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# Assessment of knowledge on proper use of antibiotics, adherence and it's resistance in in-patients and out-patients-A cross sectional study.

**Amina Turki[1*], Dr. Sabaah Khanam[2], Dr.Nimrah Mujeeb[3], Dr.Najiha Abdul Raheem[4], Dr.Tufail Ali[5], Dr.Amatul Ali Sameera[6*]**

[1*,6*]Sree Dattha Institute of Pharmacy, Sheriguda, Ibrahimpatnam, Telangana, India.
[2,3,4] St.Pauls College of Pharmacy, Turkayamjal, Ibrahimpatnam, Telangana,India.
[5]Apollo Hospitals, New Delhi,India

***Correspondence to authors:** Dr.Amina Turki, Dr.Amatul Ali Sameera
*Department of Pharmacy Practice, Assistant Professor, Sree Dattha Institute of Pharmacy, Sheriguda, Ibrahimpatnam, Ranga Reddy, Telangana, India. Mail Id: aminaturki84@gmail.com
*Department of Pharmacy Practice, Assistant Professor, Sree Dattha Institute of Pharmacy, Sheriguda, Ibrahimpatnam, Ranga Reddy, Telangana, India. Mail Id: amatulsameera2207@gmail.com

**ABSTRACT:**
**INTRODUCTION:** Antibiotics are very important to treat bacterial infections. Antibiotic resistance has been the greatest threat to modern medicine to indiscriminate and irrational use of antibiotics. This study involves understanding the knowledge, attitude, and practices of the community towards understanding antibiotic resistance.
**AIM AND OBJECTIVES:** The main aim of this study was to analyse patient's knowledge regarding antibiotic use and educate them for proper use of antibiotics and to decrease resistance. The objectives are to assess the knowledge regarding antibiotics in patients, to provide correct information on antibiotics, to educate the patients regarding compliance and rational use of antibiotics, to educate patients regarding antibiotic resistance.
**METHODOLOGY:** This is an observational-cross sectional study.
**RESULTS:** The statistical analysis of this subject proved the level of significance (p value-<0.001) thus null hypothesis was rejected.
**CONCLUSION:** Antibiotics are life-saving medications for bacterial infections. Non-compliance and irrational use of antibiotics result in therapeutic failure, re-infection and bacterial resistance. Proper knowledge, attitude and practice is required to overcome resistance. Adherence to the medication is key factor in overcoming antibiotic resistance. Hence, education must be provided to the community regarding proper and rational use of antibiotics to overcome misuse, overuse, irrational use, self-medication habits and non-compliance to overcome antibiotic resistance. Antibiotic resistance can be avoided by implementing anti-microbial stewardship programme.

**KEYWORDS**: Antibiotics, adherence, resistance, irrational use, infection, self-medication, over the counter.

## INTRODUCTION:

Among the greatest discoveries of humankind in the 20th century was the discovery of antibiotics. Antibacterial triumph changed contemporary biomedicine and seeks to define, mold, and grow both its potential and its boundaries. Regrettably, the possibility for resistance to any therapeutic agent to evolve limits its ability to be effective [1,2]. The next series of antibiotics must be developed, since resistance compromises efficacy (therapeutic effect). A pathogen's enhanced resistance to the prescribed standard therapy to which it was previously vulnerable is referred to as tolerance to an antibacterial agent (in this case, an antibiotic) [3–5]. The history of using antimicrobial agents to combat infections is rich, dating back to ancient civilizations where various natural extracts were employed for their healing properties. Some of these extracts, originating from plants and molds, exhibited antibacterial properties, even before the term "antibiotics" was coined [6]. The introduction of the term "antibiotics" was the result of pioneering work by American microbiologist Selman Waksman and his team, who successfully isolated chemical substances from microorganisms capable of inhibiting the growth of other microbes [7]. While the concept of using microorganisms to combat infections has ancient roots, it was Alexander Fleming's serendipitous discovery of penicillin in 1928 that marked the inception of modern antibiotic therapy Fleming's discovery bridged the gap between ancient knowledge, such as the Egyptians' use of moldy bread to treat infection, and the era of antibiotics [8]. The post-World War II period, often referred to as the "golden era" of antibiotic discovery, witnessed the identification of numerous antibiotic classes that continue to be used today [9]. The advent of penicillin rapidly propagated the belief that infections could be effectively controlled with antibiotics, despite earlier use of sulfonamides as the first antimicrobials, which faced limitations due to emerging resistance mechanisms that persist to this day [10]. Interestingly, the penicillin discovery team identified penicillinase, a bacterium capable of degrading penicillin, even before widespread access to the antibiotic [11,12]. Subsequent decades brought forth remarkable progress, marked by the development of antibiotics like streptomycin, chloramphenicol, tetracyclines, erythromycin, vancomycin, cephalosporins, and others. This expansion of the antibiotic arsenal made previously fatal diseases treatable, cementing the antibiotic age [13,14]. The post-World War II era also saw the emergence of semi-synthetic antibiotics like amoxicillin and

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quinolones, notable for their enhanced stability and broader antibacterial spectra. Antibiotics such as vancomycin played pivotal roles in combating drug-resistant bacterial strains, particularly methicillin-resistant Staphylococcus aureus (MRSA). Innovations continued with the development of macrolides, third-generation cephalosporins, daptomycin, and linezolid, addressing Gram-negative resistance and enhancing antibiotic pharmacokinetics [15,16].However, despite these advancements, antibiotic-resistant bacterial strains have proliferated in recent decades [17,18], leading to a reassessment of antibiotic usage, increased awareness of antibiotic resistance, and the implementation of antibiotic stewardship programs, alongside the exploration of novel strategies like phage therapy, combination therapies, and precision-medicine approaches to combat drug-resistant bacteria [19,20].

The main aim of this study was to analyse patient's knowledge regarding antibiotic use and educate them for proper use of antibiotics and to decrease resistance. The objectives are to assess the knowledge regarding antibiotics in patients, to provide correct information on antibiotics, to educate the patients regarding compliance and rational use of antibiotics, to educate patients regarding antibiotic resistance.

## METHODOLOGY:

### STUDY SITE

The study was conducted in wards of KIMS hospital Secunderabad, for six consecutive months. KIMS hospital is a multispeciality hospital commissioned in 2004 located at Secunderabad, Hyderabad. The hospital is equipped with 1000 beds including 885 operational beds and over 15 specialities with NABH accreditation. The hospital has different departments and wards including outpatient department, medical wards, cardiology, orthopaedics, neuroscience, gastroenterology, cosmetic surgery, gynaecology, obstetrics, paediatric and general surgical ward.

### STUDY DESIGN

- An Observational Cross-sectional study was employed to assess the knowledge on proper use of antibiotics in patients.
- To analyse and observe correct usage of antibiotics its adherence among the patients.
- The knowledge among patients regarding antibiotic adherence and rational use and resistance.
- Data was collected by interacting with patients through data collection forms. The information collected from patients will be analysed regarding their usage, adherence and resistance.

### STUDY DURATION

A study of 6 months was done to assess the knowledge of proper use of antibiotics, adherence and its resistance in inpatient and outpatient.

### STUDY POPULATION

The patients who were willing to get included in the study were considered and from those who fulfil the inclusion criteria were included in the study population.

**Inclusion criteria:**

- In-patients and out-patients
- Age group: 18 - 60 years
- Patients who were willing to get included in the study

**Exclusion criteria:**

- Pregnant women
- Bed ridden patients
- Critically ill patients
- Patients who were not willing to provide answers

### DATA COLLECTION PROCESS

Our data collection form was created with the study's objective in mind, and all the patients attending various departments were interviewed. Patients who were interested to get into the study were interacted to know the knowledge of antibiotics, their adherence and resistance. In general, there are a number of factors that affect the decision to use antibiotics. In order to support the rational use of medications, it is critical to gather information on patients' views on drug usage patterns as well as their knowledge on usage.

A Data collection form was prepared based on the type of study. Depending on the type of study the data collection form was divided into three sections:

***Pre-questionnaire form***- Patient details including name, age, gender, inpatient IP number was included along with the questions assessing their knowledge on what are antibiotics, what are they used for, did they use antibiotics before, what do

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they think about stopping the medication without medical advice, have they ever bought antibiotics on OTC, what do they think if resistance happen.

***Post-questionnaire form***-Patient details including name, age, gender, if inpatient ip number was included and improvement in the knowledge of patients on antibiotics, their adherence and resistance was assessed by questions like did they understand about antibiotics, its effectiveness, its rational usage, appropriateness and resistance.

**ETHICAL APPROVAL**
An Institutional Research Ethical Clearance was obtained

**DATA ANALYSIS**
The data which was collected in the data collection form, was added to Ms Excel 2010 and was analysed, tabulated and presented in a graphical manner.

**STATISTICAL ANALYSIS**
For the entire categorical variable, we have calculated the Frequency percentage and Chi-square test and
For the continuous variable, we have calculated Mean and Standard Deviation by using Microsoft Excel (2010).

**STUDY ANALYSIS:**
The study analysis is done by means of SPSS (Statistical Product of Social Sciences) is used for the statistical analysis by measuring the level of significance using MCnemer's test.

**RESULTS**
**GENDER WISE DISTRIBUTION**

**Table 1: Patients are distributed according to gender wise**

| Gender | No. of patients | Percentage |
|---|---|---|
| Male | 251 | 50.2% |
| Female | 249 | 49.8% |

**Figure 1: Patients are distributed gender wise**

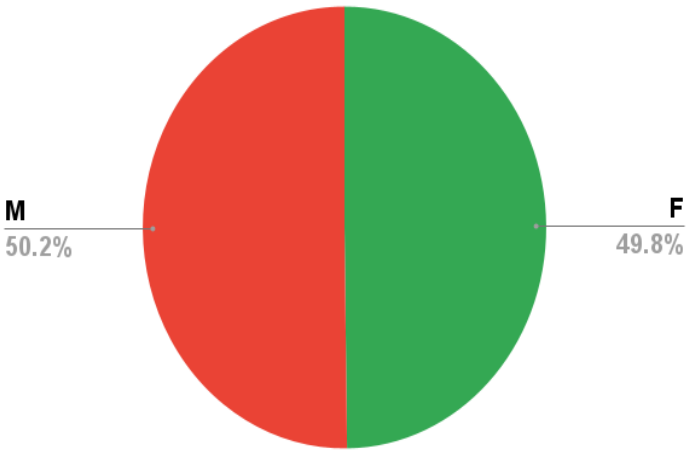


**Table 2: Statistical Analysis of Patients distributed according to gender wise**

| | Frequency | Percent | Valid Percent | Cummulative Percent |
|---|---|---|---|---|
| Female | 251 | 50.2 | 50.2 | 50.2 |
| Male | 249 | 49.8 | 49.8 | 100.0 |
| Total | 500 | 100.0 | 100.0 | |

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The study was conducted on knowledge of antibiotics and understanding adherence and resistance in 500 patients out of which 249 patients were male i.e., 50.2% and 251 patients were female i.e., 49.8%.

**AGE WISE DISTRIBUTION**

**Table 3: Patients distributed according to age group**

| Age group | No. of patients | Percentage |
|---|---|---|
| 18-28 | 90 | 18% |
| 29-39 | 137 | 27.4% |
| 40-50 | 150 | 30% |
| 51-60 | 123 | 24.6% |

**Figure 2: Patients distributed according to age group**

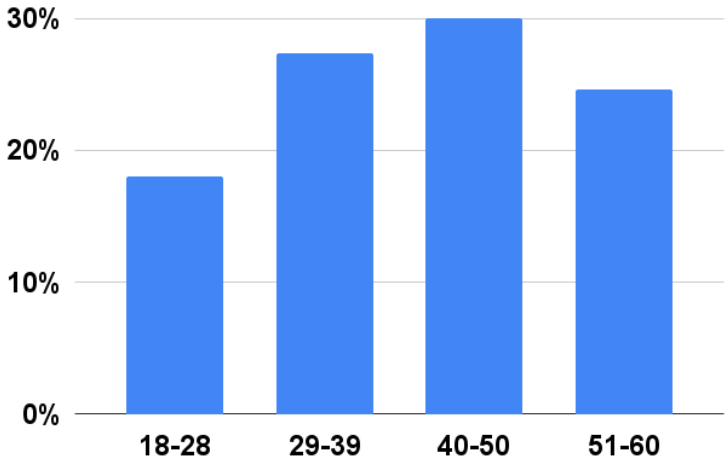


**Table 4: Statistical Analysis of patients distributed according to age group**

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| AGE | 500 | 18 | 60 | 40.77 | 11.695 |
| Valid N (list wise) | 500 | | | | |

Among 500 patients 90 patients were of age group ranging from 18- 28 i.e., 18%, 137 patients were of group 29-39 i.e., 27.4%, 150 of them were from 40-50 i.e., 30%. Lastly 123 of them were from 51-60 i.e., 24.6%.

**KNOWLEDGE ABOUT ANTIBIOTICS**

**Table 5: Knowledge about Antibiotics**

| Assessment | No of patients | Percentage |
|---|---|---|
| Pre | 226 | 45.2% |
| Post | 495 | 98.2% |

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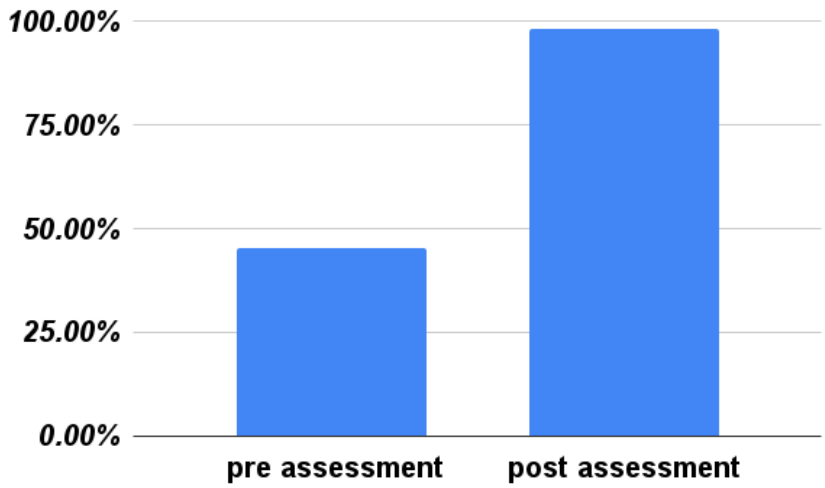
**Figure 3: Knowledge about Antibiotics**




| | |
|---|---|
| Total N | 500 |
| Test Statistic | 43.905 |
| Degree of Freedom | 1 |
| Asymptotic Sig (2-sided test) | <.001 |

**Table 6: Statistical Analysis of Patient's Knowledge about Antibiotics**

Significance <0.001

Among the total study population, it was found that patients have less knowledge about antibiotics (what are antibiotics and what they are used for) i.e., 45.2% people have knowledge about antibiotics. After the counselling, the knowledge among patients increased to 98.2%.

**USE OF ANTIBIOTICS IN VIRAL INFECTIONS**

**Table 7: Use of Antibiotics in Viral Infection**

| Assessment | No of patients | Percentage |
|---|---|---|
| Pre | 327 | 65.4% |
| Post | 24 | 4.8% |

**Figure 4: Use of Antibiotics in Viral Infections**

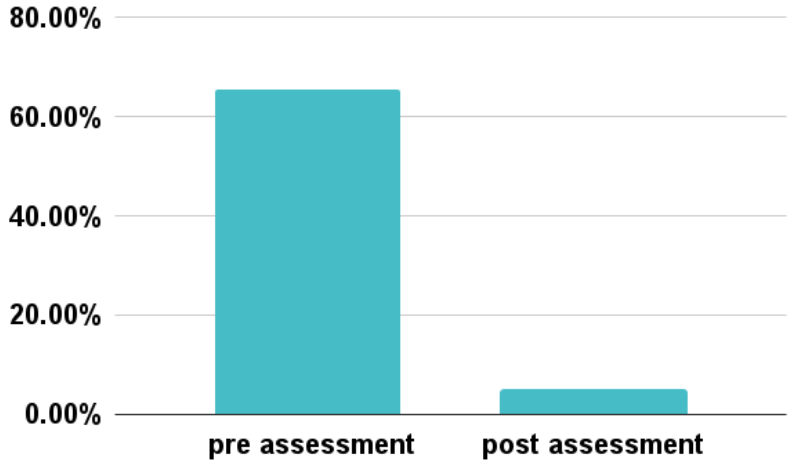


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**Table 8: Statistical Analysis of use of Antibiotics in Viral Infections**

| | |
|---|---|
| Total N | 500 |
| Test Statistic | 450.020 |
| Degree of Freedom | 1 |
| Asymptomatic Sig (2- Sided test) | .000 |

Significance <0.0001
Among the total study population, it was found that the use of antibiotics for viral infections was 65.4%. After counselling, their knowledge improved and the percentage decreased to 4.8%.

**INAPPROPRIATE USE OF ANTIBIOTICS**

**Table 9: Inappropriate use of Antibiotics**

| Assessment | No of patients | Percentage |
|---|---|---|
| Pre | 364 | 72.8% |
| Post | 10 | 2.0% |

**Figure 5: Inappropriate use of Antibiotics**

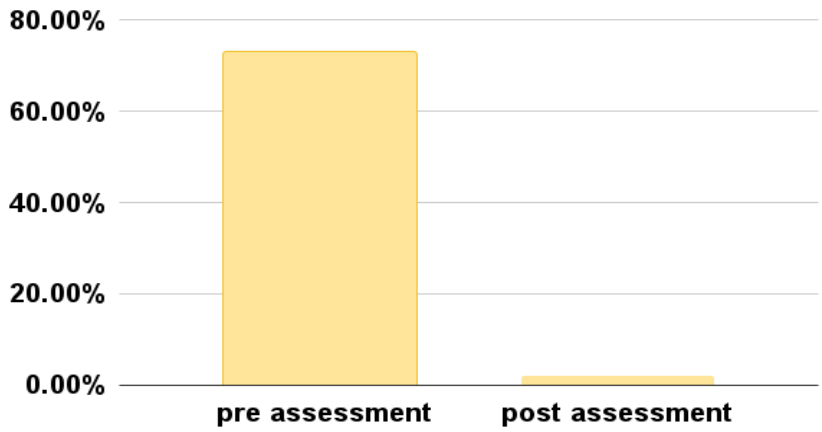


**Table 10: Statistical Analysis of Inappropriate use of Antibiotics**

| | |
|---|---|
| Total N | 500 |
| Test Statistic | 363.573 |
| Degree of Freedom | 1 |
| Asymptotic Sig. (2-sided test) | .000 |

Significance <0.0001

Among the total study population, it was found that very few patients have knowledge about appropriate use of antibiotics i.e., regarding taking the drug on the correct time, correct dose, correct route of administration with correct frequency. After the counselling, the knowledge among the patients was found to be increased. Inappropriate use of antibiotics in patients during the pre-assessment was 72.8% which was decreased to 2.0% during the assessment.

**KNOWLEDGE ABOUT ANTIBIOTIC RESISTANCE**

**Table 11: Knowledge about Antibiotic Resistance**

| Assessment | No. of patients | Percentage |
|---|---|---|
| Pre | 58 | 11.6% |
| Post | 454 | 90.8% |

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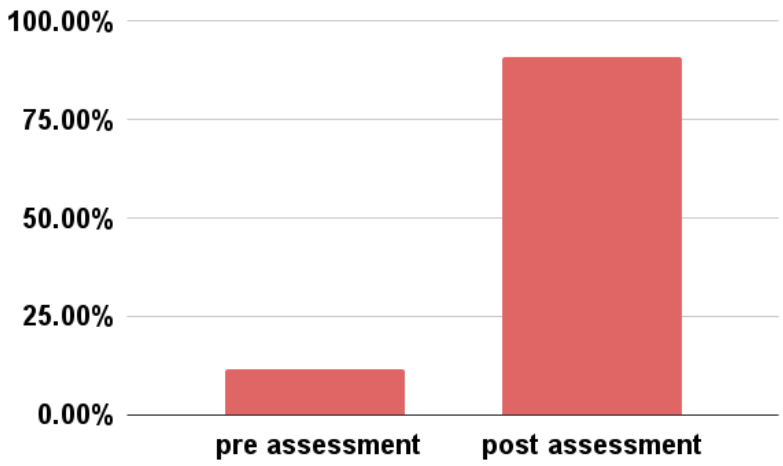
**Figure 6: Knowledge about Antibiotic Resistance**




Significance <0.0001

Among the total study population, it was found that very few patients have knowledge about antibiotic resistance i.e, 11.6%. After the counselling, it was increased to 90.8%.

**DISCUSSION:**

Antibiotics are frequently used by the public. An inappropriate belief on antibiotic related aspects was observed and inappropriate behaviour was noticed, which are reflections of insufficient knowledge and wrong beliefs. Interventions must be put in place to educate the public on appropriate antibiotic use.

Appropriate use of antibiotics is essential to ensure treatment efficacy as well as to prevent resistance. Inappropriate use results from various factors and causes adverse effects including the emergence of resistance, adverse reactions, treatment failure, and waste of resources. Non-compliance with antibiotic treatment is a common phenomenon and this could definitely have an adverse impact on the success rate of treatment.

The fact that antibiotics are commonly administered in response to community-acquired infections and most often in an outpatient setting is one of the contributing factors for antibiotic non-compliance.

Patients who have used antibiotics might have more knowledge as a result of their recent involvement with the topic of antibiotic use; health literacy may be a preventive mechanism to use antibiotics more critically.

Besides improving the health knowledge of the general population and of vulnerable groups such as patients with low levels of health literacy, intervention strategies should focus on providers as well.

Appropriate use of antibiotics is essential to ensure treatment efficacy as well as to prevent resistance. Inappropriate use results from various factors and causes adverse effects including the emergence of resistance, adverse reactions, treatment failure, and waste of resources. Non-compliance with antibiotic treatment is a common phenomenon and this could definitely have an adverse impact on the success rate of treatment.

The fact that antibiotics are commonly administered in response to community-acquired infections and most often in an outpatient setting is one of the contributing factors for antibiotic non-compliance

**CONCLUSION:**

This Observational cross-sectional study was employed to analyse the antibiotic knowledge, its adherence and resistance among people. This study includes a sample size of 500 patients.

The study concludes that antibiotics are essential for the successful completion of complex surgical procedures like organ and prosthesis transplants as well as for the treatment of infectious infections.

Worldwide healthcare systems are severely hampered clinically and financially by antibiotic resistance mechanisms. Despite the issue of antibiotic resistance among infectious bacteria, little is understood about the variety, distribution, and origins of resistance genes, particularly for the vast majority of environmental bacteria that are incapable of being cultured.

The use of antibiotics with correct dose, correct dosage form, correct route of administration with correct frequency is very important for the treatment or prevention of the disease.

The study also concludes that the knowledge of antibiotics and antibiotic resistance among people is essential as inappropriate use of antibiotics will cause the dumping of drugs in the body with no effect and increase in resistance.

Antibiotic resistance is the main factor where people are lagging behind in antibiotic knowledge.

One of the total 500 of the sample size, the gender distribution was equal to 50.2% of (male and 49.8% of females).

The age group distribution from 18-28 yrs was 18%, 29-39 yrs was 27.4%, 40-50 yrs was 30% and 51-60 yrs was 24.6%.
The knowledge of antibiotics among people in pre assessment was 45.2% which was increased to 98.2% in post assessment.
The use of antibiotics for viral infection among people was found to be very high which includes the main factor for antibiotic resistance. In this study, one result was found to be 65.4% in pre-assessment and was decreased to 4.8% during post- assessment.
The inappropriate use of antibiotics in pre-assessment was found as 72.8% which decreased to 2.0% during post-assessment.
The purpose of this study was to assess the knowledge, attitudes and practices of patients regarding antibiotic use at a regional hospital.
Antibiotics are considered among the most commonly sold drug classes in the developing countries.
The irrational and overuse of antibiotics result not only in the emergence of given the worldwide issues around antibiotic resistance, public campaigns have focused on discouraging patients from requesting antibiotics to treat viruses and other minor illnesses for which they are ineffective, and encouraging patients to take antibiotics in an appropriate way. Pharmacists have also been encouraged to develop new strategies to educate patients about resistance and to help adjust patients' expectations regarding antibiotic prescribing.
With regard to using antibiotics for viral infections, this has been addressed by counselling patients on self-management, helping patients weigh the risks of taking antibiotics against the benefits and by discussing antibiotic resistance issues with the patient.
The study reported patient education about antibiotic resistance, thus improving antibiotic use and antibiotic knowledge. The education was provided to patients through counselling.
Antibiotic resistance is a major public-health problem globally and inappropriate antibiotic use is being increasingly recognised as the main force driving this resistance.

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