ABC – VED ANALYSIS OF DRUG STORE IN TERTIARY CARE HOSPITAL FOR YEAR 2013-14

Dr. Amrita Singam, Dr. S. Dudhgaonkar, Dr. Abhishek Mamarde*, Dr. Kartik J Salwe*, Dr. Huma Khan*

1Indira Gandhi Government Medical Collage, Nagpur.
2Mahatma Gandhi Medical Collage & Research Institute, Pillayakuppam, Pondecherry.
3Speciality Medical Officer, Department of Pharmacology, Lokmanya Tilak Medical Collage and Hospital, Sion Mumbai.
4Professor and Head Department of Pharmacology, Shree Vasantrao Naik Government Medical Collage, Yavatmal.

ABSTRACT

Introduction- In government hospital, about one-third of the annual budget is spent on buying medicines. Effective inventory management is required to balance inventory expenditure against demands for medicines. In hospital inventory management, VED analysis has been commonly used together with ABC analysis. So our aim is to analyze the annual drug expenditure (ADE) & Identification of the drug categories requiring greater supervisory monitoring using ABC and VED analysis. Material and Method-Study was conducted in Indira Gandhi Government Medical Collage and Hospital Nagpur of central India, a 594 bed tertiary care hospital. The data of annual consumption and cost on each drug from Medical store, for financial year 2013-2014 was obtained. ABC analysis done. The data was arranged in Excel sheet. The ABC-VED matrix (combination) was formed by cross tabulating ABC and VED. Results are expressed as %. Result- On ABC analysis it was found that category A consisted of 26 drugs i.e.(13.19%) similarly we calculated for categories B and C which came out as, in category B 36 drugs i.e. (18.2%) and for category C 135 drugs i.e.(68.52%). On VED analysis it was found that, Vital drugs (V) were 60 i.e. (30.96%), Essential drugs (E) were 79 that was (39.08%) and Desirable drugs(D) were 58 (29.94%) were found out of 197 total drugs. On vital drugs (V) the expenditure was 1,07,75,813 (61.63%), Essential drugs (E) expenditure was 51,64,273.52 (29.53%) and on Desirable (D) expenditure was 1544434.03 (8.83%) of the total budget. Conclusion From present study we may conclude that there is a need for conducting such analysis regularly, and applying the inventory management tools for effective and efficient management of the medical stores.

Corresponding author
Dr Abhishek Mamarde
Consultant Psychiatrist at Regional Mental Hospital, Nagpur
9421816258
amritasingam@gmail.com

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INTRODUCTION

In government hospital, about one-third of the annual budget is spent on buying medicines. The medical store is one of the most extensively used facilities of any hospital where a large amount of money is spent on purchases on a recurring basis. This emphasizes the need for planning, designing and organizing the medical store in a manner that results in efficient clinical and administrative service. The need of the hour is that we follow the principles of rational drug use and inventory management techniques so that in the existing budget we can cater to more number of patients.

Inventory is an idle resource which is usable and has value. It may be men, money, materials, plant acquisition, spares and other stocked to meet future demand.

To minimize the inventory expenditure, the hospital may keep the medicines inventory low, but on the other hand, maximum service to the patients can not be provided and the lack of medicines for patients in critical condition may cause serious problem.

Therefore, effective inventory management is required to balance inventory expenditure against demands for medicines. The overall objective of inventory management is to achieve satisfactory level of health service while keeping inventory costs within reasonable limits.

The economic objective of medicine supply is to ensure provision of safe, effective and good quality medicines at reasonable cost.

ABC analysis can be used as one of inventory cost analysis instrument. ABC analysis is a method for dividing inventory cost into three classes based on annual expenditure on medicines purchased.

ABC analysis is an inventory application of Pareto principle. The Pareto principle states that inventory has been divided into the following categories:

Class A items may represent only about 10% of total inventory items, but they represent about 70% of the total money value.

Class B items may represent about 20% of total inventory items, and they represent about 20% of the total money value.

Class C items may represent about 70% of total inventory items, but they represent only about 10% of the total money value.

The limitation of ABC analysis is that it is based only on monetary value and cost of consumption of items. Some items of low monetary value are vital or life saving. Their importance cannot be overlooked simply because they are not in category A. Therefore, an additional parameter of assessment is their criticality by VED analysis.

In hospital inventory management, VED analysis has been commonly used together with ABC analysis. VED analysis is based on the criticality of an item. “V” is for vital items without which a hospital can not function, “E” for essential items without which a hospital can function but may affect the quality of the services, and “D” for desirable items, unavailability of which will not interfere with functioning.

AIMS AND OBJECTIVE

This study was to conducted economic analysis of FY (2013-2014) of IGGMCH with the objective –
1. Analysis of the annual drug expenditure (ADE) using ABC and VED analysis.
2. Evolution of the priority system based on the ABC – VED matrix.
3. Identification of the drug categories requiring greater supervisory monitoring.
4. Assessment of the expenditure on medicines for the current financial year (FY) 2013-14

This information is valuable to minimizing the expenses on medicines by knowing the ABC/VED classification and applying these changes for maximizing health benefit out of limited funds.

MATERIAL AND METHOD

Study was conducted in Indira Gandhi Government Medical College and Hospital Nagpur of central India, a 594 bed tertiary care hospital. The Medical store is divided into three sections: Tablet, Injection and Miscellaneous.

The medicine purchased by medical store of the hospital were either purchase on rate contract (RC) decided by state Directorate of Medical Education and Research (DMER), GF, GU, Municipal Corporation (MCGM), Deputy Director of Health Services (DDHS), Employee of State insurance Scheme (ESIC), or during emergency from local purchase (LP).

The data of annual consumption and cost on each drug from Medical store, for Financial year 2013-2014 was obtained. Annual expenditure on drugs data was collected from AO office.

ABC analysis done. The annual expenditure of each drug was calculated by multiplying unit cost by annual consumption in descending order as INR.

Cumulative cost calculated. % spend on each drug done. And divided into A= 70%, B= 20% & C= 10%.

The data was arranged in Excel sheet.

For VED criticality analysis of drug of the inventory was done where Vital-life saving-must available all time, Essential-less critical-may be available (E) and Desirable-lowest critical-absence is not detrimental to life (D).

The ABC-VED matrix (combination) was formed by cross tabulating ABC and VED. Resultant three categorise were as follows:

Category 1: AV, AE, AD, BV, CV - constant supervision needed
Category 2: BE, BD, CE - low supervision needed
Category 3: CD - lowest supervision needed

Here the first alphabet is for ABC, while the second alphabet is for VED analysis.

Results are expressed as %.
RESULTS
OPD attendance annual - 5,35,987 patients
Indoor attendance annual - 30,953 Patients
Health expenditure annual Financial Year 2013-14 – 37, 26,67, 000 (INR %)
Drug expenditure annual Financial Year 2013-2014- 1, 74, 8, 4521.14 (INR%)

The drug store of the hospital consisted of 197 total drugs including 3 sections i.e. Injection, Tablet and Miscellaneous. The total annual drug expenditure of the drug store on 197 drugs in 2013-2014 was Rs. 1, 74, 8, 4521.14 Rs.

Table 1 Section wise Expenditure in Medical Store.

<table>
<thead>
<tr>
<th>Sections</th>
<th>NO. Of Drugs</th>
<th>Total expenditure (INR)</th>
<th>Percentage of expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tablets</td>
<td>66</td>
<td>68,41,327.314</td>
<td>(39.12%)</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>51</td>
<td>12,15,344.7</td>
<td>(6.95%)</td>
</tr>
<tr>
<td>Injection</td>
<td>80</td>
<td>94,27,849.13</td>
<td>(53.92%)</td>
</tr>
<tr>
<td>Total</td>
<td>197</td>
<td>1,74,8,4521.14</td>
<td></td>
</tr>
</tbody>
</table>

There were 66 items in tablet section, 51 items in Miscellaneous section, and 80 items in injection section. Expenditure on tablet section was 68, 41, 327.314 Rs. On miscellaneous was 12, 15, 344.7 Rs and maximum expenditure was on Injection section it was 94,27,849.13.(Table 1) This is because maximum Life saving drugs, Anaesthetic many Antibiotics drugs are in the form of injections.

ABC Analysis

On ABC analysis it was found that category A consisted 26 drugs i.e.(13.19%) similarly we calculated for categories B and C which came out as, in category B 36 drugs i.e. (18.2%) and for category C 135 drugs i.e.(68.52%).

Total expenditure For 197 drugs was amounting to Rs 1,22,03,967.17 (69.79%), Rs 34,74,267.35 (19.87%) and Rs 1806286.6 (10.33%) of Annual Drug Expenditure(ADE) were found to be A, B and C category items respectively .The cut-offs were not exactly at 70/20/10%, and differed marginally, which is seen in (Table 2)

Table 2 ABC Analysis.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>NUMBER OF DRUGS</th>
<th>PERCENTAGE OF TOTAL DRUGS</th>
<th>COST (INR)</th>
<th>PERCENTAGE OF TOTAL COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>26</td>
<td>13.19%</td>
<td>1,22,03967.17</td>
<td>69.79 %</td>
</tr>
<tr>
<td>B</td>
<td>36</td>
<td>18.27%</td>
<td>34,74,267.35</td>
<td>19.87%</td>
</tr>
<tr>
<td>C</td>
<td>135</td>
<td>68.52%</td>
<td>18,06,286.6</td>
<td>10.33%</td>
</tr>
</tbody>
</table>

VED analysis

On VED analysis it was found that ,Vital drugs (V) were 60 i.e. (30.96%) , Essential drugs (E) were 79 that was (39.08%) and Desirable drugs were 58 (29.94%) were found out of 197 total drugs. On vital drugs (V) the expenditure was 1,07,75,813 (61.63%),Essential drugs (E) expenditure was 51,64,273.52 (29.53%) and on Desirable (D) expenditure was 1544434.03 (8.83%) of the total budget .(Table 3)

Table 3. VED Analysis.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>NUMBER OF DRUGS</th>
<th>PERCENTAGE OF TOTAL DRUGS</th>
<th>COST (INR)</th>
<th>PERCENTAGE OF TOTAL COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>60</td>
<td>30.96%</td>
<td>1,07,75,813.59</td>
<td>61.63%</td>
</tr>
<tr>
<td>E</td>
<td>79</td>
<td>39.08%</td>
<td>51,64,273.52</td>
<td>29.53%</td>
</tr>
<tr>
<td>D</td>
<td>58</td>
<td>29.94%</td>
<td>15,44,434.03</td>
<td>8.83%</td>
</tr>
</tbody>
</table>

ABC-VED Matrix Analysis

The table 4 was plotted for ABC-VED matrix analysis. In this table we have simplified total quantity of drugs, expenditure in INR on them and percentage expenditure for the same, for each category A, B and C. Then they were further analysed as per vital, essential and desirable. (Table 4)
The drugs were allocated to nine different subcategories (AV, AE, AD, BV, BE, BD, CV, CE and CD) using ABC-VED matrix analysis. These nine subcategories were further grouped into three main categories, categories I, II and III. There were 71 (36.04%) items in category I, 73 (37.05%) in category II and 53 (26.90) in category III. (Table 5)

Table 5 ABC- VED Matrix analysis Categories and percentages.

<table>
<thead>
<tr>
<th>Categories</th>
<th>No.of Drugs</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category III</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DISCUSSION

The present study shows that out of total 197 drugs, 26 belong to category A which consume around 70% of the total budget of the drug store. Drugs like Antibiotics (Inj Amoxicillin+clavulenic acid, ceftriaxone), ASV,IV fluids (DNS,RL,NS) streptokinase etc were included in this category. The drugs in this category includes require stringent monitoring, and have to be frequently observed to prevent locking up of capital in buffer stocks. A Category Items are seen to be of high Rupee consumption volume. “A” items usually include 10-20% of all inventory items, and account for 70% of the total Rupee consumption volume.

The other drugs were under category B which consumes 20% budget includes drugs like Tab metformin, Tab Atenolol, Inj Hydrocortisone, Tab Diclofenac sodium, Tab Lisinopril etc. These are important, but not critical, and don't pose sourcing difficulties.

The C category drugs which consumes 10% of Budget included drugs like Tab prednisolone, Tab Paracetamol, Tab. Cetirizine etc. "C" items account for 40-50% of all inventory items. Charactistically, these are standard, low-cost and readily available items.

ABC classifications allow the inventory manager to assign priorities for inventory control. Strict control needs to be kept on A and B items, with preferably low safety stock level. Taking a lenient view, the C class items can be maintained with looser control and with high safety stock level.

The ABC concept puts emphasis on the fact that every item of inventory is critical and has the potential of affecting, adversely, production, or sales to a customer or operations. The categorization helps in better control on A and B items.

In addition to other management procedures, ABC classifications can be used to design cycle counting schemes. For example, A items may be counted 3 times per year, B items 1 to 2 times, and C items only once, or not at all.

VED Analysis shows that there are 30.96% drugs in category (V) and the expenditure was 1,07,75,813.59 (61.63%) of the total budget of the pharmacy. As these are vital items, their stock outs are unacceptable. The drugs includes in this category were life saving drugs like inj. Streptokinase, Inj Calcium gluconate, Inj Neostigmine, Inj. Asv and many injectable antibiotics.

The VED analysis is done to determine the criticality of an item and its effect on production and other services. It is specially used for classification of spare parts. If a part is vital it is given V classification, if it is essential, then it is given E classification and if it is not so essential, the part is given D classification. For V items, a large stock of inventory is generally maintained, while for D items, minimum stock is enough.

The ABC-VED matrix shows that category I which includes matrices AV, AE, AD, BV and CV contains 71 drugs, the drugs like Inj. Amoxicilline +clavulenic acid, Inj. Daltaparin, Inj. Rantitidine, Inj. Gentamicin etc included in this group, category II which includes matrices BE, CE and BD contains 73 drugs e.g. Tab. metformin, Tab Carbamazepine, Tab ferrous sulphate included in this category, and Category III which includes matrix CD contains 53 drugs. Drugs like Tab. Metronidazole, Inj Distilled water, Tab B complex, etc were consider in this group.

Class I is the highest priority group, needing greatest attention. The management of class I medicines by top management would help in keeping a check on the annual budget and their availability. Moderate attention should be devoted by middle level management for class II, and the loose attention is devoted by lower level management for class III.
The results are comparable with similar studies in India with GMC Nagpur and BJMC Pune. 13.19% of the total items belonged to category A in our study; while the values were 10.76% in GMC Nagpur study, and 13.4 % in BJMC Pune. Similarly, category B (16.5%) and category C (70.1%) items were comparable with values in studies at GMC Nagpur, and our study values for Category B (18.27%) and Category C (68.52%) which were similar to GMC Nagpur study. (Table 6)

There was high variation in the percentage of vital, essential and desirable items. This could be because different institutes have different service profiles, depending on the specialty services available and differ in their policies of classifying drugs into Vital, Essential and Desirable.

Table 6: Comparision of % of items amongst various studies.

<table>
<thead>
<tr>
<th>Category</th>
<th>GMC Nagpur study</th>
<th>BJMC Pune</th>
<th>Our study</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10.76</td>
<td>13.4</td>
<td>13.19</td>
</tr>
<tr>
<td>B</td>
<td>20.63</td>
<td>16.5</td>
<td>18.27</td>
</tr>
<tr>
<td>C</td>
<td>68.61</td>
<td>70.1</td>
<td>68.52</td>
</tr>
<tr>
<td>V</td>
<td>23.76</td>
<td>50.9</td>
<td>30.96</td>
</tr>
<tr>
<td>E</td>
<td>38.12</td>
<td>40.2</td>
<td>39.08</td>
</tr>
<tr>
<td>D</td>
<td>38.12</td>
<td>8.9</td>
<td>29.94</td>
</tr>
<tr>
<td>I</td>
<td>29.15</td>
<td>57.0</td>
<td>36.04</td>
</tr>
<tr>
<td>II</td>
<td>41.26</td>
<td>35.0</td>
<td>37.05</td>
</tr>
<tr>
<td>III</td>
<td>29.59</td>
<td>8.0</td>
<td>26.90</td>
</tr>
</tbody>
</table>

CONCLUSION

From present study we may conclude that there is a need for conducting such analysis regularly, and applying the inventory management tools for effective and efficient management of the medical stores.

By classifying our Inventory into A, B, C categories we can manage our Inventory in a more productive and economic manner through relaxed controls on low valued items whilst applying more stringent controls of high valued items. This cuts down the costs involved in checking every item - every time by applying greater emphasis on key items.

The ABC principle gives us the guidance to spend most of our time and effort controlling the important few items that have the largest impact on our inventory. This focus will go a long way in keeping inventory down.
REFERENCES