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Compliance of antibiotic prescriptions to the antibiotic policy in surgical cases at an Indian tertiary care hospital

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Abstract

Background/ Objectives: The use of antibiotics in all kinds of medical treatments has increased tremendously in the past few years. Many tertiary care hospitals have developed guidelines and protocols on antibiotic usage but are unable to achieve targeted compliance and the desired outcome. This study aims to assess the status of antibiotic prescription and compliance with the hospital antibiotic policy during surgical cases. **Methods:** A retrospective study was carried out for a period of 2 months by passive file auditing of the patients' record. **Findings:** The results obtained show 84.8 % compliance with respect to the choice of antibiotic, 90.4 % to indication, and prophylactic antibiotic was given in only 51.2 % amongst the 122 surgical cases. With respect to the time within which antibiotics were given it was found that in 10.4 % it was given more than 2 hours of surgery being started, in 26.4 % it was given in less than one hour and for the remaining 63.2 % that data was not recorded properly. The mean duration of administering the antibiotic was 6.29 hours with SD of 5.20 hours with a median of 4 hours. **Novelty:** The study highlights the lacunae and flaws amounting to the non-compliance to the antibiotic policy in surgical cases and suggests that most of the tertiary care hospitals too need an implementable policy than a perfect policy.

Keywords: Antibiotic; assessment; compliance; prescription; surgical cases

1 Introduction

Infections caused by microorganisms have threatened human life since time immemorial, where infection can be defined as "an invasion and multiplication of microorganisms such as bacteria viruses, and parasites that are not normally present within the body". It is a well-known fact that high morbidity and mortality in humans were major concern during pre- antibiotic era. [1,2]

With tremendous research and invention in the area of pharmaceuticals the use of antibiotics in all kinds of medical treatments have increased manifold. The use of antibiotic however in many cases are not justifiable as it has resulted into antimicrobial resistance (AMR) [3]. Subsequently leading to increased cost for patients. Thus, clinical guidelines and protocols are attaining increasing recognition in medical practice as a

mean to implement evidence based medicine in healthcare facilities and to obtain cost efficiency and in order to reach these goals, these protocols need to be of high quality. Factors like ambiguity and incompleteness appear frequently in medical protocols. Moreover, people responsible tend to overlook at few aspects of the same and follow their own practices, giving rise to non- quality outcomes. Use and overuse of antibiotics in surgical cases primarily to prevent surgical site infection is highly debatable. There are studies that have evidence of, administration of prophylactic antibiotics in certain surgical procedures have led to decrease post-operative infections, decrease the length of hospital stay and reduce the overall cost of care. [2]

It is evident from many studies that with use of sound and appropriate principles of prophylaxis applied during pre and peri-operative instances results in reduced risk of post- operative infection. [3]

There are also cases where, prophylactic or post- operative antibiotics are not required. But certain patient related and procedure related factors alter the risk/benefit ratio in favor of prophylactic use, and to this effect hospitals today have developed many policies to which it needs to abide to bring about effective and efficient outcome. One such important policy is the antibiotic policy. The significance of this policy is to improve patient care by promoting the best practice in antibiotic prophylaxis and therapy. It also aids in creating an environment where, efforts are taken to better, the use of resources / means by way of using low-cost/ discounted drug is a possibility. It also aids in delaying the emergence and spread of multiple antibiotic-resistant bacteria.

Improves education of junior doctors by providing guidelines for appropriate therapy. Eradicate the use of unnecessary or ineffective antibiotics and restrict the use of expensive or unnecessarily powerful ones. [4]

Three primary surgical antimicrobial prophylaxis (SAP) performance measures have been identified by surgical care improvement project this includes: "Appropriate antibiotic selection, administration of antibiotics within 1hour of incision (exceptions are vancomycin and fluoroquinolones) and discontinuation of prophylactic antibiotics within 24 h of surgery end time." [5]

These measurements are still not being achieved, practiced and recorded in many developing countries and India is no different. Primarily, the antibiotic policies are formulated to guide physicians to prescribe appropriate antibiotics, avoid unjustified prescription, reduce the emergence of antibiotic-resistant bacteria, support high-quality clinical practice and minimize unnecessary expenses. [6]

These practices are followed and should be followed to achieve improved overall patient outcome.

Therefore, the present study was conducted to assess the use of antibiotics in surgical cases at a tertiary care hospital in an Indian metro city taking SAP measures as the base.

Objective of the Study

- To assess the status of antibiotic prescription given to patients in a tertiary care setup.
- To assess compliance to the hospital antibiotic policy during surgical cases by treating doctors.

2 Methods

The study was conducted retrospectively in a tertiary care superspeciality hospital in Mumbai for a period of two months. Passive file auditing of patient's record method was done for collecting the data for the months of March & April.

Total of 122 surgical cases and 71 non- surgical cases were studied for antibiotic prescription. The cases were selected based on whether they were prescribed antibiotics or not. Patients belonging to all age groups gender and admitted under any specialty for the months mentioned above were considered for the study.

Although it is a notable fact that, India lacks a selective antibiotic policy and there are no strict supervised guidelines in use of antibiotics in primary care, government administered hospitals and even in most of the corporate hospitals, the hospital in consideration here had formulated antibiotic policy in place, but the compliance to the same was difficult to determine. Thus, certain parameters were finalized and approved by hospital infection control committee in consonance with its present antibiotic policy; the results pertaining to it are discussed subsequently. Protocols for surgical prophylaxis were also taken into account and the records were closely monitored against them.

The observation towards the compliance were made retrospectively. The indicators on which the data was collected included symptoms for prescribing antibiotics, prescription as result of examination or investigations, compliance w.r.t choice of antibiotics, indication and with policy, antibiotics given for surgical prophylaxis and time frame within the surgery when the antibiotic was administered. Each case was observed on these indicators against the guidelines in the policy for its compliance and details were recorded.

Statistical Analysis

In this study, descriptive statistics were used to fulfil the objective. In descriptive statistics, mean was calculated with 95% confidence intervals and along with median and standard deviation were calculated for time taken to prescribe the antibiotic during the surgery and related to surgery cases. First quartile, second quartile and third quartile for time taken to prescribe the antibiotic during the surgery. For graphical representation, box plot was used to describe the time, which was taken to prescribe the antibiotic during the surgery. All analysis was carried out with the help of SPSS software version 23.

3 Results

The study sample belonged to the age group of 18 years and above. As reported in materials and methods total 193 cases were considered, among these 122 were surgical cases and 71 non-surgical cases. There were only 7.7 % of females while rest of them were males' i.e. 92.22 %. The average age of patients studied was found to be 45.3 years. For detailed analysis, only surgical cases were considered, these included cases such as general surgery, orthopedic surgery, cardiothoracic surgery etc.

The generic names of the antibiotics included the following: moxifloxacin, cefotaxime, meropenem, ceftriaxone, cefoperazone-sulbactum, cefepime-tazobactum, doripenem and cefpirome.

It is observed that clear symptomatological indication for prescribing antibiotics was present in 93.6 %. In the same number of cases, the antibiotics were prescribed because of examination or investigations. Compliance with respect to choice of antibiotics was followed in 84.8 % and not followed in 15.2 %. Next indicator was compliance with respect to indication, which was seen 90.4 % and not seen in 9.2 %. Further, it was reported that in only 79.2% of cases complete compliance with policy was followed. Prophylactic antibiotic was given in only 51.2 % (n=64) of cases out of total 122.

Further indicator with respect to time within which antibiotic was given was also assessed and it was found that in 10.4 % it was given more than 2 hours of surgery being started, in 26.4 % it was given in less than one hour and for remaining 63.2 % that data was not recorded properly to indicate the time within which the antibiotics was administered. Additionally, for this very indicator (duration of antibiotic), the mean, median and s.d along with quartiles at 95 % CI of mean was also calculated.

The reasons for non- compliance was also investigated and the results showed that the reasons included non-compliance is due to "wrong choice of antibiotics", "inappropriate indication" and in few cases documentation and recording of the data was not maintained properly. In some of the cases, the time of the prophylactic antibiotic was not mentioned. In another case, the time of administration of prophylactic antibiotic mentioned in the patient's file is different, to the time mentioned in the O.T. register. Hence, the administration time could not be calculated and so the case could not be assessed.
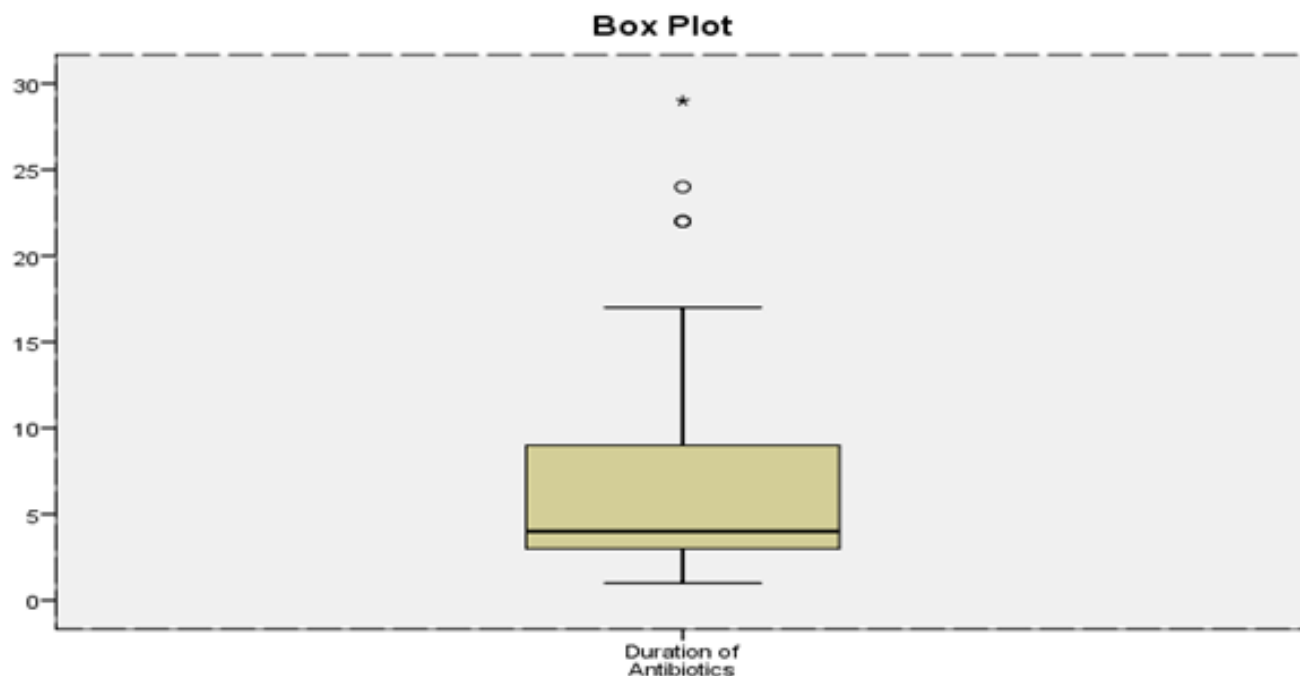
From Table 2, it is evident that for 122 surgical cases, the mean duration of administering the antibiotic was 6.29 hours with SD of 5.20 hours with median of 4 hours. To divide the data equally and assess the spread of the data quartiles was calculated for duration of antibiotic given within the start of surgery. It is reported as detailed in Figure 1 , that for first 25 % of the cases were given antibiotic dosages within 3 hours of surgery, followed by median and Q2 as 4 hours for 50th percentile and the remaining was found to be 9 hours.

Table 1. Compliance of indicators with antibiotic policy of the hospital

Indicators	Status of prescription given to patients	
	Yes	No
Clear symptomatological indication for prescribing antibiotics?	117 (93.6%)	8 (6.4%)
Prescription was a result of examination or investigations.	117 (93.6%)	8 (6.4%)
Compliance w.r.t. choice of antibiotic?	106 (84.8%)	19 (15.2%)
Compliance w.r.t indication?	113 (90.4%)	12 (9.2%)
Complete compliance with policy?	99 (79.2%)	26 (20.8%)
Surgery Prophylactic Antibiotic given?	64 (51.2%)	61 (48.8%)
Surgery cases time within (the surgery) which antibiotic was administered (in hours)		
<2	13 (10.4%)	0.00
>1	33 (26.4%)	0.00
OTH	76 (63.2%)	0.00
Total	122 (100.0)	0.00

Table 2. Descriptive statistics with respect to duration of antibiotic administration

Statistics		95% Confidence Interval for Mean	
Duration of Antibiotics	Descriptive	Lower Bound	Upper Bound
Mean	6.29	5.37	7.21
Median	4.00		
Std. Deviation	5.20		
Quartiles	Q1	Q2	Q3
	3.00	4.00	9.00

Fig 1. Outliers with respect to duration of antibiotics

4 Discussion

The results of the study confirmed that there is considerable non-compliance with the hospital antibiotic policy. It also shows lack of awareness & efforts toward reducing the same.

The first insight gained from this study was the inconvenience caused during data collection due to the documentation error and deficiencies. Like for example the incision time parameter needed for the study was not mentioned in the operation theatre register. Due to this deficiency, all of the patient files had to be referred again. In most of the cases, the time &/or frequency of the medicine mentioned in the operation theatre register & the patient's file differed. To rectify this, efforts were put in to get the data further checked from nurses' notes. Hence, data collection was a challenge during this study & these were the cases that could not be assessed.

As it can be observed from Table 1 and Figure 1, the non-compliance rate in the surgical cases was significant. The primary reasons narrowed down for the non-compliance rate were, wrong choice of antibiotics made by the physician and incorrect administration time of prophylactic antibiotics.

According to Godfrey B. S. Iyalomhe, Sarah I. Iyalomhe and Richard E. Eholor, the antibiotic drug formulary undergoes cyclic rotation & so the purpose of adhering to the antibiotic policy is to prevent the antibiotic resistance. In this study, it was seen that physicians & surgeons did not adhere to the policy and prescribed antibiotics of their own choices. On investigation, it was found that rarely any physician knew & bother of any such policy. Even while being aware they were adamant with changing their prescriptions [7].

In one of the study C. E. Tourmousoglou, et al., pointed out the optimal time of prophylactic administration is 30 to 60 minutes before incision. But the compliance observed in this parameter was not achieved mainly because the doctors overlooked, as they were comfortable following their way, given number of years of service and performing surgeries. In few cases, if the nurse performed the administration of drug then too the compliance was an issue as they blindly followed the instructions coming from the doctors [8].

Perioperative use of antibiotic, stewardship program often implements antibiotic policies that help in preventing unnecessary use of antibiotics [9,10]. The impact of antibiotic prescription feedback clearly demonstrates a weak impact in changing antibiotic prescribing behavior [11]. Antibiotic, the adherence and challenges faced in transforming hospital-specific guidelines into practice [12]. Hence, a need for educational programs in order to facilitate rational use of antibiotics and promote sensible use of available resources [13]. Unnecessary antibiotic use is still common in real-world clinical practice and remains a public health challenges. Antibiotic-related medical expenditure also presents an important economic burden [14]. Knowledge of international guidelines significantly improves the compliance rate by actively educating and monitoring [15]. In most of the hospitals, patient turnover is high and a proper system for recording antibiotic-related information and tracking hospital-acquired infections is not in place [16].

The existing hospital antibiotic policy also clearly mentions which antibiotic can be used for which symptomatological indications, in spite of this, the physicians & surgeons prescribed antibiotics which they assumed would be apt for the patient & so that they could prevent any further possibilities of infections. In all the cases, the physician was either not aware enough or sensitized about the antibiotic resistance that could occur. Further research with training and awareness programme as intervention can lead to better insight. It will also help in understanding the elements were focus is required he most.

5 Conclusion

Overuse of antibiotics has led to dangerous outbreaks of drug resistant disease, and puts us in very real danger of a global pandemic. Organizations like WHO have always stressed on careful use antibiotics. Accrediting organizations like NABH, JCI, etc. have standards designed for how an antibiotic policy should be formulated for hospitals. According to it, hospitals formulate policies, which are to be followed by the healthcare professionals of that particular hospital. Despite this as per data available from NABH assessors "most accredited hospitals, though having a well written antibiotic policy on paper, are not compliant in practice"

Present study has highlighted the lacunae and flaws amounting to the non-compliance to the antibiotic policy. Thus, along with taking corrective actions for the same it is also important to know that "Hospitals need an implementable policy than a perfect policy", which makes adherence to it easy and hence improving the compliance rate.

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