Pharmacoeconomics of Antibiotic Usage at a Tertiary Care Teaching Hospital of North India: Determining the Limitation and Rationality

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Abstract

Background: Hospital drug store or pharmacies usually stock a large range of medications. It is the most extensively used therapeutic facility and thus a large amount of hospital budget is spent on purchase of medicines. For rational distribution and usage of these medicines, there is a viable need for proper execution that results in efficient clinical and administrative services. The study was conducted to evaluate rationality in the procedure of procurement and distribution of antibiotics from a hospital pharmacy by using WHO parameters.

Methods: ABC (Selective Inventory Control) and VEN (Vital, Essential, Non-essential) analysis as per WHO guidelines to study the present practices for procurement, purchase and distribution of various groups of antibiotics at a tertiary care teaching hospital pharmacy. The study was conducted at Jawaharlal Nehru Medical College and Hospital, Aligarh Muslim University (AMU), Aligarh, India, after the due permission of the Institutional Ethics Committee (IEC).

Results: The annual consumption and expenditure incurred on each item of antibiotic for the year 2013-14 was analyzed and inventory control techniques, i.e. ABC and VEN, were applied. There were 17 different injectable antibiotics in the list of drug formulary of the hospital pharmacy. The total annual drug expenditure (ADE) on antibiotics in the same year was INR 2,494,536.6. 36.60 ABC analysis revealed 35.3%, 23.5% and 41.2% items as A, B and C category, respectively, accounting for 81%, 15.10% and 3.9% of ADE on antibiotics of the hospital drug store. However, VEN analysis showed 61.54% and 38.46% antibiotics as E and N category items, respectively as per Indian Model List of Essential Medicine 2011, which accounted 52.37 % (E), and 47.63 % (N) of ADE of the hospital pharmacy.

Conclusion: The scientific inventory management tools are needed to be applied in routine for efficient management of the hospital pharmacy stores as it contributes to not only in improvement in patient care and safety but also judicious use of resources as well, particularly to identify the antibiotics needing stringent management control and to reduce antibiotic resistance.

Keywords: Pharmacoeconomics, WHO ABC VEN analysis, antibiotic usage.

INTRODUCTION

In a developing country like India, control of hospital pharmacy inventory is very important. It is also important that the provided resources should be used appropriately, due to limited resources. Within the available budget, more number of patients can be served by following the
improved drug management practices and rational drug use. The containment of cost and improvement of efficiency should be stressed for the management of hospital drug inventory. The stocking up of hospital pharmacy items is expensive and large part of hospital capital is spent in such items and it can be decreased by 30-40% of a hospital’s expenditure by bringing efficiencies to important cost drivers. For rational distribution and usage of these medicines, there is a viable need for proper execution that results in efficient clinical and administrative services. The aims and objectives of the study were to evaluate rationality in the procedure of procurement and distribution of antibiotics from a hospital pharmacy by using WHO parameters.

MATERIALS AND METHODS

ABC (Selective Inventory Control) and VEN (Vital, Essential, Non-essential) analysis was done as per WHO guidelines to study the present practices for procurement, purchase and distribution of various groups of antibiotics at a tertiary care teaching hospital pharmacy. The study was conducted at Jawaharlal Nehru Medical College Hospital, Aligarh Muslim University (AMU), Aligarh, India, after due permission of the Institutional Ethics Committee and formal permission to access the list of antibiotics available in the pharmacy store for the year 2013-2014. The cumulative expenditure incurred on each item was calculated for the year.

1. **ABC Analysis**—For each of the drugs, the annual expenditure was calculated and was arranged in descending order and the cumulative expenditure of listed antibiotics was also calculated. The cumulative percentage of the expenditure and the cumulative percentage of antibiotics were then considered. Thereafter, they were divided into three groups [i.e. A, B & C] based on their cumulative annual expenditure percentage.

2. **VEN Analysis**—The antibiotics were divided into three categories based on their criticality and utility for the patients. The drug formulary list was divided into VEN category for the year 2013-2014 using National List of Essential Medicine, 2011. The VED classification was followed and the number and percentage of drug items in each category was calculated and the percentage of the cumulative expenditure incurred in each category was also calculated.

RESULTS

The drug formulary of the hospital consisted of 17 antibiotics and a sum of INR 2,494,536.60 was incurred in the year 2013-2014. It was also noted that 35% of the drugs i.e. antibiotics consumed 81% of the total annual drug expenditure (ADE). In this category non-essential drugs were also included in addition to vital or essential drugs.

**ABC Analysis:** In the year 2013-2014, out of the total antibiotic list of drug formulary except those exclusively recommended for tuberculosis and leprosy, 6 (35.30%), 4 (23.50%) and 7 (41.20%) items were found in the A, B & C categories respectively costing for a sum of INR 2,020,634.60 (81%), INR 3,76,836 (15.10%) & INR...
97,066 (3.9%) respectively. ABC analysis revealed 35.3%, 23.5% and 41.2% of the items as A, B and C category, respectively (Table 1).

**VEN Analysis:** In the year 2013-14, VEN analysis showed 0%, 61.54% and 38.46% antibiotics as V, E and N category items, respectively as per Indian Model List of Essential Medicine 2011, which accounts 52.37% (E), and 47.63% (N) of ADE of the hospital pharmacy. Though some medicines are of different strength than that given in the national essential list but we have included them in the essential category (Table 1).

### DISCUSSION

In our study we found that the drug formulary of the hospital consisted of 17 antibiotics and a sum of INR 2,494,536.60 was incurred in one year of the study during 2013-2014. As cost is an important factor and as much as 35% of the hospital drugs consumed 81% of ADE of the hospital pharmacy. Therefore, the hospital administration should put more emphasis on the monitoring of this group.

Our study showed that ABC analysis would help in effectively controlling the given 6 (35.3%) drug items in the A category, with almost 81% of ADE of the drug store. The shortcoming of ABC analysis is that, it would compromise on the availability of items of vital nature from B and C categories (11 items). Similarly, during VEN Analysis, we found that some of the antibiotics procured in the hospital pharmacy belonged to “Essential Medicines” but are of different strength than that given in the National Essential List. This could be a fallacy in our findings if we truly follow National Essential Medicine List. Our study is in consonance with other earlier study.

There could be several factors for not appropriately judicious in procurement system of medicine in any government hospitals. To cite a few reasons, many physicians influence hospital administration to arrange particular brand of antibiotics, different culture sensitivity

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pattern of each region or hospital, status of hospital acquired infection, no consensus among drugs and therapeutic committee of the hospital, hospital purchase committee, etc. Many recent strategies of antimicrobial cost-containment namely: promotion of therapeutic equivalents at lower cost; use of single agent; use of single dose therapy; decreasing the duration of therapy; use of oral therapy when feasible; use of long half-life antibiotics; early empirical treatment etc have been proposed and documented.5

The data regarding pharmacoeconomics of antibiotic usage in hospital set up are very limited. Hence, it is essential that the antibiotic usage in terms of procurement and utilization at hospitals be evaluated periodically to determine the rationality of its use and cost. Kerr JR in their observations found that “antibiotics account for a large part of all hospital pharmacy budgets, but the actual cost of their prescription is unknown”. They further suggested that one area in which there is scope for rationalization and cost savings is rational drug prescribing.6

CONCLUSION

Scientific inventory management tools become necessary for better management of the drug stores, to set priorities in the best way, time bound decision making in purchase of required drugs and supervision on medications belonging to essential categories. ABC and VEN analysis can be used to check the drugs necessitating strict management control for effective & efficient utilization of hospital funds and elimination of out-of-stock situations in the hospital pharmacy.

REFERENCES