Dissertation

At

AAKASH HEALTHCARE PRIVATE LIMITED,

DWARKA, NEW DELHI

Inventory Analysis in a 230 Bedded Hospital "Aakash Healthcare" Dwarka

SUBMITTED BY

JYOTI PANDEY

(PG/16/018)

Under the guidance of

Dr Anandhi Ramachandran

Post-graduate Diploma in Hospital and Health Management

(2016-2018)

International Institute of Health Management Research, New Delhi

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Aakash Healthcare
Super Speciality Hospital
We care, He cures

AAKASH HEALTHCARE PRIVATE LIMITED
CIN No. U85100DL1994PTC063836
Registered Office:
Hospital Plot, Road No. 201, Sector-3, Dwarka, New Delhi-1
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Completion Of Dissertation From Aakash Healthcare

This Certificate is awarded to

Jyoti Pandey

In recognition of having successfully completed her
Internship in the department of
Supply Chain

and successfully completed her project on

Inventory Analysis in a 230 Bedded Hospital
From 05th Feb to 05th May

Aakash Healthcare
She comes across as a committed sincere & diligent person who has a strong drive & zeal for learning

We wish her all the best for future

Vikas Chawla
General Manager-Human Resources

Training & Development

TO WHOMSOVER IT MAY CONCERN

This is to certify that **JYOTI PANDEY** student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from International Institute of Health Management Research, New Delhi has undergone internship training at **Aakash Healthcare, Dwarka** from **5 Feb 2018** to **5 May 2018.**

The candidate has successfully carried out the study designated to him during internship training and his approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish him all success in all future endeavors.

Dr. Supten Sarbadhikari

Dean Academics and Student Affairs

IIHMR, New Delhi

Dr. Anadhi Ramachandran

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Certificate from Dissertation Advisory Committee

This is to certify that **Jyoti Pandey,** a graduate student of the **Post- Graduate Diploma in Health and Hospital Management** has worked under our guidance and supervision. He/ She is submitting this dissertation titled **"Inventory Analysis in 230 Bedded Hospital" Aakash Healthcare, Dwarka** in partial fulfillment of the requirements for the award of the **Post-Graduate Diploma in Health and Hospital Management.**

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

Dr. Anandhi Ramachandran
Associate Professor,

IIHMR Delhi

Mentor Name Karanjeet
Designation,

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Certificate of Approval

The following dissertation titled **"Inventory Analysis in 230 Bedded Hospital Aakash Healthcare, Dwarka"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

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INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH,

NEW DELHI

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled **Inventory Analysis In a 230 Bedded Hospital, Aakash Healthcare** and submitted by **Jyoti Pandey PG/16/018** under the guidance of **Dr. Anandhi Ramachandran** for award of **Postgraduate Diploma in Hospital and Health Management Of the Institute** carried out during the period from **5th Feb to 5th May** embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

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CERTIFICATE ON PLAGIARISM CHECK

Name of Student (in block letter)	Dr./Mr./Ms.: JYOTI PANDEY		
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FEEDBACK FORM

Name of the student: Jyoti Pandey

Dissertation Organization: Aakash Healthcare, Dwarka New Delhi

Area of Dissertation: Inventory Analysis

Attendance: 90 %

Objectives achieved: Smoothing of discharge process of Post discharge pharmacy sales

Deliverables:

Strengths: Job understanding, Process follow and maintaing data.

Suggestions for improvement: Medical audits.

Suggestion for institute (course curriculum, industry interaction, placement, alumni):

0601 Dr. RANVIR S. SALUJA.

Signature of the Officer-in –Charge

Date: 14/5/18

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First of all, I would like to thank **Dr. Aashish Chaudhary(MD)** and **Vikas Chawla**(HR Head) for providing me such a great opportunity i.e. training opportunity in a reputed & prestigious hospital like **Aakash Healthcare Limited**.

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Jyoti Pandey

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LIST OF ABBREVIATIONS

SCM – Supply Chain Management

FSN- Fast, Slow and Non Moving

ABC-Always Better Control

ROL – Re-order Level

EHC– Executive Health Checkup

BMW – Biomedical Waste

IP – In Patient

ICU – Intensive Care Unit

NICU – Neo natal ICU

PICU – Pediatric ICU

OPD – Out Patient Department

HK – Housekeeping

CSSD – Central Sterile Supply Department

PTS - Pneumatic Tube System

GDP – Gross Domestic Product

OVERVIEW OF THE ORGANISATION

Aakash Healthcare at Dwarka is the flagship hospital of the Aakash Group, which heralds the group's noble intention to enter the healthcare space. This hospital has been planned and designed as a 230 bedded tertiary care multi-specialty facility and has commissioned 100 beds in the first phase.

The Aakash Hospital is constructed across a sprawling 1.3-acre campus which is 230 bedded having 08 OTs, 70 Medical & Surgical Critical Care, 15 bedded dialysis unit and easily accessible from Delhi, Gurgaon and the Bahadurgarh.

VISION

To become the most desired healthcare brand by providing compassionate, caring and world class services with the help of talented team of doctors, professional and latest technology.

MISSION

To achieve highest patient satisfaction index by delivering patient centric, best healthcare services amongst the local and extended community.

CORE VALUES:

ICARE: I- integrity, C- Compassion, Accountability, R- Respect, E-Excellence

SPECIALITIES

Key Specialities

1. Orthopaedics & Joint Replacement
2. Cardiology & Cardiac Surgery
3. Mother & Child
4. General & Minimal Access Surgery
5. Opthalmology& Refractive Surgery
6. Nephrology

Other Specialities

1. Anaesthesiology & Pain Management
2. Blood Bank & Transfusion Medicine
3. Critical Care
4. Dentistry
5. Dermatology
6. Endocrinology
7. ENT
8. Gastroenterology
9. G I Surgery
10. Hearing & Speech
11. Internal Medicine
12. Interventional Radiology
13. Lab Medicine
14. Medical Oncology
15. Neurology
16. Neuro Surgery
17. Physiotherapy & Rehabilitation
18. Plastic & Cosmetic Surgery
19. Preventive Health Check up
20. Pulmonology
21. Rheumatology
22. Radiology
23. Surgical Oncology
24. Trauma & Emergency (24X7)
25. Urology
26. Vascular & Endo Vascular Surgery

DEPARTMENTAL STACKING PLANNING

S. No.	FLOOR	DEPARTMENTS
1.	Seventh	Kitchen, Cafeteria, EHC, Ophthalmology
2.	Sixth	IPD Wards
3.	Fifth	IPD Wards
4.	Fourth	IPD Wards
5.	Service	HR Office, Sales & Marketing department, Purchase department, IT department etc.
6.	Third	CCU, Cath Lab, C-Sec OT, OT Complex, LDR, Pre & Post OP
7.	Second	Relative Waiting, PICU, NICU-I, NICU-II, Nursery, ICU, SICU, Medical ICU, Laboratory
8.	First	Dialysis, Endoscopy, Gynecology, Pediatrics, MD Room, NIC, ENT
9.	Ground	OPD, Pharmacy, Cafeteria, International Waiting Lounge, ER Observation, ER-Triage
10..	Basement-1	Radiology, IP Billing, Blood Bank, Fire Pump Room, Parking
11.	Basement-2	Gas Manifold, Pharmacy, Linen & HK Stores, BMS, Data Centre, Mortuary, Change Rooms, PTS Control Room, CSSD, Parking, AC Plant/ Boiler Room
12.	Basement-3	BMW Room, Trash & Linen PTS Room, Parking

INVENTORY ANALYSIS IN AAKASH HEALTHCARE

Introduction

Inventory analysis is the examination of inventory to determine the optimum amount to keep on hand. Traditionally this has been done by balancing the costs of ordering and holding inventory (Known as the economic order quantity). Hospital uses a large number of materials, both medical and non medical. Keeping a control over the number of materials actually required vis-a vis finances involved and cost containment strategies is the key issue with the material management.

Inventory refers to the stock of all materials stored within the hospital. It may be define as "An idle resource of any kind having an economic value".

The cost involved in materials is not restricted to purchase cost only but also extends to the periods of shortage. This cost remain a hidden cost, but blocks considerably amount of fund. Such cost is known as carrying cost. In addition to the costs mentioned, the carrying, carrying costs also includes cost of deterioration. We need to maintain an inventory to minimize stock outs. In hospital situation, stock out may even mean loss of human life is not the lowest quotation. There is no substitute for sound inventory.

The importance of inventory control is much more recognized these days in every organization, its principal objectives are "to reduce investment in inventories and simultaneously minimize idle item by avoiding stock –outs and shortages." And to achieve efficiencies in areas where costs are involved. Good inventory management strategy improves the accuracy of inventory orders.

Rationale: At present, all the hospital and private hospital maintain their own inventory methods, but they are still facing problem in achieving effective inventory management. To attain the efficiency, the flow of items and materials need to be managed in all aspects to overcome the pitfalls like overstocking, expiry, shortage etc. Supply chain is the area in which alternative and compromise are not acceptable when unavailability arises. A healthcare cost is an increasing phase; organizations are pressurized to give quality of care. Health Care cost saving could be achieved by increasing the efficiency of supply chain. The goal of the hospital supply system is to ensure that there is adequate stock of the required items so that an uninterrupted supply of all essential items is maintained. To ensure that resources are judicially utilized. To reduce the investment in inventory, to avoiding undue blockade of the scarce resources and to avoid stock outs and shortages. Great inventory management will helps us to figure out how much of what item of inventory that we need. It helps to keep right amount of inventory in supply without having too much in stock. There could be serious functional dislocation of patient care services in hospital when drugs are not available even for a short period of time. If items are not available in

SCM Overview

Supply chain management can be defined as a systematic flow of materials, goods& related information among suppliers, companies, retailers and customer.A definitive objective of any powerful store network administration framework is to decrease stock (with the presumption that items are accessible when required). As an answer for fruitful production network administration, refined programming frameworks with Web interfaces are contending with Web-based application specialist co-ops (ASP) who guarantee to give part or the greater part of the SCM benefit for organizations who lease their administration.

There are three different types of flow in supply chain management

- Material flow
- Information flow
- Funds flow

Material Flow –It includes a smooth flow of an item from the producer to the customer this is possible through various warehouses among distributors, dealers, and retailers.

Information Flow - The data flow comprises the request for quotation, purchase order, transmitting requests and refreshing the status of conveyance.

Funds Flow – On the basis of invoice raised by the producer, the clients examine the order for correctness. If the claims are correct, money flows from the client to the respective producer.

There are two principle sorts of SCM programming: arranging applications and execution applications. Arranging applications utilize propelled calculations to decide the most ideal approach to take care of a request. Execution applications track the physical status of products, the administration of materials, and budgetary data including all gatherings. Some SCM applications depend on open information models that help the sharing of information both inside and outside the venture (this is known as the expanded endeavor, and incorporates key providers, producers, and end clients of a particular organization). This common information may dwell in assorted database frameworks, or information stockrooms, at a few unique locales and organizations. By sharing this information "upstream" (with an organization's providers) and "downstream" (with an organization's customers).

Key benefits of SCM:

- Improvises productivity and business functions
- Minimizes warehouse and transportation costs.
- Minimize direct & indirect costs.
- Enhances inventory management, supporting the successful execution of just in time stock models.
- Assists companies in minimizing waste, driving out costs, and achieving efficiencies throughout the supply chain management.
- Develop better customer relationship and service.
- Creates better delivery mechanisms for products and service in demand with minimum delay.

Functioning of material management

Functioning of material management is depending upon three levels:-

1 Level	Level 2	Level 3
Material Planning	Purchasing	Store & Inventory control
Estimating the individual requirement	Finalization the level of inventories & Quotations	Physical control of material
Preparing the budget	Selection of source of supply	Minimization of obsolence & damage through efficient handling
Forecasting the level of inventories	Placement of purchase order	

Table:1

Objectives:

General objective: To perform an inventory analysis and establish re-order levels for the IP pharmacy in the hospital.

Specific objectives:

- To analyze the consumption rate for the available items in the pharmacy
- To categorize the available items in the IP pharmacy based on FSN &ABC Matrix.
- To establish safety stock level, lead time and re-order level for the available items in the pharmacy.

Literature review:-

1. Nitin Gupta(1), Pushpanjali Krishnappa(2) the study was conducted in a private dental institution with the aim of evolving an inventory control plan by categorizing the materials based on ABC-VED matrix. The study analysed the annual consumption, the expenditure incurred for the dental consumables and developed a matrix based on ABC and VED analysis to narrow down the group of consumables for managerial monitoring.
   By Categorization the items based on the ABC-VED matrix model helps to narrowed down the consumables for monitoring and control strategies.

2. Lt Col R Gupta, Col KK Gupta (Retd), Brig BR Jain (Retd),Maj Gen RK Garg.
   The basic principle of inventory control is ABC based on cost criteria and VED on criticality. Based on ABC-VED matrix, economic analysis of drug expenditure of priced vocabulary of medical stores (PVMS) section 01 for the year 2003 of a 190 bedded service hospital was under taken. On coupling the two techniques ABC-VED matrix was made and drugs were classified in to Category I comprising 68 drugs, Category II 159 and Category III 98 drugs.

3. Devnani M, Gupta AK, Nigah R1 The study was conducted in the pharmacy store of Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh, based on the ABC and VED analysis items were categorized and identify the categories of items needing stringent management control. The annual consumption and expenditure incurred on each item of pharmacy for the year 2007-08 was analyzed and inventory control techniques, i.e. ABC, VED and ABC-VED matrix analysis, were applied. On ABC-VED matrix analysis, 22.09%, 54.63% and 23.28% items were found to be category I, II and III items, respectively. The ABC and VED techniques need to be adopted as a routine practice for optimal use of resources and elimination of out-of-stock situations in the hospital pharmacy.

4. R. Ramanathan "ABC inventory classification with multiple-criteria using weighted linear optimization**"** In this study materials are classified into A, B and C categories so that monitoring and controlling of the inventory is made easy. The study also focused on implementing of this technique to optimize the inventory related processes. The analysis classifies the items into three categories: the first 10-15% of the items account for approximately 70% of cumulative value (cost) (category A), 20-25% are category B items that account for a further 20% of the cumulative value and the remaining 65-70% are category C items, amounting for 10% of the total value[4,5]

5. JK Das et al conducted study on topic "Essentials of Logistics and Equipment Management" discussed the importance of inventory management technique like VED, ABC and ABC-VED Matrix. VED analysis is based on critical values and shortage cost of the item. Based on their criticality, the items could be classified into three categories: vital, essential and desirable. There could be serious functional dislocation of patient care services in hospital when vital drugs are not available even for a short period. If essential items are not available beyond a few days or a week, the functioning of the hospital can be adversely affected[7]. The shortage of desirable items would not adversely affect patient care or hospital functioning even if shortage is prolonged.

6. Rajesh Ranganathan conducted study to identify the pitfalls in the existing supply chain of private and hospital pharmacies, identify the variables that influencing more in the efficiency of the pharmacy, select the appropriate inventory analysis and suggest the prioritized inventory matrix to meet customer requirements in efficient manner. The qualitative and quantitative data has been collected through questionnaire and interview of the pharmacy personnel. Through SPSS, the normal distribution and correlation analysis to be carried out on sample data. The normal distribution and correlation analysis results shows that the variables collected through questionnaire are normally distributed and the variables that most influence the efficiency of the pharmacy supply chain. The implementation of Prioritized ABC –FSN matrix in pharmacy will helps to provide high quality service to the customer and there will be an adequate supply of the items in the Pharmacy. The ABC-FSN matrix to be adopted as a routine practice for optimal use of resources and elimination of out of stock and over stock situations in the hospital and private pharmacy.

7. Joana Isabel Baptista Nabais Nº 15000333 this project aims to analyse a hospital's inventory management and make suggestions to improve its practices, with special attention on ABC analysis as an optimization tool for the inventory management, control and storage. Other cost reductions approaches are studied in order to contribute for the accurate management of clinical consumption materials. Wide efficient use of information and communication technology (ICT), using of periodic point model, warehouse layout modification, extension of stock centralization of advanced warehouse and consignment stock development, are the key proposals. These recommended ideas can be implemented in other hospitals, reducing waste & improving levels of quality in healthcare services.

METHODOLOGY

- Study design: The study was Cross-Sectional and quantitative study was carried out, the process flow of supply chain was studied.
- Study population: Unstructured interview with the senior management staff, pharmacist, purchase manager and other hospital staff.
- Study area: Aakash healthcare, Dwarka. Location of the study was the IP Pharmacy.
- Study period: The study is conducted from 17 Dec to 17March.
- Source of data collection: Primary data was collected through observation and Secondary data was collected through the hospital information system.
- Sample size: The sample size of data was total items which include drugs consumables and general items which was consumed in three months (Dec-March) In IP pharmacy in the hospital.
- Data Analysis: The observational finding and the information collected were compiled, analyze on excel sheet as well as manually then finally a report was prepared.

Findings:

Quantification of the items required for the department

Quantification is a process that involves estimating the quantities of a specific item required to be procured for a specific period of time. Quantification involves the financial requirements needed to purchase the items, human resource capacity, storage capacity, and the capacity of the system to deliver services. The purpose of quantification is to ensure an uninterrupted supply of materials by supplying and re-stocking, while at the same time avoiding wastages due to overstocking.

The order quantity is the quantity of items that is ordered to be used in one supply period, and it depends on the length of time between orders (i.e. frequency of ordering) and average monthly consumption. If, for example, you place an order every 6 months, the quantity ordered should maintain stocks above the reserve stock level until the next supplies are received i.e. last for 6 months. To calculate the order quantity, in other words how much you need for the supply period, use the formula:

Order quantity = Time between orders x Average monthly consumption

The maximum stock level is the maximum amount of any item you should have in stock at any time. You will usually only have the maximum levels in stock just after receiving a delivery. The maximum level helps to prevent from over ordering. To calculate the maximum stock level, use the formula:

Maximum level = Reserve stock level + Order quantity for one supply period

Based on the consumption of the items by the user department, the items are quantified. The consumption of the user department is calculated based on the requisition raised for that material by the department.

Item code	Item Name	Item Description	Manufacturer	Quantity	Date

Table 2

All User Departments have given their quantities for all the materials based on their consumption pattern, based on the consumption pattern quantities are procured. .

2. Budgeting the entire requirement of Non-medical items

The process for the budgeting is as follows:

Quantity Determination – Once the quantity of the items that has to be procured for the given time period is carried out based on the consumption method for that items, the next step is the budgeting.

Budget preparation – Budget is prepared after estimating the demand of the item for the user department and base price (unit price) which the vendor quotes for the material.

Item	Unit price	No. of units	Price
			Total price

Table 3

On receiving the quantities for materials from all user departments, then quantities are multiplied with the unit price to get the total cost of the materials. After adding the tax and other components into the total price, the amount which comes out is equivalent to the budget for the procurement of material. Approval of the budget – Once the budget is prepared, it is to be approved by the GM of purchase department, then GM Finance and in the last it is to be approved and signed by the CEO of the organization.

ABC ANALYSIS:- ABC analysis is an inventory categorization method which consists in dividing items into three categories (A,B,C) It is also known as "Selective Inventory Control. " Policies based on ABC analysis:

- A Items: very tight control and accurate records
- B Items: less tightly controlled and good records
- C Items: simplest controls possible and minimal records.

The ABC analysis provides a mechanism for identifying items that will have a significant impact on overall inventory cost, while also providing a mechanism for identifying different categories of stock that will require different management and controls. ABC analysis suggests that inventories of an organization are not of equal value. Thus, the inventory is grouped into three categories (A, B, and C) in order of their estimated importance. A items are very important for an organization. Because of the high value of these A items frequent value analysis is required. B items are important, but of course less important, than A items and more important than C items. Therefore, B items are intergroup items. C items are marginally important.

FSN ANALYSIS:- In FSN analysis , items are classified according to their rate of consumption. The items are classified broadly into three groups:

F- Fast Moving, S- Slow Moving & Non Moving

FSN analysis helps a company in identification of the following:-

- The items considered to be “active” may be reviewed regularly or more frequent basis.
- The items whose stocks at hand are higher as compared to their rates of consumption.
- Non Moving items whose consumption is “nil” or almost insignificant.

ABC & FSN MATRIX:- Both ABC & FSN Analysis were tabulated in the table and further sub categorized into category I, II, III.

1.Category I composed of FA, FB, FC, NA, SA

2.Category II composed of SB, SC, NB

3. Category III includes NC.

RESULTS & DISCUSSION:

Process flow of SCM in the hospital

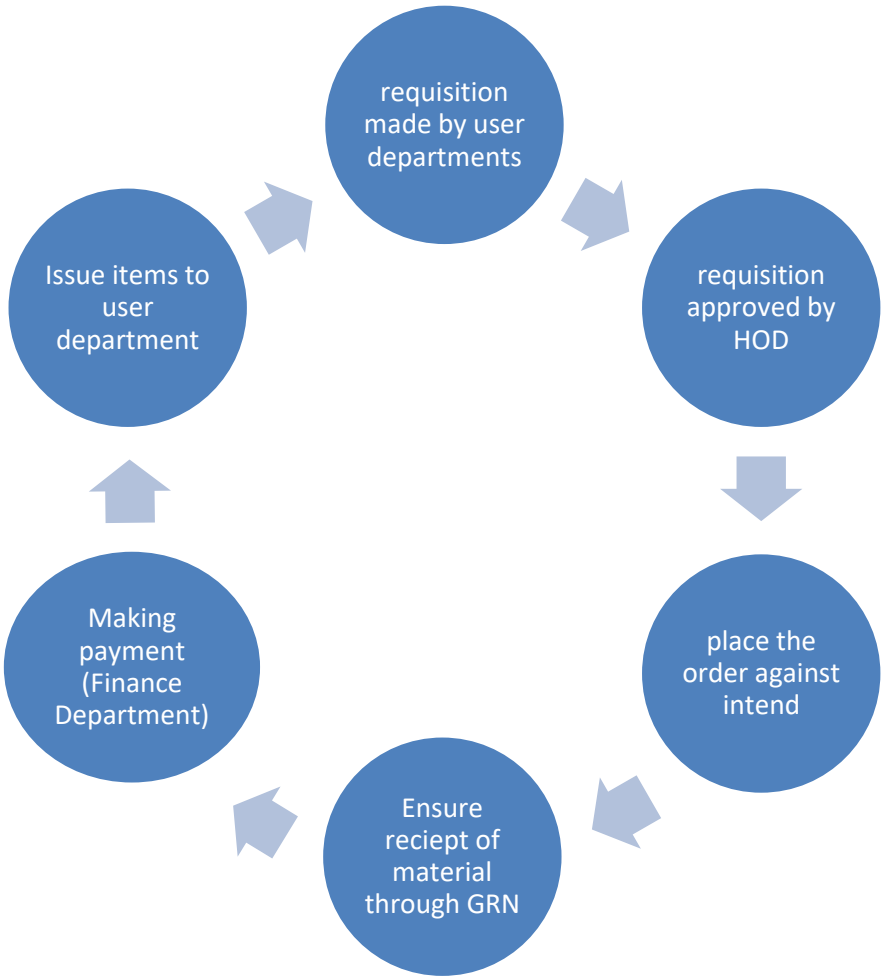


Figure: 1

Lists of few drugs:

Sr No.	Item Name	Qty	Cost Value(RS)	FSN	ABC
1	CEFTUM 500 MG TAB	1064	77954.544	F	A
2	VORIER 200MG TABLET	144	40320	S	A
3	UDILIV 300MG TAB (URSODEOXYCHOLIC) 1X15 ABBOTT	1440	32863.95	F	A
4	XARELTO 10MG TAB (RIVAROXABBAN) 1X7 ZYDUS	266	29621.76	F	A
5	MACLAR 500MG TAB (CLARITHROMYCIN) 1X10 GLENMARK	1320	26388.42	F	A
6	CEFOPRIM 500 MG TAB (CEFUROXIME AXETIL 500MG)1X4	568	23856	F	A
7	TRAJENTA 5MG TAB (LINAGLIPTIN) 1X10 BOEHRINGER	600	22616.58	F	A
8	ULTRACET TAB (ACETAMINOPHEN 325 MG + TRAMADOL HCL	2700	22560.332	F	A
9	MUCINAC TAB 600 MG (ACETYLCYSTEINE 600MG) 1×10 CIP	1980	21914.92	F	A
10	TOLVASCA 15MG TAB (TOLVAPTAN) 1X4 GLENMARK	208	19926.192	S	A
11	PANTOP 40 TAB (PANTOPRAZOLE) 1×15 ARISTO	3394	19587.728	F	A
12	AXCER 90MG TAB (TICAGRELOR) 1X14 SUN PHARMA	454	17319.966	F	A
13	NUSAM 400MG TAB (S-ADENOSYL) 1X10 SUN PHARMA	440	15239.22	F	A
14	DISPERZYME TAB (TRYPSIN 96MG+BROMELAIN 180MG+RUTO	280	14740.6	F	A
15	AZEE 500 MG TAB (AZITHROMYCIN) 1X5 CIPLA	1040	13696.32	F	A
16	RIFAGUT 400 MG TAB (RIFAXIMIN) 1X10 SUN	620	12380.78	F	A
17	TELMA 40 MG TAB (TELMISARTAN) 1X30 GLENMARK	2100	11210.04	F	A
18	ESLO 5MG TAB (S AMLODIPINE) 1X15 ZUVENTIS	1470	10120.95	F	A
19	ATORLIP 20MG TAB (ATORVASTATIN) 1X15 CIPLA LTD	1280	9573.3	F	A
20	NIKORAN 5MG TAB (NICORANDIL)1X1 TORRENT	50	8747.3	N	A

21	MISOPROST 200MG TAB (MISOPROSTOL) 1X4 CIPLA	774	8721.45	F	A
22	KETOADD TABLET (KETOANALOGUES+ESSENTIAL AMINO ACI	760	8634.8	F	A
23	TORLEVA 500MG TAB (LEVETIRACETAM) 1X10 TORRENT	880	8265.42	F	A
24	DUPHASTON 10MG TAB (DYDROGESTERONE) 1X10 ABBOTT	200	8126.76	S	A
25	STROCIT PLUS TAB (PIRACETAM+) 1X10 PURE&CURE	180	7776.44	S	A
26	ATORLIP 40MG TAB (ATORVASTATIN 40 MG) 1X10 CIPLA L	730	7765.4	F	A
27	FOLVITE 5MG TAB (FOLIC ACID) 1X45 PFIZER	6480	7254.63	F	A
28	MONTAIR LC TABLET (MONTELUKAST SODIUM 10MG+LEVOCET	1060	7039.46	F	A
29	AB PHYLLINE SR 200MG CAP (ACEBROPHYLLIN 200 MG) 1X	520	6515.24	F	A
30	CHYMORAL FORTE TAB (TRYPSIN-CHYMOTRYPSIN+) 1X20 TO	520	6307.04	F	A
31	ALLEGRA 120MG TAB (FEXOFENADINE) 1X10 SANOFI	560	6068.88	F	A
32	MINIPRESS XL 5MG TAB (PRAZOSIN 5MG) 1X30 PFIZER	600	6008.22	F	A
33	GEFTINAT 250MG TAB (GEFITINIB) 1X30 NATCO	2	5999.996	N	A
34	SHELCAL 500MG TAB (CAL.CARBONATE+) 1X15 TORRENT	1530	5964.81	F	A
35	THRIZE TABLET (TRYPSIN 48 MG + BROMELAIN 90 MG +	340	5916.48	F	A
36	TAXIM O 200MG TAB (CEFIXIME 200 MG) 1X10 ALKEM	740	5494.16	F	A
37	ALLEGRA 180MG TAB (FEXOFENADINE) 1X10 SANOFI	440	5465.24	F	A
38	SUSTEN SR 300MG TAB (PROGESTERONE) 1X10 SUN	144	5336.37	S	A
39	SIGNOFLAM 325MG TAB (PCM+) 1X10 LUPIN	800	5332.32	F	A
40	SILOFAST 8MG CAP (SILODOSIN) 1X15 CIPLA	330	5140.08	F	A
41	OROFER XT TAB (IRON+) 1X10 EMCURE PHARMACEUTICALS	540	5040.7	F	A
42	RIFAGUT 550 MG TAB (RIFAXIMIN) 1X10 SUN	200	5038.2	S	A
43	MATILDA FORTE TAB (MECOBALAMIN 1500MCG+ALPHA LIPOI	390	4979.52	F	A
44	URISPAS 200MG TAB (FLAVOXATE) 1X15 WALTER	330	4761.63	F	A
45	ROSUVAS 20 MG TAB (ROSUVASTATIN) 1X10 SUN	220	4760	S	A

46	MONTAIR FX TAB (MONTELUKAST 10MG+FEXOFENADINE HCL	560	4758.04	F	A
47	TELMA H 40MG TAB (TELMISARTAN+) 1X30 GLENMARK	480	4723.2	F	A
48	JANUMET 50MG/500 TAB (SITAGLIPTIN+) 1X15 MSD	240	4704	F	A
49	LEVIPIL 1GM TAB (LEVETIRACETAM) 1X10 SUN PHARMA	260	4653.52	F	A
50	ECONORM 250MG CAP (SACCHAROMYCES BOULARDII 250MG)	196	4617.76	S	A
51	DOLO 650MG TAB (PCM) 1X15 MICRO	3720	4585.088	F	A
52	ROSUVAS 10MG TAB (ROSUVASTATIN) 1X15 SUN	420	4505.76	F	A
53	UNICONTIN E 400MG TAB (THEOPHYLLINE CR) 1X 10 MODI	400	4504.98	F	A
54	NEO-MERCAZOLE 10MG TAB (CARBIMAZOLE) 1X1 ABBOTT	14	4382.006	N	A
55	ENDOBLOC 5MG TAB (AMBRISENTAN) 1x10 CIPLA LTD	40	4245.44	N	A
56	HEPTRAL 400MG TAB (ADEMETTIONINE)1X10 ABBOTT	60	4214.4	N	A
57	ROSUVA GOLD 20MG TAB (ROSUVASTATIN+) 1x10 RANBAXY	220	4204.8	S	A
58	STAFCURE CV 500MG TAB (CEFUROXIME+) 1X6 MACLEODS	108	4190.4	S	A
59	STARFLU 75MG CAP (OSELTAMIVIR)1X10 STRIDES	110	4177.8	S	A
60	EPTOIN 100MG TAB (PHENYTOIN) 1X120 ABBOTT	28	4148.928	N	A
61	ATORLIP 80MG TAB (ATORVASTATIN) 1x7 CIPLA LTD	294	4124.526	F	A
62	VERTIN 16MG TAB (BETAHISTINE) 1X15 ABBOTT	420	4116.21	F	A
63	GALVUS MET 50/1000MG TAB (VILDAGLIPTIN 50MG+METFOR	180	4105.44	S	A
64	THYROX 100MCG TAB (THYROXINE) 1X100 MACLEODS	44	4095.272	N	A
65	IVABEAT 5MG TAB (IVABRADINE) 1x10 CIPLA LTD	440	4076.6	F	A
66	JANUVIA 100MG TAB (SITAGLIPTIN) 1X7 MSD	112	4027.856	S	A
67	RECLIDE XR 60 MG TAB (GLICLAZIDE 60MG)1X10	440	4004.44	F	A
68	TELMA H 80MG TAB (TELMISARTAN+) 1X30 GLENMARK	240	3923.28	S	A
69	ADVENT 625MG TAB (AMOXYCILLIN 500 MG+POTASSIUM CLA	440	3855.28	F	A
70	GEMER 2MG TAB (GLIMEPRIDE2 MG	530	3800.27	F	A

Total 2599 items available in IP Pharmacy, out of total 1654 items belongs to drugs category, 929 items belongs to medical consumables and 16 items are general items.

The drug is further divided into two category –(1) Drugs (2) Other drugs

Total 778 Items belongs to drugs Category which includes only capsule and tablets. Remaining drugs belongs to other drug which includes- Inhaler, Injections, Ointment, Cream, Spray, Powder, Drop, Syrup and Gel.

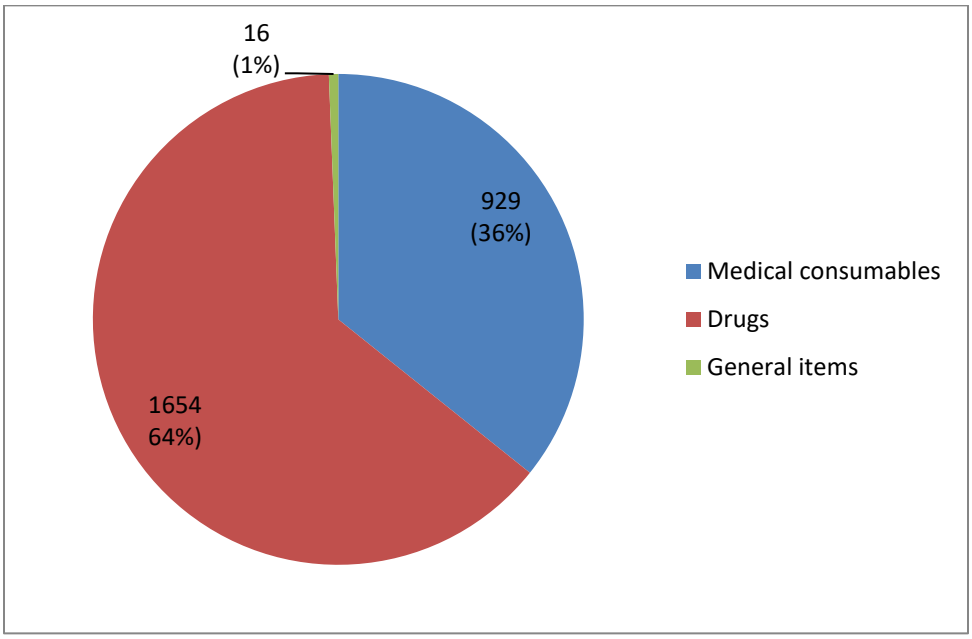
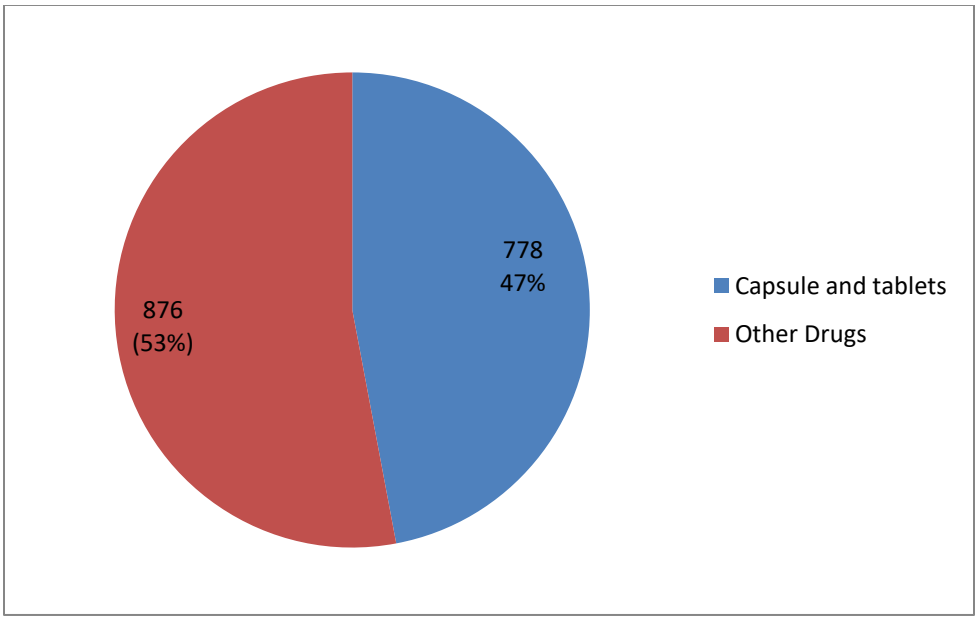


Figure:2



` Figure:3

ABC Analysis: For ABC analysis, the consumption of all the drugs cost was calculated and multiplying unit cost by annual consumption and resulting figures were arranged in descending order of rupee value. The drugs then classified into A B,C categories according to total cost consumed 70 %, 20 %, and 10 %

FSN Analysis: for FSN analysis, the consumption of all the drugs quantity was calculated and divided by the total quantity of the items and resulting figures are arranged in descending order and classified them.

Drugs: (Capsule & Tablet)

Category	No. of items	%of items	Value In RS	%value
A	101	13%	807705.8	70%
B	182	23%	223694.1	19%
C	495	64%	115770.1	10%
Total	778	100%	1147170	100%

Table:4

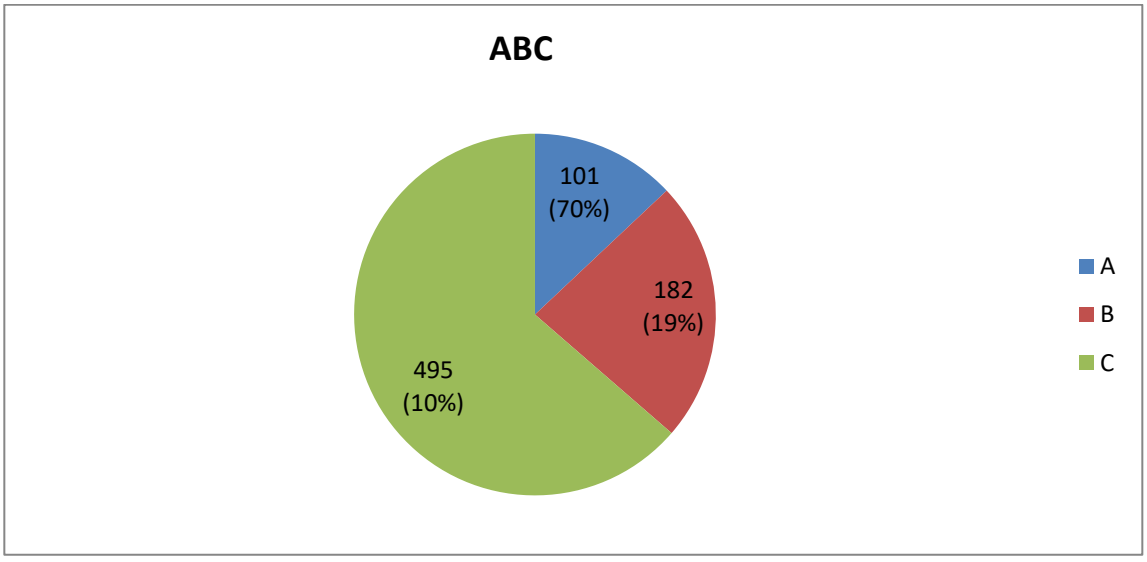


Figure:4

Category	No. of items	%of items	Value In Rs	%value
F	135	17%	681993.7	59%
S	196	25%	281827.6	25%
N	447	57%	183348.7	16%
Total	778	100%	1147170	100%

Table:5

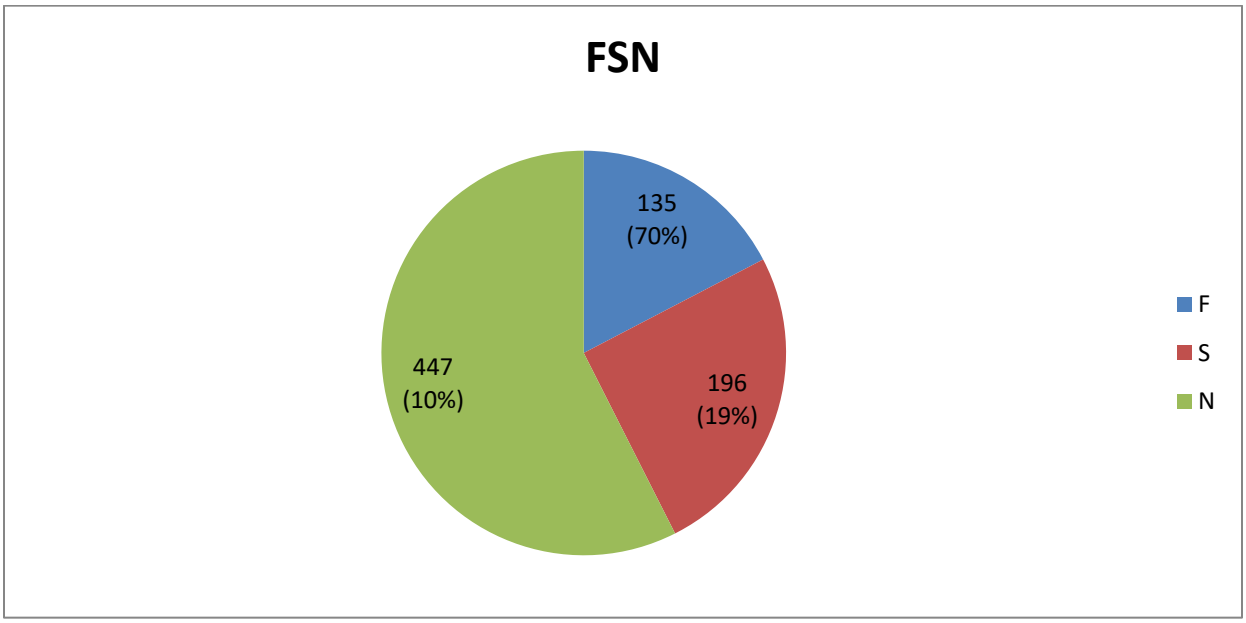


Figure: 5

Iterpretation: In ABC analysis out of 778 items listed around 13% of the materials were found to consume 70% of the cost (101items) and classified as A category. Another 23% of the materials (182items) consumed 19% B Category. While remaining 64% of materials 495 items consumed 10% of the cost. Same as in FSN analysis out of 778 items around 17% of the items were found account for 70% (135 items) movement and classified as fast moving drugs, another 25% of the items were found (196 items) 19% of the consumption remaining 57%(447) account for 10% of consumption.

	A				B				C			
Category	**No. of items**	**%of items**	**Value(RS)**	**%value**	**No. of items**	**%of items**	**Value(RS)**	**%value**	**No. of items**	**%of items**	**Value**	**%value**
F	63	62%	599198	74%	55	30%	75863	34%	17	3%	6932	6%
S	26	26%	157098	19%	84	46%	99115	44%	86	17%	25615	22%
N	12	12%	51410	6%	43	24%	48716	22%	392	79%	83223	72%
Total	101	100%	807706	100%	182	100%	223694	100%	495	100%	115770	100%

Table:6

	A	**B**	**C**
F	63(74%)	55(34%)	17(6%)
S	2619%)	84(86%)	86(22%)
N	12(6%)	43(22%)	392(72%)

Table:7

	Category 1
	Category 2
	category 3

Other Drugs: Includes- Inhaler, Injections, Ointment, Cream, Spray, Powder, Drop, Syrup and Gel etc.

Category	No. of items	%of items	value in Rs	%value
A	69	8%	2986166.5	72%
B	154	18%	803839.2	19%
C	653	75%	337142.49	8%
Total	876	100%	4127148.2	100%

Table:8

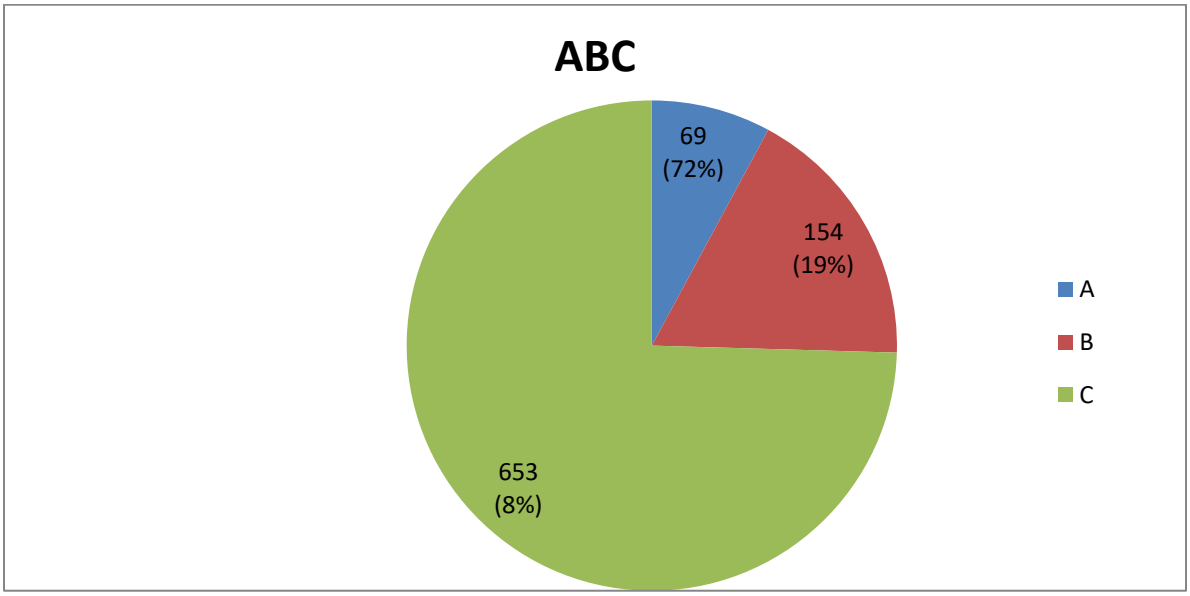


Figure:6

Category	No. of items	%of items	value in RS	%value
F	60	7%	1375284	33%
S	113	13%	1301100	32%
N	703	80%	1450763	35%
Total	876	100%	4127148	100%

Table:9

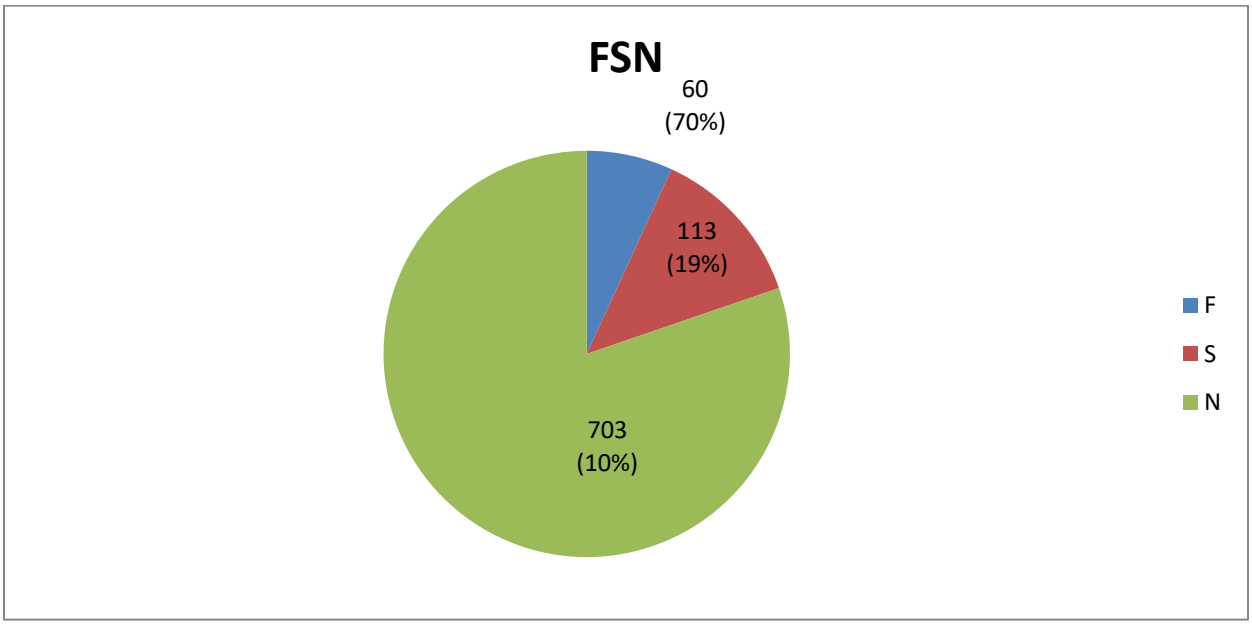


Figure:7

Interpretation: In ABC analysis out of 876 items listed around 8% of the materials were found to consume 72% of the cost (69items) and classified as A category. Another 18% of the materials (154 items) consumed 19% B Category. While remaining 75% of materials 495 items consumed 10% of the cost. Same as in FSN around 7% of the items were found account for 70% (60 items) movement and classified as fast moving drugs, another 13% of the items were found (113items) 19% of the consumption remaining 80%(703) account for 10% of consumption.

	A				B				C			
Category	**No. of items**	**%of items**	**value**	**%value**	**No. of items**	**%of items**	**value**	**%value**	**No. of items**	**%of items**	**Value**	**%value**
F	27	39%	1197335	40%	28	18%	171852	21%	5	1%	6096.882	2%
S	25	36%	1050677	35%	44	29%	203652	25%	44	7%	46771.31	14%
N	17	25%	738154	25%	82	53%	428335	53%	604	92%	284274.3	84%
Total	69	100%	2986167	100%	154	100%	803839	100%	65300%	100%	337142.5	100%

Table:10

	A	**B**	**C**
F	27(40%)	28(21%)	5(2%)
S	25(35%)	44(25%)	44(14%)
N	17(25%)	82(53%)	604(84%)

Table:11

	Category I
	Category II
	Category III

Medical Consumables

Category	No. of items	%of items	value in Rs	%value
A	122	13%	2647071	70%
B	176	19%	732068	19%
C	631	68%	380611	10%
Total	929	100%	3759750	100%

Table:12

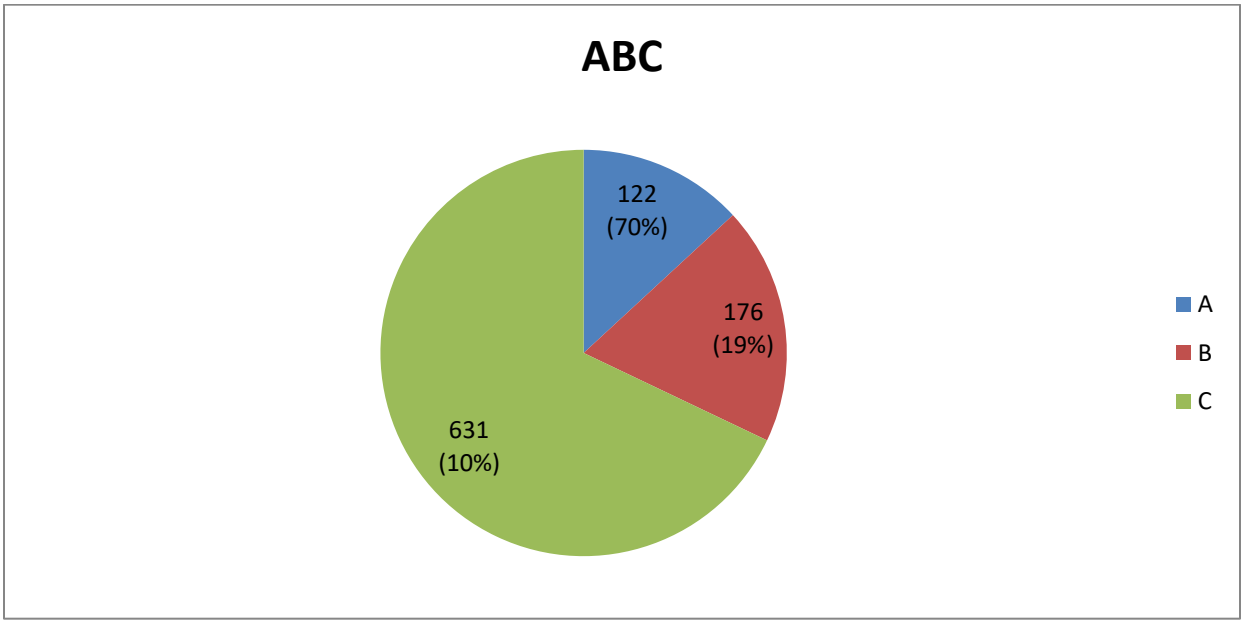


Figure:8

Category	No. of items	%of items	value	%value
F	15	2%	468916.8	12%
S	45	5%	893729.6	24%
N	869	94%	2397104	64%
Total	929	100%	3759750	100%

Table:13

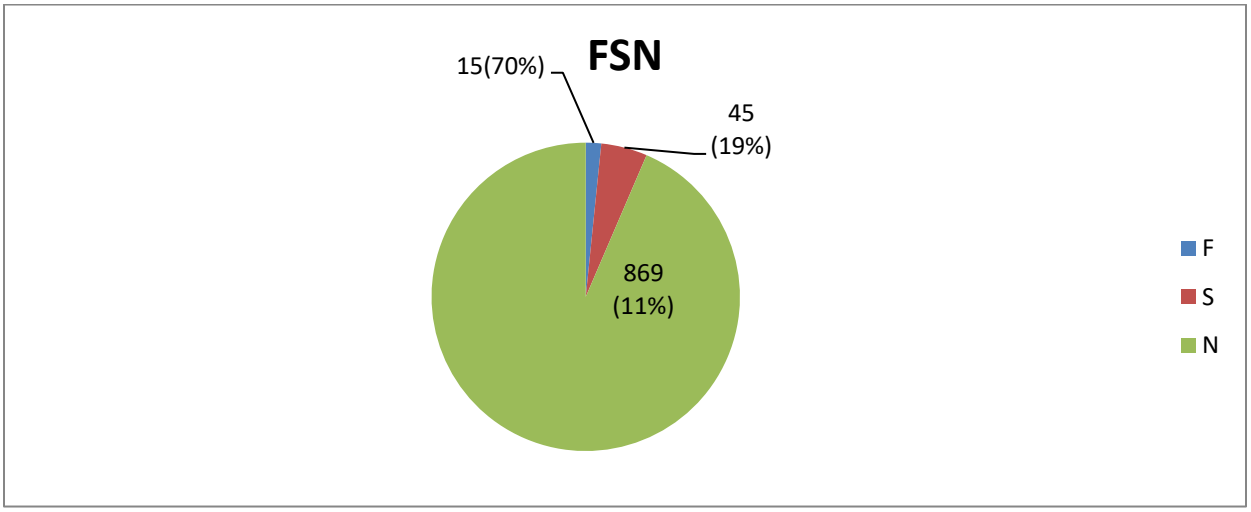


Figure:9

	A				B				C			
Category	**No. of items**	**%of items**	**value**	**%value**	**No. of items**	**%of items**	**value**	**%value**	**No. of items**	**%of items**	**Value**	**%value**
F	13	11%	459549	17%	2	1%	9368	7%	0	0%	0	0%

S	28	23%	823822	31%	12	7%	63447	46%	5	1%	6460.083	2%
N	81	66%	1363701	52%	162	92%	65925	48%	626	99%	374150.9	98%
Total	122	100%	2647071	100%	176	100%	138741	100%	631	100%	380611	100%

Interpretation: In ABC analysis out of 929 items listed around 13% of the materials were found to consume 70% of the cost (122items) and classified as A category. Another 19% of the materials (176 items) consumed 19% B Category. While remaining 68% of materials(632 items) consumed 10% of the cost. Same as in FSN around 2% of the items were found account for 70% (15 items) movement and classified as fast moving drugs, another 5% of the items were found (45items) 19% of the consumption remaining 94%(869) account for 11% of consumption.

Table:14

	A	B	C
F	13(17%)	2(7%)	0(0%)
S	28(31%)	12(46%)	5(2%)
N	81(52%)	162(48%)	626(98%)

	Category 1
	Category 2
	category 3

Table:15

General Items

Category	No. of items	%of items	value	%value
A	1	6%	21046.4	75%
B	2	13%	4290.8	15%
C	13	81%	2641.7	9%
Total	16	100%	27979.0	100%

Table:16

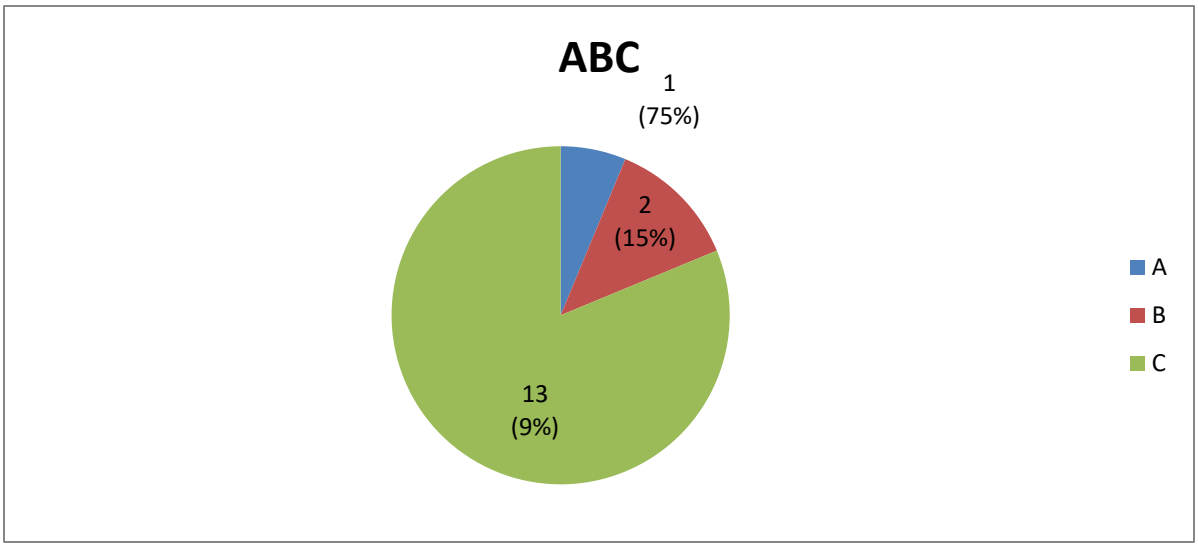


Figure:10

Category	No. of items	%of items	value	%value
F	2	13%	22259.6	80%
S	3	19%	1233.5	4%
N	11	69%	4305.8	15%
Total	16	100%	27799	100%

Table:17

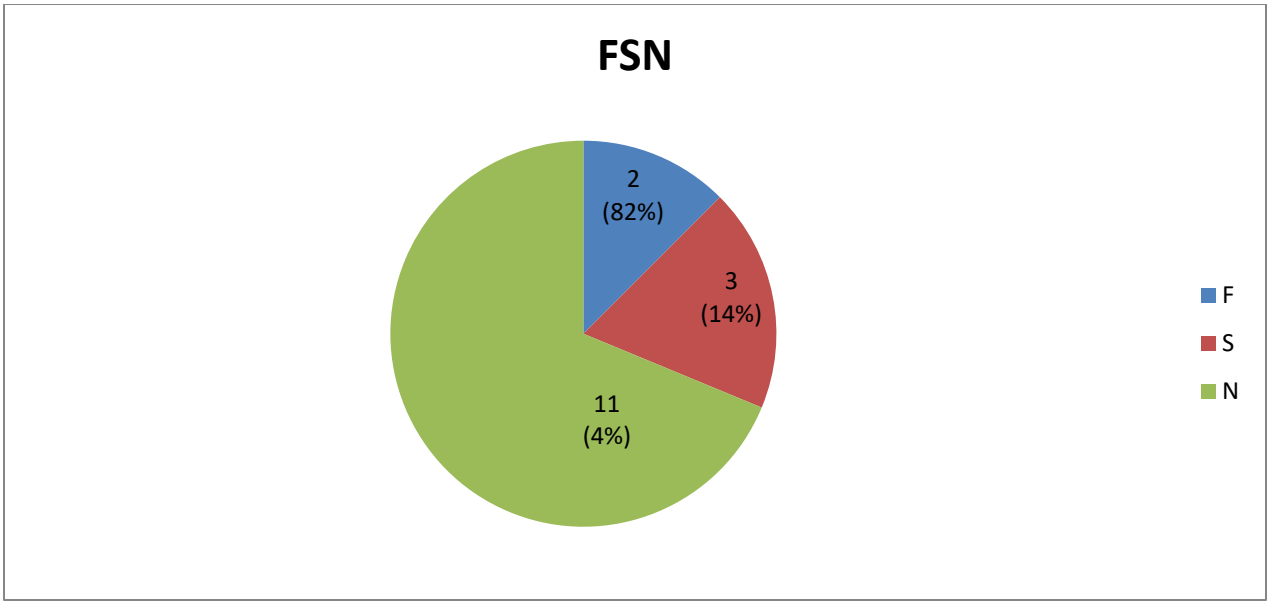


Figure:11

Interpretation: In ABC analysis out of 16 items listed around 6% of the materials were found to consume 75% of the cost (1items) and classified as A category as shown figure.8. Another 13% of the materials (2 items) consumed 15% B Category. While remaining 81% of materials (13items) consumed 9% of the cost. Same as in FSN around 13% of the items were found account for 82% (2items) movement and classified as fast moving drugs as shown in figure.9, another 19% of the items were found (3items) 14% of the consumption remaining 69%(11) account for 4% of consumption.

	A				B				C			
Category	**No. of items**	**%of items**	**value**	**%value**	**No. of items**	**%of items**	**value**	**%value**	**No. of items**	**%of items**	**Value**	**%value**
F	1	100%	26835	100%	1	50%	1312.98	27%	0	0%	0	0%
S	0	0%	0	0%	1	50%	3640.05	73%	2	15%	1303.93	51%

N	0	0%	0	0%	0	0%	0	0%	11	85%	1233.548	49%
Total	1	100%	26835	100%	2	100%	4953.03	100%	13	100%	2537.478	100%

Table:18

	A	**B**	**C**
F	1(100%)	1(50%)	0(0%)
S	0(0%)	1(50%)	2(51%)
N	0(0%)	0(0%)	11(49%)

Table:19

	Category 1
	Category 2
	category 3

Category I: Includes all Fast moving and expensive items so strict management and regularly check required.

Category II: Includes Slow moving but expensive items so moderate management control required.

Category III: Includes Non moving & cheaper items, for this category Very low management required.

FA	Comparatively higher inventory, high safety stock & Inventories needs to be monitored on daily basis
FB	Higher inventory, high safety stock and inventory can to be reviewed regularly.
FC	Highest inventory, high safety stock, inventory can be monitored on daily basis.
SA	High inventory, low safety stock and Inventories needs to be monitored on periodically(once a week)
SB	High inventory, low safety stock and inventory can be monitored periodically (twice or once a week)

SC	Low inventory, low safety stock, inventory can be monitored once a week
NA	Low inventory, no safety stock and Inventories needs to be monitored on once a month
NB	Low inventory, no safety stock & Inventories needs to be monitored once a month or once in two month.
NC	Low inventory, no safety stock, inventory can be monitored once in three month.

Consumption rate:- The amount of material and items used in a given period of time.

$$\text{Perday Consumption} = \frac{\text{Total quantities issued in the time period}}{\text{Number of days in the time period}}$$

Reorder level (ROL): Reorder level also called the reorder point is the inventory level at which a company would place a new order for a stock. Reorder level is calculated as:

Reorder level = (Average Daily usage rate x lead time) + Safety stock

The IP Pharmacy of the hospital keep minimum stock for seven days in which safety stock keep for 3 days of per day consumption rate, the lead time is 3 days of Per day consumption and the maximum stock is kept for 21 days stock. The minimum level is the stock level that indicates you need to place an order to avoid running short of supplies.

Minimum stock level = safety stock + Stock used during lead time

Sr. no.	Item Name	Sum of Qty	per day Consumption	Max. stock	Min. stock	Safety stock.	ROL
1	HIMALAYA BABY WIPES 72S	149	1.66	34.77	11.59	4.97	9.93
2	ENSURE DIABETIC CARE CHOCOLATE POWDER 1X200GM ABB	11	0.12	2.57	0.86	0.37	0.73
3	STAYFREE SECURE 1X8PCS	39	0.43	9.10	3.03	1.30	2.60
4	MAMYPOKO PANTS SMALL 4S	19	0.21	4.43	1.48	0.63	1.27
5	STAYFREE SECURE 1X7PCS	20	0.22	4.67	1.56	0.67	1.33
6	MAMYPOKO PANTS XXL 12S	2	0.02	0.47	0.16	0.07	0.13
7	MAMYPOKO PANTS XL 5S	4	0.04	0.93	0.31	0.13	0.27
8	WHISPER CHOICE 8PCS GEN, ,NO OF 1, P& G	5	0.06	1.17	0.39	0.17	0.33
9	COCONUT OIL DABUR	1	0.01	0.23	0.08	0.03	0.07
10	GLUCON D 100GM	2	0.02	0.47	0.16	0.07	0.13
11	KOHINOOR PINK 10PCS	1	0.01	0.23	0.08	0.03	0.07
12	MAMYPOKO PANTS MEDIUM 4S	1	0.01	0.23	0.08	0.03	0.07
13	ICHTHAMMOL GLYCERIN 1X25GM AGGARWAL	1	0.01	0.23	0.08	0.03	0.07
14	VASELINE 7GM GEL	7	0.08	1.63	0.54	0.23	0.47
15	VASELINE 5 GM	3	0.03	0.70	0.23	0.10	0.20
16	ENO POUCH PLAIN GLAXOSMITHKLINE	2	0.02	0.47	0.16	0.07	0.13
		267					

CONCLUSION

The use of inventory control techniques in the 230 bedded hospital could help in bringing about substantial improvement not only in patient care but also in form of optimal use of resources. We can conclude, with the right implementation of key inventory management principles Holding cost, ordering cost, Inventory cost can be brought down to a minimum. This enables organizations with much more liquidity and hence up scaling their business, growth and expansion potential.

Supply chain management is not only a whistle blower for departments incurring high expenses but also acts as a gate keeper and safeguards the capital of organization. Cost containment is an important vertical of supply chain management and shall be given its due importance.

Recommendation:

Category	No of items	Avg. Safety stock(days)	Avg. ROL(days)
A	69	17	35
B	154	5	10
C	653	1	1

Table: 20

Interpretation: According to the table-20 data shows that the average safety stock (days) of each category is almost half of the average reorder level (days). If there is a delay in lead time or demand increases there could be chances of shortage of material or unavailability of material.

- Reduce the ROL(days) of Category A
- Increase the Safety Stock for less expensive and items with more shelf life & more consumption
- Two bin inventory controls is suggested – two bin inventory control involves the storage of goods in two bins, one of which contains working stock and other containing reserve stock. The amount of inventory kept in the reserve stock bin equals the amount the company expects to use during the ordering lead time associated with that item. To use this system, reorder stock as soon as the working stock bin empty, and replacement parts should be arrive before the reserve stock bin is empty.

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