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A Study of Anti-Microbial Drug Utilization Pattern and Appropriateness in the Surgical Units of Civil Hospital, Ahmedabad

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ABSTRACT

Objective

To evaluate the appropriateness and pattern of use of antibacterial agents in the several surgical units of Civil Hospital Ahmedabad.

Materials and Method

The study was conducted in five surgical units which include two units of General Surgery and one unit each from ENT, Orthopedic and Obstetrics & Gynecology department. In our study total 500 indoor patients were studied for duration of one year. Investigator visited the ward every day and recorded the relevant data in a proforma for consequent analysis. The modified kunin criteria were used to decided appropriateness of antibacterial drug use.

Results

In majority of the cases multiple antibacterial drugs were prescribe. Metronidazole and Penicillin group of drugs the front line drugs in prescription. The appropriateness of usage was highest (75%) in ENT department, while in other departments it was around 45% only. Majority of the antibacterial drugs were prescribing in patients who went for surgery with average duration of the treatment was 7.2 days.

Conclusion

Suitable interventions in prescribing pattern of antibacterial drugs are highly recommended in the studied department of studied hospital.

Keywords: *Antibacterial drugs, Prescribing pattern, appropriateness, surgical units, Intervention.*

INTRODUCTION

There are too many groups of drugs prescribed every day in clinical practice, antimicrobials are one of them. They account for nearly 20% of all new and repeat prescriptions each year and occupy almost 25% to 30% of total annual drug budget of hospitals¹⁵.

In India prevalence of antibacterial drugs use varies from 24% to 67% and estimated to account for 50% of total value of drugs sold in our country². Not all uses can be justified. Some of the prescription of these drugs are irrational and above all excessive utilization of antibacterial drugs lead to their misuse and engenders problems like,

1. Difficulty in selection of proper drug.
2. Increases cost and side effects of drug therapy.
3. Development of bacterial resistance.

It has been observed that 64% of total antibacterials prescribed are either not indicated or inappropriate in terms of drug selection or dosage⁵. In many cases antibacterials are used without an appropriate bacteriological basis^{11,12}.

In hospital uses, major proportion (30% to 50%) of antibacterials prescribed are for surgical prophylaxis. This has been accepted as standard care over the years^{6,7}.

It is well known fact that, if the injudicious use of antibacterial in hospitals can be improved, the misuse of antibacterials can be avoided. Several remedial measures can be applied to this situation, but before that, it is necessary to evaluate the existing baseline practice. A drug utilization study may therefore help us to identify the problems, suggest the remedial measures and promote rational use¹⁰. So, the purpose of this study is to ascertain the quality of antibacterial drugs use, with a view to devise some appropriate interventions to correct the fallacies, if any.

MATERIALS & METHODS

In this study we analyzed the prescribing trends and appropriateness of anti-bacterial drugs in surgical practice. This is prospective study, and mix qualitative and quantitative parameters were used to perform the assessment.

The study was carried out at civil hospital Ahmedabad. Total 500 indoor cases from 5 Surgical units for one year period were analyzed comprising 100 indoor patients from each unit which were 2 General surgical unit, one each from ENT, orthopedics and obstetric & gynecology.

Frequency of the visiting was once or twice in working days and collected the relevant information as per pro forma.

The collected data was analyzed for several prescribing indicators such as

1. Number of prescriptions where an antibacterial agent included.
2. Number of cases where only one antibacterial drug was prescribed.
3. Number of cases where more than one antibacterial drug was prescribed.
4. Number of antibacterial drugs used per case (average and range).
5. Duration of treatment with antibacterial agents (average and range).
6. Number of cases where culture and sensitivity was done.
7. Number of cases where treatment modified according to the laboratory results of culture and sensitivity tests.
8. Number of patients where antibacterial drugs were given orally or parenterally.
9. Indications for the antibacterial drug use (prophylactic/curative).
10. Appropriateness of drug therapy.

The modified Kunin Criteria⁴ were used to decide the appropriateness of antibacterial drug use. Following categories were used to describe a judgment on the use of antibacterial agents.

Category I : Agree with the use of antibacterial therapy/prophylaxis, the program is appropriate.

Category II : Agree with the use of antibacterial therapy/prophylaxis, but a potentially fatal bacterial infection cannot be ruled out or prophylaxis is probably appropriate although advantages derived remain controversial.

Category II a : Agree with the use of one antibacterial agent but the use of other(s) is unjustified.

Category III : Agree with the use of antibacterial therapy/prophylaxis but a different antibacterial is preferred (usually less expensive or less toxic).

Category IV : Agree with the use of antibacterial therapy/prophylaxis but a modified dose and or/proper duration is recommended.

Category V : Disagree with the use of antibacterial therapy/prophylaxis administration is unjustified.

Categories I, II and IIa essentially indicate “appropriate therapy”. Categories III and IV indicate that there was some major deficiency in the choice or use of antibacterial drug by the prescriber managing the problem; while category V indicates grossly inappropriate use of antibacterial agents.

RESULTS

Results of study in General surgery units-

Out of 200 patients 192 patients i.e. 96% were prescribe antibacterial drugs. The most commonly prescribing drug was metronidazole 44.8% followed by ciprofloxacin 38.5%, gentamicin 36.9% and

cefotaxime 32.2%. Amikacin, ampicillin + cloxacillin and cephalexin were other antibacterial in use. Use of cefazolin and norfloxacin was quite minimum i.e. 7.3% and 5.7% respectively.

In 83.3% of the cases more than one antibacterial drugs were given, and on an average 2.5 (± 0.06) antibacterial drugs were used per patient in a range of 1 to 4.

The duration of the treatment with antibacterial drugs were 5 days to 15 days, with an average duration of 6.9 (± 0.14) days. Oral route was used in 15.6% of patients while in 84.4% of cases they were given parenterally.

Out of 192 patients in 42.2% of cases antibacterial drugs were used for prophylaxis while in remaining 57.8%, the intention appeared to be curative for an existing or a recently acquired infection.

Culture and sensitivity test was done only in 3.1% of cases and out of these the therapeutic modification was done only in one case which clearly indicates that laboratory support is hardly ever sought or taken in consideration in surgical practice while prescribing antibacterial drugs.

Appropriateness of antibacterial drug therapy as per Kumin's criteria in general surgical unit patients (n = 192), are shown in Table – 1.

TABLE – I

Category No.	Brief description of the category	No. of patients (%)
I	Agree with the use of antibacterial therapy/prophylaxis	2 (1%)
II	Agree with the use of antibacterial therapy but advantages controversial	Nil
IIa	Agree with the use of one antibacterial agent/other(s) unjustified	76 (39.6%)
III	Agree with the use of antibacterial but different antibacterial preferred.	Nil
IV	Agree with the use of antibacterial but modified dose/proper duration	Nil
V	Disagree with the use of antibacterial therapy/prophylaxis	114 (59.4%)

Prescribe antibacterial agents were appropriate in approximately 40.6% of patients, while it was in appropriate in 59.4% of cases.

Results of study in ENT unit-

From ENT, units total 100 patients were studied out of these, 75% of cases were undergone surgery and 94% of the cases were prescribe antibacterial agents, so the patients received antibacterial agent irrespective of the surgery.

Amoxicillin was the most commonly prescribed antibacterial agent (74.5%), followed by cloxacillin and gentamicin i.e. 59.6% & 29% respectively. In 90.5% of the cases, more than one antibacterial agent were prescribed with an average of 2.4 (± 0.08) antibacterial agents per patient in a range of 1 to 4. The duration of therapy were 5 to 10 days with an average of 6.5 (± 0.2) days and parenteral route was the common route of administration as 57.5% of the patients received drugs by that manner.

In 3.2% of the cases, microbiological testing was done and only in one case therapeutic modification was done.

Here in 47.9% of cases intention behind the use of antibacterial agents was prophylactic while in remaining 52% of cases it was to be curative.

Appropriateness of antibacterial drug therapy as per Kumin's criteria in ENT unit patients (n = 94), are shown in Table – 2.

TABLE-2

Category No.	Brief description of the category	No. of patients (%)
I	Agree with the use of antibacterial therapy/prophylaxis	1 (1%)
II	Agree with the use of antibacterial therapy but advantages controversial	Nil
IIa	Agree with the use of one antibacterial agent/others (s) is unjustified	70 (75.5%)
III	Agree with the use of antibacterial therapy but different antibacterial preferred	Nil
IV	Agree with the use of antibacterial therapy but modified dose/proper duration	Nil
V	Disagree with the use of antibacterial therapy prophylaxis	23 (24.5%)

Prescribe antibacterial agents were appropriate in almost 76.5% of patients, while it was inappropriate in 23.5% of cases.

Results of study in obstetrics & Gynecology unit-

In Obstetric & Gynecology out of 100 patients studied 68% patients under go for surgical procedure and in 95% of patients they prescribe antibacterial drugs.

Ampicillin (87.3%) was the most commonly prescribe drug which was followed by Gentamicin (40%) and metronidazole (36.8%). Almost half amount of the total prescription had single antibacterial drug, while remaining half had more than one antibacterial agents. On an average 2.06 (+0.1) antibacterial drugs were used per patient in a range of 1 to 4.

The duration of the treatment ranger from 5 day to 15 days with an average duration of treatment of 6.8 days (+0.23). Here also the major route of administration is Parenteral (57.9%) and in remaining 42% of patients received antibacterial agents orally. In 73.7% of the patients, purpose of the use is prophylaxis while in remaining 26.3% it appears to be curative. Culture and sensitivity test was done in 5.2% of cases and therapeutic modification was done in one case only.

Appropriateness of antibacterial drug therapy as per Kumin's criteria in obstetrics & Gynecology unit patients (n = 95), are shown in Table – 3.

TABLE-3

Category No.	Brief description of the category	No. of patients (%)
I	Agree with the use of antibacterial therapy/prophylaxis	22 (23.2%)
II	Agree with the use of antibacterial therapy but advantages controversial	Nil
Ila	Agree with the use of one antibacterial agent/others (s) is unjustified	18 (18.9%)
III	Agree with the use of antibacterial therapy but different antibacterial preferred	Nil
IV	Agree with the use of antibacterial therapy but modified dose/proper duration	Nil
V	Disagree with the use of antibacterial therapy prophylaxis	55 (57.9%)

Prescribe antibacterial agents were appropriate in 43.1% of patients, while it was inappropriate in 57.9% of cases.

Results of study in orthopedics unit-

From orthopedics department 100 patients were studied, out of which 90% of patients were undergone surgery. Antibacterial drugs were prescribe in 93% of cases, where cefotaxime was in higher frequency (45.2%), which is followed by gentamicin (40.9%). In only 7.5% of prescription the single antibacterial agent were prescribe while in remaining 92.5% of prescription multiple antibacterial agents were prescribe, with an average of 2.5 (± 0.08) antibacterial drugs were used per patient in a range of 1 to 4 drugs. The average duration of the treatment was 7.9 day (± 0.41) with the range of 5 days to 15 days of duration. Only 8.6% of patients received antibacterial agents orally while in 91.4% of patients Parenteral route were used. In 37.6% of patients the prophylactic intention behind the use of antibacterial agents while in remaining 62.4% of cases the intention was curative. Microbiological testing was done in only 3.2% of case while modification in the therapy was done in one case only.

Appropriateness of antibacterial drug therapy as per Kumin's criteria in orthopedics unit patients (n = 93), are shown in Table – 4.

TABLE-4

Category No.	Brief description of the category	No. of patients (%)
I	Agree with the use of antibacterial therapy/prophylaxis	8 (8.6%)
II	Agree with the use of antibacterial therapy but advantages controversial	Nil
Ila	Agree with the use of one antibacterial agent/others (s) is unjustified	35 (37.6%)
III	Agree with the use of antibacterial therapy but different antibacterial preferred	Nil
IV	Agree with the use of antibacterial therapy but modified dose/proper duration	Nil
V	Disagree with the use of antibacterial therapy prophylaxis	50 (53.8%)

Prescribe antibacterial agents were appropriate in 46.2% of patients, while it was inappropriate in 53.8% of cases.

DISCUSSION

Antibacterial drugs are lifesaving in many conditions and widely used in the world. They are accounting for almost one quarter of hospital drug costs⁹.

In present study 94.5% of admitted patients received antibacterial drugs and operative procedure were carried out in 77% of cases.

The figures of antibacterial use for each specialty being 96% in General Surgery, 94% in ENT, 95% in Obstetrics and Gynecology and 93% in orthopedics.

We also found that older antibacterial agents are more commonly used than the newer drugs which may be due to the long experience with its use and relatively low cost¹³. Apart from this, easier availability in hospital Pharmacy may be the reason for heavy use.

Amoxicillin was most commonly prescribed drug (74.5%) in ENT while Ampicillin was most commonly used (87.5%) in Obstetrics and Gynecology. Cefotaxime (45.2%) was the most commonly prescribe drug in orthopedic patients.

During our study we observed poly-pharmacy which decreases benefit – risk ratio and always lead to increased risk of drug interaction¹³. The poly-pharmacy also indicates an excessive reliance on empiricism that itself may be the result of lack of awareness on the part of prescriber and an inadequate use of microbiological support.

The average duration of treatment with antibacterial agents was maximum in orthopedic unit (7.9 days) and minimum in ENT (6.5 days). Prolonged use of antibacterials may alter the patients endogenous flora and favor the emergence of resistant strains or the acquisition of new strains with antibacterial resistance¹⁴. Prolonged antibacterial therapy reflects a casual attitude of prescriber and also increases the cost of therapy.

Major purpose behind the prescription of antibacterial drugs in surgical specialties is prophylaxis. We find 50.3% of all patients were prescribed antibacterial for prophylaxis purpose and this use were continued even after 24 – 36 hours without any evidence of infection. The purpose of surgical prophylaxis was therefore not served and ultimately leads to large proportion inappropriateness in antibacterial prescribing in present study. This practice increases the cost of therapy and increases the danger of development of resistance to the microbial agents. This thing will become more dangerous when unnecessary use of parenteral antibacterials. This again adds to a cost of therapy and also increases the risk of blood borne infections. In our study we found over all 72.8% of patients received antibacterial drugs parenterally and only 27.2% cases received them orally.

As per the Kunin's criteria the use of antibacterial agent was appropriate in 51.4% of the cases, while in remaining 48.6% of the cases it remains inappropriate. This may be because only in 3.4% of the cases culture and sensitivity tests were sought and the modification in the treatment was made in only 0.8% of patients accordingly.

Similarly the choice of antibacterial agents was wrong and inappropriate. In certain cases antibacterial agents was prescribed parenterally, although an oral substitute would have been an appropriate choice.

Thus the overuse coupled with inappropriate use of antibacterials, is likely to be associated with the risk of development of bacterial resistance and adverse drug reactions apart from increasing the duration and cost of therapy. It is important to restrict the use of unnecessary and prolonged empirical therapy. Inappropriate surgical prophylaxis also needs broader attention and amendments in prescribing habits. Since variation in antibacterial susceptibility patterns is observed in different hospitals, a separate guideline for antibacterial use for each hospital may be prepared and disseminated to the prescribers. This will not only ensure that patients receive appropriate antibacterial, but also restrict the overuse and misuse of antibacterial agents and ultimately help us to reduce the total cost of therapy and reduces the risk of adverse drug reactions in long run.

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