Original article:

Evaluation of antibiotic prescribing patterns among medical practitioners in North India.

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ABSTRACT:

Introduction: Rational and Cost Effective Medical care seeks to monitor, evaluate and suggest modifications in prescribing habits of medical professionals. The threat of rampant antibiotic resistance necessitates a study to assess the antibiotic prescribing patterns among inpatients in a tertiary care center in Ludhiana, North India.

***Methods*:** A prospective clinical record review was done on 100 patients admitted in the Medicine, Surgery, Orthopaedics , Paediatrics and Gynaecology wards of a tertiary care hospital. Using a table of random numbers5 patients/ department/ward/ day were selected from the list of inpatients obtained from theAdmissions office.

***Results*:** Majority of patients were not on any antibiotics at the time of admission.Over 65% of patients in Paediatrics and Gynaecology were prescribed 2 antibiotics. Majority of the patients in Medicine (60%), Orthopaedics(55%) and Gynaecology(50%) were on both i/v and oral antibiotic therapy whereas 85% of patients in Surgery department were only on i/v antibiotics. Antibiotics were not changed after the culture report in almost all of the patients in all the departments. In Medicine and Surgery depts., the cost of antibiotics in majority of the patients averaged between Rs.500 and Rs.1000throughout the hospital stay.95% were discharged after treatment of the illness.1 patient each from Surgery and Pediatrics expired during the study period.

***Conclusions* :** Antimicrobial resistance is an increasing problem in our hospital and is worsened by wrong prescribing practices. The need of the hour is to formulate guidelines for hospital antibiotic thereby standardizing the use of antimicrobial therapy. Appropriate antimicrobial stewardship includes not only the limitation of use of inappropriate agents but also the appropriate selection, dosing and duration of antimicrobial therapy to achieve optimal efficacy in managing infections.

INTRODUCTION

The importance of modern therapeutic agents for diagnostic, curative and preventive purpose and their contribution to health care requires no emphasis. However, it is important to realise that every medicine is potentially hazardous.[1]Of these, antibiotics are one of the most common drugs prescribed in hospitals today. Inappropriate use of antibiotics is common and presents a potential hazard to patients with increasing bacterial resistance and increased hospital costs[2]. Antibiotic resistance, a well known phenomenon in nature[3]gets amplified due to human misuse and neglect. This has thus become a serious public health concern with economic and social implications globally. Antibiotic therapy eradicates not only pathogenic organisms but also theprotective normal flora. This so called 'selective pressure' results in colonisation with bacteria that are resistant to the original therapy and can also lead to emergence of superbugs which are highly resistant strains and also can lead to the use of alternative drugs with lesser known safety profiles. Potential harms of indiscriminate antibiotic prescribing

include allergic reactions, adverse reactions and drug interactions.[4]Rational drug use is a function of prescription practices having medical, social and economic implications[1.] The study of prescribing patterns seeks to monitor, evaluate and suggest modifications in practitioners prescribing habits so as to make medical care rational and cost effective. Information about antibiotic use patterns is necessary for a constructive approach to problems that arise from the multiple antibiotics available[5]. This study was conducted to evaluate the antibiotic prescribing patterns among medical practitioners on patients admitted for care in Christian Medical College and Hospital, Ludhiana a teaching and tertiary care hospital in North India.

MATERIALS AND METHODS

The Study was conducted from01-06-2009 to 31-07-2009. A prospective clinical record review was done on100 inpatients admitted under Medicine, Surgery, Orthopaedics , Paediatrics and Gynaecology wards using a table of random numbers(5 per department per day)from the list of inpatients obtained from theAdmissions office. Patient profile, Admission details, Patient follow up details was recorded in the Proforma for each selected subject.

All specimens were sent to the Microbiology lab for culture and sensitivity and was followedup. The organisms were isolated by standard microbiological procedures and their antibiotic susceptibility testing done by the Kirby Bauers Disc Diffusion method. All findings were recorded and tabulated.

Data entry was done using EpiDATA and Microsoft Excel.Relevant analysis for frequency, risk ratio, odds ratio was calculated using Epi-INFO and SPSS

RESULTS

Majority of the patients were not on any antibiotics at the time of admission (Table 1).In more than50% (N) of patients in all the departments, samples were sent before the initiation of therapy. Empiric therapy was initiated in almost 100 % of patients except for the Surgery department where it was 10% . Antibiotics were not changed after the culture report in 97% of the patients. Antibiotics were prescribed prophylactically in all of the patients in Surgery department and 70% of patients in Orthopaedics department but not in the other departments. Invasive devices were used in majority of the patients.

Majority(65%) of patients in Paediatrics and Gynaecology were prescribed 2 antibiotics. In Orthopaedics, majority of the patients were on antibiotic therapy for more than 15 days while in Surgery and Gynaecology patients were on antibiotics for less than 5 days. Majority of the patients in Medicine (60%), Orthopaedics(55%) and Gynaecology(50%) received both i/v and oral antibiotic therapy whereas 85% of patients in Surgery department received only i/v antibiotics.

In Gynaecology (80%) and Surgery (60%),majority of the patients were shifted to oral therapy in less than 5 days. In Medical& Surgical patients, the cost of antibiotic averaged between Rs.500 and Rs.1000 throughout the hospital stay.

Majority of patients in all wards (95%)were discharged after treatment of the illness. 2 patients from Medicine were still admitted at the end of the study period. 1 patient from Medicine was discharged on request and 1 patient each from Surgery and Pediatrics expired during the study period.

TABLE 1: PRESCRIBING PRACTICES IN VARIOUS WARDS

Q.NO	PRESCRIBING PRACTICE	MEDICINE (%)	SURGERY (%)	ORTHOPAEDICS (%)	PAEDIATRICS (%)	GYNAECOLOGY (%)	TOTAL(%)
1.	WHETHER THE PATIENT WAS ALREADY ON ANTIBIOTICS AT THE TIME OF ADMISSION	0	0	1(5)	3(15)	0	4(4)
2.	WERE SAMPLES SENT BEFORE INITIATION OF THERAPY	15(75)	11(55)	14(70)	18(90)	10(50)	68(68)
3.	EMPIRIC THERAPY INITIATED	20(100)	2(10)	16(80)	20(100)	20(100)	78(78)
4.	WHETHER ANTIBIOTICS WERE CHANGED AFTER CULTURE REPORT	2(10)	0	0	0	1(5)	3(3)
5.	WHETHER ANTIBIOTIC WAS PRESCRIBED PROPHYLACTICALLY	0	20(100)	14(70)	0	0	34(34)
6.	USE OF ANY INVASIVE DEVICE	20(100)	20(100)	20(100)	20(100)	18(90)	98(98)

TABLE 2: NUMBER OF ANTIBIOTICS AND ROUTE OF ADMINISTRATION OF ANTIBIOTICS

NO OF ANTIBIOTICS/ ROUTE OF ADMINISTRATION	MEDICINE(%) (n=20)	SURGERY(%) (n=20)	ORTHOPEDICS(%) (n=20)	PEDIATRICS(%) (n=20)	GYNAECOLOGY(%) (n=20)	TOTAL (N=100)
1/(ORAL/IV)	4(20)	6(30)	4(20)	6(30)	5(25)	25
2/ ORAL	9(45)	6(30)	8(40)	13(65)	13(65)	59
3/ORAL AND IV	7(35)	7(35)	7(35)	1(5)	2(10)	24
>3/ORAL AND IV	0	1(5)	1(5)	0	0	2

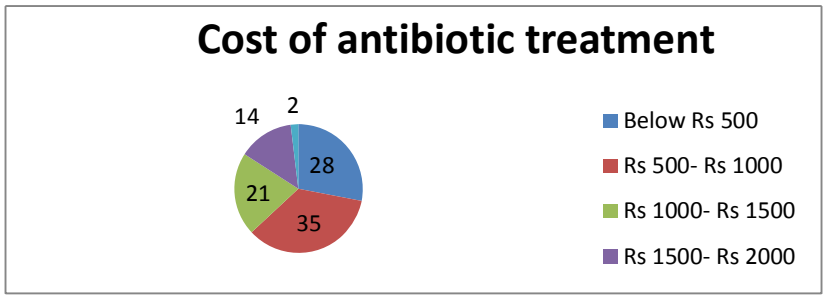
TABLE 3: DURATION OF ANTIBIOTIC THERAPY

DURATION	MEDICINE(%) (n=20)	SURGERY(%) (n=20)	ORTHOPAEDICS(%) (n=20)	PAEDIATRICS(%) (n=20)	GYNAECOLOGY(%) (n=20)	TOTAL (N=100)
0-5 DAYS	5(25)	12(60)	2(10)	4(20)	17(85)	40
5-10 DAYS	6(30)	5(25)	3(15)	7(35)	3(15)	24
10-15 DAYS	8(40)	1(5)	7(35)	9(45)	0	25
>15 DAYS	1(5)	2(10)	8(40)	0	0	11

TABLE 4: TIME PERIOD BEFORE SHIFTING THE PATIENT FROM PARENTERAL TO ORAL THERAPY

TIME PERIOD BEFORE SHIFTING FROM PARENTERAL TO ORAL	MEDICINE (%)(n=20)	SURGERY (%) (n=20)	ORTHOPAEDICS (%)(n=20)	PAEDIATRICS(%) (n=20)	GYNAECOLOGY (%) (n=20)	TOTAL (N=100)
0-5 DAYS	7(35)	12(60)	3(15)	6(30)	16(80)	44
5-10 DAYS	11(55)	6(30)	6(30)	6(30)	4(20)	33
10-15 DAYS	2(10)	1(5)	9(45)	8(40)	0	20
>15 DAYS	0	1(5)	2(10)	0	0	3

TABLE 5: COST OF ANTIBIOTIC TREATMENT



DISCUSSION

The increasing prevalence of anti-microbial resistant pathogens has become well recognized over the past decade[6] and is a matter of worldwide concern.Antibiotics are among the most commonly prescribed drugs in hospitals and in developed countries around 30% of the hospitalized patients are treated with these drugs[7] with the numbers much higher in developing countries[8].

Since the study was conducted in a tertiary care hospital we receive a number of patients already on antibiotic treatment by other practitioners. In our study 15% of pediatric patients and 1 orthopaedics patient was on antibiotic therapy at the time of hospital admission. For majority of patients in all wards, the samples were collected and sent for testing to the microbiology laboratory before the initiation of antibiotic therapy which is consistent with the recommendations of collecting appropriate samples before the start of therapy.

An important aspect of appropriate antimicrobial use is the prompt initiation of appropriate and adequate empirical therapy which has been shown to improve mortality rates in hospitalized patients[9] .In our study, empiric therapy was initiated in all our study cases in Medicine, Pediatrics and Gynecology wards and most Orthopedics patients and most of the Surgery patients were prophylacticly treated . A disturbing trend is the lack of consensus among the different units of the same dept regarding the choice of empiric antibiotics for the same spectrum of diseases. This indicates a lack of standard protocol for empiric therapy and the need for formulating an antibiotic use policy in the different wards based on the local hospital antibiograms. Empiric therapy was however found to be appropriate and had to be

changed only in 2 Medicine patients and 1 Gynecology patientafter obtaining the culture reports.This finding was promising as it showed that empiric therapy was sufficient to eradicate infection in 97% of admitted patients.

Invasive devices were used in 98% of all the admitted patients.The use of invasive device is usually associated with the development of hospital acquired infections and hence the excessive use of invasive devices should be controlled wherever possible. Majority of patients were on 2 antibiotics or less while 24 patients were put on 3 antibiotics and only 2 patients were put on more than 3 antibiotics.These findings are slightly different from earlier study conducted in our own hospital on prescribing practices[1] in which 4% of patients received 2 antibiotics, 64% of patients 3 antibiotics, 20% were found to receive 4 antibiotics and 2% were on 5 antibiotics.

Most patients (56%) were administered antibiotics parenterally while 40% were both on i/v and oral therapy and only 4% solely on oral therapy.This is comparable to the study conducted in Western Nepal by Shankar et al[7] where 51% of the patients were prescribed antibiotics by the parenteral route. In a study reported from South India [10], 36% of antibiotics were prescribed by the parenteral route.Raveh et al[11]in their study from Israel showed a much higher prevalence of parenteral antibiotic treatment(64%).The mean duration of therapy came upto 9.47 days with majority of patients(40%) on antibiotics for less than 5 days and 11% for more than 15 days.

Majority of the patients in our study were on parenteral antibiotics for a average duration of 5 days and patients were discharged once they were shifted to oral therapy. These findings were comparable to the study conducted in Western Nepal[7] by Shankar et al 33% of our patients had to pay Rs 500-Rs 1000 for antibiotics alone while 14% patients paid uptoRs. 2000 for antibiotic therapy and for 2 patients the cost escalated to above Rs. 2000.Mean$\pm$SD for cost of antibiotics came uptoRs 862.36 $\pm$560.48.This was again comparable to the Nepal study[7] where the cost of antibiotics prescribed during the hospital stay was expressed as Mean $\pm$ SD which came to 16$\pm$13US$(Rs 720$\pm$ 585)

Antimicrobial resistance is an increasing problem in our hospital. Because of the prevailing trend of antibiotic resistance,the clinicians find it imperative to start empiric therapy with higher antibiotics such as Cefperazone/Sulbactam , Piperacillin/ Tazo-bactam or Carbapenems combined with either an Aminoglycoside or a Fluoroquinolone .Also established mechanisms of resistance such as Extended spectrum beta lactamase(ESBL) and Methicillin resistant Staphylococcus aureus (MRSA) are already prevalent in our hospital settings. There are also sufficient reports of the association of antimicrobial usage in hospitals with the emergence of antimicrobial resistance to implicate use as a causal factor in antimicrobial resistance[12].

The need of the hour is to formulate guidelines for hospital antibiotic usage which will go a long way in standardizing the use of antimicrobial therapy. Appropriate antimicrobial stewardship includes not only the limitation of use of inappropriate agents but also the appropriate selection, dosing and duration of antimicrobial therapy to achieve optimal efficacy in managing infections[13]

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