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Knowledge, Attitude, and practice of management of upper respiratory tract infections in children under five years old of age among healthcare professionals in primary health care of southern Palestine

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Dedication

I look up and dedicate this whole study to my Almighty God who gave me strength, knowledge, wisdom, and protection.

To my beloved son Obaida who always encourages me to be a great mother

To my husband and my family, who have patiently and lovingly supported me through this journey

Declaration

I Certify that this thesis submitted for the degree of Master in Infectious Diseases Prevention and Control is the result of my own research, except where otherwise acknowledged, and that this thesis (or any part of the same) has not been submitted for higher degree to any other university or institution.

Marwa Al-Sarasra

Signature: 

Date: 5/1/2025

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I would like to express my sincere gratitude to my supervisor, for their support throughout my research .

I would also like to mention my husband and family for their incredible understanding, patience, and backing during this journey.

Finally, I dedicate this thesis to my parents, who instilled in me from a young age the value of education and supported me every step of the way. Their unwavering belief in my abilities inspired me to set high goals and work diligently towards achieving them.

Abstract:

Background: One of the current challenges to global public health is antimicrobial resistance (AMR). AMR has spread as a direct result of increased antibiotic use in agriculture, animals, and humans. Antibiotics are frequently used to treat upper respiratory tract infections (URIs), even when they are not necessary, as is the case with viral infections and self-limited illnesses, which account for the majority of URI occurrences. Evaluating doctors' perspectives, practices, and expertise about prescribing antibiotics to children with acute URIs may help manage the problem of antibiotic misuse.

Aim: This study aims to evaluate the problem in the community and provide information to the construction of appropriate programs to optimize the prescription of antibiotics

Methodology: This study is cross-sectional and is intended for primary care physicians in Palestine who treat acute upper respiratory tract infections (URIs).

The knowledge, attitudes, and practices of physicians were evaluated using a self-administered questionnaire. In order to evaluate the trends of antibiotic prescriptions in typical cases, the questionnaire also contained four clinical scenarios that addressed different URI possibilities.

Results: The majority of the 100 physicians in this study were general practitioners, with an average age of 36.8±7.6. The average number of right answers for the 18 knowledge questions was 14.9±2.5, indicating that they had good knowledge.

Their mean attitude scores for prescribing antibiotics inappropriately were low, with ignorance receiving the highest score (4.2 ± 0.56). 52% of participants prescribed antibiotics if the child's fever lasted more than five days, and 22% did so if the child had a yellowish or greenish nasal discharge, according to the prescribing practice for URIs in unusual circumstances. Of the 400 clinical scenarios, 207 (51.75%) included prescriptions for antibiotics, and 32.82% of those prescriptions were appropriate.

Conclusion: In Palestine's primary healthcare system, physicians who treat acute URIs are well-versed in antibiotic use and resistance, and they exhibit a positive attitude towards the responsible use of antibiotics. More research is needed to examine the reasons that contribute to incorrect antibiotic prescribing practices and non-adherence to guidelines, even if the percentage of inappropriate prescriptions in clinical scenarios is slightly high.

Establishing a national antibiotic stewardship program is also crucial to enhancing antibiotic prescription practices and addressing issues with antibiotic resistance.

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Abbreviation:

ATB: Antibiotics

AMR: Antimicrobial resistance

AURTIs: Acute upper respiratory tract infections

ENT: ear nose throat

GPs: General practitioner

IMCI: Integrated management of childhood illness

KAP: knowledge attitude practice

MDR: Multidrug resistant

MOH: Ministry of health

PHC: Primary health care

WHO: World health organization

Chapter One: Introduction

1.1 Introduction:

The antimicrobial discovery was a revolution in the medical world since, before this discovery, infectious disease had led to death and disability for many people, and the life expectancy was only forty-seven years old. After a century of antimicrobial discovery, many new antimicrobials are used for the treatment of humans and animals, and in agriculture, many bacterial strains developed resistance to them. 10 million people will be killed yearly due to antimicrobial resistance by 2050(Murray et al., 2022). By 2030, the irresponsible use of antibiotics will increase poverty and have a negative economic impact (Staiano et al., 2023). Bacterial antimicrobial resistance (AMR), which has emerged as one of the leading public health threats of the 21st century, occurs when the drug used to treat infection becomes less effective due to bacterial changes (Murray et al., 2022). Microorganisms like bacteria naturally develop resistance to antimicrobials by genetic modification since they aim to survive and spread even in difficult environments (Taher et al., 2022). The major driving fuel for the development of antimicrobial resistance is the irrational use of antibiotics (Liu et al., 2019). Overuse of antibiotics, incorrect dosing, overuse, and incorrect duration are some of the causes that contribute to antimicrobial resistance, which is associated with increased health costs, morbidity, and mortality(Machowska & Lundborg, 2019). Using antibiotics in early life affects microbiota composition, reaching as long as 6 months after use, and has been associated with long-term negative impacts, including autoimmune and metabolic diseases (Taher et al., 2022). The most frequently usable predictor of antibiotic prescription is knowledge and attitude (Liu et al., 2019). Prescribing behaviors can be influenced directly or indirectly by knowledge through affecting attitudes. Sociodemographic characteristics like gender, qualifications, clinical expertise, continuing education, and years of practice shape the knowledge and attitude of the prescribers (Taher et al., 2022). The decision of antibiotic use and the selection of its type is the responsibility of the prescriber. Their realization about antibiotic use and resistance, knowledge, and attitude play a role in prescribing behavior; it has been suggested that physicians' attitudes and knowledge determine the quality of prescribing antibiotics (Machowska & Lundborg, 2019). The presence of a good monitoring and reporting system will help in decreasing antibiotic use.

Infectious diseases in primary healthcare are very common but most of them are non-serious and self-limiting (Rop et al., 2022). Acute upper respiratory tract infections (AURTI), which include pharyngitis, tonsillitis, sinusitis, epiglottitis, otitis media, and laryngotracheitis are the most common cause for seeking an outpatient clinic (Wang et al., 2020). A normal child will have approximately five times of acute viral upper respiratory tract infections in a year (Long et al., 2019a). Gastrointestinal and respiratory diseases are managed incorrectly by

using antibiotics; doctors prescribe antibiotics needlessly, increasing the prevalent antibiotic resistance (Karuniawati et al., 2021). The duration of respiratory symptoms will not be shortened and the risk of complications in children will not be decreased, with antibiotic drug use. These infections are mostly of viral origin; despite that, it is still the major condition for inappropriate antibiotic prescription (Zhao et al., 2020). World Health Organization (WHO) considers AURTI a major indicator for antibiotics overuse assessment (Zhao et al., 2020).

Lack of available diagnostic tests to rapidly identify the pathogen and its susceptibility profile is the core problem that leads to incorrect antibiotic prescribing one of the most common upper respiratory tract infections is acute tonsillitis, which is mostly viral in origin. But when it happens due to group A streptococcus, there will be a serious complication if these bacteria will not be treated appropriately. So, besides symptoms, the use of a diagnostic test will help in the differentiation between viral and bacterial origin. So, throat swabs for rapid antigen tests can be used to detect streptococcus infection.

1.2 Problem statement:

Antimicrobial resistance has been associated with many problems. It increases the duration of infectious disease, so increases its spread between populations, which may lead to death, and disability. According to the former problems, it has a significant economic cost since it increases treatment costs and hospital admissions for infections and their consequences of treatment.

Most acute outpatient clinic visitors are children. Primary healthcare (PHC) in Palestine covers the treatment of 93.7% of Palestinian children. Since the most common cause of the visits in the acute clinic is upper respiratory tract infections and most are of viral origin, knowing the origin of the infection is important. Viral infections will be treated without antibiotics and bacterial origin of infection must not be ignored due to its bad complication if not treated appropriately. Differentiating between conditions that require antimicrobial therapy from those that do not is key to the provision of excellent clinical care.
Rapid swab test, which will help the physicians to differentiate between viral and bacterial, is not found in the PHC. Therefore, understanding how antibiotics are used, measuring their use, and explaining indicators with standards to confirm their quality are essential for better prescriptions of antibiotics and resistance control.

1.3 Significance of the study:

In 2016, World Health Organization (WHO) published a manual that put a strategy against AMR to help countries put their national plan against AMR (WHO 2016). Palestine, like other countries, is fighting this problem. In alignment with the global action plan developed by WHO to address AMR, the Palestinian MOH developed its national plan to combat AMR. Multidrug resistance microorganisms (MDR) and inappropriate antibiotic use are still real problems in low socioeconomic countries (Kose & Colak, 2021).

Multiple phenomena play a role in increasing antibiotic prescription prevalence rate, one of them is trying to meet parents' expectations, being pressured by them, and having no good background about antibiotic prescription (Kostev et al., 2023).

Upper respiratory tract infections are the most common cause of outpatient visits in PHC, it is estimated more than 250000 per 100000 aged less than ten years. (Kostev et al., 2023).

In Palestine PHC acute clinics treat 93.7% of Palestinian registered children according to the Health Annual Report 2018.

The main goal of the plan is to increase awareness and strength of the knowledge of the health care provider and provide a good environment to apply this knowledge in practice. The Ministry of Health (MOH) newly implements this plan (Ministry of Health, 2017).

Although the integrated management of childhood illness (IMCI) encourages antibiotics given only to children who need them by providing healthcare workers guidelines based on clinical signs and symptoms to differentiate between children who are likely to benefit from ATB and those who will not, which play a role in minimizing antibiotic prescriptions. However, physicians in Palestine work without specific restrictions or clear antibiotic prescribing guidelines. (Maraqa et al., 2023) (Slagboom et al., 2021)

Multiple causes in Palestine lead to irrational antibiotic prescriptions, mostly due to insufficient examination facilities, the need for doctors to feel safe and cultural beliefs that a good doctor is equal to an antibiotic prescription.

In a study, 72 cultures were taken from patients all over Palestine showed that isolated bacteria are described as extremely drug-resistant pathogens. (Ministry of Health, 2017).

Rapid swab tests since it is good in differentiation according to previous studies but it is still not found in the Palestinian Ministry of Health.

Many factors can help in arise inappropriate use of ATB like physician knowledge and experiences, no uncertainty of diagnosis, the attitude of the physicians toward antibiotics, and pressure from the patient (Shaikhan et al., 2018). To study these factors, there is only one study in Palestine that estimates knowledge, attitude and practice (KAP) of doctors regarding antibiotic prescriptions for upper respiratory tract infections. This study shows that GPs' knowledge in primary health care was good but they need education intervention about usage of ATB. The study shows a good attitude toward antibiotic use and indicates that many factors influence their practice. (Maraqa et al., 2023). On the other hand, a similar study done in Jordan shows that knowledge about antibiotic resistance is affected by years of experience, and their practice can be affected by socioeconomic and psychological factors despite the clinical aspect, but it was in a general way not about AURTI only (Karasneh et al., 2021). A systemic review done in Qatar shows that lack of knowledge leads to inappropriate diagnosis and unknown of the origin of the disease leading to misuse of antibiotics and inappropriate practice (Shaikhan et al., 2018).

Although most of the AURTIs are of viral origin, it is the most common cause of prescribing antibiotics (Kostev et al., 2023). From this point, we need a test to differentiate the origin of infection. The rapid throat swab test can be used to detect streptococcus bacteria, which is the most common cause of acute follicular tonsillitis, and delayed treatment will lead to bad complications including rheumatic fever.

An experimental study in Emirate about the influence of a guideline or an additional rapid strep test on antibiotic prescriptions for sore throat shows that if a physician has good training about how to do the rapid test, it will reduce the ATB prescription rates.

1.4 Purpose of the study:

This study aims to evaluate the knowledge, attitude, and practice of general physicians, family doctors, and pediatricians in primary health care about antibiotic prescription in cases of acute upper respiratory tract infection.

1.5 Specific objectives:

- To evaluate knowledge of GPs, family medicine doctors, and pediatricians about antibiotic prescription in cases of children of acute upper respiratory tract
- To evaluate the attitude of GPs, family medicine doctors, and pediatricians about antibiotic prescription in cases of children o acute upper respiratory tract
- To evaluate the practice of GPs, family medicine doctors, and pediatricians regarding antibiotic prescription in cases of children with acute upper respiratory tract

1.6 Research question:

- Does having good knowledge, attitude, and practice decrease ATB prescriptions for AURTI in children?
- Does having a long experience play a role in ATB prescriptions?
- Does having good practice in rapid antigen test decrease ATB prescriptions for sore throat**?**

1.7 Feasibility of the study:

- Ethical approval was obtained from Al-Quds University.
- The researcher herself is working at the Palestinian Ministry of Health
- An approval from the Palestinian Ministry of Health was obtained before conducting the study

1.8 Summary:

Antimicrobial resistant is one of the most global health problems worldwide, early warning and restrict guidelines and monitoring system will delay this problem. Good knowledge attitude and practice and available of rapid testing will help to prescribe appropriate antibiotic Palestine, there is one study that estimates knowledge, attitude, and practice ، about antibiotic use for upper respiratory tract infections between primary healthcare (PHC) physicians, but no study was concerned with throat swab rapid test.

This chapter presented the problem statement, the study objectives, research questions and feasibility of the current study.

The next chapter discussed the literature review of the current study.

Chapter two: Literature review:

The introduction of antibiotics in the middle of the last century, they were considered miraculous because of their effect on serious bacterial infections, before 1940 bacterial infection was lethal or treated with surgical drainage, silver compounds, antiseptics, arsenicals, or with time.

The golden age of antibiotics is from the 1930s to the 1960s since the newly identified antibiotic reached its peak in this period (Baran et al., 2023). Unfortunately, antibiotic resistance bacteria started to appear at the same time (Baran et al., 2023). Antimicrobial resistance occurs due to the reduction or elimination of the microbial response to pharmacological treatment which can be naturally (intrinsic) to some bacterial species or be gotten through the evolutionary process through complex mechanisms (Zgliczyński et al., 2022).

Bacterial resistance to antibiotics happens via de novo gene mutation or by getting the genetic information, which encodes resistance from other bacteria. Large use of antibiotics makes resistant bacteria survive and grow by selective pressure (Machowska & Lundborg, 2019). Inappropriate and unnecessary use of antibiotics considered as major cause of this problem. Beside several factors, play a role in the problem like availability of antibiotics without prescription, inappropriate diagnosis, incomplete antibiotic course, and insufficient patient education by the medical team and decrease knowledge of physicians about recent antibiotic recommendation guidelines and the use of antibiotics in animals and agriculture (Arshad et al., 2022). This problem become a global threat nowadays which leads to treatment failure resulting in increases in in-hospital stay, cost of care, morbidity, and mortality (Zgliczyński et al., 2022). Sever health and economic consequences of antimicrobial resistance are severe, these days' drug-resistant infections lead to approximately 700,000 deaths yearly all around the world. If no action is taken, by 2050 this number is suspected to be increased to 10 million with associated costs as high as US 100$ trillion globally (Machowska & Lundborg, 2019).

Primary care patients are the vast majority of users of antibiotics, commonly for upper respiratory tract infections (Van Der Velden et al., 2012). The definition of acute upper respiratory tract infections are infections of the nose, pharynx, larynx, and trachea subglottic, mostly it is viral in origin (Maraqa et al., 2023). There is no indication for antibiotic prescription in uncomplicated URTI.

There are many symptoms associated with upper respiratory tract infection including sore throat, cough, fever, nasal congestion, and rhinorrhea. These symptoms need from 7-15 days to disappear (Long et al., 2019). Despite AURTIS being viral originally, antibiotics used in its treatment increased from 43 to71% between 1982 to2006 according to WHO reports (Maraqa et al., 2023). There are no indications for antibiotic use for uncomplicated viral

URTIs, and their use put children at risk of side effects and contributes to develop of antimicrobial resistant (Long et al., 2019). So, AURIs are used by WHO as an indicator of antibiotic overuse, so understanding the outpatient use of antibiotics for AURTIs would be a standard point for the reduction of inappropriate antibiotic prescriptions (Zhao et al., 2020). In developing countries, antibiotics are routinely used for respiratory symptoms and fever in day-to-day practice, regardless of the etiology (Shu et al., 2022). AURTIs are common in children, the normal child may have approximately five viral URTIS per year, and more than 10% of children will experience 10 or more colds per year (Long et al., 2019b). Children and neonates will be affected by antibiotic therapy more than adults will. It may cause kidney damage as the children's kidneys are not mature enough to excrete the drugs, it may lead to organ failure, and the pediatric microbiome may be damaged causing long-term psychophysiological consequences (Al-Yaqoubi & Al-Maqbali, 2021). One of the most common health conditions that physicians in primary health care deal with is a sore throat, which is commonly viral in origin(Parthasarathy et al., 2020) ,but group A beta-hemolytic streptococci (GAS)is one of the microorganisms that cause the upper respiratory tract disease. It is the cause of tonsillo-pharyngitis, GAS causes complications and side effects of its disease courses if not treated well, so a rapid antigen test is used to diagnose it (Uzun et al., 2020).

According to the World Health Organization (WHO) definition," medicines are used rationally when patients receive the appropriate medicines, for appropriate indications, in doses that meet their requirements, for an adequate period, at the lowest cost both to them and the society and with appropriate information". If one of these points is not found the drug prescribed is inappropriate or unnecessary. General practitioners and infectious disease specialists have influence in reduction of antibiotic prescription, which will enhance decrease ATB resistance and infection control procedures. This will be achieved by promoting good practice of guideline adherence when prescribing antimicrobials, encouraging the use of vaccines among patients, managing antibiotic surveillance, educating future generations of health-care workers about AMR and engaging in research on novel therapy agents (Zgliczyński et al., 2022). Lack of proper training about antimicrobial use and infectious disease diagnosis is one of the most important factors that affect antimicrobial resistance, also patients' pressure plays a major role in the irrational use of antibiotics (Shu et al., 2022). Many sociodemographic characteristics like gender, clinical expertise, continuing education, qualification, and years of practice (Taher et al., 2022). Many external factors will be taken into consideration by physicians when medication is prescribed rather than practice or guidelines including pressures from peers or patients, government, and employees which affect the attitude directly or indirectly (Taher et al., 2022).

Previous studies in many countries show that general practitioners have good knowledge about guidelines, but they do not follow these guidelines frequently. Several factors play a role in the easy prescription of antibiotics including the belief of healthcare providers to go with patient expectations, decreased knowledge about infectious disease treatment and believing that recommendation treatment is not effective as others (Carlsson et al., 2023).

Most physicians around the world have well- knowledge about this growing problem. Antibiotic prescriptions are a complex issue since many determinants affect antibiotic prescription including both intrinsic and external ones. The core factors of the intrinsic determinant are the knowledge and attitude of the physician (Liu et al., 2019). External ones include patient requests, pressure from the environment and peers, time in the day, etc. Doctors are the prescribers of antibiotics in most countries like Palestine, the opportunities to deliver evidence-based care are limited due to lack of facilities, high workload, fear of losing their patients, and lack of information on rational antibiotic use (Shu et al., 2022).

In a Palestinian study, the results show that 40% of participants have good knowledge about antibiotic usage. The researchers find that educational intervention about appropriate antibiotics is needed to improve the doctor's knowledge which is alien to other studies that included a systemic review which shows that two-thirds of the studies that educational intervention will improve guidelines adherence and decrease percentage of prescribed antibiotics (Florence, 2013).Attitude and practice of Palestinian doctors were better than other studies, 61.4% and 58.2%. Also, they found that doctors don't prescribe antibiotics for patients to increase patients' confidence in their practice (Maraqa et al., 2023).

A cross-sectional study done in Jordan shows that most of the participant's physicians have good knowledge about antibiotic resistance and the ability to write the right prescription, with a percentage reaching 50% noticing that they refresh their knowledge frequently with access to most new guidelines. According to attitude around 42% of participants do not prescribe antibiotics due to fear of complications or deterioration of patients, most of the participants rarely prescribe antibiotics in cases of impossibility of conducting follow-up, or to be uncertain of diagnosis or maintaining a relationship with the patient. Forty percent of participants encourage patients to complete the course with the correct dose and length and not to stop the treatment when they feel improving (Karasneh et al., 2021). A cross-sectional study in Saudi Arabia shows that most of the participants lack awareness about AMR conditions in their area. This is mostly due to weak surveillance systems, education and training courses about prescription, and lack of guidelines, but at the same time they have good knowledge about antimicrobial resistance and how inappropriate prescribing leads to its development, and they have good confidence in their practice and prescription not affected by any factors (Baadani et al., 2015). A study that was a cross-sectional done in Malatya to compare pre- and post-graduated doctors shows that physicians need a postgraduate one even if they have enough education about the principle of prescription, they make a lot of mistakes since they need revision of the theoretical knowledge which is difficult due to work intensity (Kose & Colak, 2021).

knowledge and attitude have an important role in antibiotics prescription, there are external determinants that affect the prescription pattern including patient pressure, no time to explain to the patient the effect of antibiotics, and socioeconomic and psychological factors that will not allow always to follow up a guideline or delay antibiotic prescription way to be used (Liu et al., 2019). A German study shows that GPs influenced by patients' pressure and indicates that lack of time leads to a lack of communication between physicians and patients, but in the same study, seventy percent of participants agreed that AMR will be affected by their behavior. In practical areas, they use the sputum color as an indicator of antibiotic need (Salm et al., 2018).

In an Egyptian study, the results show that participants had good knowledge about antibiotics and their resistance; regarding attitudes of them the highest attitude score was for the responsibility of the others (physician, patients, or other care providers). The higher score was for indifference rather than fear, complacency, and ignorance scores. Most of the doctors in this study do not prescribe antibiotics as patients' request. Their practice depends on reported symptoms and clinical assessment as they always prescribe antibiotics for fever lasting more than 5 days or for yellowish and greenish nasal discharge, which are not indicated in the guidelines (Taher et al., 2022).

In a Swedish study about the knowledge of physicians about antibiotic prescription patterns and guidelines. The vast majority of respondents believe that they know antibiotic prescription guidelines in primary care very well, they were overconfident not in themselves only but also in their colleagues in the same center, but their answers to knowledge questions

were the same as others which were right in both groups. Moreover, about the application of guidelines the main reason for non-compliance was the patients' expectations. They balm the patient the give their expectations the responsibility that they prescribe inappropriate drugs for them. In addition, the results show that knowledge of guidelines is weak, contrary to the respondents' beliefs (Carlsson et al., 2023).

In a cohort study done in Australia about the management of children, URTIs show there is a suboptimal restriction in the guidelines mostly since there are sometimes some exceptions like children with chronic diseases like asthma or cystic fibrosis which must be taken into consideration (Long et al., 2019)

A cross-sectional study that was done in Serilalank, shows that the knowledge scores associated with post-graduation education, no education less knowledge, and the practice is aligned with knowledge (Shu et al., 2022)

In a study done in Oman about co-amoxicillin prescriptions, it was the first line of AURTIs management, which was opposed to MOH antibiotic guidelines. General practitioners often lack time and lack the necessary resources to conduct pathological investigations, so they prescribe antibiotics for pediatrics as prophylaxis especially in AURTIs, even though their origin is viral (Al-Yaqoubi & Al-Maqbali, 2021).

The physicians in Poland who participated in this study demonstrated satisfactory knowledge about antimicrobial use, the clinical application of antimicrobial guidelines, and the prevention of antibiotic resistance in their respective fields. However, educational interventions for prescribers are needed to help lead challenging communication with patients expecting antibiotics while maintaining unstrained relations. According to practice and attitude, the study shows that fear of deterioration of a patient's condition or health complications makes doctors prescribe antibiotics. Twenty percent of the participants prescribe antibiotics because they are not sure about the diagnosis, twenty –five percent of the participants prescribe antibiotic when it is impossible to follow up patient, most of them continue the antibiotic course according to guidelines, 75% never prescribe antibiotic due to time factors and no one prescribe antibiotic to maintain relationship with patient (Zgliczyński et al., 2022).

One of the most common health conditions that physicians in primary health care deal with is a sore throat, which is commonly viral in origin (Parthasarathy et al., 2020), but group A beta-hemolytic streptococci (GAS) is one of the microorganisms that cause the upper respiratory tract disease. It is the cause of tonsillopharyngitis, GAS causes complications and side effects of its disease courses if not treated well, so a rapid antigen test is used to diagnose it (Uzun et al., 2020).

In a Turkish study done to compare antibiotic prescriptions before and after RAT usage, the results show that the percentage decreases after its use since it gives confidence to physicians about the diagnosis. However, its usage is still high since more training and education of physicians are needed (Uzun et al., 2020).

In conclusion, the healthcare system, doctors, other healthcare professionals, patients, and the public are some of the various factors that affect the complicated process of prescription antibiotics. Challenges to the prevention of AMR include the emergence of bacteria resistant to antibiotics and a lack of knowledge and clarity on the appropriate use of antibiotics. Understanding the main determinants influencing healthcare professionals' prescribing of antibiotics and the interventions that may bring about change is essential since altering antibiotic prescribing patterns will require changing the behavior of these practitioners.

Chapter three: Conceptual Framework:

3.1 introduction:

A conceptual framework is a tool that helps researchers accurately identify the topic they are looking at, direct their inquiry, formulate their questions, and locate pertinent material. It is composed of a collection of general ideas and theories drawn from relevant disciplines of study. Because it aids in the clarification of the researcher's research topic and objectives, the majority of academic researchers begin their work with a conceptual framework (Smyth, 2004). It might be a written or visual product with narrative or graphic explanations (Polit & Beck, 2004).

Additionally, conceptual frameworks provide a variety of functions. It gives researchers a broad framework for analyzing data, makes it easier to see the study's variables, and is essential for creating a research proposal that makes use of cross-sectional design techniques. In addition to guiding the investigation, the conceptual framework summarizes the main independent and dependent variables in the research (Smyth, 2004).

The major concepts of the current framework focus on KAP of primary healthcare physicians about antibiotic prescription as dependent variables and other variables as independent variables such as the socio-demographic data (which includes age, specialty, years of practice, and gender). IMCI usage in practice, attended any continuing medical education courses or conferences about antibiotic prescription, reported symptoms, clinical assessment, patient expectations, cost, anticipated patients follow up and clinical guidelines (figure 3.1).

3.2 Dependent variables:

There were three dependent variables in the current study which are knowledge, attitude and practice about antibiotic prescriptions in children

Knowledge:

The fundamental factors of antibiotic prescribing behaviors are knowledge and attitudes. Knowledge can either directly or indirectly affect prescribing practices by altering attitudes (Taher et al., 2022).
Knowledge about antibiotic: about therapeutic use of antibiotic, antibiotic resistance, how it will develop and how we can reduce it.

Attitude:

Five distinct attitudes were found in other studies, and their definition as the following:

Ignorance: a disregard for antibiotic resistance driven by excessive antibiotic prescriptions, due to lack of knowledge. (7 items).
1. In primary cares, bacteriological results are not useful when treating infectious diseases

2. The prescribing of an antibiotic to a patient does not influence the development of resistance

3. Overuse of antibiotics do not contribute to generation of antibiotic resistance

4. Prescribing patients with antibiotics do not cause damage even they are not indicated

5. Over-prescribing of antibiotics do not contribute to generation of antibiotic resistance

6. Irrational use of broad-spectrum antibiotic does not contribute to generation of antibiotic resistance

7. Antibiotics prescribed selected based on the infected bacteria contributes to generation of antibiotic resistance

Responsibility of others: a belief that others (patients, governments, and other professionals) are responsible for the problem of antibiotic resistance (4 items)

1. In primary cares, diagnosis is mainly based on symptoms since bacterial laboratory and antibiotic susceptibility test were inaccessible

2. I need rapid and effective diagnostic techniques for diagnosis of infectious diseases

3. One main cause of the appearance of antibiotic resistance is patient misuse of antibiotics

4. Dispensing antibiotics without a prescription should be more closely controlled

Indifference: a lack of determination to modify the way antibiotics are prescribed (3 items).

1. Patients were satisfied with my treatment, so I do not need to change my antibiotic prescribing pattern

2. My patients and colleagues do not think I over- prescribe antibiotics, so I do not need to change my antibiotic prescribing pattern

3. My antibiotic prescriptions are rational so I do not need to change my antibiotic prescribing pattern

Complacency: giving antibiotics to meet the demand and expectations of the patient (8 items).

1. I prescribe antibiotic since patients expect it

2. I prescribe antibiotic since patients require and insist on it

3. I prescribe antibiotic to satisfy patients

4. I prescribe antibiotic to make patients continue to trust me

5. Even when I know that they are not indicated, I prescribe antibiotic since patients expect it

6. Even when I know that they are not indicated, I prescribe antibiotic since patients ask for it

7. Even when I know that they are not indicated, I prescribe antibiotic since patients press me to prescribe it

8. Even when I know that they are not indicated, I prescribe antibiotics since I do not have the time to explain to the patient the reason why they are not called for

Fear: giving antibiotics due to worry for patient loss or due to possible patient disputes (5 items)

1. I prescribe antibiotic since I am fear if patient deteriorates

2. I prescribe antibiotic since it is impossible to track the patient accurately

3. I prescribe antibiotic to avoid possible patient complaints or medicolegal problems

4. I prescribe antibiotic to avoid being perceived as doing nothing for patients

5. I prescribe antibiotic to avoid losing patients(Florence, 2013)

Practice: It is an independent variable when we talk about antibiotic prescription but it also depend on the knowledge and attitude of the prescriber and other eternal factors such as time pressure , patient and financial pressure

3.3 Independent variables:

The socio-demographic data (which includes age, specialty, years of practice, and gender), IMCI usage in practice, attended any continuing medical education courses or conferences about antibiotic prescription, reported symptoms, clinical assessment, patient expectations, cost, anticipated patients follow up and clinical guidelines.

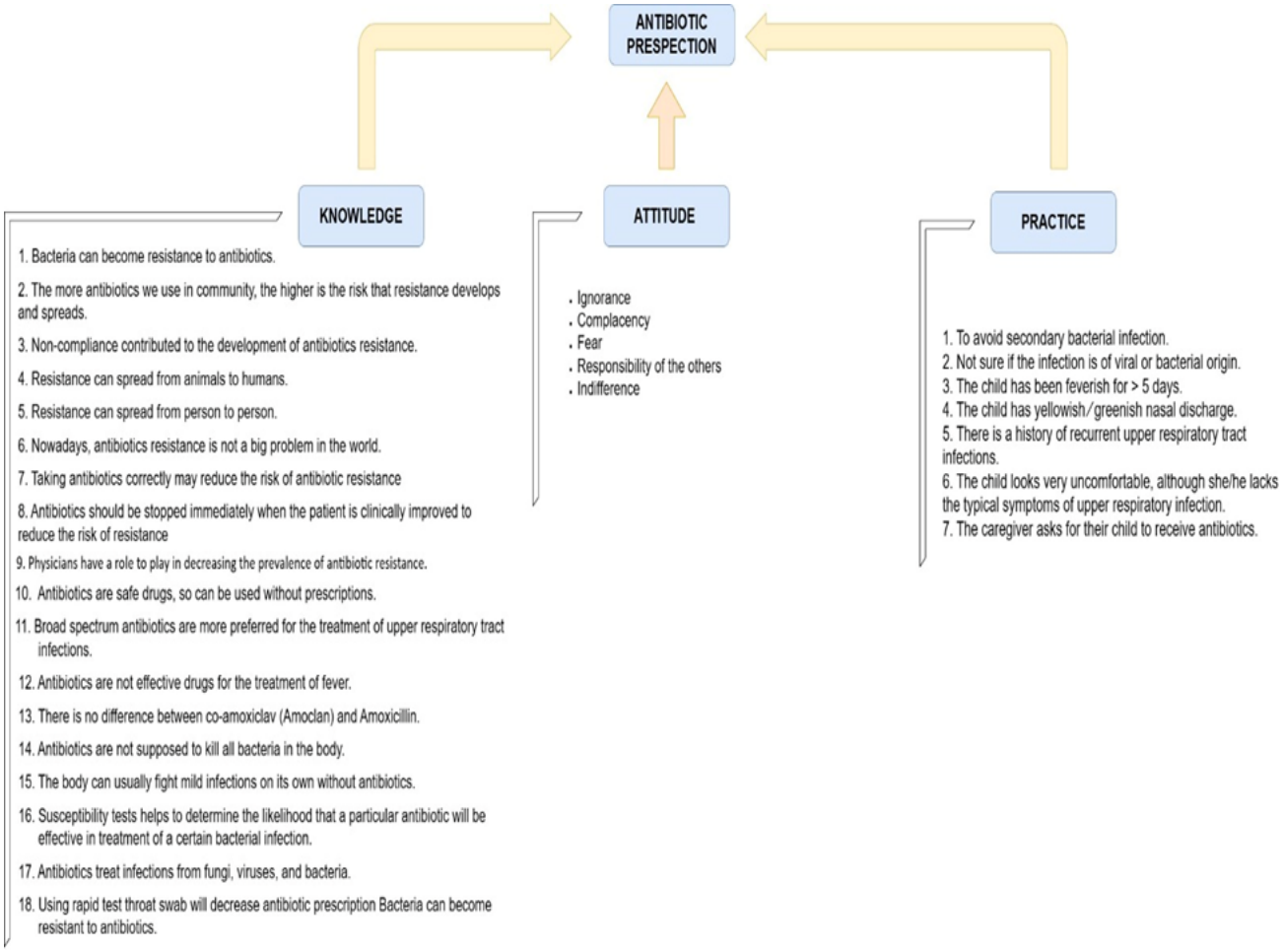

Figure 3.1: Conceptual frame work

Chapter four: Methodology

4.1 Introduction:

This study aimed to estimate knowledge , attitude and practice of primary healthcare physicians about antibiotic over prescription for upper respiratory tract infection in children less than five years old. This chapter presented the methodology that had been used in the current study.

4.2 Study design:

A formal, objective, rigorous, and methodical scientific approach to information collecting or the investigation of quantifiable characteristics, phenomena, and relationships is identified as quantitative research. It involves collecting numerical data, which is often subject to significant control and statistical analysis (Burns & Grove, 2011). Developing and using mathematical models, theories, and hypotheses is the aim of quantitative research, which is widely used in social sciences like psychology, social work, sociology, nursing, and political science (Polit & Beck, 2004).

Because it is very helpful for descriptive purposes and simultaneously displays the determining factors and the outcome**,** a cross-sectional design was used in the current investigation using self-reported questionnaires. It also saves time and effort and is less costly. However, the cross-sectional approach has many limitations, including the inability to generalize the results, the potential inability to draw conclusions about causality, and the unsuitability for event estimation, particularly when dealing with long-term results (Burns & Grove, 2011).

4.3 Target population:

Palestinian GPs, pediatricians, and family medicine doctors. The qualification of the GP is a Bachelor of Medicine and Bachelor of Surgery (MBBS), which is six-year plus one-year rotatory internship and is equivalent to the graduation level of Medical Schooling in Palestine. Pediatricians and family medicine doctors need another four years for specialization. The GPs work in general clinics with chronic and acute patients. Family medicine doctors work with chronic and special patients like those with diabetic complications or who have kidney disease and transplants

4.4 Inclusion criteria:

Doctors work in general clinics, pediatricians, and family medicine doctors

4.5 Exclusion criteria:
Specialists in dermatology, ENT, internal medicine, Gynecology, and endocrinology

4.6 Sample size and sampling approach:

All physician that had the criteria asked to fill out the questionnaire

4.7 Setting

The study will be conducted in two districts, Bethlehem and Hebron, including North Hebron, Bethlehem Central Hebron, Yatta and south Hebron governates, which are governed by the Palestinian Ministry of Health. Number of doctors in the governates approximately 150 one, including general physicians, gynecologists, endocrinologists, ENT doctors, family medicine physicians, dermatologists, dentists , and internists. Number of physician that has the criteria is 120.

4.8 Study instrument:

Study instrument A self-administered questionnaire adapted from a comparable study conducted in Egypt with only minor modifications was used to gather data for this investigation. There were four sections to the questionnaire. The first category is sociodemographic and professional characteristics, which covers demographic and personal characteristics related to physicians. Questions concerning their postgraduate coursework, continuous medical education (CME), and the factors affecting their prescriptions were also included.

The second section consists of knowledge questions with 18 items and yes/no/do not know replies. The questions were separated into two categories: knowledge of antibiotics, which assessed the doctors' familiarity with drugs and their application, and knowledge of antibiotic resistance, which assessed the doctors' familiarity with antibiotic resistance and its causes.

The third section consists of 27 items that evaluate five attitudes. According to the Teixeira Antibiotic Prescribing Behavioral Model (Liu et al., 2019). Ignorance, responsibility of others, indifference, complacency and fear. With choices for "very disagree," "disagree," "neutral," "agree," and "very agree" for the first three aspects (ignorance, responsibility of others, and indifference), the attitude questions were constructed using a five-point Likert scale. However, the scale with the options "never," "rarely," "sometimes," "often," and "always" had been used for the final two aspects (complacency and fear).

Two different kinds of questions are used in the fourth section to evaluate physician practice. First, asked as to whether they will "always," "sometimes," or "never" give

antibiotics specifically for upper respiratory tract infection situations. Secondly, they asked to evaluate four different clinical scenarios; for each case, seven items were assessed, and they had to answer questions on the recommended diagnosis, when an antibiotic was necessary and if so, what kind and how long. They were also asked if they would ask parents to return for a follow-up appointment and if they would prescribe injectable or combination antibiotics. Based on WHO-aware guidelines and Nelson's pediatric Antimicrobial Therapy Guidelines, each case was evaluated to determine whether or not an improper antibiotic prescription was prescribed.

4.9 Reliability and validity of the instrument:

The stability or consistency of the data gathered from repeated measurements is referred to as reliability. Another way to describe it is the extent to which an instrument consistently produces the same results when used with the same participants and under the same circumstances (Polgar, 1997).There are various forms of reliability, such as:
Test-retest reliability is a metric for reliability that is derived from giving a group of people the same test repeatedly over time. The test's stability over time can then be assessed by correlating the results from Time 1 and Time 2. Another measure of reliability is inter-rater reliability, which gauges how much agreement there is among judges or raters in their evaluations. Internal consistency reliability gauges reliability by analysing how similar the outcomes of various test items that probe the same construct are (Cozby, 2001).

Cronbach's alpha coefficient was employed to measure internal consistency dependability for the purposes of this study. By calculating the correlation between grouped questions in a scale connected to a certain notion, the Cronbach's alpha coefficient is one of the most often used methods for estimating the internal consistency of items in a scale. While alpha levels above 0.95 suggest very high dependability, which is not always desired, alpha levels of 0.7 or higher often indicate acceptable reliability, while 0.8 or above indicates good reliability (Rubin & Bobbie, 2010). The current study's Cronbach alpha was .8, indicating good reliability.

According to Abramson (1999), validity is the degree to which the measurement technique can accurately capture the problems or phenomena being examined. According to Cook and Campbell (1979), validity is the best estimate of whether a particular inference, assertion, or conclusion is true or false. One of the primary issues with research is validity. "Any research can be affected by different kinds of factors which, while extraneous to the concerns of the research, can invalidate the findings" (Seliger and colleagues, 1989).
An instrument content validity is necessarily based on judgment. It is becoming increasingly common to use the panel of substantive experts to evaluate and document the content validity of the new instruments (Polit& Beck, 2004). Content validity of the questionnaires in the current study was examined by a committee of three doctors; family physician, pediatrician and a family medicine doctor. Only the family medicine physician suggests some changes in the case scenarios. No other changes were requested by them.

4.10 Data collection process:

Questionnaires were sent to every doctor by the researchers on their whatsup messenger and they had been asked to fill them.

4.11 Data Analysis:

Statistical analysis Data entry and management will be done by using SPSS statistical software version 25. The percentages, frequencies, means, and standard deviations will be used to display the results. An analysis of variance (ANOVA) test or t-test will be used to examine the effect of demographic characteristics on respondents' knowledge scores. The significance of all results will be determined using a p-value of less than 0.05.

4.12 Ethical considerations:

Approval from Palestinian Ministry of Health was obtained after being formally approached. Information about the purpose of the study and the questionnaire were presented in a formal letter from Al-Quds University to the Palestinian Ministry of Health.

Also, School of Public Health at Al-Quds University approved to conduct this study according to the thesis preparation guide of the Faculty of Postgraduate Studies.

Chapter five: Results

Out of the 120 primary care physicians, 100 (83.3%) have finished the questionnaire and became part of the data analysis. The mean age of respondents was 36.8 ± 7.7, and 55% were less than 35 years old. The median duration for practice since graduation was nine years, and junior doctors in practice for less than five years represented 29% of participants. Females represented 43% of respondents and males 57%. Most study participants were general practitioners significant proportion (74%), while family medicine doctors represented 16%, pediatricians were 9% and only one ENT doctor.

Nearly half of the participants received integrated management of childhood illness (IMCI) training, and 72% used IMCI guidelines in their practice. Just 43% of participants went to ongoing medical education sessions last year that addressed antibiotic resistance (table 5.1).

Nearly seventy-one percent of participants reported that they rely on their clinical assessment for prescribing antibiotics in cases of upper respiratory tract infections, followed by clinical guidelines (65%). In contrast, patient expectations were reported to have a minor influence on the decision of antibiotic prescribing in those cases (Figure 5.1).

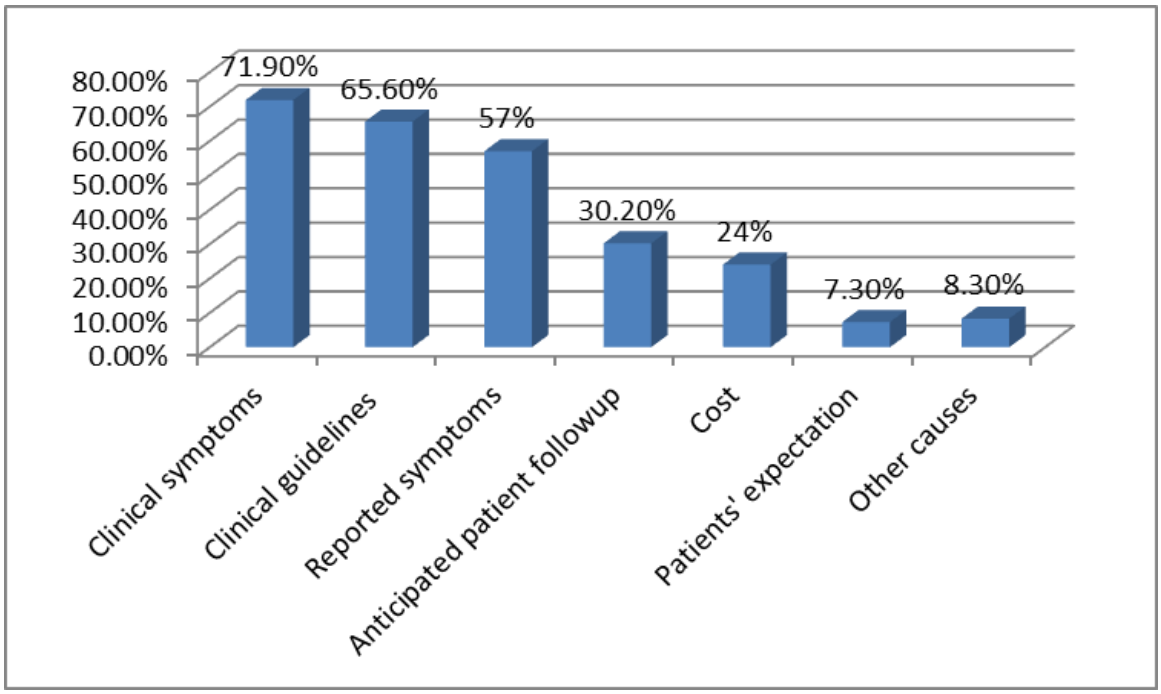

Figure 5.1. Factors affecting antibiotic prescribing as reported by participants

Table 5.1: Socio-demographic and professional characteristics of the study participants

Variable	Frequency	%
Age (years)		
24-35	54	54%
≥35	46	46%
Mean	36.8±7.6	
Years of practice		
1-5	29	29%
>5	71	71%
Median	9 years	
Gender		
Male	57	57%
Female	43	43%
Job title		
GP	74	74%
Pediatrician	9	9%
ENT Resident	1	1%
Family medicine physician	16	16%
IMCI Attendance	50	50%
Use of IMCI in practice	72	72%
Attendance of CME address AMR last	43	43%

5.2 knowledge

As regards their knowledge about antibiotics use and resistance, the participants have adequate knowledge as the mean number of correct answers for 18 knowledge questions was 14.9± 2.5. The most incorrectly answered questions in the knowledge of antibiotics were seventh and third, 46% of respondents said that susceptibility tests don't help determine whether a specific antibiotic will be effective in treating a particular bacterial infection, and nearly half (45%) said that antibiotics are an effective medication for fever.

At the same time, the fourth and fifth questions in the knowledge test on antibiotic resistance received the most incorrect answers, with 48% of participants not knowing that antibiotic resistance can spread from animals to humans and 35% not knowing that it can spread from person-to-person (Table 5.2.1, Table 5.2.2).

There was no statistically significant difference in means score between specialties as these for GPs was 14.5+2, pediatrician 16 +0.6, ENT 15 and family physicians 15.5+1.7 (p-value = 0.215).

There was statistically significant difference in means score between new doctors that they practice is less than five year and doctors their practice more than five years as they were 15.7+1.5,14.5±2.7 respectively (p-value =0.05).

There was no statistically significant difference in means score between male and female gender, male (14.6±2.7) and female (15.2±2.2) (p-value =0.24).

Table 5.2.1: knowledge about antibiotic resistant

Statement	**Correct**	**Incorrect \Uncertain**
1. Bacteria can become resistant to antibiotics. (Yes)	95%	5%
2. The more antibiotics we use in community, the higher is the risk that resistance develops and spreads. (Yes)	97%	3%
3.Non-compliance contributed to the development of antibiotics resistance. (Yes)	85%	15%
4. Resistance can spread from animals to humans. (Yes)	52%	48%
5. Resistance can spread from person to person. (Yes)	65%	35%
6. Nowadays, antibiotics resistance is not a big problem in the world. (No)	87%	13%
7. Taking antibiotics correctly may reduce the risk of antibiotic resistance (Yes)	90%	10%
8. Antibiotics should be stopped immediately when the patient is clinically improved to reduce the risk of resistance(No)	89%	11%
9. Physicians have a role to play in decreasing the prevalence of antibiotic resistance (Yes)	95%	5%
Mean number of correct answers 7.55±1.4 Correct answers from 9 questions		

Table 5.2.2: knowledge about antibiotic

Statement	Correct	Incorrect\Uncertain
1. Antibiotics are safe drugs, so can be used without prescriptions. (No)	92%	6%
2. Broad spectrum antibiotics are more preferred for the treatment of upper respiratory tract infections. (No)	74%	26%
3. Antibiotics are not effective drugs for the treatment of fever. (Yes)	55%	45%
4. There is no difference between co-amoxiclav and Amoxicillin. (No)	94%	6%
5. Antibiotics are not supposed to kill all bacteria in the body (Yes)	68%	32%
6. The body can usually fight mild infections on its own without Antibiotics (Yes)	90%	10%
7. Susceptibility tests helps to determine the likelihood that a particular antibiotic will be effective in treatment of a certain bacterial infection. (Yes)	54%	46%
8.Antibiotics treat infections from fungi, viruses, and bacteria (No)	89%	11%
9.Using rapid test throat swab will decrease antibiotic prescription (Yes)	86%	14%
Mean number of correct answers 7.3±1.4 *Correct answers from 9 questions		

5.3 Attitude:

Mean attitude scores for inappropriate antibiotic prescribing are illustrated in figure 5.3.1. This figure is showing the ignorance the highest score (4.2 ± 0.56) which is a positive attitude and mean that most of participant agree about the relationship between over prescription and resistant, followed by complacency score (3.9 ± 0.9) a positive attitude mostly ,which mean that participant has a sufficient self-stratification about their prescriptions then fear score (3.8 ±.9) also a neutral attitude which means that they scare from complication , therefor losing patients , after that indifference (3.2±0.09) also neutral slightly negative attitude which mean that they are careless about the problem and finally responsively of the others (2.3±0.8) which is negative attitude which mean they give others like government the responsibility of this problem not the prescriber only (Figure 5.3.1). There was a significant positive weak correlation between knowledge score and fear attitude score (r = 0.2), p-value = 0.048), significant negative correlation between knowledge scores and responsibility of others attitude score (r = -0.45, p-value = 0.001).There was a significant weak positive correlation between knowledge score and complacency attitude score (r = 0.3), p-value = 0.019).There was a significant positive weak correlation between knowledge score and ignorance attitude score (r = 0.19), p-value = 0.049) . There was not significant negative weak correlation between knowledge score and indifference attitude score (r = 0.1), p-value = 0.6)

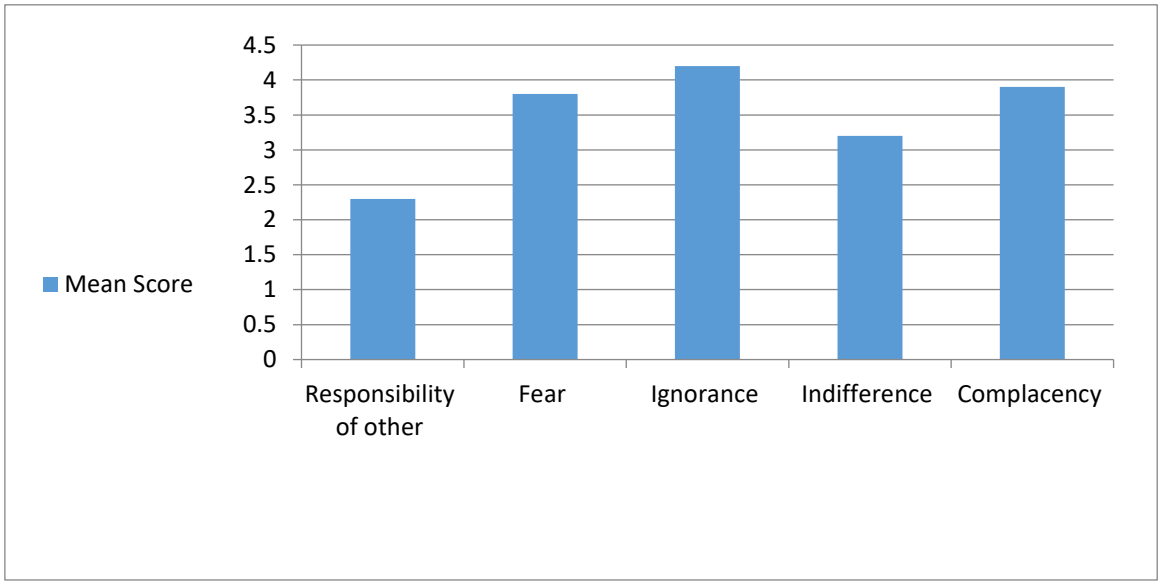

Figure 5.3.1. Mean attitudes score for inappropriate antibiotic prescribing

5.4 Practice

Prescribing practice in special conditions of URT infections showed that 20% of participants always prescribe antibiotics if fever continues for more than five days, 52% of participants sometimes prescribe antibiotics such condition, and 22% always prescribe antibiotics if the child has yellowish or greenish nasal discharge and 50% sometime prescribe it in this condition, also 54% sometimes prescribe antibiotic if the child looks uncomfortable although he/she lacks upper respiratory tract infection symptoms , and 72% sometimes prescribe antibiotic if they are not sure of the disease origin. On the other hand, 56% of participants do not prescribe antibiotics based on caregiver requests (Figure 5.4.1). There was a significant moderate positive correlation between knowledge and practice (r=0.37, p-value =0.01).

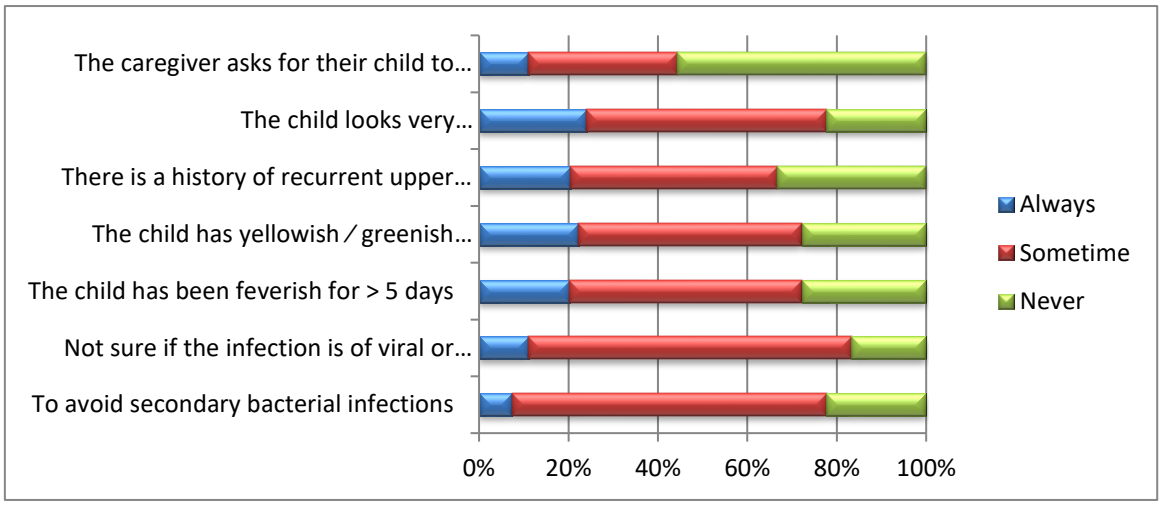

Figure 5.4.1. Prescribing practice in special conditions of URT infections

5.5 Cases Scenarios:

As each participant responded to four clinical scenarios, a total of 400 case scenarios were assessed. Among them, 207 contained antibiotic prescriptions (51.7%). Appropriate antibiotic prescriptions represented only 17.5% overall. (Table5.5.1, Figure5.5.1).

Further case analysis showed that 34 (34%) participants prescribed medications for case one, which is a viral infection and does not require them Penicillins accounted for 80.5% of the antibiotics recommended in these patients, particularly amoxicillin + clavulanic acid, which was the most commonly used variety (68%), followed by macrolides such azithromycin (30%). Four participants indicated that they would prescribe a combination antibiotic in this situation, while 6% of cases involved the prescription of antibiotics as an injection. In this case, the mean duration of antibiotic use was 7.3 ± 2.1 days.

There was no need for antibiotics in the second scenario, which involved a viral infection (common cold); yet, 10% of the participants received antibiotic prescriptions. In this case, the prescribed antibiotic were amoxicillin and azithromycin, 3% for each one. No one prescribed a combination of antibiotics, however six participants prescribed injectable antibiotics. The average amount of time spent using antibiotics in this case was 6.3±1.9 days.

The other two cases were bacterial infections where antibiotics were indicated. For the third case, otitis media. Amoxicillin and amoxicillin + clavulanic acid represented the most prescribed penicillin (38% and 19%, respectively). Also, cephalosporins (cephalexin) were prescribed in one case. No participants prescribed injectable antibiotics, while 9 (9%) prescribed combined antibiotics. In this case, the mean duration of antibiotic use was 4.9±3.8days.

About the fourth case, follicular tonsillitis, 96% of the prescriptions were for antibiotics, and the most common class was penicillin, with amoxicillin + clavulanic acid accounting for 89% of the prescriptions. Also, cephalosporin were prescribed in 5 cases, in which ceftriaxone represented 2% of them and cefazolin represented 3%of them . The average duration of antibiotic use in this instance was 7.7 ± 2.86 days. Only 37% were appropriate by assessing the appropriateness of prescribed antibiotics.

Table 5.5.1. Recommended antibiotics for clinical scenarios

Case	Clinical Vignette	Suggested Diagnosis	Recommended Antibiotic type and duration
1	A 5-year-old girl developed a high-grade fever for 2 days (39˚C) and a sore throat. Two days before the fever, she had nasal flu and cough. On examination, the pharynx was congested; otherwise, no other remarkable findings.	Viral acute URIs	No antibiotic is needed
2	A playful one-and-half-year-old child had a runny nose for two days, followed by a fever (38˚C). He had a dry cough and, as per his mother, could not sleep because of his stuffy nose	Common Cold	No antibiotic is needed
3	A 4-year-old child complained of ear pain. He had a temperature of 38.9˚C. He had a cold for several days but was eating well, and his activity was normal	Acute Otitis media	Amoxicillin OR Amoxicillin + Clavulanic acid for 5 days
4	A 5-year-old boy developed a high-grade fever of 3 days (40˚C). He complained that he could not eat because of throat pain. On examination, the pharynx was congested with excaudate on the tonsils. Also, there were palpable cervical lymph nodes	Acute Follicular tonsillitis	Amoxicillin OR Phenoxymethyl Penicillin orally for 10 days OR Benzathine Penicillin IM injection as a single dose

Table 5.5.2 Participants' responses to clinical scenarios

Clinical cases	**Case 1 N (%)** Viral URT infection	**Case 2 N (%)** Common cold	**Case 3 N (%)** Otitis media	**Case 4 N (%)** Follicular tonsillitis
Diagnosis				
Correct	64 (64%)	70 (70%)	78 (78%)	89 (89%)
Incorrect	36 (36%)	30 (30%)	22 (22%)	11 (11%)
Antibiotic Prescription				
Amoxicillin	16	3	38	46
Amoxicillin plus clavinulic acid	7	1	19	43
Penicillin oral/inj	0	0	0	0
Ceftriaxone	0	0	0	2
Cefazolin	0	0	0	3
Azithromycin	3	3	6	2
Cephalexin	0	0	1	0
Injectable antibiotic	0	6	0	5
More than one antibiotic	4	0	9(9%)	11(11%)
No antibiotic is prescribed	70	93	36	4
Duration of antibiotic use (days)				
	7.3±2.1	6.3±1.9	4.9±3.8	7.7±2.68

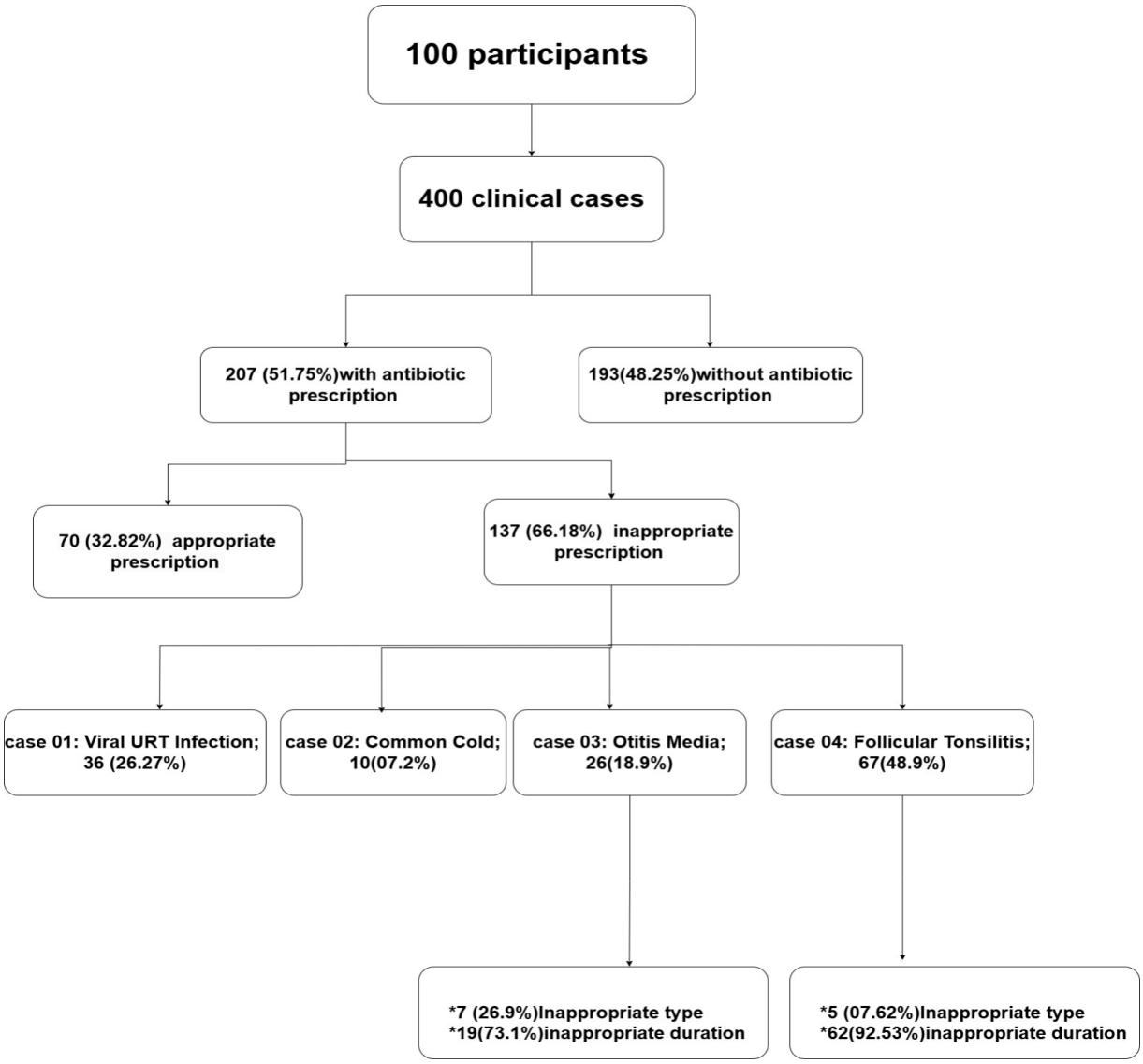

Figure 5.5.1. Flow diagram of the study illustrating responses to clinical scenarios

Chapter six: Discussion , conclusion and recommendations:

6.1 Discussion:

This is the first study to evaluate primary care doctors' knowledge, attitudes, and practice about the use of antibiotics in children who have URTIs under five years of age in primary healthcare. The Palestinian national authority has decided to create a national antimicrobial resistance (AMR) plan that is in line with the global action plan for the use of antimicrobial medications in agriculture, the environment, and animal health in compliance with World Health Organization Resolution WHA 68.7, the goal of this plan is to maintain, for as long as possible, the successful treatment and prevention of infectious diseases using safe, effective medications that are dependable, responsibly used, and available to everyone in need(Ministry of Health, 2017). Incorrect dosage, inadequate duration, improper frequency, noncompliance, unsupervised self-medication, and the sale of antibiotics over-the-counter (OTC) without a prescription are all examples of inappropriate antibiotic usage in healthcare. These global challenges are becoming worse at an alarming rate (Shu et al., 2022).

The problem of how and why doctors prescribe antibiotics inappropriately has been the subject of several studies. Perhaps the most often studied predictors of antibiotic prescribing are attitudes and knowledge. Prescription habits, however, are influenced by a far wider variety of factors. We still don't fully grasp how antibiotics are prescribed. The complicated process of prescribing antibiotics is influenced by both external (patients, organizations, and healthcare systems) and internal (knowledge, attitudes, and personal traits) aspects (Liu et al., 2019).

Sociodemographic factors may have an impact on physicians' clinical practice, attitudes (age, sex, and medical specialization), and knowledge (prior clinical practice, university education, ongoing medical education, and years of practice)(Rodrigues A,2019).

Just 43% of participants in the current study went to a continuing medical education program last year that addressed antibiotic use and resistance. Following training at the primary healthcare and hospital levels for different amounts of time across countries, key informants from every nation stated that the implementation of IMCI encouraged the prudent use of antibiotics and reduced polypharmacy (Slagboom et al., 2021). Nearly seventy percent of the participants in the current study reported adopting IMCI guidelines in their practice, and 50% of them attended IMCI training. The IMCI system is used in Palestine, although not properly; it is merely used to track the quantity of antibiotics that have been used.

This study results show that physicians know their role in decreasing the percentage of antibiotic resistance, and most of the participants say that they do not prescribe antibiotics as patients expect or when caregivers ask for it, but the patient can bring the antibiotic without a prescription from any pharmacy, so the role of pharmacist should be taken in concern when talking about antimicrobial resistant.

Community's use of antibiotics, which in turn fuels antimicrobial resistance. Patients' high expectations regarding the use of antibiotics are most likely a result of their limited knowledge of AMR and the adverse effects of antibiotics. Patient expectations and demands are a major factor in the community's misuse of antibiotics. Public education through media that targets the community is crucial (Rahbi et al., 2023). In this study, most of the doctors disagree about prescribing antibiotics as patients 'expectation or pressure.

One of the main causes of antimicrobial resistance in countries with lower and middle incomes is the inadequate training and education of healthcare professionals on appropriate antibiotic use (El-Sokkary et al., 2021). In this study the physician knowledge was adequate, physicians who nearly graduated have better knowledge, which indicates that we need a continuous medical education system in primary healthcare. Research indicates that to promote the responsible use of antibiotics, education is essential. Thus, continuing medical education must integrate the proper prescription of antibiotics. Written state and national guidelines, teaching sessions, and conference presentations are examples of educational initiatives (Kshatri et al., 2022). And their knowledge has been affected by being a specialist or general practitioner since pediatrician has better knowledge than others, like a study done in Oman shows that GPs prescribe antibiotics more than specialists, Even so, the selection of antibiotics that general practitioners can prescribe is restricted by the national MOH antimicrobial guidelines (Al-Yaqoubi & Al-Maqbali, 2021).

85% of participants agreed that antimicrobial resistance is a big problem, as in a study done in Saudi Arabian the physician believed that issue is a significant problem in their hospitals (Baadani et al., 2015).

Additionally, the information about the spread of resistant organisms from person to person and from animal to human was the most frequently falsely reported. Also, an Egyptian study shows that over half of the doctors were unaware that the resistant organism might be passed from person to person (Taher et al., 2022).

In this study, participants prescribe antibiotics in the most condition in which children has yellowish or greenish discharge. The same result appears in an Egyptian study and a Palestinian study majority of participants prescribe antibiotics when the sputum is yellow (Maraqa et al., 2023). The sputum color is a useful indicator for antibiotic usage in chronic lung diseases, but it has no value and is not recommended in acute cases (Salm et al., 2018). In this study, the majority of doctors prescribe antibiotics to children when they are feverish for more than 5 days irrespective of etiology and to avoid secondary bacterial infection, which also appears in case scenario, and 45% shows that antibiotic use to treat fever, which is similar to many studies', results from middle and low-income countries such as Sri Lanka (Shu et al., 2022). Treating fever with antibiotics without doing microbiological testing has been identified as a major contributing cause to irrational drug usage (Faizullah et al., 2017).

Attitudes are the most significant factor influencing the prescription of antibiotics (Rodrigues A, 2019). In this study responsibility of others was the negative attitude, since

physicians justified the role of the laboratory and their colleagues in decreasing the prescription of antibiotics and reported that they needed a tests help in the diagnosis, and most of the participants prescribed antibiotics when they are not sure about etiology of the disease, which is related to fear attitude from complication or medicolegal aspects, in a systemic review study finding that the conditions of diagnoses uncertainly is indirectly affected by physician attitude such as fear or responsibility of others, so the relationship between diagnostic uncertainty and antibiotic misuse, pointing out the need for quick diagnostic testing, the implementation of policies or guidelines, or the use of delayed prescribing as ways to combat this issue (Rodrigues A, 2019).
The factors that most influenced the decision to prescribe antibiotics in the current study were clinical evaluation and reported symptoms. In a Saudi Arabian study done in primary healthcare, the patient's clinical condition serves as the primary factor in deciding to start antimicrobial therapy(Baadani et al., 2015). In a study done in Sri lank doctors who work in the private sector depend on laboratory results more than governmental ones (Shu et al., 2022).

It's interesting to see that cost-effectiveness was little considered when deciding which antibiotics to prescribe. Cost may not have been seen as a significant factor because the respondents were from public sector PHC, where all children can be treated freely. Other studies revealed similar results, indicating that doctors have little understanding of the true price of medications (Baadani et al., 2015). These findings make it evident that cost-effective prescribing education is necessary.

In this study, most of the participants agreed that laboratory and rapid tests will help in decreasing antibiotic prescription, which has been the same according to a study carried out in Spain shows that access to point-of-care testing, such as C reactive protein and fast antigen detection assays, was also linked to an 18.9% lower prevalence of antibiotic prescriptions among patients who requested antibiotics (Saliba-Gustafsson et al., 2019).

Most participants (72%) prescribe antibiotics if they are not sure about the origin, other studies confirm the results since although the majority of respondents theoretically understand that antibiotics are only used to treat bacterial infections, they discovered that they frequently fail to distinguish between symptoms caused by viruses and bacteria. This finding is consistent with previous studies that have shown that over-prescription has frequently resulted from this (Krishna et al., 2023). In a Sri Lanka study, Antibiotic usage has been attributed to a high patient load and a fear of bacterial superinfections (Shu et al., 2022).

Clinical scenarios have been used in numerous studies in the past and are a useful technique for evaluating antibiotic prescribing patterns for various situations (Taher et al., 2022). More than half of the cases in the current study had participants prescribing antibiotics (51.75%), and the majority of these prescriptions (66.8%) were inappropriate. As in the Chinese study, antibiotics were prescribed for 59% of pediatric URTI cases, and 91.3% of these situations were inappropriate, although most of the cases were viral upper respiratory tract infections (Chang et al., 2018). These findings are in line with several studies conducted in underdeveloped nations like Egypt, in an Egyptian study around half of the participants were prescribed antibiotics (53%) and 91.7% were inappropriately (Taher et al., 2022), also in a study done in Gulf region the percentage of inappropriate antibiotic prescription was 80% in the emergency department (Mahmood et al., 2020). Antibiotics were provided in 56.7% of

cases in Saudi Arabia, according to a study done in Makkah PHC centers and the majority of these cases were for the common cold (Shaheen et al., 2018).

Antibiotics were recommended in the current study for 30% of cases of a common cold and 35% of cases of viral URT infection with sore throat, among improper prescriptions. However, penicillin, particularly amoxicillin and amoxicillin + clavulanic acid, were the most commonly given antibiotic type. This is in line with research that looked into the kinds of antibiotics used to treat acute URTIs, research done in Oman shows that co-amoxiclav was prescribed as the first line of therapy, and there was no significant difference between general practitioners and specialists in the use of co-amoxiclav as first-line treatment (Al-Yaqoubi & Al-Maqbali, 2021). But if the Cause of the tonsillitis is due to EBV which causes infectious monoclinous's (IM), following amoxicillin intake within acute IM the incidence of skin reactions ranges between 27.8% and 69% and may be incorrectly diagnosed as an allergy to penicillin (Ónodi-Nagy et al., 2015). The second line treatment of follicular tonsillitis is clarithromycin and cephalexin, like amoxicillin, cephalexin inhibit bacteria growth by destroying the bacterial cell wall ,and clarithromycin work by inhibition of protein synthesis which will lead to bacterial damage . Co-amoxicillin is an amoxicillin and clavalaunic acid , the later help former to damage the cell wall by combined with beta lactamase enzyme that the damage former .

Based on the diagnosis of a likely bacterial infection, appropriate antibiotic use in primary care settings was categorized. The usage of antibiotics was divided into two categories: appropriate use and inappropriate use. Four additional groups were created to better classify inappropriate use: 1) increased use of extended-spectrum antibiotics, such as prescribing cephalosporin instead of penicillin; 2) unnecessary use, such as prescribing antibiotics for viral infections; 3) incorrect antibiotic spectrum, such as prescribing aminoglycoside for gram-positive bacteria; and 5) combined use of antibiotics, which is defined as using more than one antibiotic group per patient visit without any indications(Chang et al., 2018).

Antibiotic prescriptions in the current study for bacterial cases where they are warranted are in line with findings from prior studies. However, a significant portion of incorrect prescriptions were made because of poor antibiotic selection, duration, or usage of injectable or combination antibiotics. Sixty –nine percent of participants prescribed antibiotics for otitis media (OM) patients; nonetheless, not prescribing antibiotics in this instance cannot be deemed incorrect because many guidelines recommend delayed prescription or, if not complicated, nonprescription. In this approach, the physician asks parents to wait 48 to 72 hours and administer the antibiotic only if there is no improvement in symptoms used in otitis media and pharyngitis (Barbieri et al., 2019). Among those prescriptions, nearly 26% were inappropriate, and most were due to inappropriate duration, as the recommended duration for OM treatment is five days, while in this study, the mean duration was 4.9±3.8.

The second line according to WHO for otitis media treatment is azithromycin despite 40%of bacteria that cause otitis media resistant to it(Nelson, 2019). Azithromycin is macrolides antibiotic work by Targeting the 50S subunit of the sensitive bacterial ribosome, AZM's primary goal is to suppress bacterial protein synthesis, just like other macrolide antibiotics(Oliver & Hinks, 2021).

However, 99% of instances of follicular tonsillitis were treated with antibiotics, and 67% of those treatments were incorrect. As a result, the majority of the inappropriateness was caused by the improper duration. In such instances, amoxicillin was the most often given antibiotic (46%). Additionally, injectable and combination antibiotics were neglected in certain

situations, putting kids at further risk for problems. A typical issue in cases of acute bacterial tonsillitis is noncompliance with antibiotic regimens. GAS infections, one of the causes of acute tonsillopharyngitis and one that can have major side effects and problems, are diagnosed with the rapid antigen test (RAT). RAT is a useful test for identifying the presence of GAS antigen (Uzun et al., 2020). In the case of URIs, feedback from Turkish doctors indicates that RAT had a positive impact on the diagnosis of GAS, the prescription of antibiotics, and more self-assured behavior towards the patient (Uzun et al., 2020).

6.2 Conclusion:

The doctors who treat acute URTIs in PHC's outpatient clinics have good knowledge about antibiotic use and resistance, and they exhibit a positive attitude towards the responsible use of antibiotics. Nonetheless, a significant portion of clinical scenarios are prescribed incorrectly. The reasons behind inappropriate antibiotic prescriptions and non-compliance with guidelines need to be investigated further. Establishing a nationwide antibiotic stewardship program is also essential to enhancing antibiotic prescription practices and addressing the issue of antimicrobial resistance.

6.3 Limitation:

My research was based on self-reported habits and physician recall, both of which have serious limitations. The association between attitudes and actual antimicrobial prescribing was not assessed by us.

As a result, the incidence of inappropriate attitudes and prescription behaviors may have been underestimated due to information bias caused by respondents' propensity to give answers they thought the researcher wanted to hear. No research was done on other elements that affect doctors' opinions about prescription antibiotics, such as pharmaceutical marketing, limited consultation, dispensing schedules, and financial incentives.

The study's generalizability was limited because it was only carried out in two districts of primary healthcare. Only a few characteristics, not real patients, were included in the four clinical vignettes used to assess antibiotic prescriptions. Additionally, they prohibited the ordering of additional point-of-care diagnostic testing, which would have been necessary before the administration of antibiotics.

6.4 Recommendations:

It is proposed that Palestinian primary healthcare doctors prescribe antibiotics in inappropriate ways and need improvements, guidelines, patient and physician education, yearly immunizations of patients and doctors, and stewardship initiatives.

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Appendix

Study questionnaire:

Healthcare professionals' Knowledge, Attitude, and practice about management of upper respiratory tract infections of children under five years old of age among in primary health care of southern Palestine

Dear colleague:

You are invited to participate in a research study titled "Healthcare professionals' Knowledge, Attitude, and practice about management of upper respiratory tract infections of children under five years old of age among in primary health care of southern Palestine". This study is being conducted by DR Marwa Al-Sarasra, Al-Quds University. The purpose of this study is to assess physician's knowledge, attitude and practice as regarding the use of antibiotics in pediatric cases of acute upper respiratory tract infections.

For this, kindly complete the following questionnaire. Your participation in this study is voluntary and you are free to withdraw your participation at any time. The questionnaire should take about 15-20 minutes to complete. This study has been approved by the Ministry of health . There are no risks associated with participating in this study. If you choose to participate in this study, your answers are completely confidential and will be released only as part of group summaries. While you will not experience any direct benefits from participation, information collected in this study may benefit the community and medical practice in the future by better understanding of antibiotic prescribing behavior. If you have any questions regarding the study, please contact Marwa Al-Sarasra (Phone no.: 0568192253). We are very thankful for your cooperation.

Part A: Personal characteristics

1. Name (optional):	
2. Age in years:	
3. Gender:	1-Male. 2-Female
4.Specialty	1-GP.2-Pediatrician.3-ENT.4-Family Physician.5-Other
5.Years of practices	
Have you attended6. an Integrated Management of Childhood Illness (IMCI) training?	0-No 1-Yes
.Do you use IMCI guidelines in your 7 practice?	0-No 1-Yes
8.Have you attended any continuing medical education courses or conferences in the last year?	0-No→go to Q 10 1-Yes
9. Did any of these courses or conferences specifically address antibiotic use?	0-No1-Yes

10. Which of the following influence your prescription for antibiotics? (multiple answers is allowed)
a- Reported symptoms
b- Clinical assessment
c- Patient expectations
d- Cost
e- Anticipated patients follow up
f- Clinical guidelines
g- Other (specify)

Part B: Knowledge

Knowledge of antibiotics: Please read each statement and indicate the right choice. Ifyou do not know the answer, please put a tick on don't know

Statement	**0-No**	**1-Yes**	**2-Do not know**
.9 Antibiotics are safe drugs, so can be used without prescriptions.			
2. Broad spectrum antibiotics are more preferred for the treatment of upper respiratory tract infections.			
3. Antibiotics are not effective drugs for the treatment of fever.			
4. There is no difference between co-amoxiclav (Amoclan) and Amoxicillin.			
5. Antibiotics are not supposed to kill all bacteria in the body			
6. The body can usually fight mild infections on its own without antibiotics			
7. Susceptibility tests helps to determine the likelihood that a particular antibiotic will be effective in treatment of a certainbacterial infection.			
8. Antibiotics treat infections from fungi, viruses, and bacteria			
9. Using rapid test throat swab will decrease antibiotic prescription			

b. Knowledge on antibiotic resistance: Please read each statement and indicate the rightchoice If you don't know the answer, please put a tick on don't know

Statement	**0-No**	**1-Yes**	**2-Do not know**
1. Bacteria can become resistant to antibiotics.			
2. The more antibiotics we use in community, the higher is the risk that resistance develops and spreads.			
3. Non-compliance contributed to the development of antibiotics resistance.			
4. Resistance can spread from animals to humans.			
5. Resistance can spread from person to person.			
6. Nowadays, antibiotics resistance is not a big problem in the world.			
7. Taking antibiotics correctly may reduce the risk of antibiotic resistance			
8. Antibiotics should be stopped immediately when the patient is clinically improved to reduce the risk of resistance			
9. Physicians have a role to play in decreasing the prevalence of antibiotic resistance?			

Part C: Attitude:

Please note that this part of the questions does not have the correct answer, pleasefill in them according to your personal situation / attitude. To what extent you agree with the following statements

statement	Veryagree	Agree	Neutral	Disagree	Very Disagree
1. In primary cares, bacteriological results are not useful when treating infectious diseases					
2. The prescribing of an antibiotic to a patient does not influence the development of resistance					
3. Overuse of antibiotics contribute not do to generation of antibiotic resistance					
4. Prescribing patients with antibiotics do not cause damage even they are not indicated					
5. Over-prescribing of antibiotics do not contribute to generation of antibiotic resistance					
6. Irrational use of broad-spectrum antibiotic does not contribute to generation of antibiotic resistance					
7. Antibiotics prescribed selected based on the infected bacteria contributes to generation of antibioticresistance					
8. In primary cares, diagnosis is mainly based on symptoms since bacterial laboratory and antibiotic susceptibility test were inaccessible					
9. I need rapid and effective diagnostic techniques for diagnosis of infectious diseases					
10. One main cause of the appearance of antibiotic resistance is patient misuse of antibiotics					

11. Dispensing antibiotics without a prescription should be more closely controlled					
12. Patients were satisfied with my treatment, so I do not need to change my antibiotic prescribing pattern					
13. My patients and colleagues do not think I over-prescribe antibiotics, so I do not need to change my antibiotic prescribing pattern					
14. My antibiotic prescriptions are rational so I do not need to change my antibiotic prescribing pattern					

b. Please tick the appropriate option for the following statements

Statements	Always	Often	Sometimes	Rarely	Never
15. I prescribe antibiotic since patients expect it					
16. I prescribe antibiotic since patients require and insist on it					
17. I prescribe antibiotic to satisfy patients					
18. I prescribe antibiotic to make patients continue to trust me					
19. Even when I know that they are not indicated, I prescribe antibiotic since patients expect it					
20. Even when I know that they are not indicated, I prescribe antibiotic since patientsask for it					
21. Even when I know that they are not indicated, I prescribe antibiotic since patients press me to prescribe it					
22. Even when I know that they are not indicated, I prescribe antibiotics since I do not have the time to explain to the patient the reason why they are not called for					
23. I prescribe antibiotic since I am fear if patient deteriorates					
24. I prescribe antibiotic since it is impossible to track the patient accurately					
25. I prescribe antibiotic to avoid possible patient complaints or medicolegal problems					
26. I prescribe antibiotic to avoid being perceived as doing nothing for patients					
27. I prescribe antibiotic to avoid losing patients					

Part D: practice

Did you *prescribe antibiotic* in the following cases?

Please tick the appropriate option	0-Never	Sometimes	Always
1. To avoid secondary bacterial infection			
2. Not sure if the infection is of viral or bacterial origin			
3. The child has been feverish for > 5 days			
4. The child has yellowish/greenish nasal discharge			
5. There is a history of recurrent upper respiratory tract infections			
6. The child looks very uncomfortable, although she/he lacks the typical symptoms of upper respiratory infection.			
7. The caregiver asks for their child to receive antibiotics			

Appendix 2:

Case studies:

For the cases in next pages, kindly read the scenario and answer the questionsaccording to your regular practice in outpatient's clinic

Case 1:

A 5-year-old girl developed high grade fever of 2 days duration (39℃) and sore throat. Two days before the fever she has nasal flu and cough. On examination, the pharynx is congested otherwise no other remarkable findings.

Case 2:

A playful one and half year-old child has runny nose of two days duration, followed by fever (38℃). He has dry cough and as per mother he cannot sleep because of stuffynose.

Case 3:

A 4-year-old child complains of ear pain. He has a temperature of 38.9℃, he has a cold for several days but has been eating well and his activity has been normal.

Case 4:

A 9-year-old boy developed high grade fever of 3 days duration (40℃). He complainsfrom that, he cannot eat because of throat pain. On examination, the pharynx is congested with excaudate on tonsils. Also, there was palpable cervical lymph nodes.

1. What is your suggested diagnosis??	
2. Is antibiotic indicated in this case	***0-*** No ***go to Q7*** 1- Yes
3. If yes, what type of antibiotic you will prescribe?	
4. For how long? (in days)	
5. How will be administered (Route of administration)?	1- Oral 2- Injection (IM or IV)
6. Did you prefer to prescribe more than one antibiotic in this case?	0- No 1- Yes
7. Will you ask the parents to come back for follow-up?	0- No 1- Yes, after .....days

المعرفة والموقف والممارسة في التعامل مع التهابات الجهاز التنفسي العلوي لدى الأطفال دون سن الخامسة بين العاملين في مجال الرعاية الصحية في الرعاية الصحية الأولية في جنوب فلسطين

إعداد: مروة خالد الصراصرة

إشراف: الدكتورة افنان عطا الله

المشرف المشارك :د. مراد إبراهيم

ملخص الدراسة

خلفية الدراسة : أحد التحديات الحالية للصحة العامة العالمية هو مقاومة مضادات الميكروبات. انتشرت مقاومة مضادات الميكروبات كنتيجة مباشرة لزيادة استخدام المضادات الحيوية في الزراعة والحيوانات والبشر. تُستخدم المضادات الحيوية بشكل متكرر لعلاج التهابات الجهاز التنفسي العلوي، حتى عندما لا تكون ضرورية، كما هو الحال مع الالتهابات الفيروسية والأمراض المحدودة ذاتيا، والتي تمثل غالبية حالات التهابات الجهاز التنفسي العلوي. قد يساعد تقييم وجهات نظر الأطباء وممارساتهم وخبرتهم حول وصف المضادات الحيوية للأطفال الذين يعانون من التهابات الجهاز التنفسي العلوي الحادة في إدارة مشكلة إساءة استخدام المضادات الحيوية.

الهدف: تهدف هذه الدراسة إلى تقييم المشكلة في المجتمع وتوفير المعلومات لبناء البرامج المناسبة لتحسين وصف المضادات الحيوية

المنهجية: هذه الدراسة مقطعية وموجهة لأطباء الرعاية الأولية في فلسطين الذين يعالجون التهابات الجهاز التنفسي العلوي الحادة.

تم تقييم معرفة الأطباء ومواقفهم وممارساتهم باستخدام استبيان تم إجراؤه ذاتيًا. من أجل تقييم اتجاهات وصفات المضادات الحيوية في الحالات النموذجية، احتوى الاستبيان أيضًا على أربعة سيناريوهات سريرية تناولت احتمالات مختلفة لالتهابات الجهاز التنفسي العلوي.

النتائج: كانت غالبية الأطباء المائة في هذه الدراسة من الممارسين العامين، بمتوسط عمر 36.8±7.6. كان متوسط عدد الإجابات الصحيحة للأسئلة المعرفية الثمانية عشر 14.9±2.5، مما يشير إلى أن لديهم معرفة جيدة.

كانت درجات موقفهم المتوسط لوصف المضادات الحيوية بشكل غير مناسب منخفضة، حيث حصل الجهل على أعلى درجة (4.2±0.56). وصف 52% من المشاركين المضادات الحيوية إذا استمرت حمى الطفل لأكثر من خمسة أيام، وفعل 22% ذلك إذا كان الطفل يعاني من إفرازات أنفية صفراء أو خضراء، وفقًا لممارسات وصف المضادات الحيوية لالتهابات الجهاز التنفسي العلوي في ظروف غير عادية. من بين السيناريوهات السريرية الأربعمائة، تضمنت 207 (51.75%) وصفات للمضادات الحيوية، وكانت 32.82% من تلك الوصفات مناسبة.

الاستنتاج: في نظام الرعاية الصحية الأولية في فلسطين، يتمتع الأطباء الذين يعالجون التهابات الجهاز التنفسي الحادة بخبرة جيدة في استخدام المضادات الحيوية ومقاومتها، ويظهرون موقفًا إيجابيًا تجاه الاستخدام المسؤول للمضادات الحيوية. هناك حاجة إلى مزيد من البحث لفحص الأسباب التي تساهم في ممارسات وصف المضادات الحيوية غير الصحيحة وعدم الالتزام بالمبادئ التوجيهية، حتى لو كانت نسبة الوصفات غير المناسبة في السيناريوهات السريرية مرتفعة قليلاً. يعد إنشاء برنامج وطني لإدارة المضادات الحيوية أمرًا بالغ الأهمية أيضًا لتعزيز ممارسات وصف المضادات الحيوية ومعالجة قضايا مقاومة المضادات الحيوية.