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Evaluation of Parentral Antibiotic Utilization in Medical Inpatients

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ABSTRACT

The study was conducted to evaluate the effectiveness of regulations on the utilization of antibiotics administered by the parental route. It was performed by evaluating the total number of doses of antibiotics consumed before and after imposing regulations. All the hospitalized patients in the medical ward were subjected for evaluation. The uses of all antibiotics were regulated using drug formulary and restrictions in the prescribing pattern. It was observed that the doses of antibiotics consumed by the parental route were altered significantly after the regulation.

Keywords: Antibiotics, Parentral administration, Regulations, Doses consumed.

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INTRODUCTION

Antibiotics are most widely prescribed in the drug therapy and the complexity of their overuse is a global phenomenon [1-3]. Various studies showed that the percentage of prescriptions containing antimicrobials varies from 22% to 67 % [4-7].

It was reported that the injection was the most frequently used method to administer antibiotics. It was reported that 33% of intravenous antibiotics were prescribed empirically without documented evidence of infection [8]. Such a wide range of use have lead to an increased risk of side effects, drug toxicity, and makes the therapy more expensive and in addition, increases antimicrobial resistances [9]. To ensure that antibiotics are used appropriately and rationally antibiotic utilization has to be reviewed regularly [10].
The optimization of antibiotic utilization at its most basic level is the appropriate use of antibiotics. Various antibiotic utilization strategies have been implemented to improve antibiotic prescribing in many hospitals [11-13]. These include formalized antibiotic guidelines, antibiotic control programs, restrictive antimicrobial prescribing forms, provision of a computerized information system to guide antimicrobial selection, short-listed antibiotics in hospital formularies, etc [14, 15]. Antibiotic guidelines have prove to be simple, yet effective intervention while encouraging appropriate choice of antibiotic therapies and recommending a timely switch from intravenous to oral therapy. But it is reported a single intervention alone is not sufficient enough to make the antibiotic therapy more effective. Therefore a multidisciplinary approach is more appropriated [16-18].

MATERIALS AND METHODS

The study was conducted in the medical ward of a superspecilaity multidisciplinary teaching hospital for a period of two years. The individual medical records 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 antibiotics consumed parentrally were recorded before and after the regulations. All the data were analyzed using chi-square test at 5% level of significance. All the differences were tested at $p<0.05$ (two-tailed).

RESULTS AND DISCUSSION

The study showed that the number of patients received antibiotics before and after the regulations were 2375 and 2425 respectively. Out of them 1364 received antibiotics parentrally before the regulation whereas 1093 received after the regulation.

The total doses of different class of antibiotics consumed in parentral route before and after the regulations were summarized in Table-1. The total numbers of doses of antibiotics consumed parentrally were 38181 and 26223 before and after the intervention respectively.

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The number of patients received antibiotics parentrally were reduced by 21% . The study had shown a significant reduction in the total number of doses of antibiotics (31%) used parentrally. This may lead to decrease the risk of drug interactions, over use of drugs and make the treatment more economical.

During the pre-regulation period, third generations cephalosporins were the most commonly prescribed antibiotics. After the restriction, this was decreased by 11%. The prescription of second generation cephalosporins also reduced by 52%. The reduction in the use of second and third generation cephalosporins led to an increase in the use of first generation cephalosporins by 43%.

The broad spectrum antibiotic used during the period of study was Chloramphenicol which itself reduced by 70%.The use of carbapenams - the most expensive antibiotics used parentrally- were decreased by 18%. Use of Lincosamides was reduced by 43%. Lincosamide and its combination with third generation cephalosporin were also decreased. The use of drugs belonging to oxazolidinone category was reduced to 37% .A reduction in the consumption of Sulphonamides, Penicillin and Imidazole derivatives were observed after the interventions justifying the rational use of antibiotics by parentral route.

Table – 1. Summary of the Number of Doses of Antibiotics Consumed (Parentral Route)

Antibiotics	Use of antibiotics		p-value*
	Before Regulation n (%)	After Regulation n (%)	
Total Number of Doses of Antibiotics Consumed (n)	38181	26223	
Aminoglycosides	2230(5.84)	1662(6.34)	<.0001
Broad Spectrum Antibiotics	75(0.20)	16(0.06)	<.0001
Extended Spectrum Penicillins	3447(9.03)	2866(10.93)	<.0001
Carbapenams	1538(4.03)	870(3.32)	<.0001
Cephalosporins-First Generation	58(0.15)	208(0.79)	<.0001
Cephalosporins-Second Generation	2101(5.50)	695(2.65)	<.0001
Cephalosporins-Third Generation	19423(50.87)	11934(45.51)	<.0001
Cephalosporins-Fourth Generation	241(0.63)	66(0.25)	<.0001
Lincosamide + Cephalosporin-Third Generation	148(0.39)	95(0.36)	<.0001
Lincosamides	1842(4.82)	722(2.75)	<.0001
Macrolides	86(0.23)	207(0.79)	<.0001
Oxazolidinones	116(0.30)	50(0.19)	<.0001
Penicillins	2135(5.59)	1990(7.59)	<.0001
Uredopenicillins	1848(4.84)	1873(7.14)	<.001
Fluroquinolones- First Generation	1444(3.78)	1946(7.42)	<.0001
Fluroquinolones-Second Generation	788(2.06)	613(2.34)	<.0001
Glycopeptides	603(1.58)	383(1.46)	0.0005
Imidazole Derivatives	58(0.15)	27(0.10)	0.4395

**p-value calculated using Chi-square test (two tailed, α = 0.05).*

The use of Uredopenicillins was increased by 48% as it was considered as the drug of choice for the treatment of advanced pneumonia. Use of first generation fluoroquinolones

were increased whereas the consumption of the second generation fluroquinolones did not alter much.

The use of extended spectrum antibiotics was increased in the post regulatory period (21%). 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 prescribed for the treatment of bronchitis. These increases in the use of extended spectrum penicillins and macrolids showed that all these antibiotics were found to be sensitive enough to treat the infections in place of drugs belonging to higher classes.

CONCLUSION

The evaluation of restricted use of antibiotics utilization showed that the effective use of parentral antibiotics was improved after regulation. The study emphasizes that strict regulation on the use of antibiotics is essential to promote rational use of antibiotics by parentral route.

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