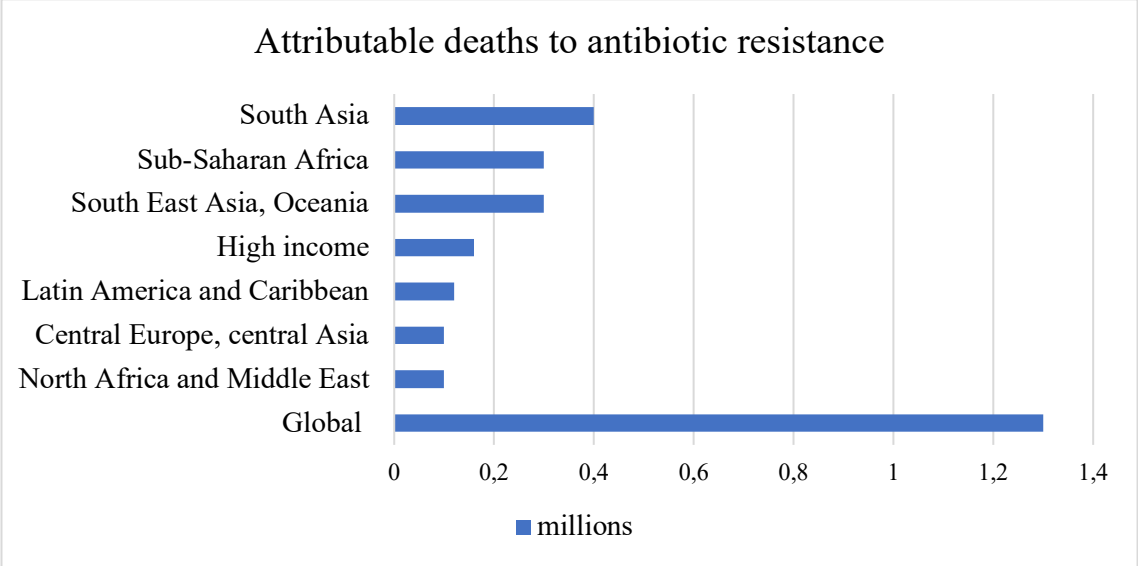

Fig.1.3 Attributable deaths to antibiotic resistance, direct result of antibiotic-resistant bacterial infections [1,10,39].

The direct use of antibiotics does not cause resistance, on the contrary, its acquisition by microorganisms is a natural process. However, the unwise use of antibiotics in health care greatly accelerates this process. Natural selection occurs, which contributes to the selection of those microorganisms that have accidentally acquired resistance to antibacterial agents [20].

The reason for this is the lack of a uniform policy regarding the prescription of antibacterial agents at the national or international level. In many countries,

antibiotics can be purchased without a prescription, and there is an uncontrolled use of antibiotics in livestock, fisheries and agriculture.

In many countries, most antimicrobials **are self-administered by patients at home in the absence of medical supervision**. Many patients disrupt the course of therapy, and stop taking antimicrobials after relief, unaware of the negative consequences of an incomplete course of treatment [3]. **A disrupted course of treatment** not only fails to kill the target organisms to the expected level, but also selects drug-resistant options in the target population and in the patient's microbiota.

Non-compliance by patients particularly increases drug resistance when the recommended course of treatment is long. An example is the treatment of tuberculosis, the recommended duration of treatment is from 6 months to a year. The WHO estimates that approximately one-third of the world's population is infected with TB, with most of them living in underdeveloped regions where antimicrobials are **available without a prescription**. In such countries, the level of commitment may be even lower than in developed regions. **Non-adherence** leads to antibiotic resistance and makes it difficult to control pathogens. As a direct result, the emergence of multidrug-resistant and widely resistant strains of tuberculosis is becoming a huge problem [7].

Over-prescribing antimicrobials also contributes to the development of antibiotic resistance. Patients often require antibiotics for conditions that don't need them, like viral colds and ear infections. Pharmaceutical companies aggressively promote drugs to doctors and clinics, and some pharmacies dispense certain antibiotics without a prescription [6].

The main reasons for the unjustified prescription of antibacterial drugs are the **lack of knowledge** of the doctor and objective information about the drug, as well as the fear of an unsuccessful outcome of treatment.

The social factor also plays a huge role in the spread of resistant strains of microorganisms**.** The social aspect of the problem is influenced by any factor of instability in society, such as poverty, migration, environmental pollution and the widespread use of antibiotics in animal husbandry, which contributes to an increase

in morbidity among the population, and consequently the emergence of a large number of resistant strains of microorganisms.

In low-income countries, patients lack the financial means to provide full treatment and antimicrobials are taken at low doses.

What are the ways to address the root causes of antibiotic resistance? After studying the literature on this issue, it is possible to identify the main directions for achieving this goal (tabl.1.3) [1,5,11].

Table 1.3

The main directions of elimination of the causes of resistance to antibiotics

Ways to eliminate	**Clarification**
Optimization of the use of antimicrobial drugs	Antibiotic therapy should be carried out only according to indications justified on the basis of clinical studies, and the dosage and frequency of administration should ensure rapid elimination of the causative agent. Reducing the use of antibiotics will help reduce the prevalence of resistant bacteria.
Enlightenment	The public should be informed about the importance of judicious use of antibiotics and the availability of alternative treatment methods.
Strengthening supervision and research	It is important to expand investments in the development of the latest antibacterial drugs. Scientists around the world are working to stay one step ahead of bacteria.
Reducing the frequency of infections	There is a search for alternative methods of treatment, such as: phage therapy, immunoprophylaxis, vaccination.
Implementation of infection control systems	One possible solution is a scheme called "directly observed therapy" (DOT), which involves the controlled administration of drugs to patients. Patients must either visit a health care facility to receive the medication, or health care providers must administer the medication at home or at another designated location.
Continuous application of preventive measures	Wash your hands regularly, practice good hygiene when preparing food, avoid close contact with sick people, practice safe sex and get up-to-date vaccinations.

The introduction of a number of such economic and social areas at the state level will help improve the situation.

Conclusions to the I Chapter

Antibiotics are products of vital activity (or their synthetic analogs and homologues) of living cells (bacterial, fungal, plant and animal origin), which selectively suppress functioning of other cells — microorganisms. They stand out spectrum and mechanism of action, side effects and indications for application.

Antibiotics are used to prevent and treat bacterial infectious diseases. Acute respiratory tract infections are the most common diseases in medical practice. In most cases of respiratory infections doctors prescribe antibiotics. Some respiratory infections are caused by viruses, for which antibiotics do not work.

Antibiotic resistance develops when bacteria change in response to these drugs. Antibiotic resistance is one of the most serious threats to human health, food security and development today. Antibiotic resistance is a natural phenomenon, but misuse of antibiotics by humans and misadministration of antibiotics to animals accelerates this process. Increasingly, infectious diseases such as pneumonia, tuberculosis, gonorrhea and salmonellosis are becoming more difficult to treat as antibiotics become less effective.

CHAPTER 2. ANALYSIS OF PROBLEMS OF RATIONAL USE OF ANTIBACTERIAL DRUGS

2.1. Assessment of consumption of antimicrobial drugs

Inappropriate use of antibiotics, especially in low-income countries, leads to collateral damage, which includes resistance. To prevent the national spread of AMR is to monitor the consumption of antibacterial drugs by collecting data from health organizations [12]. At the regional level, the tasks of monitoring are:

- monitoring the dynamics of antibiotic consumption;
- factors and conditions influencing the dynamics of consumption;
- generalization and analysis of the information received for the development of measures, aimed at the rational consumption of antibacterial drugs.

The term "consumption" refers to estimates derived from summarized data sources, the main of which are procurement and dispensing, and serves as an indicator of actual antibiotic use. These data sources do not provide any patient information or indications for treatment, but they can provide an estimate of the amount and types of drugs consumed at the national, subnational, or facility level over time. Data are collected according to the WHO methodology based on the international protocol, for national/hospital surveillance of AMR. These can be collected at the national or health facility level and analyses using the “AWaRe” classification and/or other relevant clinical categories [32].

Identifying problematic prescribing practices, assessing the scale, quality and appropriateness of antibiotic use around the world is the main goal of data collection.

Three main types of antibiotic data are used to provide baseline information and evaluate interventions. Each type of data – data on antibiotic consumption, antibiotic use, and antibiotic audit data – has its advantages and disadvantages.

These sources provide a rough estimate of antimicrobial consumption and use. Great datasets require unique resources, the most common of which are included in the pharmaceutical chain: custom forms of entries and declarations; production

records from domestic manufacturers; wholesaler records (purchases and sales data to healthcare facilities); public procurement; records of dispensing from public and hospital pharmacies; records from health insurance schemes based on reimbursement of the cost of medicines; data on the prescription from the doctor; commercial data sources (fig.2.1) [21].

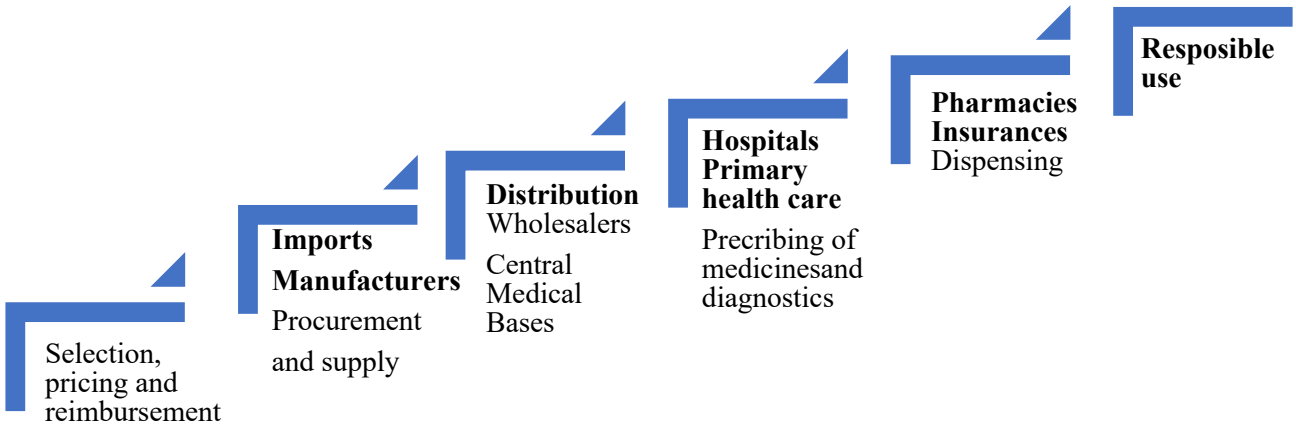

Fig.2.1 Possible sources of data throughout the drug life cycle.

An accurate consumption estimate can only be determined if the data source is the end user. This is more work intensive work and can be achieved only with full national coverage, since data is often received from many different stakeholders and data sources also vary. When studying WHO reports, we can conclude that sales of antibiotics and import accounting are the most common sources consumption data. Combination import and production data most common in countries with leading local production of medicines [36].

Antibiotic consumption is expressed using two indicators: the number of established daily doses (DDD) per 1000 inhabitants per day and the pharmacological subgroup (ATC); And the second indicator is the mass of antibiotic substances in metric units (tons).

A specific daily dose, the usual dose of an adult antimicrobial to treat a single patient for one day, is considered useful for measuring trends in antimicrobial prescribing in hospital. Amount of DDD consumed for each antibiotic is calculated by dividing amount of substance consumed in grams by the DDD value assigned to

that substance. WHO's global programme for surveillance and monitoring of antibiotic consumption for systemic use includes a core set of classes of antimicrobials that are controlled in all national programmer. Table 2.1 presents the required and dispensable classes of antimicrobials to be monitored [14,32].

Table 2.1

Required and dispensable classes of antimicrobials in the WHO global surveillance program antimicrobial consumption

Class of antimicrobials	**ATC**	**Monitoring**
Antibacterial for systemic use	JO1	Required
Antibiotics for intestinal tract	AO7AA	
Nitroimidazole derivates	PO1AB	
Antibiotics for systemic use	JO2	Dispensable
Antifungals for systemic use	DO1BA	
Antimycobacterial for treatment of tuberculosis	JO4A	
Antimalarials	PO1B	
Antivirals for systemic use	JO5	

Another classification that provides a tool to support antibiotic monitoring is the new classification of commonly used antibiotics based on the WHO EML, "AWaRe", divided into three categories: Access, Watch and Reserve. Selected “AWaRe” antibiotics are included in the WHO EML model lists as recommended treatment options for specific infectious syndromes. A complete “AWaRe” database for monitoring the consumption and use of antimicrobials is available on the WHO website.

In 2015, WHO launched the Global Antimicrobial Resistance and Use Surveillance System (GLASS), which was the first system to harmonize the global reporting of official national data on antimicrobial consumption and use. WHO has introduced the “AWaRe” classification as part of the list of essential medicines as an antimicrobial management tool. From the main list of countries, we have selected the most indicative in terms of achieving the target indicator and highlighted their data for the last five years (tabl.2.2) [2,32-35].

Table 2.2

Relative use of antibiotics by country according to the AWaRe classification

Country	AWaRe classification	2018	2019	2020	2021	2022
Austria	Access (%)	**58.3**	**58.5**	**61.4**	**60.4**	**59.9**
	Reserve (%)	0.2	0.9	1.2	1.3	1.1
	Watch (%)	40	39.3	37.4	37.7	37.9
Belgium	Access (%)	**61.6**	**67.4**	**47**	**65.9**	**68.4**
	Reserve (%)	0.7	0.3	0.4	0.5	0.5
	Watch (%)	36.1	31.2	52.1	33.3	30.3
Croatia	Access (%)	**62.6**	**63**	**61.7**	**60.4**	**60.4**
	Reserve (%)	0.1	0.2	0.2	0.4	0.4
	Watch (%)	36.8	36.5	37.8	39.1	39.3
Denmark	Access (%)	**80.2**	**80.6**	**81.4**	**81.9**	**82.8**
	Reserve (%)	0.3	0.3	0.3	0.3	0.3
	Watch (%)	19.5	19.1	18.3	17.8	17
Egypt	Access (%)	55	55.1	55.1	54.1	55.6
	Reserve (%)	1.2	1.2	1.3	1.2	1
	Watch (%)	42.2	42.5	42.9	43.7	43
Ethiopia	Access (%)	**66**	**66.1**	**66.2**	**67.6**	**72.3**
	Reserve (%)	0	0	0	0	0
	Watch (%)	34	33.9	33.8	32.4	27.7
France	Access (%)	**71.1**	**72.5**	**70.9**	**72.8**	**71.7**
	Reserve (%)	0.2	0.3	0.4	0.4	0.4
	Watch (%)	26.2	24.9	26.1	24.4	26.1
Germany	Access (%)	**56.3**	**60**	**63.9**	**66**	**64.2**
	Reserve (%)	0.2	0.2	0.2	0.2	0.2
	Watch (%)	42.6	42.6	35	33.2	34.7
Hungary	Access (%)	48.7	50.7	51.2	49.4	49.2
	Reserve (%)	0.1	0.1	0.1	0.1	0.1
	Watch (%)	51.3	49.2	48.6	50.5	50.7
Iceland	Access (%)	84.1	86.4	86	87.1	87.1
	Reserve (%)	0.1	0.1	0.1	0.1	0.1
	Watch (%)	15.8	13.6	13.9	12.9	12.8

Continuation of table 2.2

Ireland	Access (%)	68.2	70.3	70.9	73.7	74
	Reserve (%)	0.3	0.4	0.5	0.5	0.4
	Watch (%)	31.4	29.3	28.6	25.7	25.6
Italy	Access (%)	47.5	48.9	47.2	47.8	47.2
	Reserve (%)	0.3	0.3	0.4	0.5	0.6
	Watch (%)	*52.2*	*50.7*	*52.4*	*51.7*	*52.2*
Jordan	Access (%)	56.4	61.2	51.3	54.8	52.2
	Reserve (%)	0	0	0	0	0
	Watch (%)	41.5	37.3	46.7	42.7	46
Latvia	Access (%)	**68.3**	**69.1**	**70**	**71.6**	**71.4**
	Reserve (%)	0.1	0.1	0.1	0.2	0.1
	Watch (%)	31.4	30.7	29.7	28.2	28.5
Maldives	Access (%)	35.7	44.1	39.2	36.3	28.1
	Reserve (%)	0	0	0	0	0
	Watch (%)	*63.2*	*55*	*60.1*	*62.9*	*71.3*
Nepal	Access (%)	25.8	27.9	34.8	29.6	18.2
	Reserve (%)	0	0.1	0	0.1	0.4
	Watch (%)	*74.1*	*55.1*	*47.7*	*54.9*	*64.8*
Norway	Access (%)	80	80.6	79.3	79.5	81.7
	Reserve (%)	0.2	0.2	0.2	0.2	0.2
	Watch (%)	19.9	19.3	20.5	20.3	18.2
Poland	Access (%)	**55.7**	**60.5**	**63.9**	**61**	**56.8**
	Reserve (%)	0.1	0.1	0.2	0.1	0.1
	Watch (%)	44.2	39.4	35	38.8	39.3
Portugal	Access (%)	**63.4**	**61.9**	**62.4**	**62.4**	**61.6**
	Reserve (%)	0.3	0.3	0.4	0.4	0.3
	Watch (%)	36.3	37.8	37.3	37.2	38
Ukraine	Access (%)	40.8	34.3	18.7	35.4	39.7
	Reserve (%)	0.3	0.5	1.2	1.9	1.7
	Watch (%)	*55.7*	*64.4*	*78.1*	*55.1*	*59.9*
Slovakia	Access (%)	45.9	45.6	39.2	47.6	45.5
	Reserve (%)	0	0	0	0	0
	Watch (%)	*58.5*	*58.4*	*54.2*	*50.8*	*50.3*

The structure of antibiotic use at the national level, expressed as the relative use of antibiotics according to the AWaRe classification. The main goal is to reduce the use of “Watch and Reserve” antibiotics and to increase the relative benefit and availability of Access antibiotics so that at least 60% of the total antibiotic use is “Access” group antibiotics [23].

After analyzing the data, it can be concluded that the average percentage of antibiotics of the "Access" group from all antibiotics consumed was 57.5%. Nine countries have met and four countries (Iceland, Ireland, France, Denmark) have exceeded the 2022 target of at least 65% of the total. Antibiotic consumption was accounted for by drugs of the "Access" group of antibiotics in accordance with the WHO “AWaRe” classification of antibiotics [23].

At the same time, in 6 countries (Maldives, Nepal, Ukraine, Slovakia, Italy, Hungary), the AMC indicator of the "Watch and Reserve" group over the past 5 years was higher than the access group.

Data on antimicrobial use helps countries change policies to regulate consumption and implement measures to optimize access to and use of antibiotics.

2.2 The role of the pharmacist in promoting the judicious use of antibiotics and preventing antimicrobial resistance

Antibiotic misuse occurs when a person takes the wrong antibiotic, the wrong dose of an antibiotic, or an antibiotic for the wrong period of time. Excessive and improper use – causes growing resistance to their effectiveness. Therefore, one of the key challenges facing countries is to ensure the best use of antibiotics.

The severity of AMR's challenges calls on all stakeholders to address it through coordination at the national policy level, including measures to prevent infectious diseases, involving the health representative of the prescriber, the pharmacist and the patient himself. In this regard, it is important that any concerted action includes examining and, where appropriate, enhancing the role of the pharmacist as the primary supplier and regulator of these medicines (fig.2.2) [25].

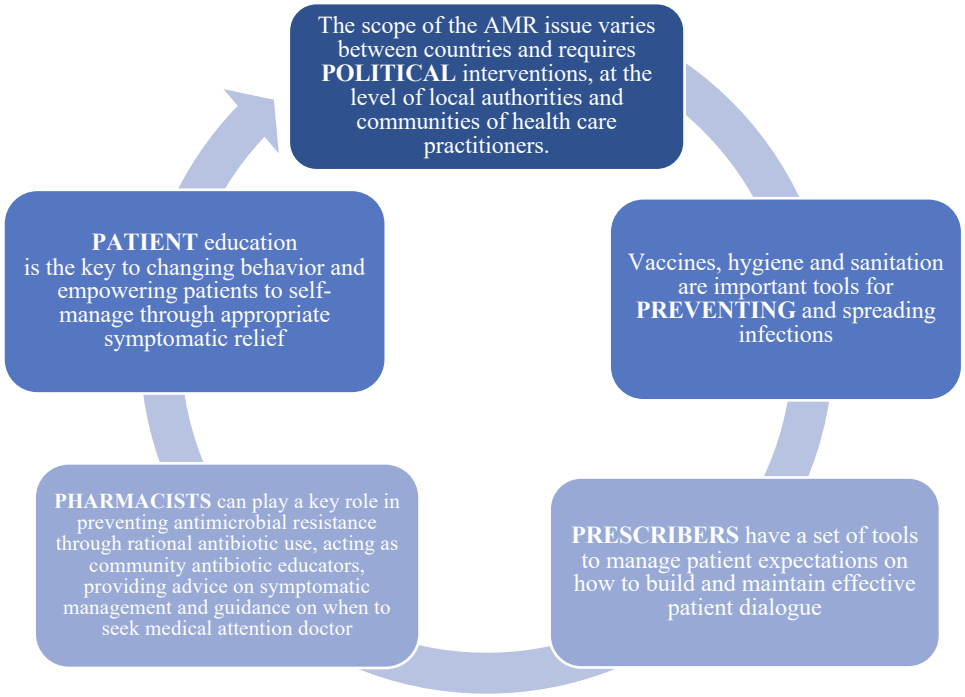

Fig.2.2 Five key aspects of addressing antibiotic resistance.

In the context of the COVID-19 crisis, the role of pharmacists in supporting health systems has increased by advising clients on the management of their symptoms and how to treat other acute and chronic diseases.

Addressing the overall decline in AMR can be achieved by addressing the issue of outpatient antibiotic use. Thus, the pharmacist is key in reducing the threat of AMR. In the chain of doctor and pharmacist, it is the pharmacist who is the last link in it and has direct contact with the patient before he receives an antibiotic.

The misuse of antibiotics in primary health care is associated with many factors. Public knowledge, attitudes and beliefs about antibiotics are strong determinants of their misuse. The easy availability of antibiotics without a doctor's prescription is also a driving factor in misuse due to the potential lack of access to proper diagnostic tools. In addition, self-medication, in which the patient can use antibiotic residues from previous therapy if the patient did not comply with therapy or the number of antibiotics prescribed exceeded the duration of treatment, contribute to the development of AMR.

Today, antibiotics are used as prescribed by a physician when clinical or laboratory evidence suggests that their manipulate is appropriate. However, it is not

only the choice of antibacterial drug that matters, but also adherence to the treatment regimen, as improper use may backfire [16].

In this context, the importance and value of the role of qualified pharmaceutical care in the dispensing of antibiotics becomes clear, because it is the pharmacist who determines both the effectiveness of therapy and the patient's adherence to the prescribed treatment, as well as the prevention of possible undesirable complications.

The pharmacy is usually the first place people go for help when they have a cold, sore throat, or other symptoms caused by an infection, so pharmacy staff have a unique opportunity to educate customers and treat patients with effective treatments, whether they are prescription or over-the-counter.

Pharmacists are truly in a unique position, at the forefront of the pharmaceutical sector and healthcare in general, where patients go for advice and trust the information they receive. Because of their abilities, capabilities, and motivations, community pharmacists are well-placed to be antibiotic stewards who will lead efforts to contain the threat of AMR. With appropriate training and the use of available resources, the entire pharmacy team can play an active role in addressing this issue.

It is important that local pharmacists help patients understand when antibiotics are needed and reduce the use of over-the-counter antibiotics. Unfortunately, at this stage of drug circulation, there are many violations on the part of pharmacists. There are many potential obstacles that explain why pharmacists often fail to effectively communicate the importance of appropriate antibiotic use to patients. One is that there is a lack of knowledge about antibiotic therapy, pharmacists do not give sufficient advice, or they give patients unrealistic expectations about the duration and severity of symptoms. They may be unwilling to go against the doctor's advice and may not consider it appropriate to disagree with the doctor's decision. Financial hurdles may arise if pharmacists believe they can better sustain their business by dispensing antibiotics over the counter rather than providing more appropriate advice. Pharmacists can recommend evidence-based products to treat the most

problematic and most troublesome symptoms, taking into account personal preference. Obviously, there are several issues that need to be addressed in the context of the role of the pharmacist in the fight against AMR (fig.2.3) [24].

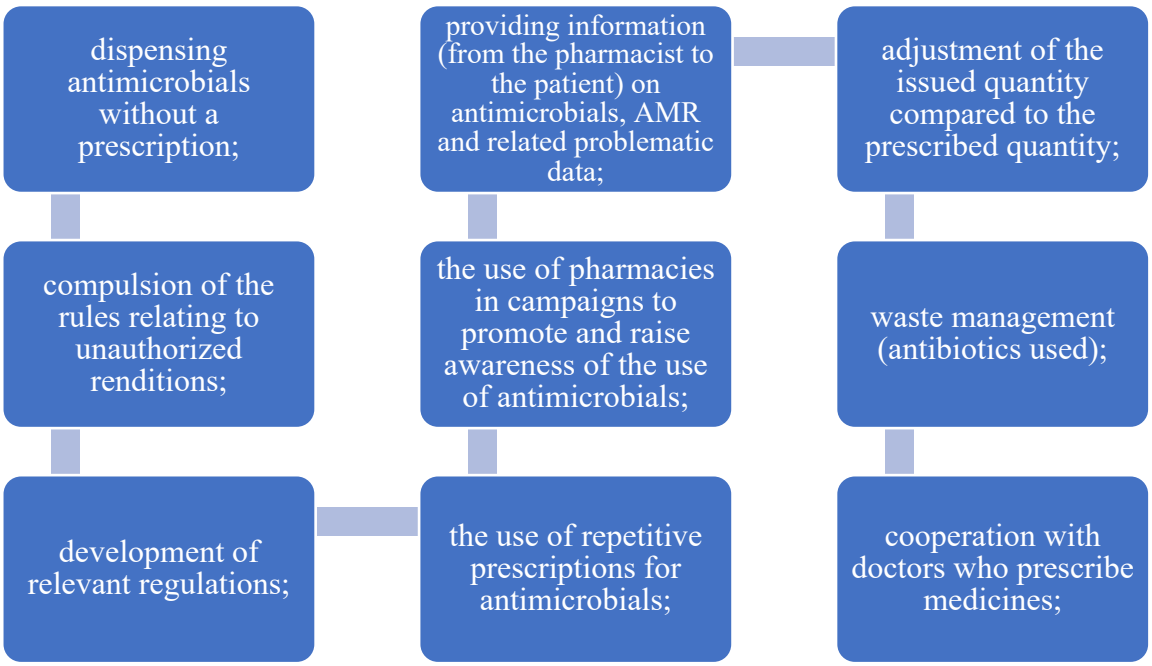

Fig.2.3 Key areas of action for pharmacy organizations to address the problem of AMR.

In our opinion, the main problem of all the above is the lack of necessary control over compliance with official rules, according to which antibiotics can be used only as prescribed by a doctor. Dispensing an antibiotic on prescription allows the doctor to make sure that the patient really received the prescribed drug. Also, a certain control of the therapy of outpatients is carried out, because it often happens that the patient does not buy and does not take the prescribed drug, and the doctor cannot understand why the treatment is ineffective.

2.3 Administration of antibiotics in the context of a pharmacy institution

A study conducted by the WHO in the countries of the European Region showed that pharmacists are leaders among all health workers in the fight against AMR [9]. However, a lack of knowledge among medical and pharmaceutical professionals is an obstacle to the rational prescribing of antimicrobials and can lead

to the spread of AMR. Many countries are working in this direction, trying to solve this issue. There are enough positive initiatives to increase the level of knowledge of pharmacists at the country level [20,25,27].

In the UK, for example, pharmacists have access to a 10-hour online course on antimicrobials and infection control from the Northern Ireland Centre for Pharmacy Learning and Development's (NICPLD).

In Spain, the General Pharmaceutical Council (Consejo General de Colegios Oficiales de Farmacéuticos – Consejo) is a leader in the development and implementation of good manufacturing practices, which include the Standard Operating Procedure (SOP) for the dispensing of antibiotics in community pharmacies. Pharmacists are provided with flyers with a schematic representation of the provisions of the SOP.

In Northern Ireland, an information project is being implemented with the key message "Get advice and feel better", urging not to use antibiotics for self-treatment.

In Belgium, the Belgian Antibiotic Policy Coordination Committee (BAPCOC) has created a website to raise awareness of AMR in Dutch, French and English. Also, through Belgian media channels, in particular, radio, this information is conveyed to the population.

Mandatory legal and regulatory tools, frameworks and oversight at every stage of the antimicrobial life cycle are critical steps in ensuring the effective operation of AMR.

In 2015, the World Health Assembly adopted the Global Plan of Action to Combat Microbial Resistance, which provides for the adoption of programs at the state level [38]:

- antibiotic administration;
- improving the use of antibacterial drugs;
- prevention of transmission of infection through compliance with sanitary and epidemiological standards and immunization.

In 2016, the United Nations adopted the Political Declaration of the High-Level Meeting of the General Assembly on Antimicrobial Resistance, which was supported by all its participants.

The AMR Integrated Activities process should lead to a comprehensive review of regulatory needs and address gaps in existing legal and regulatory frameworks and frameworks. These steps lie in creating an enabling environment by engaging with stakeholders involved in the development, production, marketing, prescribing, marketing and use of antimicrobials to harmonize rules and regulations for the conservation of antimicrobials essential to human health.

Medically speaking, drug misuse can begin at any of the four main stages of the drug use cycle [29]. These four stages are diagnosis, prescribing, dispensing, and patient adherence (fig.2.4).

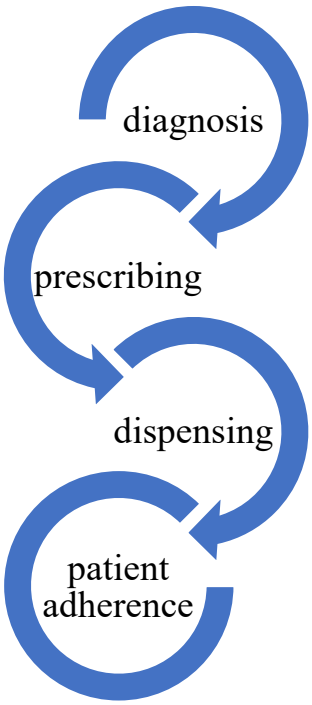

Fig.2.4 Stages of the drug use cycle.

The diagnostic stage includes the identification and definition of the problem that requires intervention. This initial stage can create a cycle of medication misuse if the wrong problem is identified for the intervention. After the diagnosis is established, treatment is usually prescribed - it can be pharmacological or non-drug

therapy. Subsequently, patients are provided with their prescribed medications and are expected to take their medications as directed.

The classification of medicines is mainly based on risk assessment, which takes into account scientific evidence, as well as the characteristics of the local health system, literacy and culture of the population that affect the potential use of prescription drugs. Some medications are only available by prescription because they are risky. Improper use of these drugs, for example, can cause serious side effects or addiction. Such medicines include drugs such as antibiotics. Each country, when registering a drug, refers it to the over-the-counter or prescription list. There are large differences between states in self-reported use of over-the-counter antibiotics.

There are antibiotics that can be sold from pharmacies without a prescription. However, only certain types of antibiotics are available without a prescription, in table 2.3 we have highlighted the main characteristics of antibiotics sold from pharmacies [25,30].

Table 2.3

Dominant characteristics of antibiotics dispensing from pharmacies

The four types of antibiotic administration routes	**Topical over-the-counter antibiotics**	**Some common bacterial infections that require oral antibiotics**	**Some common antibiotics prescribed**
Topical (some over the counter availability) Oral (prescription required) Intravenous (IV) (prescription required) Intramuscular (IM) (prescription required)	Neosporin (bacitracin/neomycin/ polymyxin B) Polysporin (bacitracin/polymyxin B) Neosporin Plus (neomycin/polymyxin B/pramoxine) Proactiv/Clearskin (Benzoyl peroxide)	Urinary tract infections Strep throat Certain Sexually Transmitted Infections Cellulitis Dental infections Pneumonia	Ceftriaxone Piperacillin/ tazobactam Levofloxacin Amoxicillin Azithromycin Clindamycin Metronidazole

Antibiotics can be injected into the body in different ways. There are invasive and non-invasive ways to administer antibiotics.

Topical antibiotics have generic brands and can be made in the form of a cream or ointment that can be applied directly to the skin and many are available without a prescription.

Oral, intravenous and intramuscular antibiotics are not available without a prescription. Oral antibiotics are taken by mouth and used to treat bacterial infections. There are more than 100 types of antibiotics, each with different indications for treatment.

In many countries, the over-the-counter sale of antibiotics is prohibited by law, although this does not mean that antibiotics are not sold without a prescription in these countries [10].

The sale of antibiotics without a prescription is a global problem, as recognized in the Global Action Plan on Antimicrobial Resistance. Sales of over-the-counter antibiotics vary by region, with higher prevalence generally reported in low- and middle-income countries. Improper antibiotic prescribing and self-medication are factors that contribute to the inappropriate use of antibiotics and can contribute to the emergence of resistant bacteria [1,3]. In a community setting, pharmacists can help patients understand when and when antibiotics should not be used. Pharmacists can help explain how to use an antibiotic and encourage patients to choose other treatments to help relieve symptoms.

Antibiotic self-medication is associated with incorrect self-diagnosis, short-term treatment, and incorrect choice of therapeutic class and dosage [4,5,6,7]. The use of antibiotics without a prescription can also be the result of poor instructions from the pharmacist regarding their use and safety [8].

The factors that contribute to the sale of over-the-counter antibiotics may be specific to certain settings, but common challenges for low- and middle-income countries can be identified. The main factors that affect the use of over-the-counter antibiotics can be divided into three components: patients, clinical experience, and health system factors (fig.2.5).

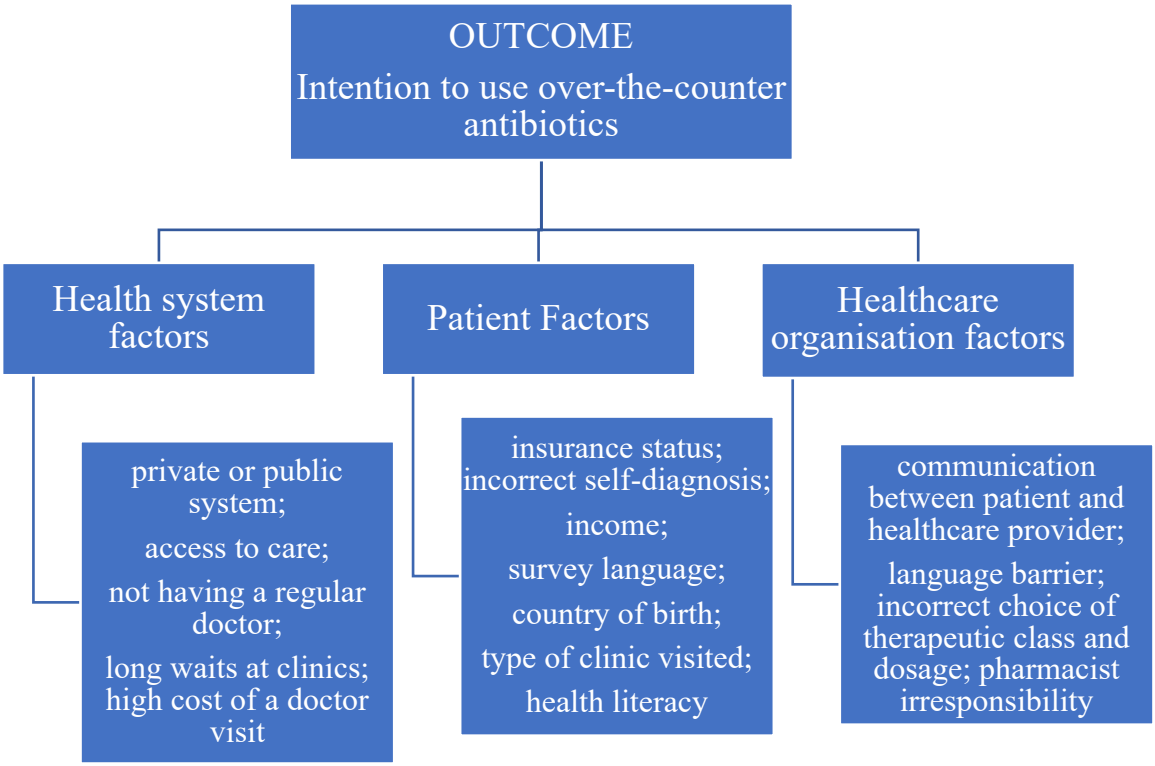

Fig.2.5 Identifying potential indicators of over-the-counter antibiotic use

Resolving these issues requires the participation of all parties. Comprehensive and multifaceted measures are needed to enforce laws prohibiting the sale of antibiotics without a prescription. Enforcement requires adequate resources, well-functioning and efficient registration systems for medicines and their suppliers, sufficient inspection capacity, and a legal system capable of imposing fines for violations of regulations. Many low- and middle-income countries are now transitioning to access to antibiotics only by prescription [12]. They announce and conduct a variety of activities to support compliance with existing laws and regulations, including government inspections, media campaigns, and educational events. Action is needed at the national and local levels to recognize the expertise that pharmacists can provide with AMR in all health care settings.

Assessing the impact of policy interventions is paramount in determining whether the intended effects have been achieved and/or whether unintended effects have occurred [13].

Conclusions to the II Chapter

Antimicrobial resistance has been identified as one of the most important challenges of our time and is at the heart of European policies for health and well-being. The WHO estimates that drug-resistant bacteria cause 5 million deaths worldwide each year. More than half a million of these deaths occur in the WHO European Region.

Regular collection of data on the prescribing, marketing and use of antimicrobials is an important source for monitoring and systematically documenting antibiotic use.

Pharmacists play an important role in the fight against antibiotic resistance by leading antimicrobial management programs in hospitals and helping other healthcare professionals know and follow the correct recommendations for prescribing and using antibiotics.

There are no special provisions for the management of antibacterial agents for pharmacies. However, Good Pharmacy Practice (GPP) defines the role of the pharmacist in solving problems with the use of medicines, in particular promoting the optimal prescription of antibiotics.

Misuse of medicines is a major global health problem with serious consequences for patients, health systems and society as a whole. Several factors can contribute to the misuse of medicines at different stages of the drug cycle. Understanding these factors is key to changing the behavior of the population, addressing the shortage of prescribers and the health system, and taking appropriate action.

CHAPTER 3. STUDY OF MODERN PROBLEMS OF DISPENSING ANTIBIOTICS FROM PHARMACIES IN MOROCCO

3.1 Analysis of the national strategy for prevention and control of antimicrobial resistance in Morocco

Mass and repeated use of antimicrobials creates selective pressure on bacteria and therefore contributes to the emergence and spread of antimicrobial resistance. In Morocco, as elsewhere in the world, the rational use of antibiotics is a major challenge.

In Morocco, studies have shown that antibiotics account for more than 25% of total drug consumption in hospitals. The dispensing of antimicrobials at the level of community-acquired pharmacies is not subject to any control. The legal and regulatory framework for the use of antimicrobials in Morocco is weak. The main normative acts can be distinguished [18]:

1. Act No. 17-04 establishing the Code of Medicines and Pharmacy;
2. The Decree of December 2, 1922, concerning the rules of importation, trade, storage and use of poisonous substances.

Antimicrobials are in Schedule A, which is subject to strict terms of supply.

Following the adoption of the global plan on antimicrobial resistance at the 68th session of WHO in 2015 and the United Nations declaration in September 2016, the Moroccan Ministry of Health, in collaboration with the Ministry of Agriculture and Marine Fisheries, has begun the process of developing a National Strategic Plan for the Prevention and Control of Antimicrobial Resistance. The main directions of the implementation of this plan are reflected in several paragraphs [19]:

- the establishment of a national multisectoral coordination mechanism;
- developing/improving national AMR policies, strategies and control plans;
- integrated monitoring to determine the rational use of antimicrobials for human and animal health;

- raising awareness among key stakeholders: patients, prescribers, pharmacists, farmers;
- access to information for antimicrobial therapy (strategy, sentinel monitoring for therapy determination);
- application of current regulations regarding the use of antimicrobials (prescription requirement).

In 2015, WHO launched the Global Antimicrobial Resistance Surveillance System (GLASS) to harmonize the exchange, collection and analysis of data on bacteria that cause infections in humans [34].

By the end of July 2017, only 42 countries had participated in GLASS, and Morocco was not among them. As of December 2022, 127 countries and territories have submitted AMR and/or antimicrobial use data to GLASS, and Morocco has not yet participated in these activities. According to GLASS's first report, both high- and low-income countries suffer from high levels of antibiotic resistance from common bacterial infections.

The burden of antimicrobial resistance is a global problem. In 2021, 4.9 million people died worldwide from drug-resistant infections. AMR was directly responsible for 1.27 million of these deaths (fig.3.1) [30,34,40].

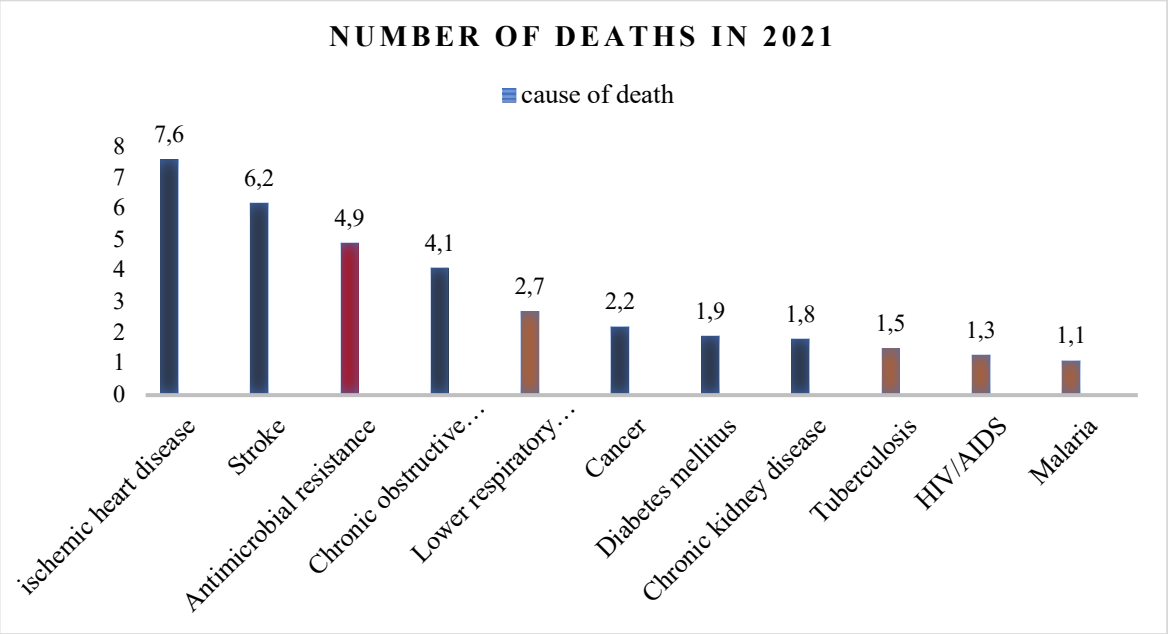

Fig.3.1 Global number of deaths due to the global burden of disease and AMR-related deaths

In order to address these problems, the Government of Morocco has decided to adopt a joint approach between public and private organizations. It has also taken steps to comply with various international goals, such as the UN Sustainable Development Goals.

However, a balanced antibiotic intake depends on an absolute change in mindset at the population level as well as in the health sector.

Any AMR response depends heavily on the evidence base from observation and research.

This allows to track the evolution of antimicrobial susceptibility and provide reliable data that forms the basis of public health action. The strategic goal includes the following actions (tabl.3.1) [19].

Table 3.1

Status of AMR in Morocco

Competence	Direction	Areas for improvement
Monitoring	- collaboration between laboratories - implementation of a national surveillance network - surveillance of AMR within the framework of certain vertical programs (TB, AIDS, Malaria) - monitoring the use of AMR in animal and plant health	-identification of a national surveillance network -the offer in terms of bacteriological examinations at the hospital laboratory level
Infection prevention and control	-surveillance of HAIs (Circular 83/DHSA 11/21/2014) -national strategy to combat National Institute of Hygiene - National Immunization Program	-implementation of the national strategy to fight against HAIs -the operationalization of Committee for the Fight against Nosocomial Infections
Research	development of operational research in the field of AMR	methodological and financial support for research teams
Governance	-political will -rise of awareness -international commitment	inter-sectoral coordination

Strengthening infection prevention measures through improved overall hygiene and vaccination is essential to limit the spread of resistant microorganisms and reduce the abuse and misuse of antimicrobials.

In 2014, Circular 83/DHSA of November 21, 2014 established a system for reporting adverse events related to the provision of health care [19].

The National Programme for Immunization (PNI) is considered a model in its WHO region. The introduction of vaccines against hemophilia (2007) and against pneumococcus (2010) had a positive impact on morbidity and mortality from these two microbes, as well as on the levels of antibiotic resistance [4]. Vaccination against rotavirus has contributed to a reduction in the incidence of diseases associated with diarrhoea and the unnecessary use of antibiotics.

3.1.1 Impact of antimicrobial resistance

Morocco, like many other countries, is experiencing a rapid increase in antimicrobial resistance. Morocco has the 97th lowest age-standardized mortality rate per 100,000 population associated with AMR across 204 countries. In Morocco in 2020, there were 5,850 deaths referable to AMR and 18,900 deaths associated with AMR (fig.3.2) [18,19].

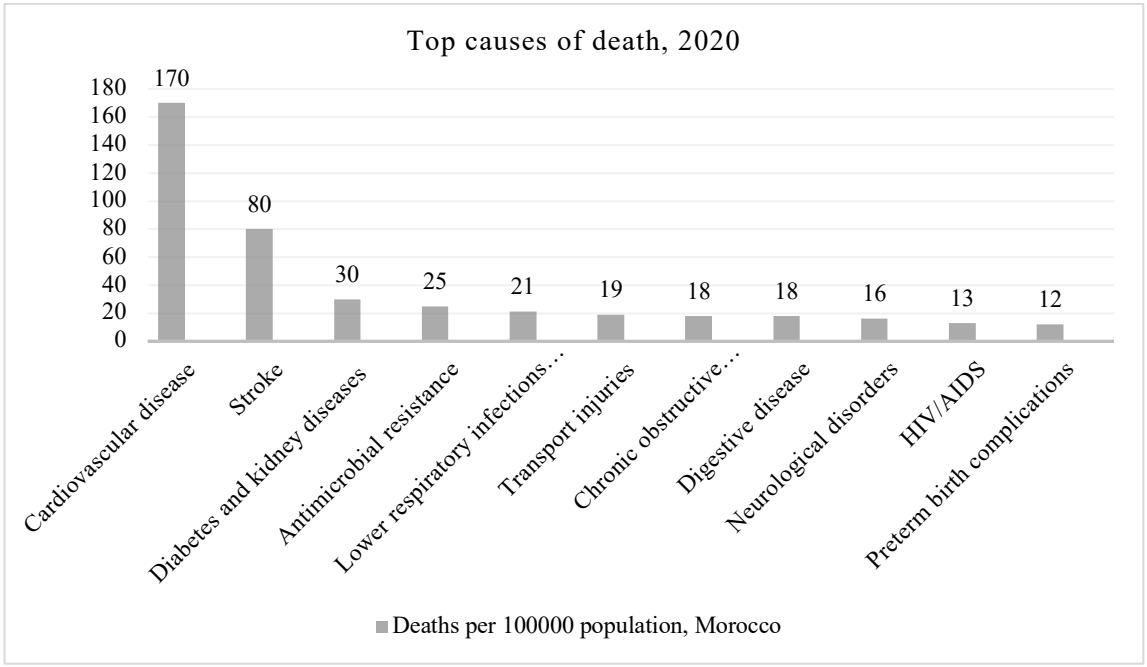

Fig.3.2 Leading causes of death, Morocco

One of the features of antibiotic use in Morocco is the easy access to self-medication. For the general population, the relatively high prices of antibiotics are often a brake on access to these drugs. People can self-medicate and request antibiotics in pharmacies without medical advice from a doctor or after consulting a pharmacist. This self-medication is encouraged by certain assistants, pharmacy sellers, for whom turnover is important. Expensive visits to the doctor also provoke patients to seek direct help from a pharmacist.

A pharmacist is a specialist in medicines and therefore in Morocco, as in other countries, he has the right to dispense certain medicines without a prescription. These are medicines produced for the treatment of minor pathologies, such as non-opioid analgesics, cough syrups, ointments, gels, etc.

Unfortunately, the dispensing of antibiotics without a doctor's prescription is "common" in pharmacies, despite the risk it poses to the patient's health, so there is interest in raising awareness of the seriousness of this practice for public health.

It is evident that the overuse or inappropriate use of antibiotics, which unfortunately in some cases are prescribed by some practitioners only to satisfy the client, which in itself constitutes an abuse of antibiotic prescription and does not benefit patients, but ultimately contributes to the development of antimicrobial resistance.

Human error is not the only factor in the spread of AMR. Over the past few years, it has become common practice for livestock farmers fighting for better milk and meat production to use antibiotics to treat cows. In addition to social and health factors, the economy plays a role in Morocco's unbalanced antibiotic consumption. The marketing of antibiotics by pharmaceutical companies in Morocco today represents a growing niche.

There are about a hundred trade names on the private market for several treatments for this family of drugs. In the treatment of acute pathologies (with antibiotics), the place of generics has become predominant. The breadth of the offer has created strong price competition, especially for generics. According to the

pharmacists of Moroccan pharmacies, the country's pharmaceutical industry is influencing doctors to increase sales of antibiotics and other drugs.

3.2A survey of pharmacy visitors regarding the status and problems of dispensing antibiotics for self-medication

Antimicrobial resistance is one of the great threats to public health in Morocco. This leads to increased morbidity (sometimes death), costs, and overuse of antibiotics leads to AMR. The role of the pharmacist has changed over the past two decades, from a drug distributor to a team member dedicated to providing medical care. Pharmacists, having the advantage of being accessible to patients in the community, could play an important role in reducing the rise in antibiotic resistance by advising patients not to use antibiotics for such self-limiting infections, and helping to play a role in concerted efforts to reduce the incidence and increase antibiotic resistance [25].

From the beginning of April and over the next two months, we conducted a sociological survey of visitors to pharmacies in Morocco. The aim of our study was to assess the level of knowledge of antibiotic use among the population, as well as understanding of the problem of antibiotic resistance.

The study included 62 pharmacy visitors. The inclusion criteria were all categories of the population over 18 years of age who agreed to participate in our monitoring after verbal consent. To conduct such an express survey, we developed a questionnaire that consisted of 10 questions. In the first part of the data, we sought to assess the level of participants' awareness of the definition of antibiotics and their role, attitudes towards the use of antibiotics. The second part of the data is devoted to self-treatment with antibiotics and the factors that contribute to such self-treatment. The first block of the questionnaire consisted of forth closed-ended questions. This part is devoted to the study of the respondents' attitude to antibiotic therapy. In the second part of the survey, the behavior of pharmacy patrons when using antibiotics was assessed using six closed-ended questions. Participation was

voluntary. The anonymity and confidentiality of respondents' answers were guaranteed. The questionnaire, as well as the results of processing the answers to these questions, are presented in table 3.2.

Table 3.2

Analysis of the population of respondents and the results of processing data from a survey of pharmacy clients in Morocco

Respondents' understanding of the concept of antibiotic therapy	
Questionnaire questions	**Statistical processing data of survey indicators**
1.In your opinion, what is the purpose of prescribing antibiotics? (several answer options)	
1. Treatment of bacterial infections 2. Prevention of flu and colds 3. Relieving pain symptoms 4. Treatment of viral infections	1. Treatment of bacterial infections (40,38% - 25 clients) 2. Prevention of flu and colds (35,5% - 22 clients) 3. Relieving pain symptoms (3,22% - 2 clients) 4. Treatment of viral infections (20,9% - 13 clients)
2.Should antibiotics be taken as a preventative measure to combat future microbial attacks? (one answer option)	
1. Yes 2. No 3. I don't know	1. Yes (48,58% - 30 clients) 2. No (45,16% - 28 clients) 3. I don't know (6,45% - 4 clients)
3.Can antibiotics destroy in addition to pathogenic microbes, also beneficial bacteria in our body? (one answer option)	
1. Yes 2. No 3. I don't know	1. Yes (72,58% - 45 clients) 2. No (24,19% - 15 clients) 3. I don't know (3,22% - 2 clients)
4. In your opinion, the principle of safe nutrition (hygiene, contact with sick people, vaccination) prevents infection. (one answer option)	
1. Yes, always 2. Yes, sometimes 3. No, not always 4. No 5. I don't know	1. Yes, always (24,19% - 15 clients) 2. Yes, sometimes (32,25% - 20 clients) 3. No, not always (22,59% - 14 clients) 4. No (17,74% - 11 clients) 5. I don't know (3,23% - 2 clients)

Continuation of table 3.2

Factors significantly associated with self-medication with antibiotics	
1. How often do you buy antibiotics without a doctor's prescription? (one answer option)	
1. Always 2. Sometimes 3. Never	1. Always (20,96% - 13 clients) 2. Sometimes (25,81% - 16 clients) 3. Never (53,23% - 33 clients)
2. Should you stop taking antibiotics when symptoms improve? (one answer option)	
1. Antibiotics should not be stopped when symptoms improve 2. If symptoms disappear, can stop taking antibiotics	1. Antibiotics should not be stopped when symptoms improve (67,74%-42 clients) 2. If symptoms disappear, can stop taking antibiotics (32,26%-20)
3. Who do you turn to for help with colds? (one answer option)	
1. Friends 2. Pharmacist 3. Doctor 4. Medical publications	1. Friends (11,29%-7 clients) 2. Pharmacist (59,68% - 37 clients) 3. Doctor (24,19%- 15 clients) 4. Medical publ. (4,84% - 3 clients)
4. What symptoms do you treat with antibiotics without a doctor's prescription? (several answer options)	
1. Cough 2. Fever 3. Diarrhoea 4. Headache 5. Sore throat 6. Otalgia	1. Cough (48,39%- 30 clients) 2. Fever (17,74%- 11 clients) 3. Diarrhoea (8,06%- 5 clients) 4. Headache (1,61%- 1 client) 5. Sore throat (11,29 - 7 clients) 6. Otalgia (12,90%- 8 clients)
5. What factors prompt you to take antibiotics without a doctor's prescription? (several answer options)	
1. Saving on consultations and time 2. Easy to get treatment without a prescription 3. Availability of treatment at home 4. Similarity of symptoms to previous antibiotic treatment for infection	1.Saving on consultations and time (23 clients -37,10%) 2.Easy to get treatment without a prescription (21 clients - 33,87%) 3.Availability of treatment at home (16,13 -10 clients) 4.Similarity of symptoms to previous antibiotic treatment for infection (8 clients - 12,90%)
6.Are their health risks associated with self-medicating with antibiotics? (one answer option)	
1. Yes 2. No 3. I don't know	1. Yes (32,26% - 20 clients) 2. No (51,61% - 32 clients) 3. I don't know (16,13% - 10 clients)

Let us dwell in more detail on the analysis of the results of the questionnaire of pharmacy visitors. The primary question of our study was to establish the respondents' opinions on the level of their familiarity with the purpose of prescribing antibiotics, given its importance and relevance (fig.3.3).

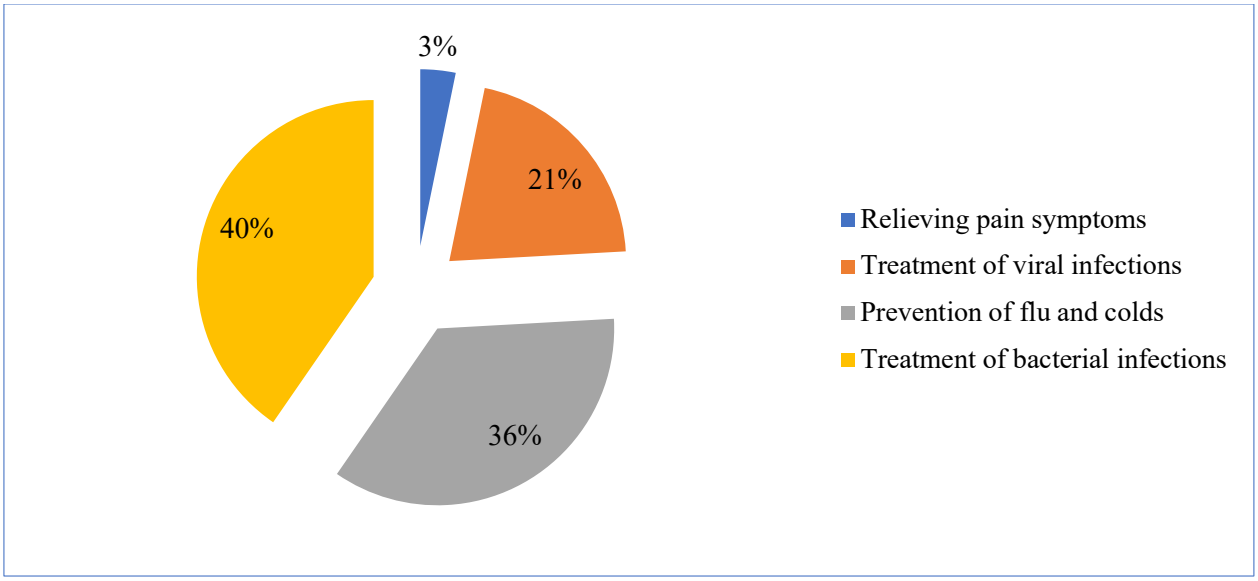

Fig.3.3 Results of processing data from a survey of pharmacy visitors to the first question ("In your opinion, what is the purpose of prescribing antibiotics?")

According to the results of the survey, we found that more than half of the respondents – 25 (40.39% of respondents) correctly answered the question that antibiotics are prescribed for bacterial infections, unfortunately, 35.5% (22 respondents) considered that antibiotics are used to prevent colds. Some of the respondents - 13 (20,9% of clients) do not know that antibiotics, being antibacterial drugs, are useless for the treatment of diseases of a viral nature. Patients' lack of knowledge about the prescription of antibiotics does not contribute to a quick recovery and generates antibiotic resistance.

Respondents' knowledge of taking antibiotics to prevent future bacterial infections was assessed using the second question, as shown in figure 3.4. The majority of visitors – 30 (48.58%) agreed with this statement, and believe that taking antibiotics will protect them from future infections. Just under half – 28 (45.16%) of those surveyed believe that antibiotics should not be prescribed for future infections, and 4 (6.45%) could not answer this question.

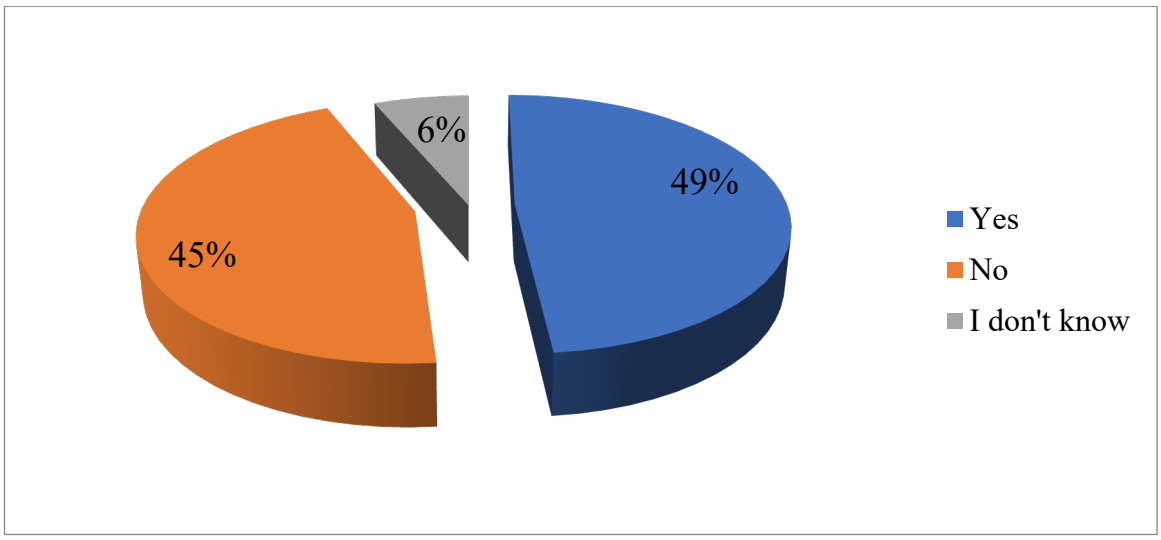

Fig.3.4 Antibiotics should be prescribed as preventive measures to fight against future microbial attacks.

The main reason why antibiotics can cause digestive problems is that they kill the beneficial bacteria in the gastrointestinal tract. Antibiotics are designed to kill the "bad" bacteria, but unfortunately, they can also kill the good ones. This leads to an imbalance in the number of different types of bacteria living in the gut.

The next question of our questionnaire was devoted to the knowledge of respondents on this topic. The majority of pharmacy visitors answered positively – 45 (72.58%), which can be assumed that most of them have faced this problem (fig.3.5).

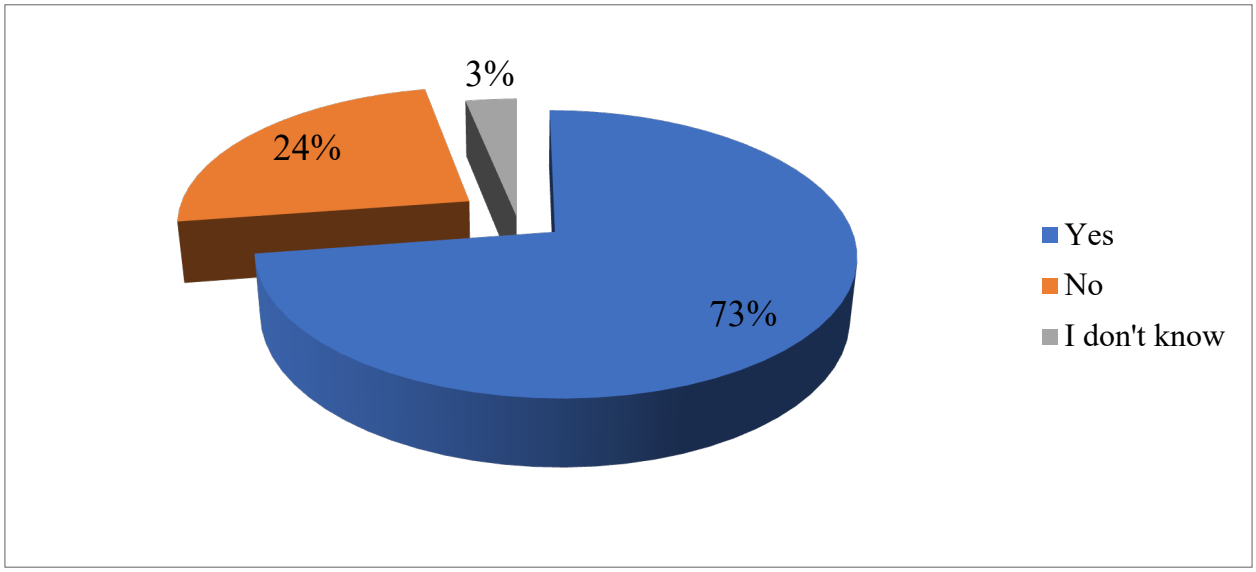

Fig.3.5 Can antibiotics destroy in addition to pathogenic microbes, also beneficial bacteria in our body?

Antibiotic resistance is gaining momentum due to their misuse and overuse, as well as poor infection prevention and control. Measures to mitigate the effects of infection can be taken at all levels of society. The WHO recommends following the "Five Principles of Safe Nutrition" to prevent infection. It was interesting to find out the respondents' attitude to this appeal. To the fourth question, which was formulated as follows: “In your opinion, the principle of safe nutrition (hygiene, contact with sick people, vaccination) prevents infection”, we received a significant number of positive responses. These answers only differed in additions and explanations in the wording. 15 people, which is 24.19%, marked the answer option "Yes, always", "Yes, sometimes" – 20 visitors (32.25%). "Not always", prevention and hygiene can prevent diseases were answered by 14 (22.59%) respondents and only 11 respondents (17.74%) noted a negative answer. Thus, it can be argued that 35 (61.22%) of the surveyed pharmacy customers adhere to the rules of the five most important principles of safe nutrition (fig.3.6).

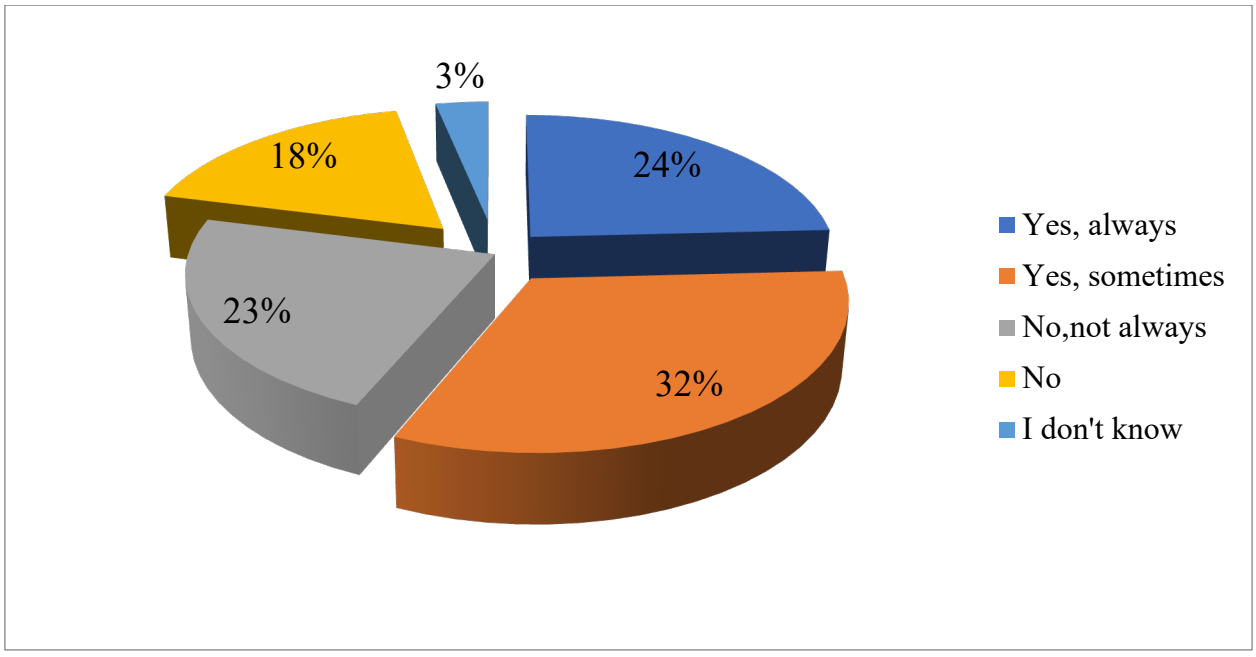

Fig.3.6 In your opinion, the principle of safe nutrition (hygiene, contact with sick people, vaccination) prevents infection?

Inappropriate use of antibiotics in society contributes to the development of antibiotic resistance, which is one of the most pressing problems of modern public health. The objectives of the second block of our study were to study attitudes towards the dispensing of antibiotics without a prescription, as well as to assess the

factors affecting self-medication in Morocco. The sale of antibiotics without a prescription is a problem in many countries around the world, especially in countries with underdeveloped economies, such as Morocco. Prescription antibiotics should only be dispensed with a doctor's prescription under current Moroccan law, but this is not always the case. To the question "How often do you buy antibiotics without a doctor's prescription?" according to the results of a survey of respondents regarding the frequency of purchasing medicines without a prescription, the following results were obtained: 13 pharmacy visitors (20.96%) “always” buy such medicines, 16 (25.81%) respondents “sometimes” and still the majority, 33 (53.23%) respondents adhere to prescription intake, which is a positive point (fig.3.7).

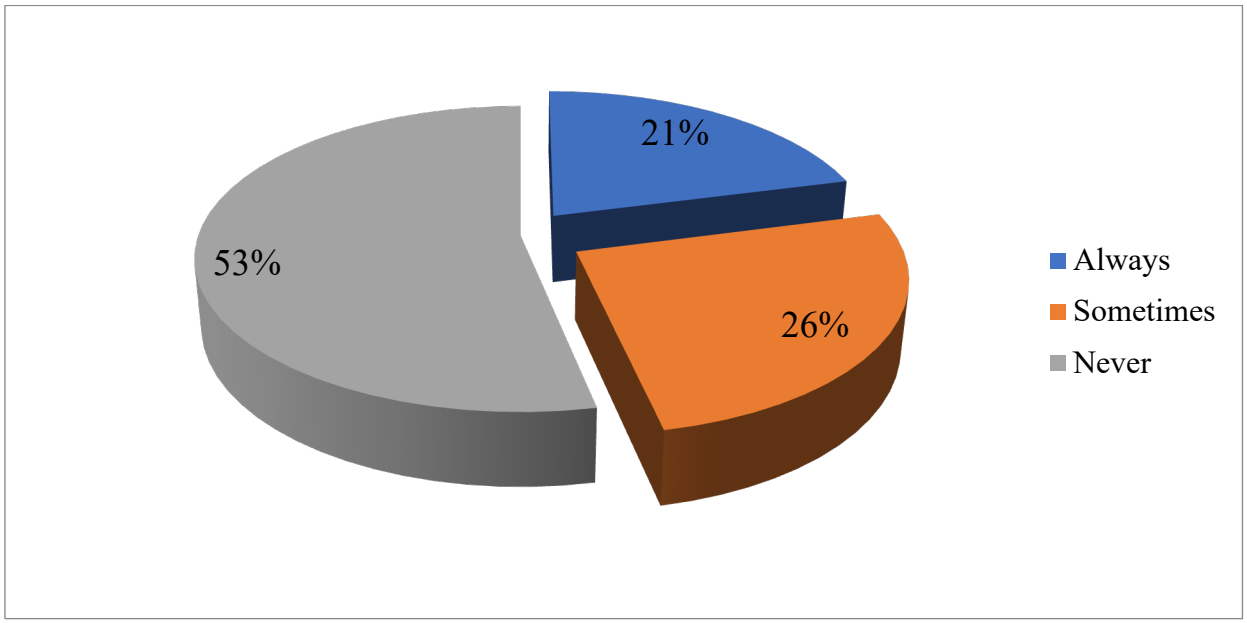

Fig.3.7 Results of processing data from a survey of pharmacy visitors to the question: "How often do you buy antibiotics without a doctor's prescription?"

The duration of antibiotics indicated by the doctor and compliance with the recommended intervals is a prerequisite for treatment.

The disappearance of symptoms does not always mean that the infection has been completely eradicated, and stopping the medication as soon as the symptoms disappear can lead to a relapse of the disease. Respondents' awareness of this issue was reflected in their responses to the question: “Should you stop taking antibiotics when symptoms improve?”. Just over two-thirds of the study participants (67.74%) correctly answered that antibiotics should not be stopped when symptoms improve,

and 32.26% (20 respondents) believed that the disappearance of symptoms meant that the infection had been completely eradicated (fig.3.8). The danger of early interruption of the course of antibiotics is that these patients can become carriers of dangerous infections.

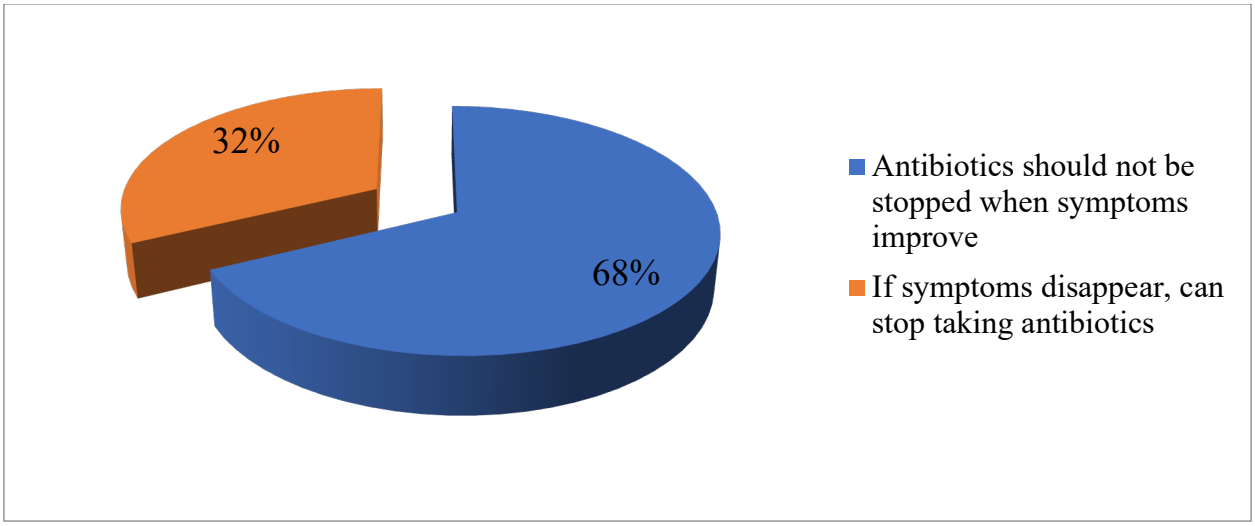

Fig.3.8 Should you stop taking antibiotics when symptoms improve?

The third question of the second block of the questionnaire was aimed at determining the primary source of information for the patient, to whom he turns at the first signs of a cold. In the rating, the first person to seek help for a cold was a pharmacist - 37 (59.68%), followed by a doctor - 15 (24.19%), friends were preferred by 7 (11.29%) respondents and the source of information was medical publications for 3 (4.84%) respondents (fig.3.9).

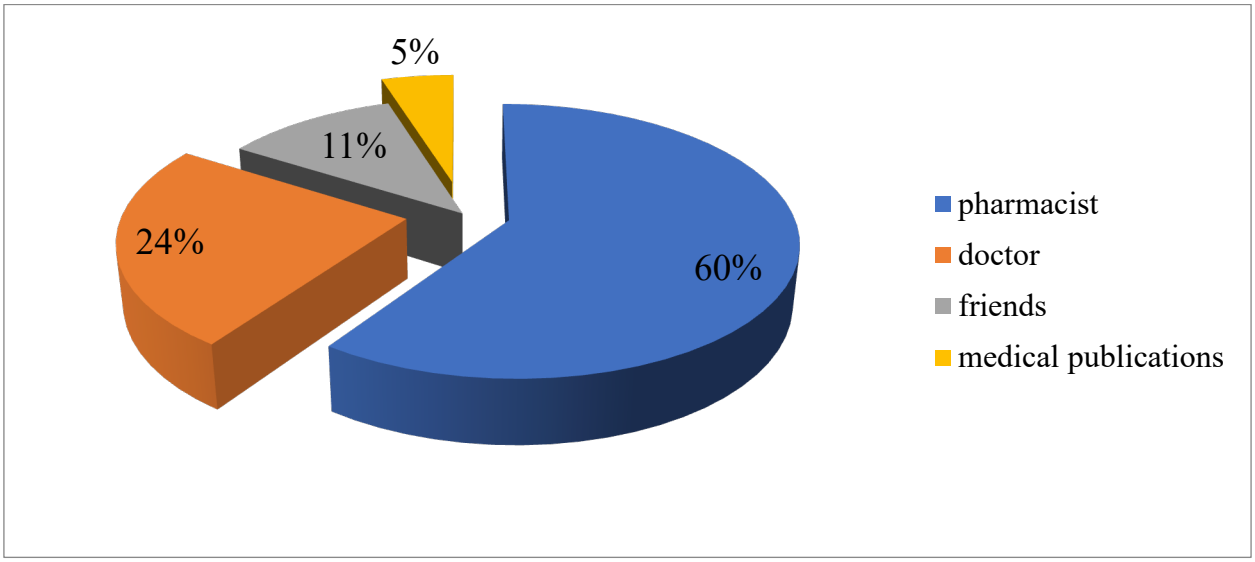

Fig.3.9 Who do you turn to for help with colds?

Antibiotics are the most commonly used medicines worldwide, with most countries defining them as prescription-only medicines. However, the widespread use of antibiotics for self-treatment for a number of symptoms opens the way to the development of antimicrobial resistance. To the fourth question of the questionnaire ” What symptoms do you treat with antibiotics without a doctor's prescription?”, we received the following responses. Antibiotic self-medication has been used to treat a range of symptoms, including cough – 30 clients (48,39%), fever – 11 (17.74%), sore throat – 7 (11.29%), otalgia - 8 (12.90%), diarrhea - 5 (8.06%), and headache - 1 (1.61%) (fig.4.0).

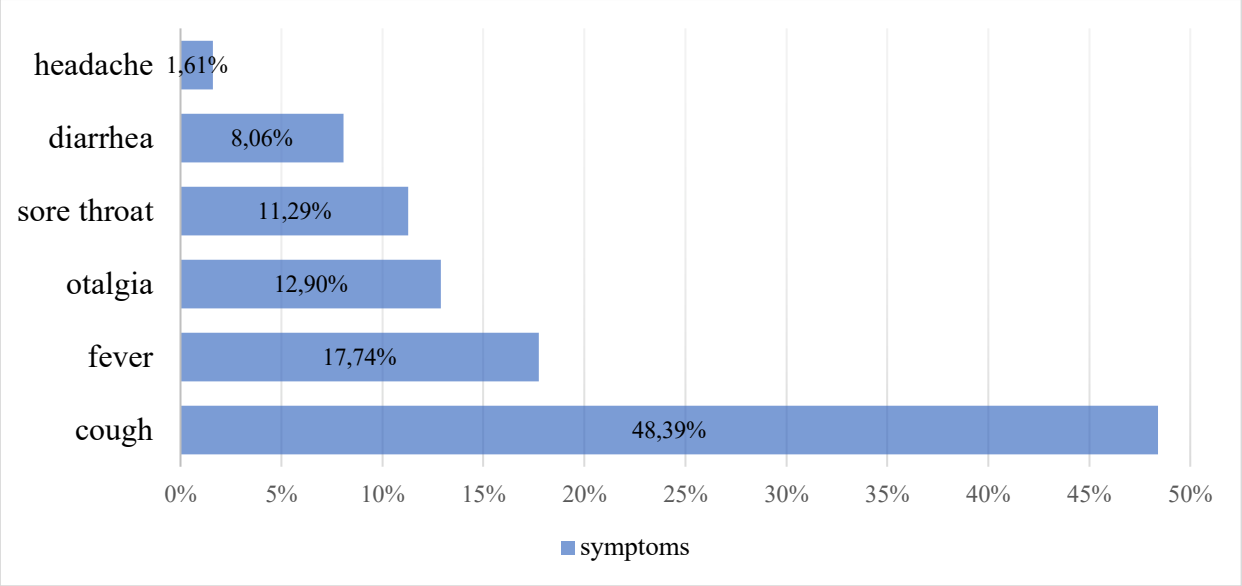

Fig.4.0 Symptoms causing self-medication with antibiotics

The reasons for self-medication are an important indicator for solving the problem of AMR. The effectiveness of previous treatment, savings in consultation costs, time savings, and ease of obtaining treatment without a prescription were noted in most of the responses to our next question: “What factors prompt you to take antibiotics without a doctor's prescription?” (fig.4.1).

According to the respondents, the main factor that prompts taking an antibiotic without a prescription is, first of all, the high fee for doctor's consultations and time saving (23 - 37.10%), at the same time, it is important to have the opportunity to receive treatment without a prescription from a health care worker (21 - 33.87%). The availability of treatment at home was noted by 10 respondents

(16.13%). Thus, it can also be noted that the respondents are very little aware of self-medication with similar symptoms to previous antibiotic treatment (8 – 12.90%).

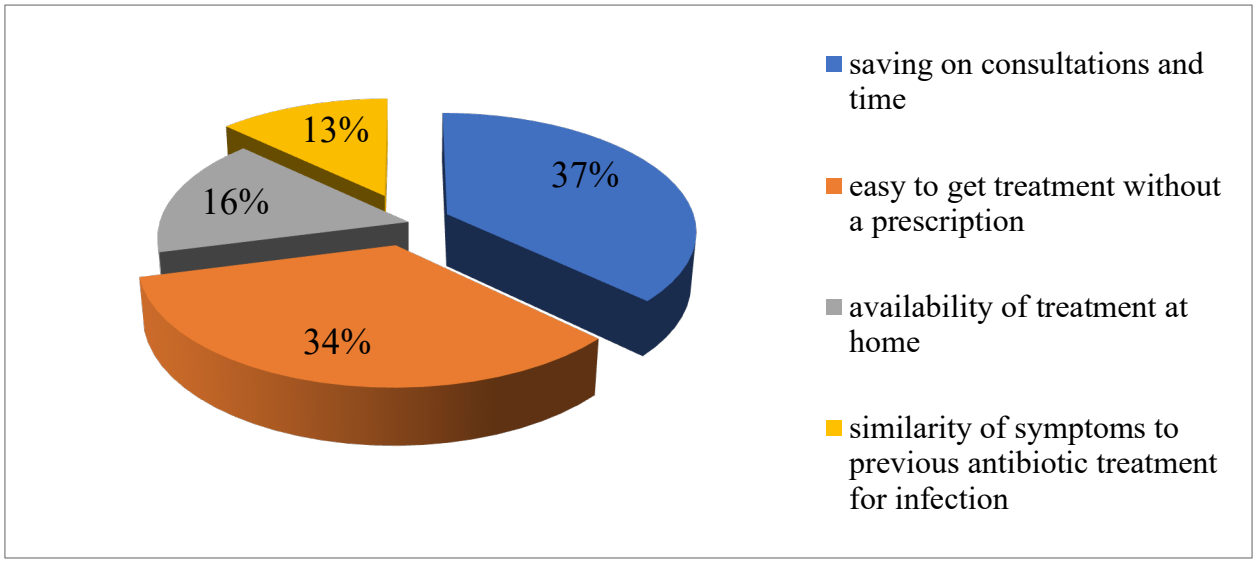

Fig.4.1 What factors prompt you to take antibiotics without a doctor's prescription?

How often do people not realize the risk of uncontrolled antibiotic intake, taking medications at their own discretion or on the advice of friends. In fact, in 90% of situations, taking antibiotics is not recommended, as it carries the risk of bacteria developing antibiotic resistance. And with the real need for antibiotics, they may be ineffective and will no longer be able to help. The last question of our questionnaire showed that the majority of pharmacy visitors do not associate self-administration of an antibiotic with health risks – 32 respondents (51.61%) and 20 clients (32.26%) and 10 participants (16.13%) could not give an answer (fig.4.2).

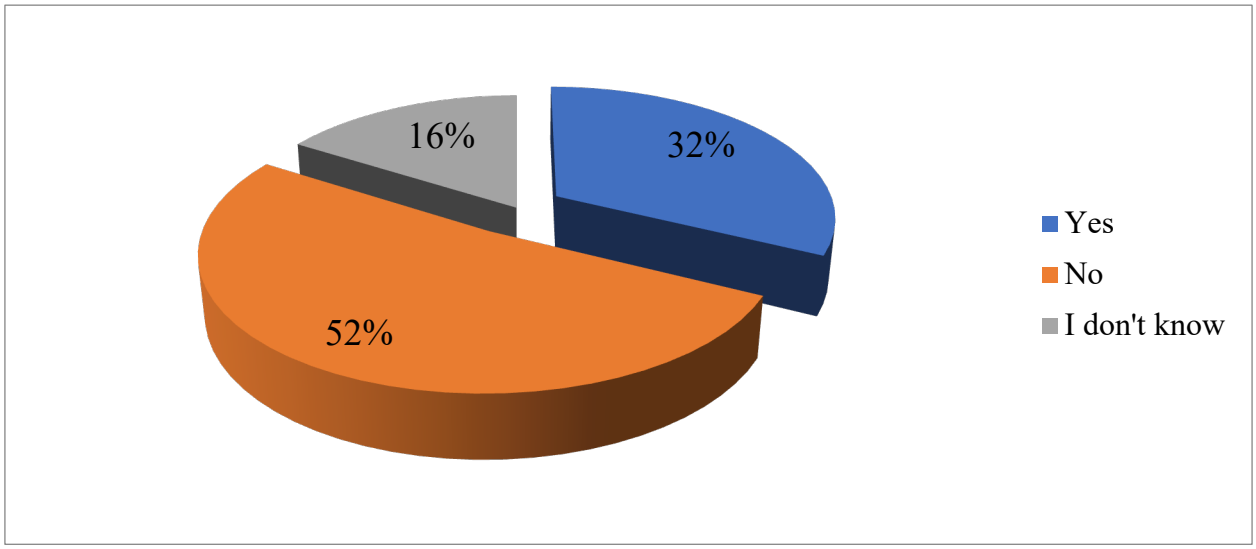

Fig.4.2 Are their health risks associated with self-medicating with antibiotics?

Conclusions to Chapter III

The health systems of developing countries such as Morocco suffer from systemic deficiencies that affect the quality, coverage and delivery of health services and medicines. The poor quality of public health services and medicines, the high cost of medical advice in the private sector, and the lack of public awareness of the correct use of antibiotics encourage people to buy these medicines without a prescription or to replenish previous prescriptions themselves. Patients often share antibiotics with friends without professional advice, and stop taking antibiotics when they feel better.

The results of our survey showed that the majority of pharmacy visitors in Morocco had a lack of knowledge about antibiotics and their use, with approximately 40% knowing that antibiotics are often prescribed for infectious diseases and that patients should not stop taking antibiotics if symptoms improve (68%).

However, almost 21% of customers believed that antibiotics could be used for viral infections and almost 39% believed that antibiotics could be taken for preventive purposes. The main reason for this may be the lack of information about the dangers of using antibiotics on your own. The lack of knowledge in these areas was also related to status and experience, which needed to be taken into account in the future.

Over-the-counter antibiotic dispensing remains a common phenomenon in pharmacy practice in Morocco, the availability of an antibiotic without a prescription (39%) remains a leading factor for the patient to self-medicate and can significantly contribute to antibiotic resistance.

GENERAL CONCLUSION

1. The analysis of the data of scientific literature, as well as legislative acts that cover the issues of antibiotic therapy and the use of antibiotics in the field of health care, including in Morocco, is carried out.

2. An analysis of antibiotic classifications based on various criteria, including a new classification proposed by the WHO in 2017 for the national health systems of various countries, as an effective tool to prevent the spread of antibiotic resistance, was carried out.

3. It is established that the new classification is based on three criteria: by groups of access, observation and reserve. A new target for countries has been adopted – at least 60% of all antibiotics used must be from the access group. This indicator is designed to monitor access to essential medicines.

4. An estimate of the number of deaths associated with drug-resistant infections was carried out, which showed that infections remain one of the leading causes of death worldwide.

5. It is estimated that in 2020, 4.9 million people died worldwide from drug-resistant infections. AMR was the direct cause of 1.27 million of these deaths. The number of deaths from lower respiratory tract infections was estimated at 7,926,000 in 2021.

6. An analysis of official national data on the consumption and use of antimicrobials according to the AWaRe classification, based on essential medicines lists as an antimicrobial management tool, was carried out.

7. As a result of the analysis and systematization of data, the problems and features of antibiotic consumption in 11 countries over the past five countries have been identified. A questionnaire was developed and a sociological survey of pharmacy customers was conducted to determine knowledge about antibiotics and their use in the process of self-medication in Morocco.

8. Factors have been identified to show that, combined with patients' misconceptions about antibiotics and the ease with which these drugs can be

obtained in pharmacies without a prescription, an environment conducive to the misuse of antibiotics is created, which stimulates the emergence and rapid spread of bacterial resistance.

9. The results of the study showed that over-the-counter antibiotic dispensing remains common, especially in low-income countries, and can contribute significantly to antibiotic resistance. The misuse and abuse of antimicrobials not only increases resistance; but also causes therapeutic inefficiencies by increasing length of hospital stay, mortality rates, and health care costs.

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National University of Pharmacy

Faculty for foreign citizens' education
Department of social pharmacy

Level of higher education master's

Specialty 226 Pharmacy, industrial pharmacy
Educational program Pharmacy

APPROVED
The Head of Department
of Social Pharmacy

_____
Alina VOLKOVA
"15" of April 2024

ASSIGNMENT
FOR QUALIFICATION WORK
OF AN APPLICANT FOR HIGHER EDUCATION

Hala REBBAH

1. Topic of qualification work: «Analysis of the reasons for irrational use of antibiotics in the world», supervisor of qualification work: Lyubov TERESHCHENKO, PhD, assoc. prof., approved by order of NUPh from "06" of February 2024 № 34

2. Deadline for submission of qualification work by the applicant for higher education: October 2024.

3. Outgoing data for qualification work: authors' publications; media publications; official health sites; State Statistics Service of the world; sites of WHO, Internet, etc.

4. Contents of the settlement and explanatory note (list of questions that need to be developed): analysis of the current situation with the circulation of antibacterial drugs; studying the pharmacist's role in promoting the judicious use of antibiotics and preventing antimicrobial resistance; analysis of modern problems of dispensing antibiotics from pharmacies in Morocco.
5. List of graphic material (with exact indication of the required drawings):
Tables – 8, schemes – 20.

6. Consultants of chapters of qualification work

Chapters	Name, SURNAME, position of consultant	Signature, date	
		assignment was issued	assignment was received
1	Lyubov TERESHCHENKO, associate professor of higher education institution of department of social pharmacy	16.04.24	16.04.24
2	Lyubov TERESHCHENKO, associate professor of higher education institution of department of social pharmacy	24.04.24	24.04.24
3	Lyubov TERESHCHENKO, associate professor of higher education institution of department social of pharmacy	25.04.24	25.04.24

7. Date of issue of the assignment: «_ 15_ » of April 2024

CALENDAR PLAN

№ з/п	Name of stages of qualification work	Deadline for the stages of qualification work	Notes
1	Study of concept of an antibacterial drug. Study of the current situation with the circulation of antibacterial drugs.	*April 2024*	**done**
2	Study of the role of the pharmacist in promoting the judicious use of antibiotics and preventing antimicrobial resistance.	*May 2024*	**done**
3	Analysis of modern problems of dispensing antibiotics from pharmacies in Morocco.	*June 2024*	**done**
4	Registration of a qualification work according to the general requirements	*September 2024*	**done**
5	Preparation of the report and multimedia presentation in official protection of a master's thesis	*October 2024*	**done**

An applicant of higher education_____ Hala REBBAH

Supervisor of qualification work _____ Lyubov TERESHCHENKO

ВИТЯГ З НАКАЗУ № 34
По Національному фармацевтичному університету
від 06 лютого 2024 року

1. Затвердити теми кваліфікаційних робіт здобувачам вищої освіти 5-го курсу 2 циклу Фм20*(4,10д) 2024-2025 навчального року, ступінь вищої освіти «магістр», галузь знань 22 Охорона здоров'я, спеціальність 226 – Фармація, промислова фармація, освітньо-професійна програма – Фармація, денна форма здобуття освіти (термін навчання 4 роки 10 місяців). Мова навчання англійська

№ з/п	Прізвище, ім'я здобувача вищої освіти	Тема кваліфікаційної роботи		Посада, прізвище та ініціали керівника	Рецензент кваліфікаційної роботи
• **по кафедрі соціальної фармації**					
18.	Реббах Хала	Аналіз причин нераціонального використання антибіотиків у світі	Analysis of the reasons for irrational use of antibiotics in the world	доцент Терещенко Л.В.	доцент Бондарєва І. В.

Ректор

Вірно. Секретар

ФА2.8-03-317

ВИСНОВОК

експертної комісії про проведену експертизу
щодо академічного плагіату у кваліфікаційній роботі

здобувача вищої освіти

«20» листопада 2024 р. № 329631347

Проаналізувавши кваліфікаційну роботу здобувача вищої освіти Реббах Хала, Фм20*(4,10д)-англ-02, спеціальності 226 Фармація, промислова фармація, освітньої програми «Фармація» навчання на тему: «Аналіз причин нераціонального використання антибіотиків у світі / Analysis of the reasons for irrational use of antibiotics in the world», експертна комісія дійшла висновку, що робота, представлена до Екзаменаційної комісії для захисту, виконана самостійно і не містить елементів академічного плагіату (компіляції).

Голова комісії,
проректор ЗВО з НПР,
професор **Інна ВЛАДИМИРОВА**

Ф А 2.2.1-32-353

REVIEW

of scientific supervisor for the qualification work of the master's level of higher education of the specialty 226 Pharmacy, industrial pharmacy

on the topic: **«Analysis of the reasons for irrational use of antibiotics in the world»**

Relevance of the topic. Infectious diseases throughout the history of mankind have remained one of the main threats to health and life. For decades, antibiotics have been an effective tool in the fight against bacterial infections, making many of them curable, but in recent years, the effectiveness of antibiotic therapy has begun to decline due to the development of resistance of microorganisms to antibacterial drugs. Therefore, the study of the attitude of the population and their awareness on these issues remains relevant.

Practical value of conclusions, recommendations and their validity. The qualification work notes that the wide availability of antibiotics (due to over-the-counter dispensing), their "prophylactic" prescription for viral infections, the wrong choice of antibiotic, its dosage regimen or duration of treatment, as well as non-compliance with medical recommendations by patients lead to the formation and spread of antibiotic-resistant strains of microorganisms, which today is an urgent problem for all countries of the world. Thus, the research direction of Hala REBBAH qualifying work is relevant and has practical significance.

Assessment of work. During his qualification work, Hala REBBAH studied and analyzed a significant amount of literature and regulatory legal acts on the topic. The analysis carried out confirms the relevance of the research and puts forward the need for their implementation.

General conclusion and recommendations on admission to defend. On structure this work meets the requirements to qualification work in "Pharmacy" and can be presented to protection to EK of NUPh.

Scientific supervisor _____ Lyubov TERESHCHENKO

«07» of November 2024

Ф А 2.2.1-25-356

REVIEW

for qualification work of the master's level of higher education, specialty 226 Pharmacy, industrial pharmacy

Hala REBBAH

on the topic: **«Analysis of the reasons for irrational use of antibiotics in the world»**

Relevance of the topic. The problem of antibiotic resistance arose almost simultaneously with the synthesis of the first antibiotics, but in the last few decades it has become threatening. Antibiotic resistance is gaining momentum due to their misuse and overuse, as well as poor infection prevention and control. Measures to mitigate the effects of sustainability and limit its spread can be taken at all levels of society, and coverage of these issues remains relevant in today's world.

Theoretical level of work. The qualifying work is a theoretical generalization and solution of problems designed to substantiate the reasons for the irrational use of antibiotics at all levels of their life cycle and to identify ways to solve these problems.

Author's suggestions on the research topic. The study found differences in public awareness of antibiotic resistance and the influence of pharmacists in addressing the problem. There is a need to increase the awareness of pharmacists on the issue of increasing antibiotic resistance to improve their skills. Pharmacists should also consider prescribing over-the-counter medications to help patients with infectious diseases.

Practical value of conclusions, recommendations and their validity. The results of these studies can be used to develop evidence-based approaches to address the problems of irrational use of antibiotics in developing countries.

Disadvantages of work. Hala REBBAH qualification work, submitted for review, made a good impression, primarily due to its content and the relevant current standards of research results.

General conclusion and assessment of the work. On structure the specified work conforms to requirements to qualification work in "Pharmacy" and can be presented to protection to EC of NUPh.

Reviewer _____ Irina BONDAREVA

«08» of November 2024

Ф А2.5-32-231

ВИТЯГ

з протоколу засідання кафедри соціальної фармації

№ 5 від «08» листопада 2024 року

ПРИСУТНІ: зав. каф. доц. Аліна ВОЛКОВА, проф. Ганна ПАНФІЛОВА, проф. Вікторія НАЗАРКІНА, доц. Галина БОЛДАРЬ, доц. Наталія ГАВРИШ, доц. Тетяна ДЯДЮН, доц. Юлія КОРЖ, асист. Альміра НОЗДРІНА, доц. Вікторія МІЩЕНКО, доц. Ірина ПОПОВА, доц. Олександр СЕВРЮКОВ, доц. Ірина СУРІКОВА, доц. Любов ТЕРЕЩЕНКО, доц. Наталія ТЕТЕРИЧ.

ПОРЯДОК ДЕННИЙ:

Про представлення до захисту в Екзаменаційній комісії кваліфікаційних робіт.

СЛУХАЛИ: завідувачку кафедри доц. Аліну ВОЛКОВУ з рекомендацією представити до захисту в Екзаменаційній комісії кваліфікаційну роботу здобувача вищої освіти спеціальності 226 Фармація, промислова фармація Реббах Хали на тему: «Аналіз причин нераціонального використання антибіотиків у світі».

Науковий керівник к. фарм. н., доцент кафедри СФ Любов ТЕРЕЩЕНКО.

Рецензент к. фарм. н., доцент кафедри ММЗЯФ Ірина БОНДАРЄВА.

УХВАЛИЛИ: Рекомендувати до захисту в Екзаменаційній комісії кваліфікаційну роботу здобувача вищої освіти Реббах Хали на тему: «Аналіз причин нераціонального використання антибіотиків у світі».

Завідувачка каф. СФ, доцент Аліна ВОЛКОВА

Секретар, доцент Наталія ТЕТЕРИЧ

Ф А2.2.1-32-042

НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

ПОДАННЯ
ГОЛОВІ ЕКЗАМЕНАЦІЙНОЇ КОМІСІЇ
ЩОДО ЗАХИСТУ КВАЛІФІКАЦІЙНОЇ РОБОТИ

Направляється здобувач вищої освіти Реббах Хали до захисту кваліфікаційної роботи за галуззю знань 22 Охорона здоров'я
спеціальністю 226 Фармація, промислова фармація
освітньою програмою Фармація
на тему: «Analysis of the reasons for irrational use of antibiotics in the world».

Кваліфікаційна робота і рецензія додаються.

Декан факультету _____ / Світлана КАЛАЙЧЕВА /

Висновок керівника кваліфікаційної роботи

Здобувач вищої освіти Реббах Хала під час виконання кваліфікаційної роботи вивчив і проаналізував значний обсяг літератури та нормативно правових актів по темі. Проведений аналіз підтверджує актуальність досліджень і висуває необхідність їх проведення.

Керівник кваліфікаційної роботи _____ Любов ТЕРЕЩЕНКО

«07» листопада 2024 р.

Висновок кафедри про кваліфікаційну роботу

Кваліфікаційну роботу розглянуто. Здобувач вищої освіти Реббах Хали допускається до захисту даної кваліфікаційної роботи в Екзаменаційній комісії.

Завідувачка кафедри
соціальної фармації _____ Аліна ВОЛКОВА

«08» листопада 2024 р.

Qualification work was defended
of Examination commission on
« _28__ » __November_ 2024
With the grade _____
Head of the State Examination commission,
DPharmSc, Professor
_____ / Oleh SHPYCHAK /