

**EVALUATION OF MEDICATION INAPPROPRIATENESS IN THE MANAGEMENT OF
OBSTRUCTIVE AIRWAY DISEASES IN VETERANS**A. P. Sreeja¹, R. D. Kiran², T. P. Angel Rose^{1*}, Edcy Edvi¹, Celesti Sibi Jose¹, Sandra Elsa Thomas¹¹Department of Pharmacy Practice, Grace College of Pharmacy, Palakkad.²Department of General Medicine, Karuna Medical College and Hospital, Chittur.***Corresponding Author: Dr. T. P. Angel Rose**

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ABSTRACT

Obstructive airway diseases refers to a group of disease that cause airflow blockage and air breathing related problems, and it includes emphysema, chronic bronchitis, bronchiectasis and asthma. According to WHO estimates these diseases have remained the leading cause of death globally in last 15 years especially among old aged patients. The aim of this study was to apply the Medication Appropriateness Index (MAI) by a clinical pharmacist to identify issues of inappropriate prescribing amongst patients admitted from the general medicine. This was a prospective observational study conducted in 202 patients to determine the inappropriateness of antibiotic in obstructive airway diseases. The most common problems were seen with indication, dose of antibiotic, directions, duplication, expensiveness and duration of therapy. Of the 202 patients, 174(86%) cases had a problem with antibiotic prescribing according to the MAI criteria. In contrast to our study ex-smokers were more prone to infective exacerbations. In majority of the cases the daily dosage 164(15.92%) was lower than recommended. Apart from inappropriate dose, duration of therapy 149(14.47%) as well as effectiveness of antibiotics 151(14.66%) were also considered to be inappropriate according to MAI criteria. The study concluded that high rate of inappropriate antibiotic prescribing that extends beyond antibiotic selection for patients diagnosed with COPD, chronic bronchitis, asthma, bronchiectasis.

KEYWORDS: Medication appropriateness index (MAI), obstructive airway diseases, inappropriate prescribing, Infective exacerbations.

INTRODUCTION

Obstructive airway diseases are common among older adults, which include COPD, asthma, chronic bronchitis, emphysema and bronchiectasis. Although antibiotics are indicated in infective airway diseases with a likely bacterial etiology. So the prescribing process can be complicated by many additional factors that need to be considered. Most previous studies are evaluating antibiotic appropriateness in bacterial respiratory tract infections which focused only on antibiotic choice.^[1] Inappropriate prescribing is a common problem, especially among elderly patients, although the reported prevalence of the problem is variable due to the lack of a GOLD standard.^[2] Inappropriate prescribing causes many preventable adverse events and treatment failures, and attempts therefore have been made to find good instruments for identifying and quantifying appropriate and inappropriate prescribing. The Medication Appropriateness Index (MAI) developed by Hanlon et al., in 1992 and modified in 1997 is intended to be a reliable, standardized method of addressing multiple elements of drug therapy prescribing, applicable to a variety of medications and clinical conditions. To date, the reliability has been tested in ambulatory veterans and

nonveterans with polypharmacy, and in patients seen in community pharmacies.^[2] Inappropriate prescribing in terms of dosage, duration of therapy, drug-drug interactions, and drug-disease interactions is also important because it can contribute to increased adverse drug reactions, health care costs, and bacterial resistance. These aspects of prescribing are also important because under dosing of patients can lead to therapeutic failures and increased bacterial resistance.^[1] The aim of this study was to apply the Medication Appropriateness Index (MAI) by a clinical pharmacist to identify issues of inappropriate prescribing amongst patients admitted in general medicine department.

MATERIALS AND METHODS

This prospective observational study was conducted in both the inpatient and outpatient General Medicine Department at a tertiary care hospital. The study was conducted according to the guidelines set by the Ethical Committee of the hospital. The study was carried out for a period of six months. A predesigned data entry form was used for collecting patient's data. The patients admitted to at Medicine Department were enrolled in to the study by considering the following inclusion and

exclusion criteria .Patients greater than 60 year old, life expectancy more than six months, patients visiting Inpatients Department Of General Medicine with Obstructive Airway Disease were included. Patients with TB and on treatment with immunosuppressant's were excluded.

Data Collection Form

The data collected using predesigned data collection form which includes the patient demographic data, past medical and medication history, laboratory investigations and treatment chart.

Medication Appropriateness Index

This study used Medication Appropriate Index (MAI) to assess the quality of antibiotic prescribing .The MAI measures ten domains of prescribing (i.e., indication, effectiveness, dosage, directions, practicality, drug-drug interactions, duplication, duration, expensiveness, route of administration).

RESULTS AND DISCUSSION

A total of 202 patients with infective exacerbations were enrolled into the study out of which 150 (74%) were male patients and 52 (26%) were female patients. Nearly one fourth of the patients were smoker 34(21.25%) and 33(20.62%) had a history of alcohol abuse. In our univariable analyses, history of steroid users are more prone to develop infective exacerbations. Table 1 describes the baseline characteristics of the patients. The types of inappropriate prescribing were similar across the three types of lower respiratory tract infections.

Fig:1 describes various criteria for evaluating appropriateness of antibiotic prescribing. The most common problems were seen with indication, dose of antibiotic, directions, duplication, expensiveness and

duration of therapy. Of the 202 patients, 174 (86%) had a problem with antibiotic prescribing according to the MAI criteria

Indication

Appropriate indication determines proper drug selection which is based on accurate diagnosis. The data in Fig:1 shows that most of the patients are prescribed antibiotics without indication 137(68%) cases and remaining were prescribed with proper indication. Cephalosporins and fluoroquinolones are most widely used to treat lower respiratory tract infections.

Effectiveness

Selection of appropriate antibiotics can affect the success of therapy. According to data 151 cases (75%) have ineffective treatment and remaining 51(25%) have effective treatment. (Fig:1)

Dose

Dose is an important factor in successful treatment of infection. Excessive dose may cause toxicity and side effects. Data in Fig:1 shows that some of dose regimen are not in accordance to standard ,ie more than two-third patients are prescribed with incorrect dose 164(81%) cases and remaining 38(19%) with correct dose. So dose calculation should be based on circumstances and patient's condition.

Direction correct

Drugs can be dangerous though, given when they are mean to improve our health .so taking them correctly and understanding the right way to administer them can reduce the risk. In our study, Fig:1 data shows that about two-third of the patients are administering antibiotics without following correct directions in 137(68%) cases.

TABLE 1: DEMOGRAPHIC PROFILE

PARAMETERS	NO: OF PATIENTS (n=202)	PERCENTAGE (%)
• AGE		
• 60-69	122	60.4
• 70-79	59	29.2
• 80-89	19	9.41
• 90-99	2	0.99
• GENDER		
• MALE	150	74
• FEMALE	52	26
• RISK FACTOR		
• SMOKER	34	21.25
• EX-SMOKER	73	45.63
• ALCOHOLIC	33	20.62
• EX-ALCOHOLICS	8	5
• ALLERGIES	12	7.5
• PAST MEDICAL HISTORY		
• COPD	108	53.4
• ALLERGIC BRONCHITIS	41	20.2
• ASTHMA	13	6.43
• OTHERS	40	20

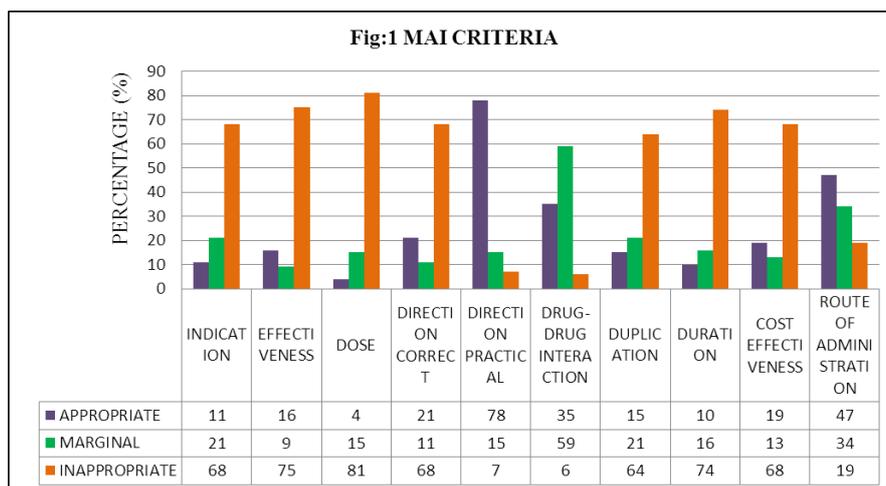


Table 2: Inappropriate Prescribing In Antibiotics

CRITERIA	DRUGS WITH INAPPROPRIATE MAI CRITERION (n=1030)	
	No of prescriptions	Percentage (%)
INDICATION	137	13.30
EFFECTIVENESS	151	14.66
CORRECT DOSE	164	15.92
CORRECT DIRECTIONS	137	13.30
DIRECTIONS PRACTICAL	14	1.36
DRUG –DRUG INTERACTIONS	12	1.17
DUPLICATION	129	12.52
DURATION OF THERAPY	149	14.47
EXPENSIVENESS	137	13.30

Duration of therapy

According to standard guidelines, antibiotic treatment duration of respiratory tract infections is 5-10 days. The data in Fig:1 shows that only 20 (10%) cases of antibiotic treatment duration of RTI were accordance to standards and remaining 149(74%) cases were inappropriate duration of antibiotic therapy. Inappropriate duration of antibiotic treatment leads to development of antibiotic resistance.

Drug–drug interactions

Interactions is said to occur when the effects of one drug are changed by the presence of another drug .Sometimes drug interaction may result in reduction in efficacy of prescribed antibiotics. The data on the Fig:1 shows that in 190 cases (94%) there is no significant drug –drug interactions and only 12 (6%) have major interactions.

Directions practical

Overuse and improper use of antibiotics causes side effects and in long term it reduce the effectiveness .So antibiotics should be used only whenever necessary. In our study, Fig 1 shows practical directions of antibiotics was found in 158(78%) cases and only 14(7%) was found to have impractical directions.

Route of administration

In our hospital, parenteral administration of antibiotics was more common than oral and also parenteral drug

was switched to oral form. In our study, Fig:1 shows that inappropriateness was found in 38 (19%) cases and appropriateness was found in 96(47%) cases. Factors such as the unavailability of an oral preparation and a patient’s inability to tolerate one may influence the choice of this route

Cost of therapy

Cost effectiveness of antibiotics influenced by several factors relating to characteristics and use of antibiotics (ie, diagnosis, resistance, patient compliance with treatment and treatment failure). So physicians need to take into account of these factors when prescribing on antibiotics and assess whether a specific antibiotic treatment adds sufficient value to justify its cost. From the data collected, Fig:1 shows that most of the prescriptions were costlier 137(68%). Inappropriate intravenous therapy increases the cost of care while also exposing the patient to the risk associated with intravenous catheters.

Duplication

Duplicate prescribing is known to occur across health systems and is one of the most frequent drug related problems therapeutic duplication increases the risk of adverse drug reactions without additional therapeutic benefits. In our study, Fig 1 shows that unnecessary duplication was observed in 129 (64%) cases.

Table 2 represents the percent of patients with inappropriate prescribing. In majority of cases the daily dosage 164(15.92%) cases was lower than recommended. Apart from inappropriate dose, duration of therapy 149(14.47%) as well as effectiveness of antibiotics 151 (14.66%) were also considered to be inappropriate according to MAI criteria.

DISCUSSION

Our study is conducted to evaluate multiple dimensions of antibiotic prescribing practices for lower respiratory infections. We found that more than two thirds of patients had one or more prescribing problems with antibiotics. This rate is higher than the rates ranging from 15 – 55% found in previous studies that only evaluated inappropriate antibiotic prescribing practices for upper respiratory infections unlikely to have a bacterial etiology in the ambulatory care setting.^[3,4,5] This form of inappropriate prescribing was not only ineffective but also costly. This rate of inappropriate prescribing of antibiotics is also higher than that seen in other studies that used the MAI to specifically evaluate antibiotic use. In the first study, Miller *et al.* evaluated the quality of prescribing for urinary tract infections in long-term care facilities.^[6] They found that approximately 40% of antibiotic orders were rated as inappropriate. The antibiotics that were most often prescribed inappropriately were ciprofloxacin, cotrimoxazole, and nitrofurantoin due to expensiveness, incorrect duration, and incorrect dosage, respectively. In previous study they evaluated antimicrobial appropriateness in hospitalized patients and found that 34% of antibiotic orders were rated as inappropriate.^[7] The study involved only fifty-three patients, which may have contributed to the lower incidence of inappropriate prescribing practices. The difference in the rates of inappropriateness could also be due to the types of infections and antibiotics studied. For instance, our study looked specifically at the diagnoses of chronic bronchitis, COPD, asthma which is a more diverse group of infections than urinary tract infections. Regardless, our study confirms problems with prescribing, even for infections like bronchitis, COPD, asthma where antibiotics are generally indicated.

We found that the most common prescribing problems involved indication, dose of antibiotic, directions, duplication, expensiveness and duration of therapy. In Similar study reported that greatest problems with dosage, drug-disease interactions, and expensiveness.^[6] Biggest problems involved dosage and expensiveness.^[7] It is also discovered that inappropriate antibiotic prescribing practices due to drug-disease interactions is likely related to the presence of multiple comorbidities in the older population of long-term care facilities.^[6] In our study, broad spectrum antibiotic was prescribed when a narrow spectrum agent was also indicated. Of all the factors we evaluated, only a history of smoking was independently associated with inappropriate prescribing. Improving the appropriate use of antibiotics is a difficult task, but necessary in order to decrease the development

of antibiotic-resistant bacteria. The authors of a recent review of the literature on the effectiveness of interventions designed to improve antibiotic selection, dosing, and/or duration of therapy for any type of infection in the outpatient care setting.^[8]

CONCLUSION

Our study demonstrated that there is a high rate of inappropriate antibiotic prescribing that extends beyond antibiotic selection for patients diagnosed with COPD, chronic bronchitis, asthma. Incorrect dose, ineffectiveness and wrong duration of therapy were all common reasons for inappropriate prescribing. Future interventions to improve antibiotic prescribing need to consider aspects beyond selection. In contrast to our study ex-smokers were more prone to infective exacerbations.

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