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## Pharmacoeconomic appraisal of antimicrobial utilization in a medical college hospital

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### ABSTRACT

Study was conducted in the IPD of General Hospital Sangli, Government Medical College; Miraj (Maharashtra). A total of 3312 case papers of patients admitted in different departments of the hospital over a period of six months were screened. The cost of antimicrobials administered to these patients for different indications was calculated and compared with the cost of standard drug treatment regimes. Surgical departments were found wasting huge amounts of money on antimicrobials followed by medical departments. Study concludes that there is % wastage of money on inappropriate use of antimicrobials on patients admitted in various departments.

**Keywords : Antimicrobial utilization, GHS Sangli, IPD patients**

### Introduction

If health care costs and economy continues to grow at the same rate as in the past few years, health care costs will consume the total GDP in most of the European and North American Countries by the year 2040<sup>1</sup>, unfortunately situation is worse in India<sup>2</sup>.

Research demonstrate that health care systems have the potential for dramatic improvement in costs and quality but to achieve this we have to shed the paradigm "Better quality at higher costs" because better quality often means lower costs<sup>1</sup>. To achieve this quality at lower costs we have to introduce the discipline of economics in health care systems. However that the intrusion has not been welcomed by the clinicians is quite understandable given the philosophical and methodological differences between the two disciplines. However, there has been a silent revolution in the thinking if not yet practicing of medicine with the invasion of health economists in to the territories previously occupied exclusively by clinicians. Economic evaluation studies are growing exponentially<sup>3</sup>.

Pharmacoeconomics is a subdivision of health economics and results from the discipline coming of age through consolidation to diversification. Health Economics, as a branch of economics is itself relatively young. One can hardly find any systematic reference to it before the mid 1960's and the first reading book on this subject was published in 1973<sup>4</sup>. The premises upon which both Health Economics and Pharmacoeconomics are based are virtually identical to those of mainstream economics. The central problem in economics is to find a socially acceptable solution to people's unlimited demands and society's limited ability to respond to these demands with production of goods and services. An extended definition of Economics by Samuelson contains all these elements and more:

"Economics is the study of how men and society end up choosing, with or without the use of money, to employ scarce productive resources that could have alternative uses, produce various commodities and distribute them for consumption, now or in future, among various people and groups in society. It analyses the costs and benefits of improving patterns of resource allocation"<sup>5</sup>

Pharmacoeconomics was originally established as a sub-discipline of health economics. Indeed, there are still health economists who regard the growth of Pharmacoeconomics as an unnecessary over specialization. Of a discipline which is still in the process of growth and whose definitions are becoming outdated every day, one of the earliest definitions is "Analysis of the costs of drug therapy to health care systems and society"<sup>6</sup>.

There are four types of economic evaluation, all of which can be applied to pharmaceutical products. In order of sophistication and level of complexity these are cost minimization, cost effectiveness analysis, cost benefit analysis and cost utility analysis. The ultimate objective of all four methods is to compare the cost and outcome of alternative regimens, ideally by generating a single index or cost-outcome ratio.

Another important aspect is that the cost of the drug item does not reflect the cost of the drug therapy. In most of the situations the choice of antimicrobial can influence other treatment related costs significantly. Several levels has been suggested for cost estimation of drug therapy

First level estimation: Includes only acquisition costs

Second level estimation: Cost of acquisition + Cost of preparation and administration

Third level estimation: Second level estimation + Cost of monitoring

Fourth level estimation: Third level estimation + Cost of treatment of complications

Fifth level estimation: Fourth level estimation + Cost due to suboptimal therapy

Besides, various other costs can be added in these five levels to get further or advanced cost levels, like the cost of disposing the hospital garbage, cost of harms done to the ecosystem which is done by increasing the level of pollution while incinerating the disposables.

**Prescription and Utilization of Antimicrobials**

As per WHO definition, it is a study of "Distribution, prescription and use of drugs in society, with special emphasis on resulting medical, social and economic consequences"<sup>7</sup>

In this era of drug explosion where drug availability is plenty, risk of adverse effects is ample, cost of some drugs is exorbitant and physicians are following variable prescribing patterns, it is important to gather data on prescription and utilization of drugs.

Antimicrobials are important agents in that they represent a huge part of pharmaceutical market and prescription. For this reason they are good candidates for economic appraisal. Besides, as the spectrum of antimicrobials has expanded, the inherent differences in their spectrum now overlap to the point at which numerous agents can be considered equally efficacious for a number of clinical situations, because of that the variability in prescribing habits is more.

#### Medical Practice variation

There are many examples of systematic variation in medical practice that is consistent variation between doctors working in two different Institutions or geographic areas<sup>8,9</sup>. Naturally doctors would like to believe that variations in practice are due to genuine variations in the epidemiology of the disease, but this rarely explains the marked systematic medical practice variations which exist.

#### Impact of knowledge gained with time

It is a general perception that in India with time the healthcare providers are becoming more cost sensitive. More so because our knowledge of health economics is increasing and more of the principles of economics are being implemented to achieve effectiveness in healthcare related costs every day. But does this knowledge and awareness of health economics really change our behavior, make us more cost effective and most importantly decrease the unnecessary wastage on drugs, particularly when per capita income of population is increasing; people are becoming more educated and more aware about their healthcare needs. But is it really so?

There is need of more and more studies so as to generate data on prescribing behavior of clinicians not only to know the actual facts but also to enable the health managers to have something to compare the effectiveness of any strategy which may be adopted in future for improvement in healthcare systems and also to have this data in a form which is easily comparable like monetary.

Considering all these factors the present study was undertaken in General Hospital Sangli, a tertiary care Hospital of Government Medical College, Miraj (Maharashtra) to study the prescribing behavior in relation to antimicrobials and its economic appraisal.

#### Material and Methods

##### Data collection

Case papers of the patients were screened from the record section of the hospital. Data was collected over a period of six months (from January 1, 1998 to June 30, 1998). From every month 15 days were selected based on date of admission, half of them from first half and half from second half of the month alternatively. First half of January was selected by tossing of a coin (systemic random sampling). This way case papers of patients admitted on total 89 days were screened and a data of total 3312 patients was collected (The method should yield one fourth of total admissions in a year but some case papers were found missing from the record room as they are stored separately in medicolegal record section to which we could not have access). Sufficient time was given for the admitted patient to get discharged and the visits to record section were made till September 23, 1998.

#### Costing of antimicrobials

Acquisition cost of the drugs was found out from the records of drug store. Drugs purchased from the month of September

1, 1997 to August 31, 1998 were recorded (including drugs purchased on rate contract, from government undertaking companies, quotation and local purchase) and that of administration items (syringes, needles, infusion set etc.) from surgical store. The average cost was calculated based on these figures.

This way the total second level cost of antimicrobials given to the patient was calculated. This was assumed that every patient was admitted at 12 noon (as pilot study suggested that the average number of patients admitted before and after 12 noon remains almost same) and this was considered that the patient received first dose on admission. Cost of antimicrobial therapy was calculated only for the period of hospital stay of the patient. Same procedure was followed for assessment of cost of standard regime but this was considered only for the days the therapy is recommended, if patient stayed in the hospital beyond that period the cost was not considered as suggested by many studies that if the selection of the drug is proper this will decrease the hospital stay of the patient.

#### Standard drug treatment regimes

This is the most important part of such studies because SDTRs decide whether the study is cost minimization, cost effectiveness or other type of pharmacoeconomic study. Present study, though may look cost minimization but actually is a cost effectiveness study because the SDTRs were the best possible regimes published irrespective of the cost. SDTRs for various diseases were formed with the help of standard text books of Pharmacology, Therapeutics, other specialties, standard journals and discussion with authorities on the subject. In this way more than one drug treatment regimes were formed for every disease, out of them the cheapest was considered for comparison with the prevalent practice.

#### Analysis of the data and comparison of the costs

Data was analysed using Microsoft Excel programme. Difference between actual and ideal cost was found out keeping in mind the objectives.

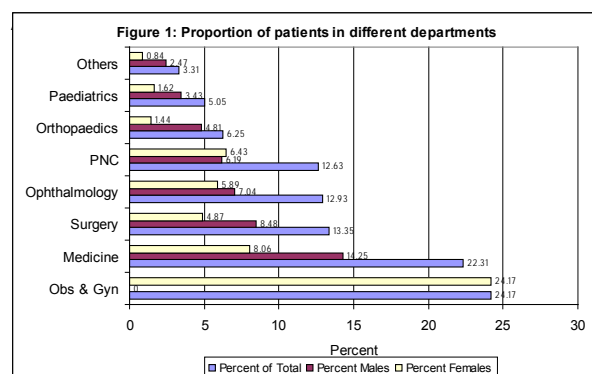
#### Culture and sensitivity reports:

Most of the reports of culture and sensitivity were there with the case papers but to double check, the records of culture and sensitivity were screened for two purposes:

1. To study the sensitivity pattern of microorganisms in the hospital
2. To find the percentage of antimicrobial prescriptions in which culture and sensitivity was done.

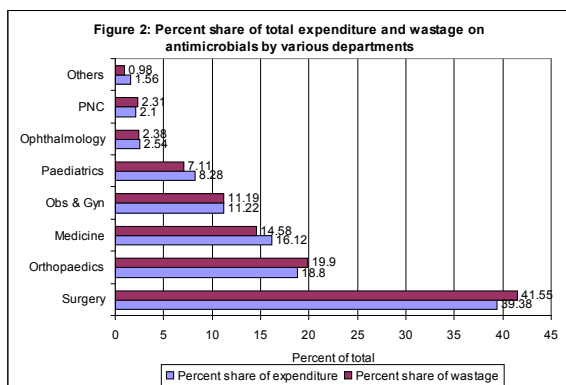
#### Discussion

After taking permission from Institutional Ethics Committee, data from IPD of General Hospital Sangli, Government Medical College, Miraj (Maharashtra) was collected. A total of 10,196 patients were admitted in the hospital during the study period of six months with 3607 males, 4313 females, 1324 boys and 952 girls. Distribution of patients in different departments is shown in figure 1.



months period of study and 15.80% of total patients admitted in one year was collected and analysed. Rs. 21,07,452.03 were spent on antimicrobials during the six month period from 1.01.1998 to 30.06.1998; ideally the expenditure should have been Rs. 1,98,546.72 leaving a wastage of Rs. 19,08,905.31.

Extrapolating these figures to the estimates of one year from 24.09.1997 to 23.09.1998, the duration of which the authors have the data of hospital admissions, a total of 20,967 patients were admitted, a total of Rs. 43,33,753.10 were spent on antimicrobials that ideally would have been Rs. 4,08,290.39 leaving a wastage of Rs. 39,25,462.71. Proportion of this money spent on antimicrobials by different departments and proportion of wastage done by these departments are shown in figure 2.



Department of surgery had the maximum share of this expenditure on antimicrobials and maximum share of wastage also. Reason was unnecessarily prolonged and costly surgical prophylaxis for various surgical procedures like proctectomy, appendectomy, Incision & drainage of abscesses, herniorrhaphy, repair of cleft lip and cleft palate and herniotomy. Department of Orthopaedics was second in share of expenditure and wastage. Various procedures performed were open reduction and internal fixation and PMR operation.

Department of Obstetrics & Gynaecology received maximum number of patients with maximum variety of diagnoses. Procedures for which antimicrobials administered were suction & evacuation, caesarian section, hysterectomy and normal delivery with and without episiotomy. Department of ophthalmology performed cataract surgeries with and without intraocular lens implantation besides using antimicrobials for some other infections.

Findings from the present study suggest a definite overuse and misuse of antimicrobials in the hospital

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