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INITIAL ANTIBIOTIC PRESCRIBING PATTERN AMONGST PHYSICIANS, FOR PATIENTS OF PNEUMONIA, AT MEDICAL WARDS AND INTENSIVE CARE UNITS – AN OBSERVATIONAL STUDY FROM INDIA

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ABSTRACT

Introduction: The growing body of evidence shows a strong linkage between inappropriate antibiotic use and antimicrobial resistance.
Objective: To analyze the initial antibiotic prescribing pattern among physicians for patients of pneumonia (community and hospital acquired) at medical wards and ICU of a tertiary care institute in northern India.
Methods: The initial antibiotic regimen is defined as the antibiotics prescribed during the first day of therapy. The prescription was considered appropriate if antibiotics were prescribed in correct dose and duration, considering the patient types, local microbiology data, and sensitivity profile or if it was showing adherence to the Institute's antibiotic protocol. One hundred and twelve prescriptions were analyzed, one from each patients with pneumonia over a period of 12 months.
Results: Majority of prescriptions (87.5%) contained combination antibiotics. Cefaperazone-Sulbactum was the commonest combination antibiotic prescribed, in 33.93% prescriptions either alone or with other group of drugs. The next most commonly prescribed antibiotics were Azithromycin (33.04%), followed by levofloxacin and Amoxicillin-Clavalunic acid (32.14%). Fifty-three (47.32%) initial prescriptions were found appropriate as per definition used in this study.
Conclusion: Present study concludes that irrational antibiotic prescribing patterns is still prevalent in developing countries like India and needs to be addressed.

Introduction:

Antibiotics play a vital role in limiting morbidity and mortality in India as bacterial disease burden in India is among the highest. One of the causes attributable to emergence of resistant pathogens is indiscriminant use of antibiotics. It has been observed from previous studies that rational use of antibiotics can reduce antimicrobial resistance. The prevalent use of antimicrobial agents in India varies from 24 to 67% whereas in developed countries around 30% of the hospitalized patients are treated with these drugs[1].

Irrational use of medicines is a major problem worldwide. WHO estimates that more than half of all medicines are prescribed, dispensed or sold inappropriately, and that half of all patients fail to take them correctly[2]. The overuse, underuse or misuse of medicines results in wastage of scarce resources and widespread health hazards. The rational use of medicines (RUM) is defined as "Patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community (WHO 1985).

In 1998 Kshirsagar MJ et al. reported that more than 30% of medical prescriptions were irrational, with the probability of such prescriptions increasing significantly with the number of drugs per prescription[3]. Similarly, Badar VA and Navale SB could find rational use of antimicrobial agents in only 30% patients[4].

Objective: Present study was planned to see the antibiotic prescribing pattern amongst physicians for community and hospital acquired pneumonia (CAP & HAP) in medical wards and intensive care unit (ICU) at our institute.

Materials and Methods

All adult patients (≥ 18 years) who were newly admitted or transferred to medical wards and ICU with a diagnosis of pneumonia (both community and hospital aquired) and who were receiving antibiotics were recruited in the study after obtaining informed consent.

A diagnosis of community-acquired pneumonia[5,6] (CAP) was made if patient had following features: -

Pneumonia acquired in community in a patient who has not been hospitalized within 14 days prior to onset of symptoms or hospitalized less than 4 days prior to onset of symptoms. Diagnostic criteria:-

- Symptoms of an acute lower respiratory tract illness
- Cough plus another lower tract symptom (e.g. dyspnoea, pleuritic pain).
- New focal chest signs on examination (e.g. bronchial breathing) with or without the presence of chest infiltrates
- One of: fever or hypothermia, leucocytosis or leucopenia
- No other explanation for the illness

Hospital acquired pneumonia (HAP)[7] was defined as pneumonia that occurs 48 hours or more after admission and that was not incubating at the time of admission, characterized by a new and persistent infiltrate (radio-graphically present for greater than 48 hours) PLUS one of the following:

- Positive pleural or blood culture for the same organism as that recovered in respiratory secretions
- Radiographic evidence of cavitation or necrosis
- Histopathology evidence of pneumonia
- Two of the following:

* Core temperature > 38.3°C
* Blood leukocytes > 10,000 cells/mL
* Purulent tracheal secretions

Patients diagnosed with tuberculosis and fungal pneumonia was excluded. All patients were categorized into following groups (type 1,2,3) based on certain characteristics, (table 1).

Table1: Classification of patients into 3 types based on certain characteristics

	Patient type1	Patient type 2	Patient type 3
Health care contacts in past 3 months	None	Yes Minimum	Prolonged
Invasive procedure done in past 3 months	None	Minimum	Major
Antibiotic treatment history in past 3 months	None	Yes	Multiple repeat exposure
Co morbid conditions	None	One or two	More than two

The initial antibiotic regimen is defined as the antibiotics prescribed during the first day of therapy. One prescription from each patient of CAP and HAP was evaluated in terms of antibiotic

number, dose, duration and route of administration. The prescription was considered appropriate if antibiotics were prescribed in correct dose and duration, considering the patient types, local microbiology data, and sensitivity profile or if it was showing adherence to the Institute's antibiotic protocol.

All clinical variables were recorded on preformat and statistically analyzed using SPSS 11. Continuous variables were described in mean ± SD and categorical variables as frequency percentage.

Results

One hundred and twelve consecutive patients of pneumonia, 80 (71.43%) CAP and 32 (28.57%) HAP, who fulfilled the inclusion criteria were analyzed. Mean age of study population was 53.545±18.37 years and majority of them were females (55.36%). Out of 112 patients 57 (50.89 %) were in ICU at the time of recruitment to study and majority were type 3 patients (75.44%). There were 78 (69.64%) pneumonia patients on mechanical ventilator at the time of recruitment. Table 2 shows distribution of study population based on diagnosis and patient types.

Table 2: distribution of study population based on diagnosis and patient types.

	Patient type 1 (N=6)	Patient type 2 (N=52)	Patient type 3 (N= 74)
HAP (N=80)	2 (2.5%)	28 (35%)	50 (62.5%)
CAP (N=32)	2 (6.25%)	16 (50%)	14 (43.75%)

HAP= hospital acquired pneumonia, CAP=community acquired pneumonia

One hundred and twelve prescriptions, one from each patient were analyzed. Details are given in table 3.

Table 3: Initial antibiotic prescription in 112 patients of pneumonia

Initial antibiotic (iv)	Patient Type 1 (4)	Patient Type 2 (44)	Patient Type 3 (64)
Amoxicillin-Clavulanic acid	1 (25%)	4 (9.09%)	2 (3.12%)
Ceftriaxone	1 (25%)	3 (6.82%)	1 (1.56%)
Piperacillin-Tazobactum	0	2 (4.54%)	2 (3.12%)
Cefaperazone-Sulbactum	0	3 (6.82%)	4 (6.25%)
Meropenem	0	2 (4.54%)	1 (1.56%)
Imipenem	0	1 (2.27%)	1 (1.56%
Amoxicillin-Clavulanic acid + Azithromycin	1 (25%)	7 (15.91%)	9 (14.06%)
Amoxicillin-Clavulanic acid + Levofloxacin	1 (25%)	4 (9.09%)	7 (10.9%)
Cefaperazone-Sulbactum + Azithromycin	0	1 (2.27%)	10 (15.6%)
Cefaperazone-Sulbactum + Levofloxacin	0	3 (6.82%)	8 (12.5%)
Cefaperazone-Sulbactum + Amikacin	0	1 (2.27%)	1 (1.56%)
Piperacillin-Tazobactum + Levofloxacin	0	1 (2.27%)	5 (7.81%)
Piperacillin-Tazobactum + Azithromycin	0	1 (2.27%)	3 (4.69%)
Piperacillin-Tazobactum + Amikacin	0	1 (2.27%)	1 (1.56%)
Meropenem + Levofloxacin	0	2 (4.54%)	0
Imipenem + Levofloxacin	0	0	1 (1.56%)
Cefaperazone-Sulbactum + Levofloxacin + Clindamycin	0	1 (2.27%)	1 (1.56%)
Piperacillin-Tazobactum + Levofloxacin + Clindamycin	0	0	2 (3.12%)
Cefaperazone-Sulbactum + Azithromycin + Clindamycin	0	2 (4.54%)	1 (1.56%)
Piperacillin-Tazobactum + Azithromycin + Clindamycin	0	1 (1.56%)	1 (1.56%)
Additional (Vancomycin / Linezolid /Teicoplanin) staphylococcus cover	0	2 (4.54%)	2 (3.12%)
Colistin (+ Cefaperazone Sulbactum)	0	1 (2.27%)	1 (1.56%)

Majority of prescriptions (87.5%) contained combination antibiotics. Cefaperazone-Sulbactum was the commonest combination antibiotic prescribed, in 33.93% prescriptions either alone or with other group of drugs. The next most commonly prescribed antibiotics were Azithromycin (33.04%), followed by levofloxacin and Amoxicillin-Clavalunic acid (32.14%) and Piperacillin-Tazobactum (17.85%). Fifty three (47.32%) initial prescriptions were found appropriate as per definition used in this study.

Discussion

The primary aim of this study was to analyze the prescription pattern of physicians in medical wards and ICU for diseases like community acquired and hospital acquired pneumonia. Majority of patients admitted were having HAP and were of type 3 (more sicker patients) as we see more number of referred cases.

Previous studies have reported wide variability in antibiotics and antibiotic regimen employed. El-Solh AA and colleagues examined the antibiotic prescribing pattern among healthcare providers in patients of nosocomial pneumonia, admitted to three tertiary care centers[8]. Fluoroquinolones (51.4%), Ceftriaxone (45%), and Azithromycin (42.15) were the three most commonly used compounds for inpatient treatment in their study. Mono therapy was prescribed in 57.1%. Fluoroquinolones represented 79.5% of these cases.

A wide diversity in initial antibiotic prescribing pattern was observed in present study too. Cefaperazone-Sulbactum (33.93%) was the commonest combination antibiotic prescribed followed by Azithromycin (33.04%). Levofloxacin and Amoxicillin-Clavalunic acid were used in 32.14% prescriptions each. A relatively low prescription rate was observed for Piperacillin-Tazobactum and Amikacin. The co-existence of Acute Kidney Injury (AKI) in many of patients may the limiting factor for Amikacin use.

Chan and colleges in their study evaluated the antibiotic prescribing pattern in 90 hospitalized patients treated for CAP. Most frequently prescribed antibiotics in the initial therapy were Ampicillin /Amoxicillin (70%), Erythromycin (12%) and Benzyl penicillin (6%)[9]. In Fowler et al. study, the most commonly employed antibiotics for treatment of suspected Ventilator Associated Pneumonia (VAP) were Fluoroquinolones, Piperacillin-Tazobactam, Vancomycin, Cephalosporins, and Aminoglycosides [10]. Combination therapy was given to 53% of patients. In present study (combining CAP and HAP) combination drugs were used in 87.5%. Inappropriate use of antimicrobials is widely reported as a major contributing factor for the emergence of multidrug resistance and health care–associated infection. In present study initial antibiotic prescription was appropriate only in 47.32%. This percentage is slightly higher than that observed from other part of India but lower than that observed from Nepal[4,11].

Present study concludes that irrational antibiotic prescribing patterns is still prevalent in our country and needs to be addressed.

Future perspective: Addressing prescribing behavior is a key component of antimicrobial stewardship. Formulation of local antibiotic protocol and adherence to the same can improve prescribing pattern and thereby antimicrobial sensitivity.

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