

Do Economic Factors Contribute to Development of Drug Resistance: A Study

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ABSTRACT

Aim: To compare the antibiotic sensitivity patterns of the common gram negative organisms which were isolated in a free hospital and a corporate hospital in the same campus, with common ICU facilities.

Design: Retrospective study.

Materials and Methods: Over a period of six months, various clinical specimens from the free and corporate hospitals were studied. The sensitivity pattern of the gram negative isolates were compared. Further, isolates from community acquired

urinary tract infections from both the hospitals and also isolates from HAI in the common ICU were studied.

Results: The percentage of resistance among the isolates from the free hospital was significantly lower than that from the corporate hospital. There was no difference in the resistance patterns of the isolates of HAI from the ICU.

Conclusion: The unrestricted use of antibiotics could be a factor which leads to increased antibiotic resistance. So, instituting and implementing an antibiotic policy becomes necessary.

Key Words: Antibiotic resistance, Antibiotic usage, Antibiotic availability

INTRODUCTION

Antimicrobial resistance is a global problem that asks for urgent action. The development of antimicrobial resistance is a phenomenon which is inevitably related to the microbial evolution and antibiotic use [1]. Most of the government hospitals and the medical college hospitals in India are not worried about drug resistance, as for them the available life saving antibiotics belong to a narrow spectrum and their availability is dictated more by economics and not by need. It is the private practitioners and the private and corporate hospitals which are the actual culprits, as they are the breeding grounds for resistance. So, this study was done to compare the resistance pattern in a free hospital and in a corporate hospital which were functioning parallel in a campus, but, with common intensive care units.

MATERIALS AND METHODS

The study period was six months. The samples which were studied included urine, blood, sputum and exudates. Only gram negative bacilli were included in the study. A total of 437 gram negative organisms were isolated from the free hospital. During the same period, there were 930 gram negative isolates from the corporate hospital. The organisms which were studied included *Escherichia coli*, *Klebsiella* species, *Acinetobacter* species and *Pseudomonas* species, as these were the more common isolates. The antibiotics which were studied were Amikacin, Gentamicin, Ciprofloxacin, Ofloxacin, Levofloxacin, Cefipime, Ceftazidime, Cefotaxime, Piperacillin, Piperacillin+tazobactam and Cefoperazone+Sulbactam. The sensitivity patterns of all the isolates from the two hospitals were compared. Their resistance percentages were calculated.

Subsequently, we studied the sensitivity patterns of the isolates from hospital acquired infections (HAI) in the intensive care unit (ICU) and community acquired urinary tract infections (UTI) over a period of

six months. A majority of the isolates from the community acquired UTIs were *E. coli* (49 from the corporate hospital and 55 from the free hospital) and *Klebsiella* (12 from the corporate hospital and 9 from the free hospital). The resistance percentage was calculated for Amikacin, Gentamicin, Ciprofloxacin, Norfloxacin, Levofloxacin, Nitrofurantoin, Cefipime, Ceftazidime, Cefotaxime, Amoxycyclav and Ceftriaxone.

In HAI, the predominant organisms which were isolated were *Klebsiella* (4 from the free hospital and 9 from the corporate hospital) and *E. coli* (5 each from the free and the corporate hospitals). Their resistance percentages were calculated.

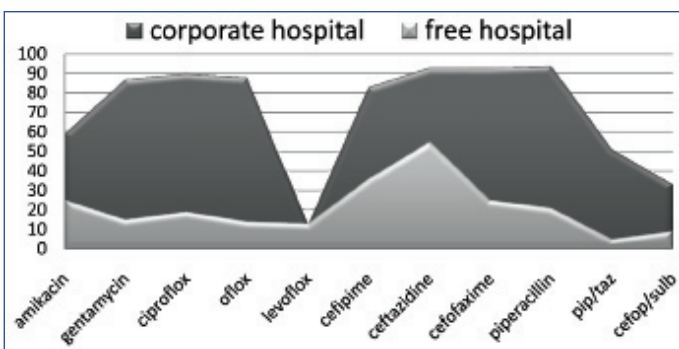
RESULTS

Overall, the isolates from the free hospital showed a lesser antibiotic resistance as compared to those from the corporate hospital. The percentage resistances of the individual isolates are as shown in the [Table/Fig-1, 2, 3 and 4]. In this study, *Acinetobacter* and *Pseudomonas* which were isolated from the free hospital showed more resistance to Levofloxacin.

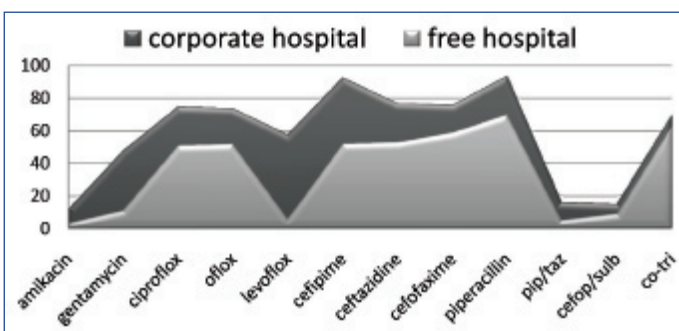
In community acquired UTI, the isolates from the corporate hospital showed more resistance [Table/Fig-5 and 6]. In HAI, there was not much difference in the sensitivity patterns of the isolates from the free and the corporate hospitals.

DISCUSSION

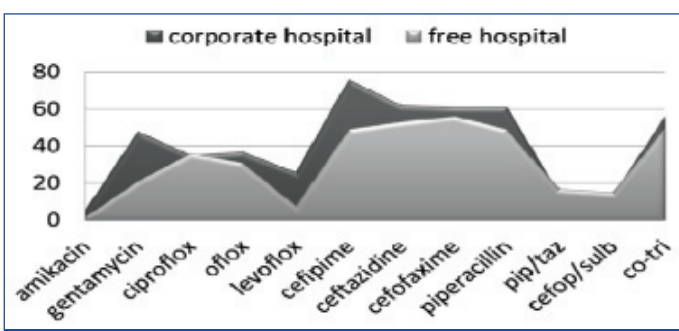
Antimicrobial resistance is a growing problem worldwide, which requires international approaches. The World Health Organization and the European Commission have recognized the importance of studying the emergence and the determinants of antibiotic resistance and the need for strategies for its control [2,3,4,5]. Although multiple factors play a role in this problem, the selective pressures of the inappropriate and the widespread use of antibiotics are considered as the major contributors [6,7]. A hospital-wide



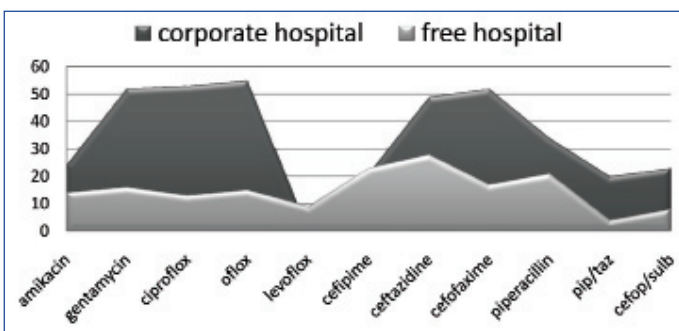
[Table/Fig-1]: Acinetobacter spp



[Table/Fig-2]: E. Coli



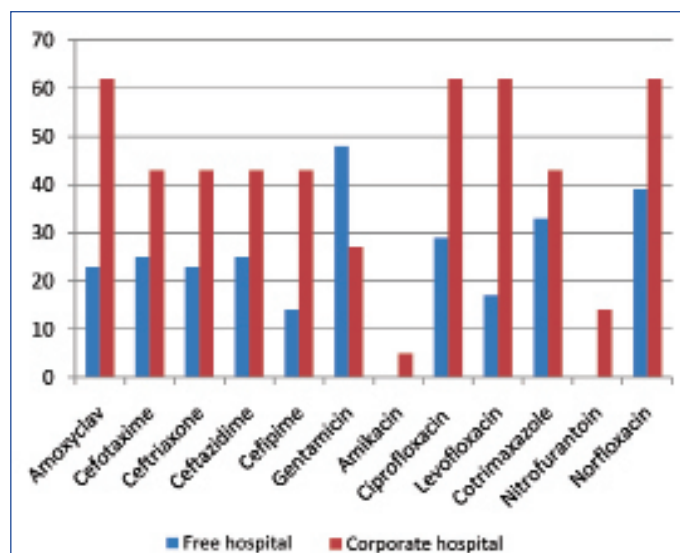
[Table/Fig-3]: Klebsiella spp



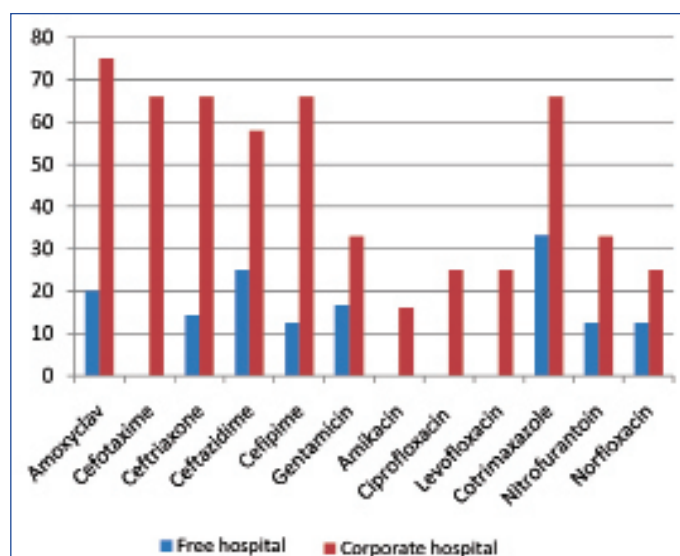
[Table/Fig-4]: Pseudomonas spp

surveillance has traditionally been used for the detection of the resistance problems within an institution. However, the hospital-wide surveillance data may be misleading, since these data can mask the important trends in the resistance within the individual patient-care areas [6, 8,9,10]. Recently, recommendations have been made, which have suggested that the individual patient-care areas should be monitored separately, in an attempt to assess the antimicrobial resistance [6]. The studies which were done by Iosifidis E and Antachopoulos C et al showed that the rates of the antimicrobial consumption and the prevalence of the resistance varied substantially among the hospitals' departments [11].

In our study, a corporate hospital as well as a free hospital were functioning within the same campus. The treating doctors were



[Table/Fig-5]: E. coli in Community acquired UTI



[Table/Fig-6]: Klebsiella in community acquired UTI

the same. The formularies of the antimicrobials in the two hospitals were different. The drugs which were available in the corporate set up had a wide range from the common first line antibiotics to the newer and more expensive ones and there was no restriction on their usage. Whereas in the free hospital, fewer antibiotics were available free of cost and there was a limited use of the newer expensive antibiotics. The ICU was common for both the hospitals and the treatment which was given there was dictated by the requirement of the patients.

In this study, we compared the susceptibility pattern of the common gram negative bacilli in the two hospitals. The data was collected for certain antibiotic pathogen combinations. Our finding was that there was a higher percentage of drug resistance among the isolates from the corporate set up for most of the antibiotics which were studied. This could be because there was an increased usage of the higher antibiotics in the corporate hospital, whereas, in the free hospital, the same drugs were not available for free and so their usage was restricted. Since levofloxacin was available for free in the teaching hospital, it was prescribed commonly. This was probably the reason for the increased resistance to this drug which was seen in the Acinetobacter and the Pseudomonas isolates from the free hospital. Previous studies had shown that there was a relationship between the antimicrobial usage and the susceptibility trends [2,5,6,7,8,9,11,12,13,14,15]. High levels of the availability

and the consumption of the antimicrobials could lead to a high prevalence of resistance [16,17].

In our study on the isolates from the ICU, we did not find a significant difference in their sensitivity patterns. This could be because of the shared ICU, where the requirements of the patients decided the choice of the antibiotics.

We found the availability of the drugs and the financial status of the patients as the possible causes for the development of the drug resistance [18]. Other factors which could contribute towards the emergence of drug resistance, such as the dosage and the duration of the drug administration could not be studied.

CONCLUSION

From our initial study, we observed that the percentage of resistance among the corporate hospital isolates was more. Later, we continued the study with the isolates from the community acquired UTI of patients from both the hospitals and the same pattern of resistance was seen. This could again be because there was no restriction on the availability and the usage of the antibiotics among the patients from the corporate hospital. Since other factors which could contribute towards the development of the resistance were not studied, further research on this is needed. This is just a preliminary observation. Instituting an antibiotic policy in every hospital may be the first step in combating the development of drug resistance.

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