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A PROSPECTIVE STUDY ON DRUG UTILISATION PATTERN OF CEPHALOSPORINS IN RESPIRATORY TRACT INFECTIONS

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ABSTRACT

Objective: Drug Utilization Pattern are defined by WHO in 1977 as "the marketing, distribution, prescription and the use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences". Aim is to evaluate the Drug Utilization Pattern of cephalosporins in respiratory tract infections. **Methods:** In a prospective observational study performed over a 6 months period (2017-2018), hospitalized adult patients who received cephalosporins for respiratory tract infections were selected. The collected data included demographic details, information regarding cough, phlegm, periods of cough and phlegm, breathlessness, wheezing, chest illness, past illness, tobacco and smoking. **Findings:** Over the study period 185 patients were evaluated. Lower Respiratory Tract infected patients (130) 70.3% were more than Upper Respiratory Tract (55) 29.7%. Majority patients came with a complaint of breathing (113) 61.1% difficulty following by acute exacerbation of COPD (39) 21.1%. First, second and third generation cephalosporins was prescribed. Out of which, third generation were mostly prescribed than the other two; ceftriaxone 51.4% and cefixime 22.2%. Around (83) 44.9% patients were having co-morbid conditions, diabetes followed by hypertension.

KEYWORDS: cephalosporins, Drug Utilisation Pattern, Respiratory Tract Infection, ceftriaxone.

INTRODUCTION

Drug Utilization Pattern are also reffered to as Drug Utilization Evaluation (DUE), Drug Utilization Review (DUR) or Medication Utilization Evaluations (MUE), are derfined by WHO as "the marketing, distribution, prescription and the use of drug in a society, with special emphasis on the resulting medical, social and economic consequences". Drug Utilization Pattern encompasses a drug review against predetermined criteria that results in changes to drug therapy when these criteria are not met. It involves a comprehensive review of patients prescription and medication data before, during or after dispensing to ensure appropriate medication decision-making and positive patient outcomes.

The principle aim of Drug Utilization studies is to facilitate the rational use of drugs in populations. For the individual patient, the rational use of a drug implies the prescription of a well-documented drug at an optimal dose, together with the correct information, at an affordable price. Without a knowledge of how drugs are being prescribed and used, it is difficult to initiate a discussion on rational drug use or to suggest measures to improve prescribing habits.

Cephalosporins are a group of semisynthetic antibiotics derived from 'cephalosporin-c' obtained from a fungus *Cephalosporium*. They are chemically related to penicillins; the nucleus consists of a β-lactam ring fused to a dihydrothiazine ring. By the addition of different side chains at position 7 of β-lactam ring and at position 3 of dihydrthiazine ring, a large number of semi-synthetic have been produced. These have been conventionally divided into 4 generations. All cephalosporins are bactericidal and have the same mechanism of action as penicillin, i.e. inhibition of bacterial cell wall synthesis. However, they bind to different proteins than those which bind penicillins. This may explain differences in spectrum, potency and lack of cross resistance.

The main objectives of the study includes

- To study the indications for which cephalosporins is prescribed.
- To determine the frequency and usage of cephalosporins.
- To determine the adverse effects and drug interactions of cephalosporins.
- To evaluate the risk factors and complications in the patients with respiratory tract infections.
- To study the rationality of drug use.

REVIEW OF LITERATURE

***Mohd. Muhammad et al (2017)*:** conducted a study on **Drug Utilisation Pattern of Cephalosporins in tertiary care hospital; in patient departments**. The study design was, prospective and concurrent Drug Utilization Evaluation. This study was carried out for a period of 6 months.

The study was divided into phase I (before intervention) and phase II (after intervention), study includes all the patients who have been prescribed with any generation of cephalosporins. The criteria and guidelines were taken from the standard references and used to monitor the drug therapy on patients based on indication, dose, dosage form, frequency, duration, laboratory tests. All the standard guidelines for prescribed cephalosporins have been circulated to the required physicians and other related health care professionals.

The result was inappropriateness of drug therapy was found in phase I (before intervention) and appropriateness in terms of rational use for indication, dose, dosing interval, renal dosage adjustment was improved in phase II this may be due to the implementation of the DUE guidelines through interventions obtained during phase.

***Arul B. et al.(2017)*:** conducted a study on **Drug Utilisation Review of cephalosporins in tertiary care hospital-A retrospective study**. The objective was to assess the prescribing patterns of Cephalosporin in a Tertiary care hospital, to determine the frequency of drug usage of Cephalosporin antibiotics, to study the indications for which the drug was being prescribed and to identify therapeutic treatment, co-morbidity conditions in the patients.

A Retrospective study was conducted for a period of six months in the various departments of a tertiary care hospital, Salem, Tamilnadu.

Cephalosporin Utilisation was evaluated in 150 patients in the various departments of the hospital. The present study involves 54% of males and 46% of females. Patients with the age group of 51-60 (52.67%) received the majority amount of Cephalosporins. The Culture sensitivity test was done in 26 patients. Cephalosporins were widely prescribed in the department of General Medicine (67.33%). Out of the 150 prescriptions only six were found to have drug-drug interactions.

Cephalosporins especially third generation drugs were widely used when compared to second generation of drugs. The therapy provided in the prescriptions were efficacious but there is a need to emphasize to all prescribers encourage prescribing by generic name and to do the culture sensitivity tests more often so as to reduce the incidence of a grave danger i.e. antibiotic resistance.

Dr.Bandari Kiran et al.(2016): Conducted a study on the **Drug Utilisation Evaluation of cephalosporins in a tertiary care hospital**. The mean duration of hospitalization among the study population was 6.25 days. 121 cephalosporins prescribed out of 115 patients.

Majority of patients were 26 belonged to age group 61-70 (34.21%). used generic (22) 18.18% and brand drugs was (99) 81.82%. route of administration of cephalosporin's were prescribed more commonly in injection form (105) 86.78%, mainly second (25) 20.66% and third generation drugs were (96) 79.34%. Cefoperazone +sulbuctum (47) (38.84%) and cefixime (40) 33.06% were the commonly prescribed third generation cephalosporins. Fourty one (41) patients were received cephalosporins along with co-prescribed other antibiotics in the treatment. The majority of co-prescribed other antibiotics were Metronidazole prescribed in fifteen (15) patients 36.59%. The majority of patients were utilized cephalosporins in Hepatology thirty (30) patients with 26.09%, According to the ATC classification the overall direct costs from use of cephalosporins and other antibiotics consumption was 4, 71,758.4 lakhs of rupees in 719 bed days and the (Daily Drug Dose) DDD/100BD was 6577.64 rupees consumed in hospital stay.

C.Suhas Reddy et al.(2015): conducted a study on **Drug Utilisation Evaluation of cephalosporins in the general medicine and general surgery departments in a tertiary care teaching hospital**. The aim was to conduct a prospective observational study on Drug Utilization Evaluation of cephalosporins, to determine the frequency of usage of Cephalosporin and to study the indications for which cephalosporins were prescribed. A total of 250 patients were enrolled in the study, 200 from general medicine (n1) and 50 from general surgery (n2) department. Data were collected, by scrutinizing the inpatient case sheet from both departments, for a period of 6 months.

Out of 250 patients', majority of patients' 58 (23.2%) belonged to age group of 31- 40 years. The average age of male and female patients' were (41.37±16.13) and (44.69±16.14), (41.87±15.96) and (31.06±18.63) in general medicine and general surgery respectively. This

study observed that cephalosporins were prescribed to 58 (29%) of patients with Respiratory Tract Infection (RTI). Out of 250 patients enrolled in the study from both the departments, 182 (72.8%) patients received only third generation cephalosporins, while the remaining received a combination of cephalosporin with a β-lactam inhibitor. The most prescribed drug in the general medicine department was ceftriaxone121 (60.1%). The average duration of use of Cephalosporin was 5 and 8.5 days in general medicine and general surgery departments respectively.

The study concluded that the prescriber should follow the standard treatment guidelines for improving the Rational Use of Drugs and to prevent the development of resistance. The duration of use of cephalosporins is in partial compliance with the guidelines.

Kiran Nagarju et al.(2014):conducted a study on **Drug utilisation evaluation of cephalosporins, macrolides, quinolones antibiotics in KIMS hospital**. The aim was to determined the prescribing pattern of cephalosporins, macrolides and quinolones antibiotics and to monitor and report the adverse drug reaction and drug interaction.

The study was conducted in KIMS Hospital, Bangalore. It is a hospital based prospective and retrospective study conducted for a period of six months from, to study the utilization pattern of cephalosporins, macrolides and quinolones antibiotics. We have attempted to observe the utilization pattern of cephalosporins, macrolides and quinolones in our hospital.

Among 160 patients included during the study, we observed that 114(71.25%) patients were been prescribed with cephalosporins, which was high compared with other class of antibiotics followed by 38(23.75%) patients were been used with quinolones and the remaining eight (5%) patients were on macrolides antibiotics.

They concluded that the utilization pattern of cephalosporins was seen more in patients compared with quinolones and macrolides antibiotics.

Gururaja et al.(2013): conducted a study on **cephalosporin utilization evaluation in a university teaching hospital: a prospective study**. Aim of the study was to systematically evaluate the prescribing and sensitivity patterns of various Cephalosporins in Medicine and Surgery inpatients in a University teaching Hospital of Mangalore district, Karnataka, India.

239(59.8%) patients from Medicine department and 161(40.2%) patients from Surgery department were enrolled in the present study. Patients with age group greater than or equal to 60 years received Cephalosporins maximum with 34% and 28% from Medicine and Surgery wards respectively. The median length of hospital stay was 10 days. The most widely prescribed formulation was parenterals (69%). The third-generation Cephalosporins were widely prescribed. 131 patients (32.8%) were prescribed Cephalosporin for surgical propylaxis and 56 patients (14%) to prevent infections. Culture test was performed in only 66(16.5%) cases, only 43 specimens showed positive culture test. Metronidazole was the most commonly co prescribed drug.

The study revealed the wider usage of Cephalosporins especially third-generation Cephalosporins. The treatment regimens implemented in most of the cases were without doing any culture sensitivity test which lead to irrational prescribing.

Harish Govind Naik et al.(2013): conducted a study **Drug Utilization Study on antibiotics use in lower respiratory tract infection**. Aim of the study was to evaluate the pattern of antibiotics use in Medicine Department of a Krishna Hospital, Karad, Maharashtra, India.

Data was retrospectively collected. The obtained data was examined and were subjected to descriptive statistical analysis using Microsoft excel.

96 case records were examined of which 46.87% were LRTI (nonspecific LRTI& acute bronchitis) and 51% were pneumonia. Female accounted for 53.12% and male for 46.87% of total cases. The World Health Organization (WHO) indicators (utilization in defined daily doses (DDD); DDD/1000inhibitant/day) were used and the ATC/DDD method was implemented. The most frequently prescribed antibiotic was ceftriaxone, followed by Azithromycin.

The study concluded that Average treatment period was found to be 5.42 and 6.52 for LRTI (nonspecific LRTI and Acute Bronchitis) and pneumonia respectively. A total of 96 cases studied; in which 33 cases had mono-antibiotic therapy (33.37%) and rest contained poly-antibiotics therapy (66.63%).Prescribing by generic names has to be encouraged.

***Jyothi k.et al. (2012)*:** Conducted a study on **Drug Utilisation Evaluation of cephalosporins in general medicine units of rural tertiary care hospital**. It was a prospective observational study carried out for in-patients in medicine departments. The documented data were

evaluated for use, safety outcomes and cost for the treatment associated with the use of cephalosporins. One hundred and one patients were identified for the use of cephalosporins.

Cephalosporins usage accounted for 30.02% of total admission. Male patients accounted for 50.50% while female patients were 49.50%. The average length of hospital stay was 7 days. Co-morbid condition is accounted for 24.88%. 74.26% patients received cephalosporins for empirical therapy whereas 25.74% received for specific treatment. Majority of hospitalized patients had UTI (16.83%) followed by GI (14.85%) as primary diseases. The widely prescribed cephalosporin was ceftriaxone 48.51%. Majority of hospitalized patients received injection 81.18% and oral 18.82% of cephalosporins. A total of 9 adverse drug reactions were identified. The average direct cost incurred per patient was Rs 1047.90.Cepahlosporins cost accounted for 74.21% of the total medication expenses (Rs 2333469.68).

Cephalosporins especially third generation were widely used in medicine departments to treat various disease conditions. Urinary tract Infections is the major disease condition followed by Respiratory Tract Infections and Digestive system infections were seen in the admitted patients. Antibiotics usage cost is accounted for 70% of total hospital stay.

CONCLUSION

Infections of respiratory tract are among the most common causes for antibiotic prescribing. The diagnosis within the community is generally limited to clinical criteria, and microbiological information is frequently lacking. Hospitalized patients are more likely to undergo diagnostic sampling, but difficulties remain in reliably defining a microbial etiology, thereby providing a confident basis for antibiotic selection. In this study, very few antibiotics were found to be prescribed in brand names while analyzing the prescription. Cephalosporins were usually prescribed in a generic name. This has being done may be the prescribers have no role in purchasing and dispensing of particular brand medicine. Most of the patient consulting in the OP department are not undergoing the culture sensitivity test and less number of patients were undergoing this test in the IP department. The decrease in the percentage of culture might be based on the clinical presentation at the time of admission or patient might have consumed the antibiotic prior to admission. Large percentage of sterile culture might be attributed to this and also to the viral cause of illness and, or proper specimen might have not collected. This is found to be the major impact in the rational use of drugs. Hence, the rationality of drug is found to be irrational.

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