

**DETERMINANTS OF MODERN TOOLS FOR MATERIAL
MANAGEMENT AT URBAN HEALTH CENTRE, GANDHIDHAM*****Bhupendra S. Modi**

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370205.**ABSTRACT**

The entire gamut of purchasing, storage, inventory control, distribution now forms a discipline called materials management; and in future, more hospitals are going to adopt material management (MM) orientation. It is the science that deals with the raw materials procurements, obtaining machines and equipments, which are necessary for the service provider and it also includes the upkeep and maintenance of the premises and making available the consumables, spares and reagents required for providing the quality services to customers by service provider. Every enterprise requires materials as inputs for providing the desired services. Hence

the success of an enterprise depend to a large extent on the efficient and judicious use and procurement of materials and other inputs. Materials management is a fundamental tool of the Business which adds value directly to the product itself. Materials management is the planning, directing, controlling the activities which are related with the materials and inventory requirements from the point of their inception to their introduction into the process. It deals with the regulating and controlling the flow of materials in relation to the changes in the variables like demand, price, availability, quality, delivery schedule etc.

KEYWORDS: Urban health centre, Inventory, Hospital formulary, Pharmacy and therapeutic committee.

INFORMATION UHC, GANDHIDHAM

The Urban Health Centre, Gandhidham is situated in the premises of Rambaugh hospital. The centre is established in the year 2011. The centre offers best possible service to the community of the area by 05 UPHCs, located in Cargo slum, Sunderpuri slum, Nagarpalika

Adipur, Rambaugh and Ganeshnagar, i.e. slum dwelling regions. Providing both clinical and also the out-reach services. Various national programmes are also implemented in the area.

UHC, Campus

Area: 0.3 Sq. KM

Location: Adipur Police Station road, Gandhidham.

Building: Single storied building with 07 Functional units, Administrative office, Doctor room, Pharmacy counter, Injection room, Vaccine store, Pathology laboratory and Community Hall.

Public health laboratory: It undertakes investigations like routine blood & urine, sugar, lipid profile, Widal, VDRL, pregnancy test, MP, etc.

Demography: Estimated total population of the service area is 247992 (estimated as per census 2011) out of which slum population is 88434, which equals to 35.70% of total population.

Other stakeholders: Sub district hospital, Private sector hospitals, Industrial workers, as Gandhidham is Industrial hub, NGOs, School and College students as 7000 students studying in Tolani Vidhya Mandir Campus, Adipur.

ACTUAL PRACTICES

Procurement: Drugs, surgical items, reagents, antiseptics, disinfectants are supplied by Gujarat Medical Service corp. Ltd. (GMSCL), Jamnagar warehouse by online indenting in E Aaushadhi program. Vaccines, School health medicine, Family planning medicine, Epidemic medicine and Reproductive child health (RCH) medicines are supplied by District Medical Store, Bhuj. Yearly indent procedure is there. Supplementary indent may be given, if required in case of all the drugs. Indent is generated on the basis of past consumption traits and practical experience of pharmacist. They are indenting 20% higher than the last year's consumption.

Indent is generated by pharmacist and endorsed by Urban health centre Medical officer. In Epidemics when there is huge demand for a particular drug is more, it is provided by district drug store. Ancillary items from the GMSCL or District store, the same is inspected by the pharmacist both in terms of number and physical condition of the packages and materials received,(against delivery challan) if any discrepancy is observed then it will be informed to

warehouse and necessary action will be taken as per instructions of GMSCL warehouse. The received material is credited in the stock register meant for it. e.g. Stock register for Tablet, Capsule, Injection, Vaccines, Surgical items, Miscellaneous items etc. For equipments and drugs not provided by GMSCL and District store, local purchase can be done, and if costing of the item is more than Rs.1000, Urban Medical officer will institute procedure for bid inviting and lower bidder will be selected.

Storage and distribution of drugs

The responsibility store keeping is lies with senior pharmacist. Material from store is issued on the request to the hospital pharmacy and nursing station for dispensing and administration, the same is debited in the respective stock register. They are keeping emergency drugs kit ready for Indoor as well as Outdoor patients, the responsibility of up keeping of this kit lies with pharmacist. Poisonous and schedule X drugs is kept in cupboard with lock and key. Black disinfectant is stored separately. Precautions were taken to store injection and ointments in a cool dry place protected from light. Room temperature and Relative humidity is recorded once in a day. Temperature should not be more than 30 degree centigrade and Relative humidity should not more than 60% for routine drugs. Hygroscopic materials they are keeping in corrugated boxes (7 ply) only, and keeping small quantity on racks as per requirement, on the upper portion of rack. Drugs should not be stored in vaccine store, except diluents of vaccines. Textile stores is regularly examined for dampness, mildew and fungus and when these are noticed they should be spread out and sun dried. A review is be made by concerned pharmacist in first week of every month to identify the medicine whose expiry date falls with in six months, hence it can be consumed or necessary arrangements can be done to transfer it to the hospital. where it is required. Following “first in first out” (FIFO) policy for all the items by keeping new stock of particular item on back side of old stock, hence front item will be moved first.

Storage of vaccine

Vaccines are stored in ILR (Ice lined refrigerator) Temperature 2-8 C° Deep freeze provision was there for formation of Ice packs. Provision of digital thermometer for measurement of temperature. Preventive maintenance of ILR/Deep freeze is carried out once in a month. Hold over time for ILR in case of power cut off is 8 to 10 hrs. Cold box with ice packs can preserve vaccines for 02 days. Temperature monitoring is done by pharmacist two times in a

day (10:00hr and 16:00hr). At district level post of technician for repair and maintenance of ILR and deep freeze. Adequate number of vaccine carrier were there for field Immunization.

Condemnation

For condemnation of drug store items a condemnation committee is to be setup, comprising of medical officers, pharmacists and nursing staff. This committee meets once in a year to review the position regarding stocking of various items of store and such items which are no longer needed or expired are condemned or disposed suitably.

Theft prevention

Provision of single entry/exit was there. Costly items kept in cupboard with lock and key. In/out register for man and material is maintained. Personnel entry is curtailed. Windows are provided with iron grills as measure of security.

Audit

Monthly physical verification is done by pharmacist against stock registers for tablets, capsules, surgical items, ointments, injections, syrup and vaccines. Audit branch of CMS will carry out stock audit i.e. cross verification of stock registers with physical availability of drugs.

Quality Assurance

Monthly random sample collection by drug inspector for analysis, and sending it to drug control Laboratory, if it does not complies with pharmacopoeial standards then it is considered not of standard quality and withdrawal is done from dispensing and marked as "Stop for patient's use". Entire stock pertaining to that B.No. is kept as rejected; and disposal is done as per standard procedure. However chances of not of standard quality is less at hospital store as GMSCL is following 100% pretesting policy before distribution. If sample failed by drug control laboratory at GMSCL level, it will not be distributed for further use, and declared as 'Not of standard quality'. In such case FDA will inform to other stake holders also, who are purchasing directly from the suppliers. Stock of 'Not of standard quality' is retained and marked as "Not Approved" with red Label. If repetitively sample failures of the particular supplier is reported, then that supplier is removed from approved vendor category and rate contract will be terminated automatically. In that case next rate contract supplier will be preferred, and if he does not acknowledge the purchase order then purchase shall be done from open market, strictly at the price mentioned for RC (Rate Contract) suppliers.

METHODOLOGY OF INVENTORY ANALYSIS

Inventory control is basically a scientific system which indicates what to order, when to order, how much to order, how often to order so that the purchasing costs and storing costs are kept as low as possible. The two basic techniques of inventory control, which can be very effectively used in the medical stores, are A-B-C analysis and V-E-D analysis. Inventory analysis helps the materials managers to exercise selective control and focus his attention only on a few important items when he is confronted with thousand of store items.

A-B-C Analysis

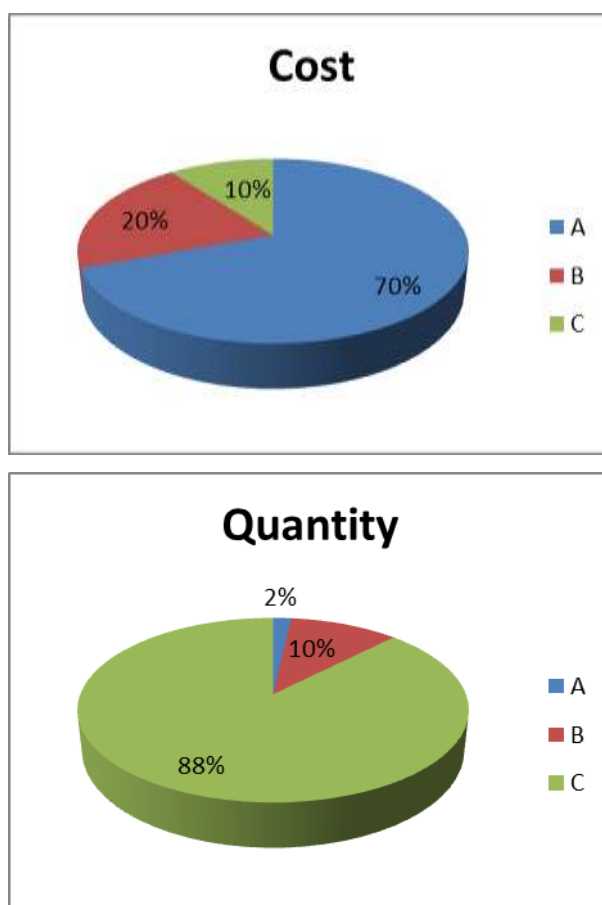
A-B-C analysis is a basic analytical management tool, which enables any store managers to provide the best result of his efforts. This analysis is purely based on Selective Management Principle or Pareto's Law. It is also popularly known as "Always Better Control", has universal application in many areas of human endeavour. A-B-C analysis does not depend on the unit cost of the items but also on its annual usage and not on their importance because all items are important. Analysts commonly classify inventory into three categories 'A', 'B', and 'C'. The 'A' items have a high annual usage in terms of monetary investment. 'B' items are average, while 'C' items have a low value of usage. Every item in inventory is ranked and listed in order of item's annual value of usage. At the top of list would be the high value items, followed by a longer list of medium value items and finally a list of low value items. The dividing line between classes of items is arbitrary.

Mechanics of A-B-C Analysis: The mechanics of classifying the items into 'A', 'B' and 'C' categories is described in the following steps:

Calculate rupee annual issues for each item in inventory by multiplying the unit cost by the number of units issued in a year. It is assumed that the issues and consumption are the same. Sort all items by rupee annual issues in descending sequence. Prepare a list from these ranked items showing item no., unit cost, annual units issued and annual rupee value of units issued. Starting at the top of the list, compute a running total, item-by-item issue value and the rupee consumption value i.e. cumulative cost of the items. Compute and print for each item the cumulative percentages for the item count and cumulative annual issue value.

Hence from the A-B-C analysis of drug list of Urban Health Centre, consisting of 226 items of store, of which there were,

Group 'A'	2 % items	70% of the total expenditure
Group 'B'	10 % items	20% of the total expenditure
Group 'C'	88 % items	10% of the total expenditure



This is how the A-B-C analysis is done for classifying the items of any drug store into Group 'A' Group 'B' and Group 'C' items.

V-E-D Analysis

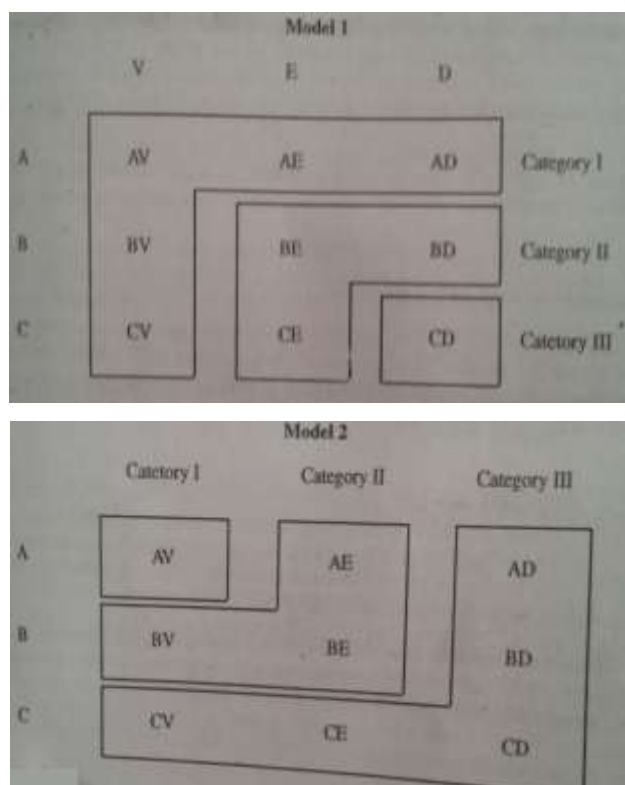
The limitation of A-B-C analysis is that it is based only on monetary value and the rate of consumption of the items. Sometimes, particularly in a hospital, an item of low monetary value and consumption (e.g. Injection Adrenaline, Anti-Snake Venom etc.) may be very vital or even life saving. Their importance cannot be overlooked simple because they do not appear in A category of inventory. Therefore, another parameter of the materials is their criticality. This could be in terms of the therapeutic value of a drug or intrinsic value of the material in achieving the objectives of hospital system. V-E-D analysis is based on critical values and shortage costs of the item. Based on their criticality, the items could be classified into three categories –Vital, Essential and Desirable.

Combination of A-B-C and V-E-D Analysis

A combination of A-B-C and V-E-D analysis can be gainfully employed to evolve a meaningful control over the material supplies particularly in a hospital system.

There are two models of this combination, which are generally in use as shown in Fig.

Models



Category I includes all vital and expensive items. These require close monitoring and strict control. Category II covers items of essential category and they are less expensive. Category III comprises the desirable and cheaper group of items.

Modern methods of Inventory control

Provision of biometric readers in drug store to restrict the entry only to the licensed professional. Inside the pharmacy additional restriction to specific drug areas by automated drug cabinets and dispensing devices, which also require another level of security such as biometric reader access or user name and password access. To prevent expiration of drugs daily reviews of expiration dates by computerized programs and physical verification. Use of automated inventory management and dispensing devices and tools for monitoring the procurement processes, which are automatic rather than manual (carousels). Carousels can be

connected to the pharmacy's drug ordering system this allows the carousel to track which drugs have been ordered so when the drug are placed into inventory, the quantities will either automatically match or show a discrepancy that needs to be investigated and resolved. For the purchase of controlled substances, supporting documentation and additional reviews are to be maintained to overcome high risk nature of these drugs. Follow Hospital Formulary. PTC is prerequisite for framing and implementation of Formulary. Formulary is framed by PTC (Pharmacy and therapeutic committee) members. When formulary is followed number of store items will be less. Formulary also enhances quality and cost of therapy. Formulary is not merely list of drugs, it also includes drug's pharmacological actions, indications, dose possible adverse drug reactions, special precaution for administration if any, drug- drug reactions, drug food reactions, therapeutic index etc. Criteria for selecting drug product manufacturer should be rigid, inspection of manufacturer's unit is essential and only after satisfactory compliance of Production facilities, Quality control facilities, Quality assurance, utility services, approval should be given to the manufacturer as Approved vendor. Web based tool for ordering and tracking shipments, replacements of inventories. The system performs tracking at the site and depot level. It eliminates the need of paper and minimizes human error. The system generates alerts when inventory drops below a predefined threshold, reducing the chances of insufficient drug supply.

OBSERVATIONS AND RECOMMENDATIONS

ABC analysis

VED analysis

Type of Item as per ABC analysis	Number of items	Contribution in Percentage	Type of Item as per VED analysis	Number of Items	Percentage Contribution
A	04	1.77%	Vital	19	8.41
B	24	10.62%	Essential	151	66.81
C	198	87.61%	Desirable	56	24.78

Categorization based on ABC and VED Analysis

Categorization based on ABC /VED Analysis	Number of Items	Contributing Percentage %
AV	0	0
AE	04	1.77
AD	0	0
BV	0	0
BE	18	7.96
BD	06	2.65
CV	19	8.41
CE	129	57.08
CD	50	22.12

From above tabulation is analyzed that, Vital items are 8.41% only, as at UPHC level we are mainly providing primary health care. We have to ensure its availability at any given point of time. We have to focus mainly on CE category for inventory control, as it is contributing 57.08% of total items and are essential. No item belongs to AV and BV category, means at UPHC level no costlier vital item, so we have to keep excess stock of CV items, as they are cheaper and vital too. Give indent requisition for the year. Percentage of A and B items are less in terms of quantity i.e. 1.77% (04 items) and 10.62% (24 items) respectively, as Urban health centre runs vaccination program and vaccines are quite costlier and its consumption rate is also high, hence 70% cost is incurred by only 04 items and considered as A items, next 20% cost is incurred by 24 items and considered as B items. Here 90% cost is incurred by 28 items falling under A and B items as per ABC analysis. Rest 10% cost is incurred by 198 items out of 226 items and contributing 87.61% of total volume of items. Demand and supply gape is all most Nil except for ointments and liquid orals. It is the advantage of central purchasing organisation.

- Here in the following table, found interesting fact that items in the following table are vital one and cheaper too, but quantity purchased for the entire year is very less, the entire cumulative cost of all these items is Rs.1721. Total population under UHC is 247992 and our targeted slum population is 88434. Here the question arises that this much quantity will be adequate for accidental future needs. We can keep these items in excess, space occupied by them will be less.

Name of the drug item	Unit cost In Rs.	Quantity purchased	Amount in Rs.
Dexamethasone Inj.Injection	2.28	250	570
Adrenaline Injection	1.52	250	380
Methyl Ergometrine Inj.	3.21	125	401
Frusemide Injection	1.48	250	370

Material management is important management tool which will be very useful for assuring the quality, quantity and economy of the hospital materials. Quality and cost are critical dimensions. As we are dealing with drugs, we have to be judicious. We can not compromise with quality of drug products considering cost factor. On the other hand we have to provide cost effective medication to our patients. Patient delight is important for survival of any organization, by observing principles of material management we can satisfy our patients up to certain extent by proving safe, cost effective and uninterrupted drugs supply. Potency of

the drug product is directly depend on the proper storage, i.e. specified temperature, relative humidity, protection from light etc. for the particular product. We have to provide medicinal supply without undue delay. By codification and proper storage methods we can assure easy accessibility of materials. Hospital Formulary is the need of hour.

Material management at both level outside i.e. purchase as well as inside the hospital i.e. storage and distribution system needs attention. Efficacy of the product is dependent on proper method of administration, dosage, frequency, vehicle, time of administration. Patient's counselling and coordination between Doctors, Pharmacist and Nursing staff plays great role in it. The procurement of sterile and non sterile pharmaceutical products in a hospital is related to the requirements of the hospital in a given period of time. Since procurement is to be rated to the future demand, a correct estimation of future demand called forecasting is necessary.

It can be estimated judgments based on experience that will be required of a particular pharmaceutical product.

The past consumption pattern of hospital is extended to the future by constructing a time series and extrapolating it. Casual models should also be adopted. e.g. demand of antibiotics is related to the total number of patients with Infections amenable to that antibiotic admitted every month etc., regression analysis is used to arrive at an estimate.

➤ MCR (Monthly consumption rate) should not be taken into consideration for vital items.

Inflammable material like gauze, cotton/bandage, cotton wool etc stored along with drugs. It is better to store it in a separate place. In store exhaust provision was not there, it should be provided for better circulation of air.

Height of ceiling in drug store was 11 feet from floor, it should be at least 20 feet from floor, alternatively false ceiling should be there, for prevention of heat. Storage of surgical gloves and other rubber items was not proper. The melting point of rubber being low, high temperature tends to destruction, it is essential to store rubber gloves at a temperature of about 27 degree Celsius and to achieve it cool and dark place is required.

ABC and VED methods for inventory control is not followed in my study centre, However they are keeping adequate stock of emergency items. As per ABC analysis 'A' items are of

highest value and required in large number/quantity, they should be purchased more frequently as and when indicated by the stocked reaching the re-order level, for C items it is better to order the requirement annually. List of Vital, Essential and Desirable items was not there, it should be prepared by consulting a team of doctors and should be revised at least once in a year. After ABC and VED analysis they should be correlated to work out the level of reserve and safety stocks. After analysing the item in terms of ABC/VED, proper inventory levels should be fixed for items falling in different classifications. Full use of available accommodation was not there in store, one way of doing this would be to provide shelves up to a greater height. Bottles, medicines with bigger packing's and fast moving items should be stored in lower portion of the shelves. Items which are light in weight and requiring more space should be stored in upper portion of shelves. Lead time for all categories of items should be calculated.

Work out the safety stock for each item, safety stock is the quantity of stores set apart as insurance against the variations in demand during the lead time. Reorder level, denotes the stock levels at which fresh order has to be placed; this is the sum of the safety stock and the consumption during lead time, to prevent out of stock crisis.

In store number of tablet blisters were found, i.e. out of carton, may lead to deterioration and contamination. After issue remaining material should be placed in the original carton of that particular product.

Glass of windows of store were transparent, it can be provided with amber colour glass to provide protection against sun light.

As per standards laid down by National Board of Accreditation (NABH) 4th edition December 2015, entire chapter is given on management of medication (MOM), considering its importance. Principles of Material management had direct bearing on any form of organization either government, private, corporate, trust, small or large scale hospitals and even in our day to day life. Store in charge has to ensure that vital items (as per VED analysis) must be present at any given period of time, as it may be matter of life and death of patient. Adequate buffer stock must be maintained for Vital items. Chief pharmacist should be cautious while giving purchase order of category AD items (as per combination of ABC and VED analysis), as these items are costlier and desirable items and may lead to blockage of investment and space. For CV type of items safety stock should be high.

Storage of drugs based on Alphabetical method is good when no. of store items are less, but in drug store Pharmacological categorization of drugs and sub classification based on alphabetical method is best to cover large number of drug items and for their easy accessibility. Patient centred pharmacy services is the need of hour as hospital services is profession not merely business and we are dealing with suffered community.

As material management ensures continuous health care services, tools of inventory control must be practiced.

- Even a common man must know the basics of material management so that he can get the best of the available resources and make it a habit to adopt the principles of material management in all our daily activities.

REFERENCES

1. Atmaram Power and Dr. R.S. Gaud, Modern Dispensing pharmacy, career publication, 2006.
2. Dr.G.Vidya Sagar, Pharmaceutical Industrial management, Pharma book syndicate, 2005.
3. Guidelines for the maintenance of central ESI medical store.
4. Dr.Mahesh D. Burande, Principles and practice of Drug store administration, Nirali Prakashan, 2007.
5. Dr. Mahesh Kulkarni, Business Accounting, career publications, 2014.
6. Mohan Singhal and Jaidev, Drug store and business management, P V books, 2011.
7. Practical manual, PGDHHM-02, Introduction to management II, IGNOU, 2001.
8. R.M. Mehta, Drug store and Business Management, Vallabh prakashan 2001.
9. S.H. Merchant, A text book of retail pharmacy management, B.S. Shah prakashan, 1988-89.
10. Sukhdev singh, Paramjit singh, Drug store Business Management, S. Dinesh and Co, 1999.