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DRUG UTILIZATION EVALUATION OF ANTIBIOTICS IN PAEDIATRIC INPATIENTS IN A PRIVATE HOSPITAL

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ABSTRACT

Objectives: To perceive the drug utilisation evaluation of antibiotics in paediatric in-patient admitted in a private hospital. **Methods:** In this prospective observational study conducted in a secondary care hospital under the pediatric department patient data along with demographic details and medical details like name, sex, age, weight, past medical history, past medication, lab value, diagnosis, drug dosage regimen(dosage form, route, frequency, dose), etc. were collected and included in the study. The data required was collected from case records and documented to determine antibiotic utilization among the patients. **Results:** Out of 100 cases collected, 92% of the population received antibiotics. A total of 106 antibiotics were requested in the prescription of 92 cases. Still, the brand name was the most preferred way of prescribing (83.96%) and just 16.03% of the antibiotic prescriptions were written in generic names. Out of the 106 antibiotic prescriptions, 62.26% of antibiotics were prescribed twice-daily regimen followed by 33.01% of antibiotics prescribed thrice a day and only 4.71% of antibiotics were prescribed once daily. The most commonly seen disease condition was URTI, Bronchitis, acute gastroenteritis, and bronchopneumonia. In 73.9% of cases, antibiotics were prescribed without any culture and sensitivity test, indicating prophylactic planning. Amoxicillin and potassium clavulanate combination was the most common antibiotic utilized. **Conclusion:** The study states that the antibiotic therapy for patients, in the majority does not involve culture and sensitivity tests, which in turn can lead to irrational prescription with an excess of antibiotics administration in inappropriate dosing and finally leading to resistance.

KEYWORDS: DUE, antibiotics, pediatrics, prescribing.

INTRODUCTION

Drug utilization evaluation is a study of sale and utilization, its supply, for the use of drugs in a people, with structural outcome on treatment, society and influence on economy.[1] The advantage of drug utilization evaluation provides the patients with a benefit of precise drugs at a nominal price there by cutting cost on entire treatment. These studies can also be utilized to gather information on morbidity, occurrence of adverse reactions, patient's treatment adherence, effectiveness of treatment and finally the involvement pharmaceutical care on the total budget of illness.[1]

The inappropriate and unwanted use of antibiotics raises a major threat to the healthcare system and can cause adverse events including antimicrobial resistance, associated health problems, increased treatment cost, and length of stay. Therefore, Drug Utilization Evaluation (DUE) studies are aimed at evaluating the rational use of medications and improve the standards of prescribing and administration of drugs.[2]

Drug utilization is a complex procedure. Uncetainities in factors like diagnosis, treatment adherence to the medication affect how medicines are used in the given condition. Because of its complexity, the effect of the drug treatment may not be obtained as a result of the underuse, overuse, or misuse of drugs. Irrational drug use may contribute to an increase in healthcare cost, therapeutic failure, adverse effects, and even patient mortality. Drug use evaluation is a progressive quality development activity done to improve the standard of hospitals and is designed to, review drug use and prescribing patterns, provide feedback to clinicians, develop measures for safe use and induce standards into ideal drug use, and finally to encourage drug usage policy through proper education and interventional procedures. Drug utilization review helps the health care system in identifying, understanding, interpreting, evaluating, and improving the prescribing, administration, and use of the medication thereby balancing the cost and quality of prescribed drugs.[3]

Antibiotics constitute an important class of drugs in treating paediatric patients in both hospital and community health care systems.[4]As paediatrics are most vulnerable to infections, they are frequently prescribed with antibiotics and one-third of the prescriptions contain at least one antibiotic.[5]

It is reported that 33-78% of paediatric patients receive at least one antibiotic in hospitals setting[6,7] and the inpatient paediatric patient receive up to 20% of antibiotics.[8] A high

proportion of antibiotic prescriptions for paediatric patients are found to be unnecessary even then antibiotics are frequently prescribed for patients with viral infections than non-viral infections.[9]

There is also an observed trend of prescribing broad-spectrum antibiotics for patients who requires only narrow-spectrum antibiotics as per the disease.[10] Many patients receive antibiotic prescriptions which are inappropriate due to, inaccurate total daily dosing or prolonged duration of treatment which is not required.[11]

In majority of the situations, physicians prescribe antibiotics empirically without reports of bacterial infection. Treatment of viral infections with an antibiotic regimen for which they have no benefit is also a common practice seen in hospitals.[8] The irrational use of antibiotics has many negative impacts. The risk for antibiotics related adverse effects is observed to be higher in case of improper antibiotic use.[12,13] Since there has been a decline in the development of newer antibiotics over the past many years there emerges the need for preserving the activity of existing antibiotics. Therefore, efficient measures should be initiated to limit the use of antibiotics only in clinically relevant situations.[2]

METHODS

Ethical Considerations

An Institutional ethics committee clearance and permission was obtained from the hospital. An informed consent from the parents (as the patient population is paediatric) was obtained and the confidentiality of data collected and documented was assured.

Study Design

It is a prospective observational study conducted in a secondary care hospital under the pediatric department. Patient data along with demographic details and medical details like name, sex, age, weight, past medical history, past medication, lab value, diagnosis, drug dosage regimen (dosage form, route, frequency, dose), etc. were collected and included in the study.

The inclusion criteria set was the, age below 12 admitted into the paediatric ward and excluded all the outpatients. All the data obtained were analysed using Microsoft excel and the results were represented in percentage.

RESULTS

The study involved 100 patients, selected randomly and patients were followed from the date of admission into the hospital to the date of discharge.

Patient demographics

Table 1: Demographic Profile.

Gender Distribution		Age distribution			
Gender	**Percentage (%)**	**Category**	**Percentage (%)**	**Category**	**Percentage (%)**
Males	54	Infant	10	Pre-schooler	29
females	46	Toddler	36	Schooler	25

The male patient admitted (54%) into the hospital outnumbered female (46%) patients. All the patients were categorized into different age groups as infants (with the age of 1month to 1 year), toddlers (1-3 years), pre-schoolers (4-6 years), and school-age (6-12 years). It was found that children under the category of pre-schooler were having a high percentage (75%) of hospital admission suggesting that children under these age categories are more prone to infectious diseases (Table 1).

Distribution of infections in paediatric patients

The entire patients were classified based on the diagnosis. The most commonly seen disease condition was URTI (20%), followed by bronchitis (13%), acute gastroenteritis (12%), and bronchopneumonia (11%). Respiratory tract infection accounted for 66% of all diagnosis and the less common disease was thrombocytopenia, meningitis, gastritis, viral fever, sinusitis and urticaria (Table 2)

Table 2: Distribution of infections in paediatric patients.

Diagnosis	Percentage of cases	Diagnosis	Percentage of cases
Upper Respiratory Tract Infection	20%	Thrombocytopenia	4%
Bronchitis	13%	Para cardiac pneumonia	3%
Acute gastroenteritis	12%	Viral fever	3%
Bronchopneumonia	11%	Sinusitis	3%
Pharyngitis	7%	Urticaria	2%
Urinary Tract Infection	7%	Gastritis	2%
Lower Respiratory Tract Infection	6%	Meningitis	1%
Tonsillitis	6%		

Distribution of antibiotics

Among the collected cases, 92% of cases contained antibiotics and a total of 106 antibioticswere prescribed to among these inpatients. The distribution pattern based on

generic and branded drug prescribing indicated that 83.96% of antibiotics were prescribed by using the brand name and only 16.03% of antibiotics were prescribed utilizing generic name.

Distribution of dosage form ofantibiotics

Out of the total 106 antibiotics prescribed it was found thata majority (86.79%) received an antibiotic by IV route followed by oral route accounting for 12.2% and topical applications were the lowest with 0.94% case. Figure (1)

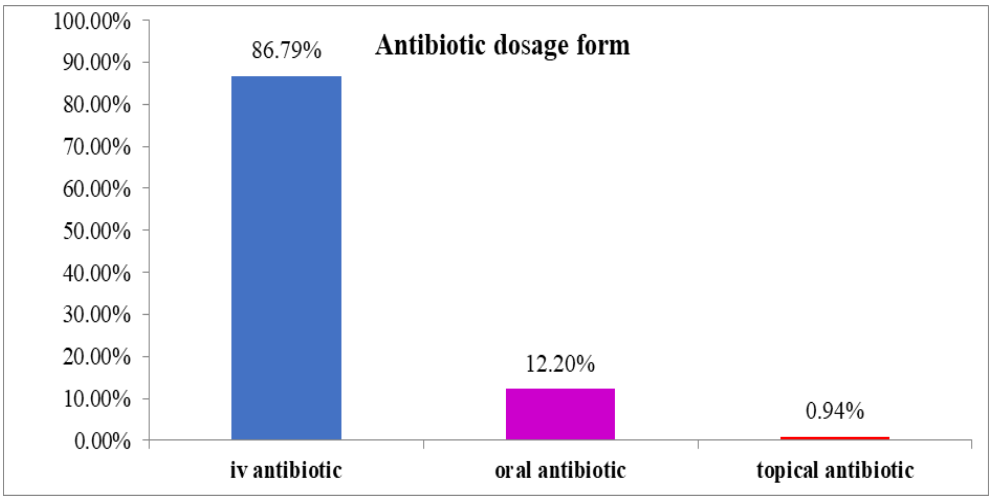

Fig 1 Distribution of dosage form of antibiotics.

Distribution of frequency of administration of antibiotics Out of the 106 antibiotics been prescribed, 62.26% of antibiotics were prescribed twice-daily regimen followed by 33.01% of antibiotics prescribed thrice a day and only 4.71% of antibiotics were prescribed once daily.

Distribution of antibiotic culture and sensitivity tests

Among the 92 patients who received antibiotic therapy, only 24 patients (26.1%) were advised to perform antibiotic culture and sensitivity tests, whereas 68 patients (73.9%) were treated without performing antibiotic sensitivity testing, by adopting empirical therapy.

Distribution of antibiotics in discharge medication

The majority of the patient (81.5%) was discharged with antibiotics in their discharge medication. IV antibiotics were switched to oral formulation in discharge medication for all the patients. (Table 3)

Table 3: Distribution of antibiotics in the discharge medication.

No of cases with an antibiotic in the discharge	81.5%
Injections converted to syrup	54.3%
Injections converted to a tablet	11.9%
Injections converted to drops	6.53%
No change (drops, syrups)	8.69%

Distribution of antibiotics in discharge medication per prescription

Out of the 81.5% of patients receiving antibiotic therapy 83.6% of patient received single antibiotic therapy. Table (4)

Table 4: Distribution of antibiotics in discharge medication per prescription.

Number of antibiotics prescribed		
with 1 antibiotic	**with 2 antibiotics**	**with 3 antibiotics**
83.6%	13.04%	3.26%

Distribution of class of antibiotics

On evaluating the prescribing pattern of antibiotics, it was observed that the Cephalosporin class of antibiotics was highly prescribed (63.04%) class of antibiotics, in which the Ceftriaxone (48.27%) was the most commonly prescribed cephalosporin.

The Penicillin's (52.17%) and the Aminoglycosides (14.13%) followed the highly prescribed class of antibiotics after the Cephalosporins class (Figure 2).

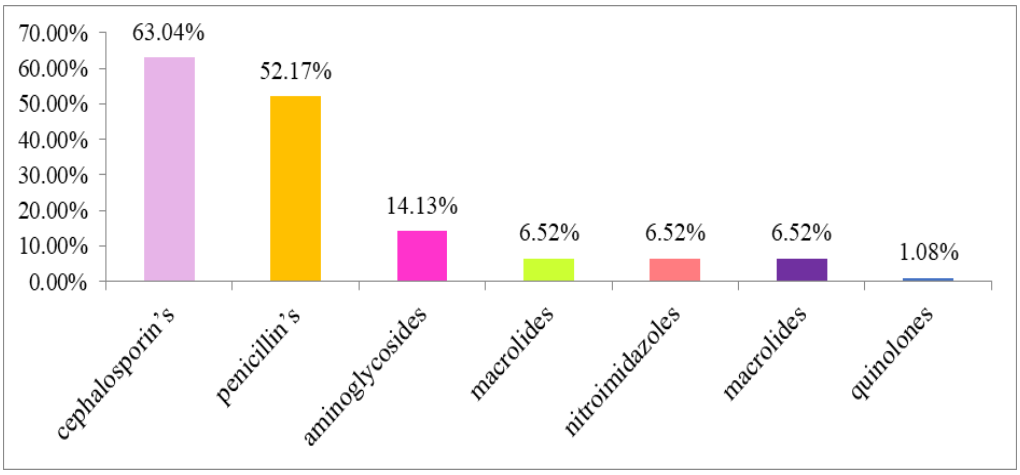

Figure 2 Distribution of class of antibiotics.

Amoxicillin and potassium clavulanate were the most commonly prescribed drug in all the conditions. It was also observed that antibiotic combinations were incorporated into the

treatment plan by use of combinations like; amoxicillin + potassium clavulanate, ceftriaxone + tazobactam, ampicillin + cloxacillin.

DISCUSSION

Antibiotics constitute an important class of drugs in treating paediatrics but the rational and appropriate use of antibiotics is always warranted to reduce antibiotic resistance, adverse drug effects, and improve the quality of care and health care cost.

In the present study, out of 100 patients admitted to the hospital the number of male patients was 54% and females were 46% The male preponderance observed in the study has been similarly observed in results of study "prescribing pattern and antibiotics use in hospitalized patients in a northern Nigerian teaching hospital which shows 60.6% of male patients (Table 1).[14] The reason for male dominance in the number of cases was not clear. Children between the age of 4-6 were admitted more frequently than other age groups suggesting that the predominance of these younger age groups to the burden of developing the infections and requiring antibiotic therapy (Table 2). Majority of the children were admitted with chief complaints of fever and cough. Respiratory tract infections were the most common diagnosis made among all the cases. Only 24 cases had supportive antibiotic culture and sensitivity indicating that most of the antibiotics are prescribed empirically on a clinical basis without confirming bacterial infections based on the diagnosis of the disease. A study by Cole CP et al. which has reported only 74.8% of prescription to contain antibiotics, but our reports show that 92% of the prescriptions contained antibiotic which is suggestive of inappropriate antibiotic use.[15] In our study, 83% of the patient received single antibiotic therapy and 13.04% with 2 antibiotics and 3.26% with 3 antibiotics, whereas the study by Umar LW et. al. shows varying percentage and states that only 63% of the patients received single antibiotics and 3.3% of them with 2 antibiotics and 0.7% with 3 antibiotics.[14] 83.96% of antibiotics were prescribed by using the brand name and only 16.03% of antibiotics were prescribed by generic name which contradicts the results of study by Umar LW etal in which the the percentage of drugs prescribed in generic name was higher 66.8%.[14] The difference in generic prescribing may be due to the difference in training, influence of pharmaceutical companies, experience of prescribers, adherence to the treatment guidelines and availability of the drugs.[16] This study points out the most frequently prescribed class of antibiotics as cephalosporin's, followed by penicillin's, and aminoglycosides which appear to be different from those of Umar LW et. al. in which the most common antibiotics were gentamicin,c

cephalosporin's, beta-lactam and penicillins.[14] Among the cephalosporin's, the most commonly prescribed drug was ceftriaxone third-generation cephalosporin (figure 2).

In this study co-amoxiclav was most commonly prescribed antibiotic which is complementary to the results of AlBalushi K et. al. but as per the author Umar LW et. al. the most frequently prescribed antibiotic combination was ampicillin cloxacillin 38.1%.[17,14]

In our study most of the patients were prescribed parenteral antibiotics (86.79%).But there are several studies showing varying percentage of parenteral antibiotics. Syrups were the commonly used oral dosage form of drugs in the prescriptions because children's show more compliance to syrups and drops compared to tablets as they are more palatable. The study points out that the antibiotic use was irrational because of the lack of culture and sensitivity testing, inappropriate drug selection, dose, wrong frequency, and duration.

CONCLUSION

Rational choice and appropriate use of antibiotics and recognition of their adverse effect are the main problems while prescribing antibiotics. Studies on antibiotics use have to be done at regular periods as they are highly prescribed for the treatment of paediatric illness. When prescribing antibiotics, the information on the causative organism of the disease, the culture, and sensitivity test must be taken into consideration to make the right choice of the antibiotic regimen. The development of a hospital-wide antibiotic policy should be encouraged. Physicians should have a thorough understanding of the need for microbiological diagnosis, use of antibiotics, and make a good decision in clinical situations without looking into the financial burden of culture tests on patients.

It is necessary to study the prescribing patterns in pediatrics as the correct diagnosis of diseases and its management with medicines constitutes important aspects of care which is very essential in the case of pediatric patients. The various guidelines proposed for the treatment of various infectious diseases prescribing of antibiotics include 2013 NHS practice guidelines for antibiotic prescribing, 2008 National Institute for health and clinical excellence suggests practicing guidelines for respiratory tract infections-antibiotic prescribing. According to standard antibiotic prescribing guidelines, a culture sensitivity test should be done before antibiotic prescribing to overcome antibiotic resistance threats. Great care should be taken in pediatric patients to avoid inappropriate dosing. This study concludes that the antibiotic therapy given to the patients in most of the cases is without doing any culture

sensitivity test which may lead to irrational prescriptions. Treatment of viral infections with antibiotics for which it is not effective should be avoided and appropriate diagnostic and laboratory facilities for distinguishing such infections should be implemented. The expertise of an appropriately qualified clinical pharmacist can assist the nurses in dose calculation, conduct prescription audits, and ensure the safe and rational use of drugs in children.

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