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# KNOWLEDGE AND PRESCRIBING PRACTICE OF AMBULATORY CARE PHYSICIANS ABOUT DISTINCT ANTIBIOTICS TOWARDS TRIVIAL RESPIRATORY TRACT INFECTED PATIENTS: STRATEGIES FOR OPTIMAL OUTCOMES AND MINIMIZED RESISTANCE

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## ABSTRACT

According to World Health Organization (WHO), respiratory tract infections kill 2.6 million children every year worldwide so, it is recognized as the leading cause of morbidity and mortality. Respiratory tract diseases are quite prevalent & more dangerous to the people with weak immune system function. The study was carried out for a period of 90 to 100 days in Rajiv Gandhi Institute of Medical Sciences (RIMS), Kadapa. Antibiotics are prescribed based on symptoms and laboratory investigations. It is a single centered, prospective observational study. Subjects of both genders who indicated with any one antibiotic or its combination are taken in our study and patients who had co morbid pathological conditions also included. Pediatrics, pregnant women and surgical cases were excluded from the study.60 patients (Ambulatory patients) were collected. 36 were male and 24 were female. 20 patients were found to be Literates and 40 patients were Illiterates. 38 patients belong to Lower class, 17 patients belong to Middle class and 5 patients belong to Upper class. 9 patients belong to 15-30 years of age group, 21 patients belong to 31-45 years of age group, 16 patients belong to 46-60 years of age. Ceftriaxone is prescribed in 24 patients, Azithromycin is prescribed in 17 patients, Levofloxacin is prescribed in 7 patients, Ceftriaxone + Augmentin is prescribed in 12 patients.Drug utilization studies used to analyze the different aspects of the use of drugs and to implement ways of improving therapeutic quality. In the present study, pneumonia diagnosed patients (12 patients) received antibiotic combination regimen, while other common respiratory disease patients (48 patients) received single antibiotic during treatment. All the prescribed antibiotics belong to broad spectrums that are effective against most of causative organisms such as Streptococcus, Staphylococcus, Mycoplasma, Klebsiella, Hemophilus etc. In our study, it was also found that, physicians prescribed correct drug in correct dose at correct time through right route of administration for right duration of treatment, it clearly implies that most of the prescriptions found to be Rational.

**Keywords**: Prescribing Behavior, Trivial Respiratory Tract Infections (RTI), Broad Spectrum Antibiotics,.

## INTRODUCTION

A Respiratory Tract Infection (RTI) is an infection that occurs in the respiratory tract (i.e. nose, throat, lungs) and prevents normal breathing function.[1] It usually begins as a viral infection in the nose, trachea (wind-pipe), or lungs. If infection is not cured, it spreads to the entire respiratory system. The disease is quite prevalent & more dangerous to the people with weak immune system function. Respiratory Tract Infection (RTI) is considered as one of the major public health problems in developing countries. It occurs in both children and adults. Conferring to the World Health Organization (WHO), respiratory infections kill 2.6 million children every year worldwide[2]so, it is recognized as the leading cause of morbidity and mortality in many developing countries. In developing countries, 30% of patient's consultation and 25% of

pediatric admissions are of acute respiratory tract infections ultimately causing 3.5 million deaths each year.[3]Age, gender, and season are factors that have been implicated to affect the prevalence of RTIs. There is a need, particularly in developing countries like India, for timely diagnosis of the major microbial causes of the respiratory infections in the community, and the administration of appropriate therapy based on the antibiotic susceptibility test in order to prevent further spread of the pathogen, which may lead to complications if not treated.[4]Many of micro-organisms cause infections to upper respiratory tract and only 5% involve lower respiratory tract. Patients with clinical diagnosis of Pneumonia or Pleural effusion or Chronic bronchitis or Pharyngitis are taken as Inclusion criteria of our study.

## Antibiotic Resistance

It is a specific type of drug resistance defined as ability of a microorganism to withstand the unwanted effects of an antibiotic. Antibiotic resistance occurs naturally through random mutation and is monitored by applying evolutionary stress on a population. Once such a gene is generated, bacteria transfer the genetic information in a horizontal fashion (between individuals) by plasmid exchange and if a bacterium carries several resistance genes, it is called multi-resistant. Many studies demonstrated the patterns of antibiotic usage and affecting the number of people in a wide range of population. Overuse of broad spectrum antibiotics, such as second and third generation cephalosporins, greatly hastens the development of Methicillin Resistance Staphylococcus Aureus (MRSA).

## Development of Resistance

Antibiotic medications are used to kill bacteria that cause illness and diseases. Many people die due to diseases and unwanted effects of antibiotics given for the treatment. However, some bacteria developed resistance to commonly used antibiotics. Antibiotic resistant bacteria are those bacteria that are neither controlled nor killed by antibiotics. These bacteria survive and multiply on taking antibiotics. Many bacterial infections become resistant to at least three or four antibiotics. Bacteria that are resistant to many antibiotics are known as Multi Resistant Organisms (MRO).

## Ways to Prevent Antibiotic Resistance

*Minimize unnecessary prescribing and overprescribing of antibiotics*:
This is possible if doctors do not prescribe antibiotics for a viral illness (antibiotics do not work against viruses) or when antibiotics are prescribed for conditions that do not require them.
*Complete the entire course of any prescribed antibiotic*:
It can be fully effective and thereby reducing breed resistance.
*Practice good hygiene*:
Includes hand wash and using appropriate infection control procedures

## Lung Abscess:

It is defined as necrosis of pulmonary tissues and formation of cavities containing necrotic debris or fluid that is majorly caused due to microbial infections. Pus-filled cavity is often caused by aspiration, which may

occur during anesthesia, sedation or unconsciousness from injury. Alcoholism is the most common condition predisposing to lung abscesses.The formation of small (<2 cm) multiple abscesses is occasionally referred as Necrotizing Pneumonia or Lung Gangrene. Both lung abscess and necrotizing pneumonia manifestations have a similar pathologic process.

Onset of symptoms is often gradual, but in necrotizing staphylococcal bacillary pneumonia patients suffer from acute illness. Cough, fever and night sweats are often present. Cough can be productive of foul smelling. Affected individuals may also complain of chest pain, shortness of breath and lethargy.Broad spectrum antibiotic is one of the mainstays of treatment. Pulmonary physiotherapy and postural drainage are also important. Surgical procedures are required in selective patients for drainage or pulmonary resection[5]. Most cases respond to antibiotics and prognosis is usually excellent unless there is a debilitating underlying condition. Mortality from lung abscess alone is around 10%.

## Pneumonia:

Pneumonia is defined as an infection or inflammation of lungs parenchyma caused by microbial pathogens. Noninfectious pneumonia or pneumonitis results from exposure to drugs, fluids or chemicals. Common risk factors are cigarette smoking, Dysphagia, COPD, chronic bronchitis, emphysema, liver cirrhosis and impaired consciousness. Three classic types of pneumonia are Community-Acquired Pneumonia (CAP), Hospital-Acquired Pneumonia (HAP), and Nursing Home-Acquired Pneumonia (NHAP). It is caused due to bacteria (Streptococcus pneumoniae, Staphylococcus aureus, Haemophilusinfluenzae), virus, fungi (Aspergillus, Candida) and parasite[6]. Clinical presentations include cough with sputum, yellow colour mucus, fever, shaking chills, shortness of breath, headache, excessive sweating, clammy skin, loss of appetite and confusion. Diagnostic parameters include Examining signs and symptoms, past medical history, chest x-ray, pulse oximetry, CRP and urine examination.

## Pharyngitis:

It is inflammation of the pharynx which is present at backside of the throat. It typically results in a sore throat and fever. Other symptoms may include Rhinitis, cough, headache and hoarseness of voice. Symptoms usually last for 3 to 5 days. Complications can include sinusitis and acute otitis media. Pharyngitis is a upper respiratory tract infection. Most cases are caused by viral infection (Adeno virus, Orthomyxo-viridae, Herpes simplex. Strep throat, a bacterial infection, is the major cause in about 25% of children and 10% of adults.

Uncommon causes include other bacteria such as (Gonorrhea, Streptococcus, Haemophilusinfluenzae, Corynebacterium diphtheria), fungus (Candida albicans), irritants such as smoke, allergies and gastroesophageal reflux disease[7]. Modified Centre criteria (MCC) may be used to determine the therapeutic outcomes in patients suffering with pharyngitis.

Based on 5 clinical criteria, it indicates the probability of a streptococcal infection. One point is given for each of the criteria: Absence of a cough, Swollen and tender cervical lymph nodes, Temperature more than 38.0 °C

(100.4 °F), Tonsillar exudate or swelling , Age less than 15 (one point is subtracted if age is more than 44).

## Pleural Effusion:

Pleural effusion is defined as accumulation of excess amount of fluid in the pleural cavity i.e., fluid-filled space surrounding the lungs. This excess fluid impairs normal breathing mechanism by limiting the expansion of the lungs. Various kinds of pleural effusion depends on the nature of the fluid are hydrothorax (serousfluid), hemothorax (blood), urinothorax (urine), chylothorx (chyle) and pyothorax (pus). Pneumothorax is the accumulation of air in the pleural space, and is commonly called a "collapsed lung". Symptoms include shortness of breath, chest pain, fever and cough. Etiological factors include Transudative congestive heart failure, liver cirrhosis, severe hypoalbuminemia, nephritic syndrome, acute atelectasis, myxedema and rheumatoid pleuritis. Exudative factors include increase in Amylase, glucose, PH and cell counts. Diagnostic parameters include medical history, physical examination, chest X- ray, CT scan and ultrasound[8].

## Acute Bronchitis:

It is also known as a chest cold, is short-term inflammation of the bronchi (i.e., large and medium-sized airways) of the lungs.  The most common symptom is presence of cough. Other symptoms include excessive cough with mucus, wheezing, shortness of breath, fever and chest discomfort. Infection may last from few days to 10 days. Cough may persist for several weeks, while total duration of symptoms is experienced by patients for about 20 days. Some patients may have symptoms for 6 weeks. Acute bronchitis is caused due to contagious pathogens, most commonly viruses.

Typical viruses include respiratory syncytial virus and rhinovirus[9]. Bacteria such as Mycoplasma pneumoniae, Chlamydophilapneumoniae, Bordetellapertusis, Streptococcus pneumoniae, and Haemophilusinfluenzae may be uncommon pathogens. Diagnostic parameters include physical examination, chest X-ray, sputum test and blood test.

*Following drugs are most commonly prescribed in study*

## Ceftriaxone:

*CLASS:* Cephalosporins, Third generation.

*DOSE:* 1gm qd per day

*MOA*: It is active against gram-positive organisms and enteric gram-negative bacilli. It acts by adhering to bacterial penicillin binding proteins, thus inhibiting cell wall synthesis.

*Adverse drug reactions*: Headache, Dizziness, Nausea, Vomiting, Diarrhea, Candidiasis, Thrombocytosis, Leukopenia and Hypersensitivity reactions[10].

## Amoxicillin + Potassium Clavulanate (Augmentin):

*CLASS:* Amino penicillin and beta- lactamase inhibitor

*DOSE:* 625mg tid per day.

*MOA:* It is a semi synthetic antibiotic with broad spectrum of bactericidal activity that kills both gram negative and gram positive microorganisms. Amoxicillin binds to penicillin binding proteins and inhibit transpeptidation step of peptidogycan synthesis. Potassium clavulanate inhibits beta lactamate producing bacteria allow amoxicillin to extend spectrum of action.

*Adverse drug reactions:* Diarrhea, Mycosis, Nausea, Rashes, Candidiasis, Vaginitis, Hypersensitivity reactions, Flatulence, Abdominal discomfort and Cholestatic jaundice[11].

## Levofloxacin:

*CLASS:* Fluoroquinolones

*DOSE*: 500-750 mg qd per day

*MOA*: It inhibits bacterial DNA gyrase and other enzymes that are required for DNA replication, transcription, repair and recombination in susceptible bacteria.

*Adverse drug reactions*: Nausea, Headache, Diarrhea, Insomnia, Constipation, Dizziness, Dyspepsia, Rashes, Pruritis[12].

## Azithromycin:

*CLASS:* Macrolides

*DOSE*: 500 mg qd per day

*MOA*: It is a bacteriostatic and bactericidal. It binds to 50s subunit of bacterial ribosomes blocking protein synthesis. It is effective against gram positive and gram negative bacteria.

*Adverse drug reactions:* Diarrhea, Nausea, Abdominal pain, Vaginitis, Flatulence, Malaise, Allergic reactions, Facial edema, Vertigo, Urticaria[13].

## Methodology:

A Hospital Based Prospective Study was done in General Medicine IP, OP and ICU departments at Rajiv Gandhi Institute of Medical Sciences (RIMS), Kadapa for a period of 90 to 100 days. RIMS Hospital is a 750 beded multi-disciplinary tertiary care teaching hospital. A total of 60 patients prescribed with different antibiotics such as Ceftriaxone, Augmentin, Azithromycin, levofloxacin and Ceftriaxone + Augmentin. Patients who are willing to participate in the study were included. Both male and female patients who were prescribed with any one of the antibiotic drug therapies in general medicine department with a clinical diagnosis of Lung abscess or Pneumonia or Pharyngitis or Acute Bronchitis or Pleural Effusion and suffering with other co-morbid pathological conditions were included in our study. Only Ambulatory patients (OP Admissions) were included in our study. Patients who are not willing to participate in the study, Neonates, Pediatric patients, patients less than 30 years of age, Pregnant women and Patients admitted for surgical procedures were excluded. Ethical approval was taken from respective Ethical committee. After taking consent from the patients, a self-designed data collection form was used to collect data such as patient demographic details, laboratory investigations, details of therapeutic outcomes, adverse drug reactions of antibiotics during hospital stay. Complete information was collected, analyzed and documented. Patients were also provided with patient information leaflets at the time of discharge.
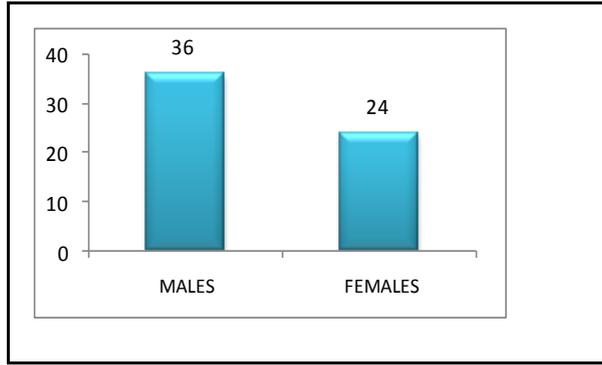
### RESULT ANALYSIS



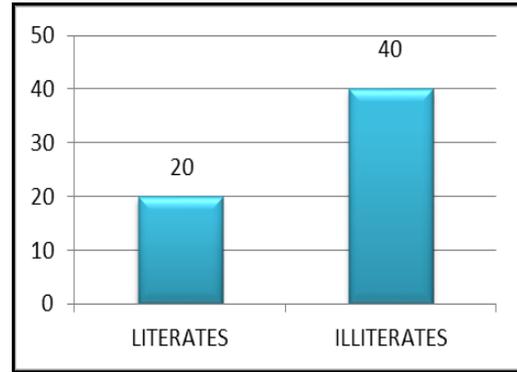Figure 1:  Shows Gender Wise Distribution of Patients



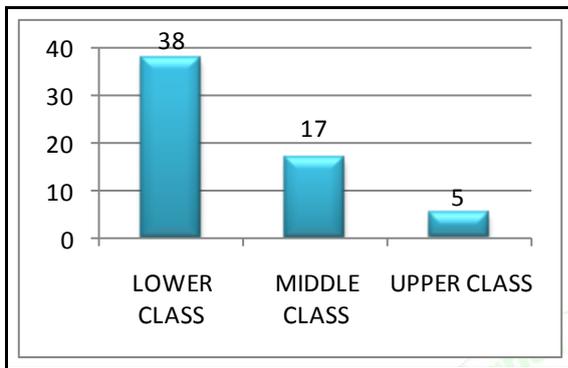Figure 2:  Shows Distribution of Patients Based on Literacy & illiteracy Rates



Figure 3:   Shows Distribution of Patients Based on Socio-Economic Status
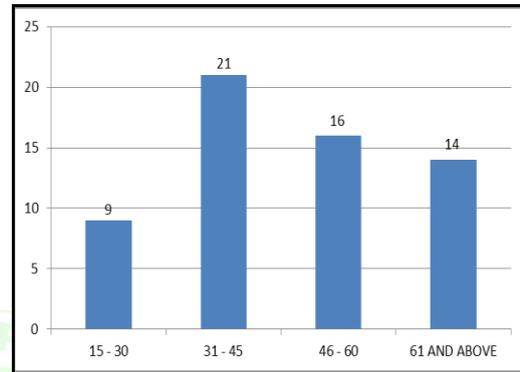


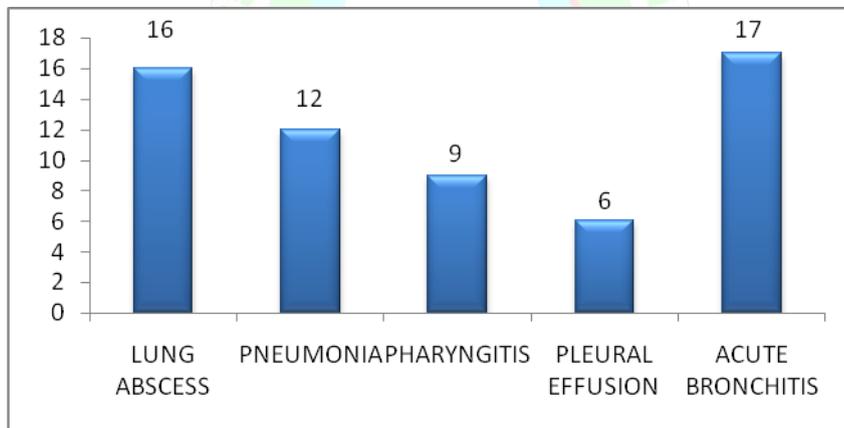Figure 4:  Shows Distribution of Patients Based on Different Age Groups



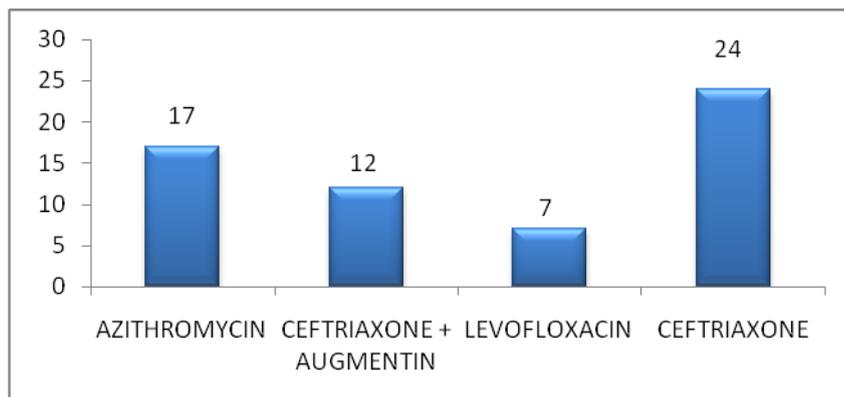Figure 5:  Shows Distribution of Patients Based on Clinical Diagnosis



Figure 6:  Shows Distribution of Patients Based on Different Antibiotic Regimens

## DISCUSSION:

Although there are no defined standards available worldwide regarding prescription quality, undoubtedly a correlation exists between the number of drugs per prescription and increasing risk of poly-pharmacy. Prescription is an order written by a physician, dentist, veterinarian or a registered medical practitioner to a pharmacist to compound and dispense a specific medication for the patient. It includes directions to the pharmacist to prepare and to dispense required dosage form of medication such as tablets, powders, solutions etc. It also contains directions for the patients, regarding dose, dosing interval and route of administration of prescribed drugs.Drug Utilization Evaluation (DUE) is defined as an authorized, structured, ongoing review of prescribing, dispensing and use of medication. If therapy is deemed to be inappropriate, interventions with providers or patients is necessary to optimize drug therapy. A DUE is drug specific or disease specific and can be structured so that it assess the actual process of prescribing, dispensing or administering a drug (indications, dose, drug interactions, etc.)[14]. DUE is same as Drug Utilization Review (DUR), both the terms are used synonymously. DUE encompasses a drug review against predetermined criteria that results in changes to drug therapy when these criteria do not meet. It involves a comprehensive review of patient's prescription and medication data before, during and after dispensing to ensure appropriate medication decision-making and positive patient outcomes. As a quality assurance measure, DUE programs provide corrective action, prescriber feedback and further evaluations. It is designed to review drug use, provide feedback of results to clinicians, to develop criteria and standards which describe optimal drug use. On identifyingthe main problem areas, (from aggregate data, health facility indicators, qualitative studies, other DUE studies, or even recommendations from DTC members), a DUE system can be established relatively quickly. General Practioners were among the top three Health Care Professionals who prescribed the most antibiotics, corticosteroids and injection form of drugs. Frequent prescription of above-mentioned categories may suggest an increasing risk of inappropriate use of medicines. According to our findings, there is a significant difference between prescribing behavior of physicians depending on their specialties. Not using the antibiotic at the right time, stopping taking antibiotics before course completion may leads to antibiotic resistance development and is an emerging problem worldwide. Respiratory tract infection (RTI) refers to number of infectious disease of the upper or lower respiratory tract[15]. Upper respiratory tract infections (URTIs) include the common cold, laryngitis, pharyngitis, tonsillitis, acute rhinitis, acute rhinosinusitis and acute otitis media. Lower respiratory tract infections (LRTIs) include acute bronchitis, bronchiolitis, pneumonia and tracheitis. Most people will develop an acute respiratory tract infection (RTI) every year. RTIs are also the commonest acute problem dealt with in primary care – the 'bread and butter' of daily practice. As all infections are potential threats to life, antibiotics are life-saving instruments, comparable to mechanical ventilation, dialysis and other advanced life-support devices. Three different antibiotic management strategies can be used for patients with RTIs who present in primary care and other first face-to-face contact healthcare settings (such as emergency departments and walk-in centres): no antibiotic prescribing; delayed (or deferred) antibiotic prescribing (in which an antibiotic prescription is written for use at a later date should symptoms worsen); and immediate antibiotic prescribing. However, Prescribing patterns for antibiotics for RTIs vary widely among general practices[16]. In our study the patients are clinically diagnosed with pulmonary disorders with increased severity due to which antibiotic drugs such as Ceftriaxone, Azithromycin, Levofloxacin, and Ceftriaxone+Augmentinare prescribed and don't lead to Irrational prescribing. The main aim and target ofour study is to improve quality of life and increasing life expectancy of patients.

## CONCLUSION:

In recent years, studies on Drug utilization have become a potential tool to be used in the evaluation of health care systems. Drug utilization studies used to analyze the different aspects of the use of drugs and to implement ways of improving therapeutic quality. A total of 60 patients of respiratory tract infections (RTIs) were included in the study, 75 % were males and 25% of the patients were females. In present study the most common diseases were Pleural effusion, Chronic bronchitis, Pneumonia, Lung abscess and Pharyngitis. The most commonly affected patients (21 patients) were belongs to 31-45 years of age group. In the present study, of all the antibiotics, pneumonia diagnosed patients (12 patients) received antibiotic combination regimen, while other common respiratory diseased patients (48 patients) received single antibiotic during treatment. Rational use of the antibiotics is the foremost goal in writing a prescription. Rational use of antibiotics improves quality of life (QOL) of patients. In collaboration with other health care professionals, Pharmacists play a significant role in educating patients about hazards of self-medication, over use of drugs and poly-pharmacy. There is a need of educational programs to promote rational use of antibiotics. Such programs should be initiated within a multidisciplinary framework including doctors, pharmacists, social scientists, government agencies and non-profit organizations.All the prescribed antibiotics belongs to broad spectrum that are effective against most of respiratory tract infections causative organisms such as Streptococcus, Staphylococcus, Mycoplasma, Klebsiella, Hemophilus etc. In our study, it was also found that, physicians prescribed correct drug in correct dose at correct time through right route of administration for right duration of treatment, it clearly implies that majority of prescriptions were found to be Rational. Prescribing by brand names may be an evidence of vigorous promotional strategies by pharmaceutical industries. Prescribing

drugs by brand names may undermine some of the goals of essential medicine concept. Prescribing by generic name helps the hospital pharmacy to have a better inventory control. This will also help the pharmacist to reduce the confusion among pharmacists while dispensing. Generic drugs are often more economical than the branded ones. Regarding the prescribing of FDCs, Potential advantages of FDC's include reduced side effects, increased patient compliance, synergy and increased efficacy and reduced cost, potential disadvantages include inflexible fixed dose ratio, incompatible pharmacokinetics, increased toxicity, physician and pharmacist's ignorance.Hence there is a need of educational programs that bring rational use of antibiotics resulting in development of standard guidelines for antibiotic prescription.

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