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Antimicrobial drugs usage in a tertiary care hospital –A descriptive study

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Abstract

Background: Emergence of resistant organisms is alarmingly high all over the world. Irrational and inappropriate prescription of antimicrobials is the major contributing factor for developing drug resistance in addition to poor patient compliance. It is the high time to create awareness of antimicrobial resistance among physicians and patients. Encouraging physicians/surgeons to undergo training programmes on infectious disease control periodically would be beneficial to combat the resistant organisms, so called super bugs.

Objectives: To assess the pattern of antimicrobial usage in a tertiary care hospital, to determine whether antimicrobials are prescribed judiciously.

Methods: A retrospective study was conducted to determine the current antimicrobial prescribing practices at Tagore Medical College Hospital. A randomised sample of 100 inpatient case sheets of General Medicine, OBG, General Surgery, Paediatrics, Chest Medicine, Skin, and ENT from Medical Records Department was analysed with respect to oral and parenteral (iv) administration of antimicrobials.

Results: In this study, 53% were males and 47% were females. Majority of patients were middle aged (17-60yrs). A total of 16 antimicrobials were prescribed for 100 inpatients. The most frequently used were Metronidazole and Ciprofloxacin. Duration of treatment was minimum 3 days, maximum of 13 days and mean duration was 5.5 days. The common route by which antimicrobials were administered was Parenteral as the patients were inpatients. The Parenteral (iv) drugs were Metronidazole (52%), Ciprofloxacin (42%), Cefotaxime (27%), Amikacin (7%), Ceftriaxone (7%). Among 100 prescriptions, 63% were empirical prescriptions, 12% were directed and 25% were targeted prescriptions.

Conclusions: The most frequently used antimicrobials were Metronidazole and Ciprofloxacin and the condition for which the antimicrobials were commonly used was acute gastroenteritis. The proportion of targeted prescriptions was low compared to empirical prescriptions. Antimicrobials have to be prescribed rationally based on antibiotic policy.

Keywords: Antimicrobial agents, Drug Resistance, Rational Prescription

1. Introduction

Medicines play an important role in health care delivery and disease prevention. The availability and affordability of good quality drugs along with their rational use is needed for effective health care. However, irrational drug use is prevalent, especially in the developing countries due to irrational prescription and inappropriate administration of medications. Also, the World Health Organization (WHO) reports that more than half of all medicines are prescribed [1], dispensed or sold inappropriately and that half of all patients fail to take them correctly. Antimicrobials are one of the most common groups of drugs prescribed in hospitals. The extraordinary therapeutic effects of antimicrobials, the problems of antimicrobial resistance, irrational prescribing, different untoward toxic-effects and high cost involved – up to 40% of a hospital's drug expenditure–are compelling reasons for concern about optimisation and appropriate use of antimicrobials [2]. As there is a rise in the antimicrobial resistance and a decline in the development of new antibiotics, antimicrobial resistance has become a major obstacle in the way of the treatment of infectious diseases worldwide [3]. Because of increasing concern and awareness of antimicrobial resistance problems worldwide and frequent inappropriate use of antimicrobial agents in hospitals, these drugs have often been the target of attempts to evaluate and control their uses [4].

Therefore, to fight against antimicrobial resistance, antibiotic utilisation studies are being carried out. Instituting appropriate therapy is essential for a favourable outcome of the patient and to decrease mortality and morbidity. Clinicians often face challenges in selecting, initiating and individualizing appropriate drug therapy for patients admitted in the

emergency medicine ward [5]. A prescription based survey (drug utilization study) is considered to be one of the most effective methods to analyse the prescribing pattern of drugs and prescribing behaviour of physicians [6]. Monitoring the trends in drug utilization in tertiary care hospital can provide insight into major health-care problems. Therefore, with the same perspective, this retrospective study was done to evaluate the current usage of the anti-microbial agents in our tertiary care hospital, Chennai.

1.1 Aim of the Study

The aim of this study was to assess the pattern of therapeutic use of antimicrobials in a tertiary care hospital which is important for the initiation of the prudent and appropriate use of antimicrobials in tertiary care hospital.

2. Methodology

A descriptive, retrospective study was conducted to determine the current antimicrobial prescribing practices in our hospital after obtaining Institutional Ethics Committee approval. A randomised sample of 100 inpatient case sheets from Medical Records Department was analysed. The data collection forms (which contain patient's details such as age, gender, and specific conditions related to antimicrobial use such as name of antimicrobials, their dosage schedule, route of administration, date of discontinuation, and related laboratory investigations) were completed by reviewing the patients' treatment files.

3. Results

A total of 100 admitted patients' case sheets were reviewed. Among the 100 patients, 53 were males and 47 were females. Majority of the patients were in 17-40 years age group and 24 were children.[Table 1]

Table 1: Demographic Profile

Variable		Frequency(Numbers)	Percentage
Age	0-16 Yrs	24	24 %
	17-40 Yrs	44	44 %
	41-60 Yrs	17	17 %
	> 60 Yrs	15	15 %
Sex	Male	53	53 %
	Female	47	47 %

Table 2: Clinical conditions for which patients were started on Antibiotics

Diagnosis	Number Of Patients	Percentage
Acute gastroenteritis	55	55 %
Typhoid fever	6	6 %
Upper respiratory infection	7	7 %
Lower respiratory infection	5	5 %
Chronic obstructive pulmonary disease	1	1 %
Cellulitis/wound infection	18	18 %
Chronic gastritis(H.pylori)	1	1 %
Viral fever	1	1 %
Foreign body ear	1	1 %
Primigravida with upper respiratory infection	2	2 %
Dysfunctional uterine bleeding with bacterial vaginitis	1	1 %
Urinary Tract Infection	1	1 %
Acne	1	1 %

Out of the 100 patients' records analysed 55% were treated for Gastroenteritis and 18% were treated for cellulitis/wound infection. The others included patients with upper respiratory infection, lower respiratory infection, chronic gastritis, viral fever, skin infection and COPD. There were 16 different antimicrobials used for their treatments [Table 2]

Table 3: Department under which the patient has been admitted and treated

Department under which the patient has been admitted and treated	Frequency	Percentage
General surgery	18	18 %
General medicine	54	54 %
Paediatrics	19	19 %
Obstetrics & Gynaecology	6	6 %
ENT	1	1 %
Dermatology	1	1 %
Chest medicine	1	1 %

The majority of subjects were from General medicine department (54%) followed by Paediatrics(19%) and General Surgery (18%). 6% of subjects were from Obstetrics and Gynaecology and the others were from ENT, Dermatology and Chest medicine departments[Table 3]

The treatment records of all the subjects were tabulated. Antimicrobial drug usage was analysed. The commonly prescribed antimicrobials were Metronidazole (52%), Ciprofloxacin (42%), Cefotaxime (27%), Amoxycillin+Clavulanic acid(15%), Amikacin (7%), Ceftriaxone (7%). Most of the above drugs were given by parenteral route, since in-patients only were studied. Duration of treatment was minimum 3 days and maximum of 13 days. Mean duration was 5.5. Only 3% of the patients received antimicrobials prophylactically and none of them reported any side effects [Figure- 1]

Figure 1: Frequently used antimicrobials

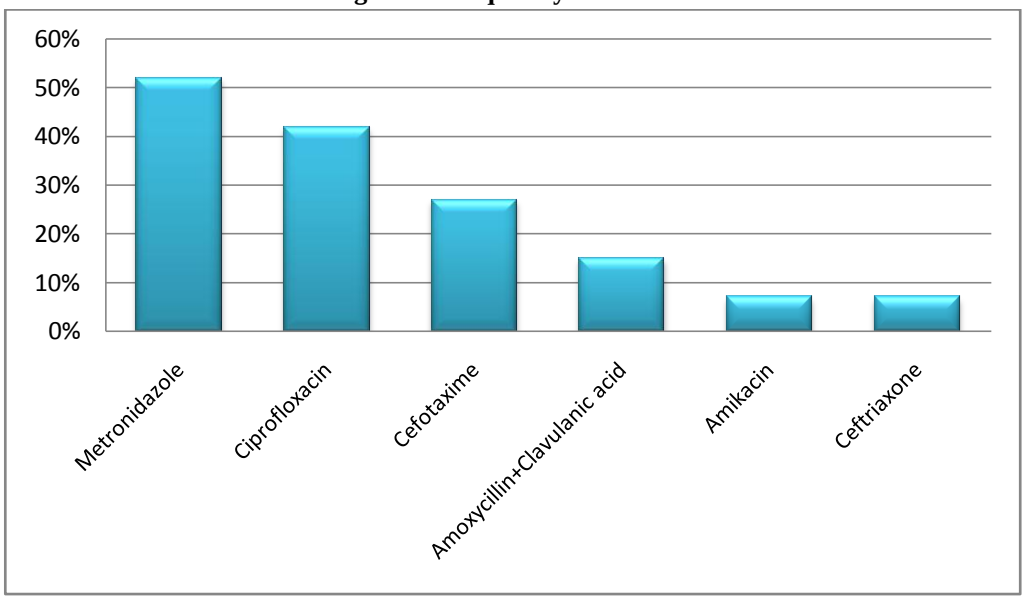

Table 4: Total Prescriptions

Sl. No	Total no prescriptions* (100)	Nos	Percentage (%)
1	Empirical Prescriptions	63	63%
2	Directed Prescriptions	12	12%
3	Targeted Prescriptions	25	25%

*Prescriptions were classified as 'empirical' when the pathogen was unknown at the time of prescription, as 'directed' when the pathogen was suspected based on provisional microbiological result (such as Gram stain), and as 'targeted' when a pathogen was identified.

The above table [Table 4] showed that among 100 prescriptions, 63% were empirical prescriptions, 12% were directed and 25% were targeted prescriptions.

4. Discussion

In this study, the most frequently used antimicrobials were Metronidazole and Ciprofloxacin. Pandiamunian *et al* study stated that Cephalosporins (35.6%) and Penicillins (21.3%) were the most commonly prescribed groups of antimicrobials [7]. The commonest antimicrobial agent prescribed was Cefotaxime in Vandana A badar *et al* study [2] where as Ampicillin, Amoxicillin, Metronidazole, Ciprofloxacin and Crystalline Penicillin were the five commonly prescribed antibiotics in the study conducted by Shankar *et al* [8]. Sharif *et al* study showed that Amoxicillin-Clavulanic acid combination was prescribed commonly among the antibiotics [9]. In our study, Duration of treatment was minimum 3 days, maximum of 13 days and mean duration was 5.5 days. Prolonged use of antibiotics is one of the factors which provoke the emergence of resistant organisms. The common route by which antimicrobials were administered was parenteral as the patients were inpatients. The common parenteral (iv) drugs were Metronidazole, Ciprofloxacin, Cefotaxime, Amikacin, and Ceftriaxone. The antimicrobials were commonly prescribed for acute gastro enteritis in this study.

Nearly one fifth of the patients have received two or more antimicrobial agents. Girish MB *et al* study revealed that 58% received two or more antimicrobials in combination and their mean duration of administration being 9.79± 1.33 days [10]. Even though the common organism causing acute gastroenteritis is Gram negative bacteria (*E.Coli*), Metronidazole had been given along with Ciprofloxacin in our study. Majority of the patients were treated empirically. Only 25% cases were treated appropriately and rationally after doing the antibiogram of the specific clinical material.

Cusini *et al* study highlighted that out of 1270 antimicrobial prescriptions, 958 (75.4%) were for treatment and 312 (24.6%) were for prophylaxis, which concluding that 37.0% of the therapeutic and 16.6% of the prophylactic prescriptions were inappropriate [11].

As infectious disease specialists are not available adequately, these drugs are prescribed by various health care professionals both in developed and developing countries, sometimes without adequate knowledge about the use of these important therapeutic drugs [1]. The selection of antimicrobials to prescribe for the patients may be based on the personal choice of a particular physician in a hospital. The personal choice, limited experience and other influences on physicians may lead to inappropriate prescribing of antimicrobials. Certain other factors which also influence antimicrobial prescribing practices include patients' factors (demand, culture/attitude and socio-economic status), prescribers' factors (pre-qualification training, in-service education, workload, and feedback from patient responses), drug factors (availability and cost) and influence of industry (medical detailing). However, the most important factor could be the current antibiogram pattern of the hospital [1].

Irrational, inappropriate prescribing and misuse of antimicrobials is a widespread problem imposing a substantial economic burden on health care systems. Both over prescribing and under prescribing of antimicrobials are harmful practices as former one leads to toxicity, drug resistance and later one to failure of the treatment [12]. Still we need to emphasize the importance of rational prescribing practices among the physicians in order to avoid drug resistance.

It is suggested that infectious disease clinics to be set up in all tertiary care hospitals and more infectious disease speciality course be created in all states in order to increase the number of infectious disease specialists all over India. Antibiotic guidelines (as a booklet) was introduced in Australia and study was conducted subsequently. There was a improvement in rational prescriptions in order to reduce drug resistance [13]. Antibiotic guideline should be formulated and accepted by various health care professionals including physician, surgeon, microbiologist and pharmacologist. Physicians must be aware of the prevalence of various pathogens and resistance patterns in their hospital and explore good judgment in selecting empirical antibiotic regimens [14].

Pharmacologists do have a vital role in combating drug resistance. They can design a drug which does not develop resistance to microorganism easily and they can develop a drug which may be combined with antimicrobials to avoid resistance. Pharmacologists in developing countries like India and Bangladesh do not play any role in hospital practice [15], whereas they attend ward rounds in developed countries. We strongly feel that a pharmacologist also be allowed to do ward rounds along with physicians(combined round) to ensure rational prescription of antibiotics to the patients [16].

4.1 Limitations

The following would be considered as limitations of this study.

1. Less sample size
2. Outpatients have not been included

5. Conclusion

From this study, we concluded that most frequently used antimicrobials were Metronidazole and Ciprofloxacin and the condition for which these antimicrobials were commonly used was acute gastroenteritis. The proportion of targeted prescriptions was low compared to empirical prescriptions. Antimicrobials have to be prescribed rationally based on antibiotic policy. Encouraging physicians/surgeons to undergo training programmes on infectious disease control periodically would be beneficial. This will help in improving adherence to safe rational prescribing practices.

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Conflict of Interest: Nil

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