

## EVALUATION OF ORAL ANTIBIOTIC UTILIZATION IN MEDICAL INPATIENTS

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## ABSTRACT

The study was conducted to evaluate the effectiveness of regulations on antibiotic utilization after oral route of administration. It was performed before and after imposing regulations on antibiotics administration. The uses of all antibiotics were regulated using drug formulary and restrictions in the prescribing pattern. All the hospitalized patients in the medical ward were subjected for evaluation. Significant changes in the total doses of antibiotics consumed in the oral routes were observed. This led to effective and rational use of antibiotics.

## INTRODUCTION

Today, antibiotics are one of the most expensive drug expenditure in hospitals accounting for 20% to 50% of total pharmacy spending with intravenous antibiotics accounting for the most expensive category of antibiotics in hospitalized patients<sup>1, 2</sup>. Furthermore, patients on intravenous therapy often had prolonged hospital stay to complete antibiotic treatment. A switch from intravenous to oral therapy could favour an earlier discharge and directly save health care costs<sup>3</sup>. Although the relationship between duration of intravenous antibiotic therapy and length of hospital stay was well recognized, the delayed switch produced additional costs per hospitalization<sup>4, 5</sup>. These results concur with findings in comparable studies, where saving were achieved with a timely transition from intravenous to oral therapy<sup>6, 7, 8</sup>. Savings were achieved through reduced costs of oral antibiotics and due to a shortened period of hospitalization.

Programmes to optimize antimicrobial use had reduced the cost and volume of therapy while optimizing care<sup>9, 10, 11</sup>. The limitation of unnecessary antibiotic administration consists of appropriate diagnosis, acquiring appropriate culture and sensitivity data, implementing the most appropriate treatment, selecting appropriate antibiotics and dosing appropriately<sup>12, 13, 14</sup>. Various antibiotic utilization strategies including antibiotic utilization guidelines, formulary restriction and antibiotic cycling or rotation have evolved from our understanding of the impact of changes in antibiotic utilization on subsequent antibiotic susceptibility patterns<sup>15</sup>. Drug

use evaluation can assess the actual process of medication administration or dispensing like appropriate indications, drug selection, dose, route of administration, duration of treatment and drug interactions<sup>16, 17, 18</sup>. It also assesses outcomes of treatment like cure of disease conditions, decreased clinical parameter levels. The aim of antibiotics utilization evaluation is to determine the pattern (rates and costs) of antibiotic usage in a particular clinical setting<sup>19, 20</sup>.

## STUDY MATERIAL

The study was performed in the medical ward. The individual patient profiles of all in patients admitted in this ward were studied. Regulations were imposed on the antibiotic prescription pattern and adherence to hospital formulary was strictly implemented. Doses of all antibiotics consumed were recorded. All the collected data were analyzed using chi-square test at 5% level of significance and the differences were tested at  $p < 0.05$  (two-tailed).

## RESULTS AND DISCUSSION

2375 patients were treated with antibiotics during the pre-regulatory period. Out of this 1534 consumed orally. After implementing the regulation on the antibiotic prescription, the study showed that out of 2425 patients treated with antibiotics, 1832 consumed them by oral route.

The total doses of antibiotics consumed orally before and after the regulations were recorded (Table-1).

Table 2: Summary of the Number of Doses of Antibiotics Consumed (Oral Administration)

Antibiotics	Use of antibiotics	
	Before Regulation n (%)	After Regulation n (%)
Total Number of Doses of Antibiotics Consumed (n)	15130	18169
Extended Spectrum Penicillins	3545(23.43)	6202(34.14)
Cephalosporins-First Generation	588(3.89)	891(4.90)
Cephalosporins-Second Generation	1326(8.76)	841(4.63)
Cephalosporins-Third Generation	3125(20.65)	1759(9.68)
Lincosamides	806(5.33)	377(2.07)
Macrolides	1559(10.30)	3082(16.96)
Oxazolidinones	114(0.75)	54(0.30)
Fluroquinolones First Generation	1993(13.17)	3283(18.07)
Fluroquinolones-Second Generation	1860(12.29)	1553(8.55)
Sulphonamides and Trimethoprim	188(1.24)	124(0.68)
Imidazole Derivatives	26(0.17)	3(0.02)

\*p-value calculated using Chi-square test (two tailed,  $\alpha = 0.05$ )

The total numbers of doses of antibiotics consumed orally were 15130 and 18169 before and after the intervention respectively. The study had shown a significant increase (20%) in the total number of doses of antibiotics consumed. Early switching from injection to oral dose was significant after the restricted use. The number of patients

who have received antibiotics orally were increased by 17%. The drugs which were changed to oral route of administration without much delay were the macrolide (Azithromycin), extended spectrum antibiotics like ampicillin, amoxicillin with clavulanate, and first generation fluroquinolone like Ciprofloxacin.

The total numbers of doses of Second and Third generation Cephalosporins, Lincosamides, drugs belonging to Oxazolidinone category were reduced after the regulations. A reduction in the consumption of Sulphonamides, Penicillin and Imidazole derivatives were also observed after the interventions. These reductions after the regulations justify the rational use.

The extended spectrum antibiotics were the most commonly prescribed antibiotic during the pre regulatory period. The total numbers of doses of these class of antibiotics were increased in the post regulatory period. Amoxicillin was the most commonly used drug of choice during the period of study for upper respiratory infections particularly for sinusitis. But increase in the resistance against this drug caused an increase in the use of amoxicillin combined with clavulanate. Use of macrolid antibiotics increased mainly due to the increase in the use of Azithromycin for the treatment of bronchitis. Use of first generation fluoroquinolones were increased whereas the consumption of the second generation fluoroquinolones did not alter much indicating its selective use in enterobacteriae infections. The increase in the consumption of these oral antibiotics showed that the infections can be treated with these classes rather than drugs belonging to higher class.

### CONCLUSION

The evaluation of antibiotics utilization showed that the effective use of oral antibiotics was improved after the regulation. The study emphasizes that strict regulation on the use of antibiotics is essential to promote rationalization of antibiotic therapy. Early switching over from parenteral to oral and reduced use of expensive class of antibiotics leads not only to appropriate use but also made the treatment more cost effective.

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