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EVALUATION OF ANTIBIOTICS USE AT EMERGENCY DEPARTMENT IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Emergency departments (EDs) provides an interface between ambulatory care and hospital care settings, where doctors work under intense time pressure. It results in an inappropriate choice of antibiotics which causes adverse events, unsuccessful treatments and antimicrobial resistance (AMR). **Aim:** To evaluate the pattern of antibiotics prescribing in the emergency department. **Methodology:** A hospital based prospective observational study was carried out over a period of nine months at the emergency department of St. Philomena's Hospital, Bangalore. **Results:** A total of 329 patients who received antibiotics were included in the study. Females were predominant and Fever with myalgia was the most common complaints of patients visiting the ED. Azithromycin was the most common antibiotics prescribed for fever with myalgia. Majority of the antibiotic's prescriptions (322) followed the standard prescribing guidelines of the hospital. Among 329 patients with antibiotics, 2 patients developed hypersensitivity reactions from Injection. Metronidazole and Injection ciprofloxacin. **Conclusion:** Azithromycin was the commonly prescribed antibiotic for fever with myalgia. Hereby I conclude the study by stating that the prescribing pattern of antibiotics at ED in our hospital was found to be rational. Presence of a clinical pharmacist at ED will still help in

collecting the patient's medical and medication history which would help the physicians in appropriate choice of drugs.

KEYWORDS: Antibiotics, Emergency department(ED), Azithromycin.

1. INTRODUCTION

Emergency departments (EDs) are unique in the health care systems which offers care for both medical emergencies (such as poisonings, diabetes complications, failures of the kidneys, lungs, the heart's rhythm, etc.) and surgical emergencies (such as assaults, burns, severe stomach ache, blockage of limb's blood supply, bleeding, intestinal perforation, etc.). A well-designed and staffed emergency room can provide high-quality emergency care to not only adults but also to vulnerable populations like children, pregnant women, and elderly patients.[1]

Antibiotics in Emergency Department

Antibiotics are among the most commonly prescribed medications in emergency departments (ED). Almost half of ED visits require antibiotic prescriptions. The most common antibiotics recommended in emergency rooms for infections like URTI and UTI are penicillin (amoxicillin), followed by macrolides (azithromycin and clarithromycin), cephalosporin (cefuroxime, cephalexin), penicillin (amoxicillin), and quinolones (mostly norfloxacin).[2]

Epidemiology of antibiotics use

The use of antibiotics has been progressively rising in recent years. The number of antibiotics marketed grew by roughly 40% between 2005 and 2009. The most significant gain in sales over that five-year period was for cephalosporins, which had a 60% increase in sales (measured in units sold). However, most antibiotic classes experienced some growth as well.[3]

Antibiotics

Antibiotics are drugs used to treat bacterial infections in humans. They accomplish this by either killing the germs or by inhibiting their ability to develop and reproduce.[4]

Alexander Fleming made the first antibiotic, penicillin, in 1928. The approval of penicillin as a treatment for bacterial infections took more than ten years.[5]

Classification of antibiotics

Antibiotics are classified according to their mode(s) of action, or their capability to interfere with microorganism's metabolic processes.[6]

Cell wall synthesis inhibition

- Beta Lactams- Penicillin's, Cephalosporins, Carbapenems, Monobactams.
- Vancomycin, Bacitracin

Nucleic Acid Synthesis Inhibition

- Folate synthesis - Sulfonamides, Trimethoprim.
- DNA gyrase – Quinolones.
- RNA polymerase –Rifampin.

Protein Synthesis Inhibition

- 50S subunits- Macrolides, Clindamycin, Linezolid, Chloramphenicol, Streptogramins.
- 30S subunits- Tetracyclines, Aminoglycosides.[7]

Adverse effects of antibiotics

- Mild rash on skin or other allergy symptoms
- Stomach upset, nausea
- Appetite loss
- Oral thrush or vaginal infections caused by fungi (yeast)
- Severe allergic reaction that causes facial oedema (lips, tongue, throat, and face), trouble breathing, or severe watery or bloody diarrhoea; infection with Clostridium difficile
- Stomach pain
- Vaginal or oral yeast infections (white discharge and severe itching in the vagina or mouth sores or white patches in your mouth or on your tongue).[8]

Antibiotic Resistance

Antimicrobials are undoubtedly helpful in suitable conditions, but it's important to avoid inappropriate antimicrobial use, which can lead to resistance.[9] Antimicrobial resistance occurs when antimicrobials apply selective pressure on pathogens that leads to development of defence mechanisms against that antimicrobial agent's mode of action. Since the invention of the first antimicrobial drugs, antimicrobial resistance has been a natural phenomenon;

nevertheless, the overuse of antimicrobials has accelerated the speed and severity of this process.[10]

The main factors contributing to the development of resistance are patient's inappropriate use of antimicrobials, such as skipping doses, reusing unused or expired medication, and obtaining and using antimicrobials without a prescription.[11] Other factors that contribute to bacterial resistance include the use of broad-spectrum antibiotics for minor infections and the prescription of antibiotics for viral infections.[12] The ED-based practitioners commonly deal with the confluence of diagnostic uncertainty and time constraints, which makes the ED distinct in its hurdles to safe antibiotic treatment. The ED is regarded as a crucial location that acts as a bridge between the community and the hospital in order to address incorrect antibiotic prescribing patterns.[13]

The study was aimed to evaluate the pattern of antibiotics prescribing in emergency department.

MATERIALS AND METHODS

Study design: This was a hospital based prospective observational study.

Study site: The study was carried out at the emergency department of St. Philomena's Hospital, Bangalore.

Study period: The study was conducted for a period of nine months.

Study criteria: The study was carried out by considering the following criteria's.

Inclusion Criteria

- Both genders of all age groups who received antibiotics were included in the study.

Exclusion Criteria

- Patients who were not willing to participate in the study.

Sources of data

- Patients case sheets.
- Interview with patients/attender.
- Interview with consultant/resident.

Study Procedure

- The research student visited the emergency department on a daily basis and all the details of patients such as demographic data, social, medical, medication history along with the antibiotics prescribed were collected, documented and analysed.

Statistical Analysis

- Descriptive statistics was used.

Ethical Approval

- Ethical committee approval was obtained from the Institutional Ethics Committee of St. Philomena's Hospital, Bangalore.

Informed consent: Informed consent was obtained from all patients included in the study.

RESULTS AND DISCUSSIONS

A total number of 329 patients who met the inclusion criteria at emergency department were included in the study. Out of 329 patients, 171 were females (51.9%) and 158 were males (48%) and majority of patients (32.82%) were in the age group of 21-30 years.

The major complaints received in ER were fever with myalgia (14.2%) followed by fever with cough (8.4%) and abdominal pain associated with vomiting (6.4%).

Among 329 patients prescribed with antibiotics, Macrolides(39.81%) were majorly prescribed followed by fluoroquinolones+ nitroimidazole(19.75%) and cephalosporins (12.15%).

Table no. 1: Distribution of Patients Based On Class of Antibiotics Prescribed.

Sl.No	Antibiotic Class	No Of Patients	Percentage
1	Cephalosporins	40	12.15%
2	Fluroquinolones	3	0.91%
3	Fluroquinolones+ Nitroimidazole	65	19.75%
4	Nitrofurans	1	0.30%
5	Macrolides	131	39.81%
6	Nitroimidazole	3	0.91%
7	Penicillin's	6	1.82%
8	Penicillins+Beta Lactamase Inhibitors	38	11.55%
9	Rifamycin	1	0.30%
10	Tetracyclines	37	11.24%
11	Aminoglycosides	1	0.30%

12	Cephalosporin+Beta Lactamase Inhibitors	3	0.91%
	Total	329	100%

Out of 329 patients prescribed with antibiotics, 130 patients (39.15%) were prescribed with Azithromycin, 51 patients (15.50%) with ciprofloxacin+ tinidazole, 38 patients (11.5%) with amoxicillin+ clavulanic acid, 37 patients (11.24%) with doxycycline and 20 patients (6.07%) with cefixime.

Table no.2: Distribution of patients based on common Antibiotics prescribed.

Sl no	Antibiotics	No. Of patients	Percentage
1	Ciprofloxacin+ Metronidazole	6	1.82%
2	Gentamycin	1	0.30%
3	Metronidazole	3	0.91%
4	Amoxicillin	6	1.82%
5	Azithromycin	130	39.51%
6	Cefixime	20	6.07%
7	Cefpodoxime proxetil	8	2.43%
8	Cefuroxime	12	3.64%
9	Clarithromycin	1	0.30%
10	Doxycycline	37	11.24%
11	Levofloxacin	1	0.30%
12	Nitrofurantoin	1	0.30%
13	Ofloxacin	2	0.60%
14	Rifaximin	1	0.30%
15	Amoxicillin +Clavulanic acid	38	11.55%
16	Cefpodoxime +Clavulanic acid	3	0.91%
17	Ciprofloxacin+ Tinidazole	51	15.50%
18	Ofloxacin+ Ornidazole	8	2.43%
	Total	**329**	**100%**

Among antibiotics prescribed in emergency department, majority of (34) patients were prescribed with Azithromycin for fever+ myalgia followed by 25 patients with Doxycycline for fever+ myalgia, 16 patients with Ciprofloxacin and tinidazole for loose stools+ vomiting, 16 patients with Amoxicillin and clavulanic acid for fever+ cough and 5 patients with cefixime for abdominal pain+ burning micturition.

Among 329 antibiotics prescription, only 49 patients were switched from parenteral to oral route among which 35 patients who received Inj. Metronidazole were converted into Tab ciprofloxacin and tinidazole, 4 patients with Inj. Metronidazole were converted to Tab. Azithromycin.

Table no. 3: Distribution based on change in ROA.

SL. NO	PARENTERAL	ORAL	TOTAL
1	Ciprofloxacin	Ciprofloxacin+tinidazole	1
2	Ciprofloxacin+Metronidazole	Ciprofloxacin+tinidazole	5
3	Metronidazole	Ciprofloxacin+tinidazole	35
	Metronidazole	Azithromycin	4
	Metronidazole	Ofloxacin+ornidazole	3
	Metronidazole	Rifaximin	1
	Total		**49**

Among 329 prescriptions with antibiotics majority 322(97.06%) of them followed the standard prescribing guidelines of the hospital, wherein 7 prescriptions were not in accordance with hospital standard guidelines.

Table no. 4: Prescribing pattern of antibiotics in accordance with guidelines.

Sl. No	Prescription In Accordance With Guidelines	No. Of Patients	Percentage
1	Did Not Follow	**7**	2.12%
2	Followed	322	97.06%
	TOTAL	**329**	**100%**

Among 7 prescriptions, Cefixime was prescribed instead of Ofloxacin / Norfloxacin for fever + burning micturition + vomiting. Ofloxacin+ ornidazole was not recommended for abdominalpain. Ofloxacin+ ornidazole prescribed instead of Azithromycin / Doxycycline for fever + cough, fever+ cough+ headache and fever + cough+ chest pain.

Out of 329 patients who visited emergency, 2 patients (0.6%) developed adverse drug reactions among which 1 patient (50%) developed itching after administering Inj. ciprofloxacin, 1 patient (50%) developed rashes after Inj. metronidazole.

All 2 ADRs were found to be "probable" as per WHO and Naranjo causality assessment scale.

Table no. 5: Distribution based on ADR reported.

Sl.No	Drug	Adversereaction	Fate OfDrug	No Of Adr	Percentage
1	Ciprofloxacin	Itching	Stopped	1	50%
2	Metronidazole	Rashes	Stopped	1	50%
	Total			**2**	**100%**

4. CONCLUSION

During the study period of nine months a total number of 329 patients were enrolled into the study from the Emergency department of St. Philomena's hospital. In the study, female

patients (171) were higher in number than male (158) patients. The most common antibiotics prescribed were Tab Azithromycin for fever with myalgia followed by Tab Ciprofloxacin+ tinidazole for loose stools+ vomiting. Out of 329 antibiotics prescriptions, 322 were prescribed according to guidelines, whereas 7 prescriptions were not according to the guidelines. Among 329 patients prescribed with antibiotics, 2 patients experienced adverse drug reactions Inj. Ciprofloxacin induced itching, Inj Metronidazole induced rashes.

Hereby I conclude the study by stating that the prescribing pattern of antibiotics at ED in our hospital was found to be rational. Presence of a clinical pharmacist at ED will still help in collecting the patient's medical and medication history which would help the physicians in appropriate choice of drugs.

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