An analysis of the Inventory Level of Consumables in the Wards of a Tertiary Care Teaching Hospital in South India

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Abstract

Material management is important and crucial for all healthcare industries because it not only deals with the financial aspects but also deals with the well-being of the hospital and quality care of the patient. Reducing inventory cost is a critical responsibility of healthcare managers in hospitals. Inventory management should be done with the help of proper value analysis. This study attempts to assess the inventory techniques and monthly maintenance figure which have contributed to efficient inventory management in a tertiary care teaching hospital.

Keywords: *Monthly Maintenance Figure, Inventory management, Material management, hospitals*

Introduction

Inventory management is a discipline primarily about specifying the shape and placement of stocked goods. It is required at different locations within a facility or within many locations of a supply network to precede the regular and planned course of production and stock of materials.

The motive behind materials administration is to achieve control over the procurement, stockpiling, retrievability, circulation, utilization and transfer of provisions and gear so as to complete the essential obligations of the association in a proficient, successful and sparing way. Materials administration looks to guarantee access to the correct materials, at the opportune time, to the perfect place, in any event at the lowest cost.[1] This study endeavors to survey two methods: Monthly maintenance figures and stock records which have added to effective administration of stock at a two thousand bedded tertiary care teaching hospital. In an investigation, it was discovered that around 33% of the annual hospital budget is spent on purchasing materials and supplies, including medicines.[2] In any tertiary care doctor's facility, roughly 33% of the annual budget is spent on purchasing materials and supplies, with prescriptions constituting a significant majority of the same.[3]

There is a requirement for sensible arranging, planning, sorting out and maintenance of the drug store and general consumables in a way that produces productive clinical services.[4] Health administrators should utilize logical low-cost strategies to boost their profits. The medicinal store is a standout amongst the most widely utilized offices of the doctor's facility and one of only a handful of zones where a lot of cash is spent on repeat purchases. These underline the requirement for arranging, planning and sorting out the medicinal stores in a way that brings efficiency in clinical and pharmaceutical services.[5] Inventory management tries

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to accomplish maximal yield with minimal venture input. Everything might be viewed as essential and there is an apparent need to supply increased services.[6] Hospital supervisors must set up proficient stock framework approaches for ordinary working conditions that additionally guarantee the clinics' capacities to take care of crisis demand conditions.[7,8] The word stock refers to any sort of asset having financial value and is maintained to satisfy the present and future needs of an organization. The hospitals have a centralized supply department where equipment and supplies are stored and from which they are distributed throughout the hospital to different units and departments. The supply department ensures the timelines, availability and safety of the supplies and equipment delivered throughout the organization directly. Store network costs devour as much as 40 % of the aggregate working spending plan, the second-biggest cost for healthcare organisations. Indeed, even little changes in production network execution can enormously affect a healthcare organisation's cot structure, lessening store network costs by as much as 10 to 12 %. This impacts the quality of patient care and the revenue costs associated with that care. Inventory optimization can account for 10% of the overall savings.[9]

This study depicts one such strategy to have better stock control over consumables at ward level. It is called Monthly Maintenance Figures, which was initially utilized in Military Clinics. Another zone of enhancing effectiveness in material administration is through enhancing turnover of stock. The general stores in the hospital under examination followed the utilization of stock and advanced another technique called stock file. The hospital has grown over the years from 950 beds to 2050 beds as of 2014, with an average bed occupancy of 1750 and an Outpatient average of 2500 patients for each day. It is indeed a test to oversee materials particularly consumables in the wards.

Methodology

Phase 1: Observation of the indenting method by the wards to the stores and collection of the data from the general stores of issued consumables materials.

Phase 2: Verifying the issued items from the wards and consumption of those consumables by the patients.

Phase 3: Verifying the bed consumption data from the Medical Records Department and analyzing the data with bed occupancy of those 3 months.

MMF (Monthly Maintenance Figure), is an inventory management technique implemented in our hospital which predicts the usage of consumables based on the consumption pattern of the previous records of the consumables at the ward level.

Previous year consumption pattern was analyzed which contained the information related to consumables issued to the wards with average bed occupancy rate of the hospital. The main objective was to analyze the inventory stock days and their holding cost, revising the MMF (monthly maintenance figure) based on the above study for **A** and **B** items in the wards.

The list of consumables with ABC analysis was analyzed and segregated. **A** and **B** items from the list were compared against the data with inventory records from the wards and stores. The data was compared retrospectively with previous two years data to obtain an average consumption for all the respective wards.

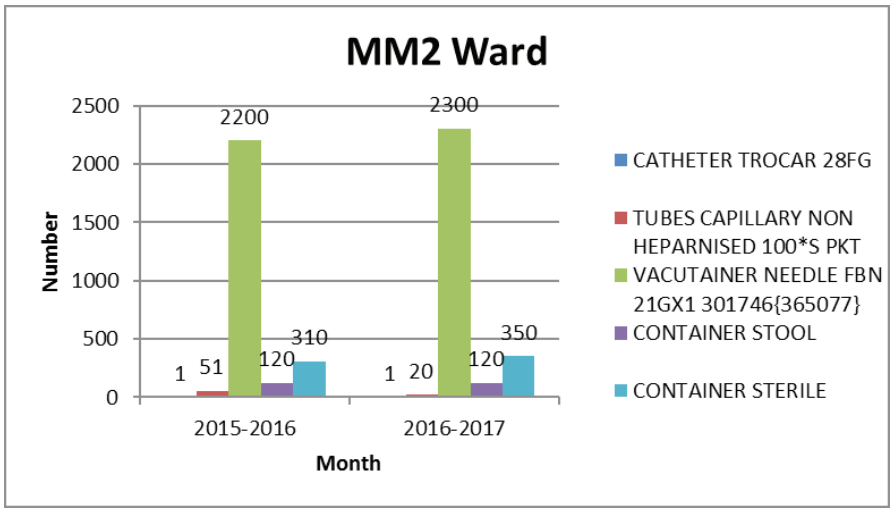
The list of consumables specifically for the month of July to September 2016-17 and July to September 2017-18 was compared. These three months were opted for because of the high purchase pattern in these three months for the respective years and also the increased bed occupancy. After taking an average, the consumption quantity of the particular item of the respective three months for both the years was given a fixed quantity, stating that the particular item is consumed not beyond the average value, and a standard deviation was fixed to the average quantity. By fixing the average consumption quantity with standard deviation, it can be assured that the consumption pattern will not cross beyond the standard deviation. After providing the consumption quantity, the cost per unit for particular item was calculated using the average quantity and the same was compared with the purchase cost of the consumables. The control measure was first implemented in the surgery and medicine wards. Based on the feedback received from these wards, the technique was later applied to rest of the wards in the hospital.

It was possible to estimate the financial resource that could be saved. For example, if the consumption of

'Airway plastic size 03' before taking average consumption and the standard deviation is 140 pieces and after taking average rounding up to 100 and S.D of 20, it can be said that the consumption of airway plastic cannot exceed 160 and go below 80 pieces. The holding stock, average consumption and standard deviation with a final value of the particular consumables was calculated for all the issued consumables to their respective wards.

Results

Comparing the stock consumption for three months (July, August, September) of consumables for 2015-16 and 2016-17, Graph no 1 shows the consumption pattern of July to September of 2015-16, consumption pattern of July to September of 2016-17 of Medicine Male 2 Ward.



Graph 1: Represents the sample of the MM 2 ward consumption pattern of the consumables of the respective 3 months (July, August, September) of 2015-16 and 2016-17.

The consumption pattern was deviating in both the years. 2200 pieces of VACUTAINER NEEDLE was consumed in the year 2015-16 and 2300 pieces in the year 2016-17, which happened to be the highest. Whereas the least consumption was the CATHETER TROCAR 28F. Similarly, there was a 12.9% increase in the consumption of sterile containers. On the other hand, stool container consumption remained constant.

Table 1 represents a sample taken from the ward consumption pattern along with mean and standard deviation. Average consumption quantity was obtained from the respective two years data and the quantity was frozen. It can be stated that the stock maintenance should not be more than or less than the standard deviation.

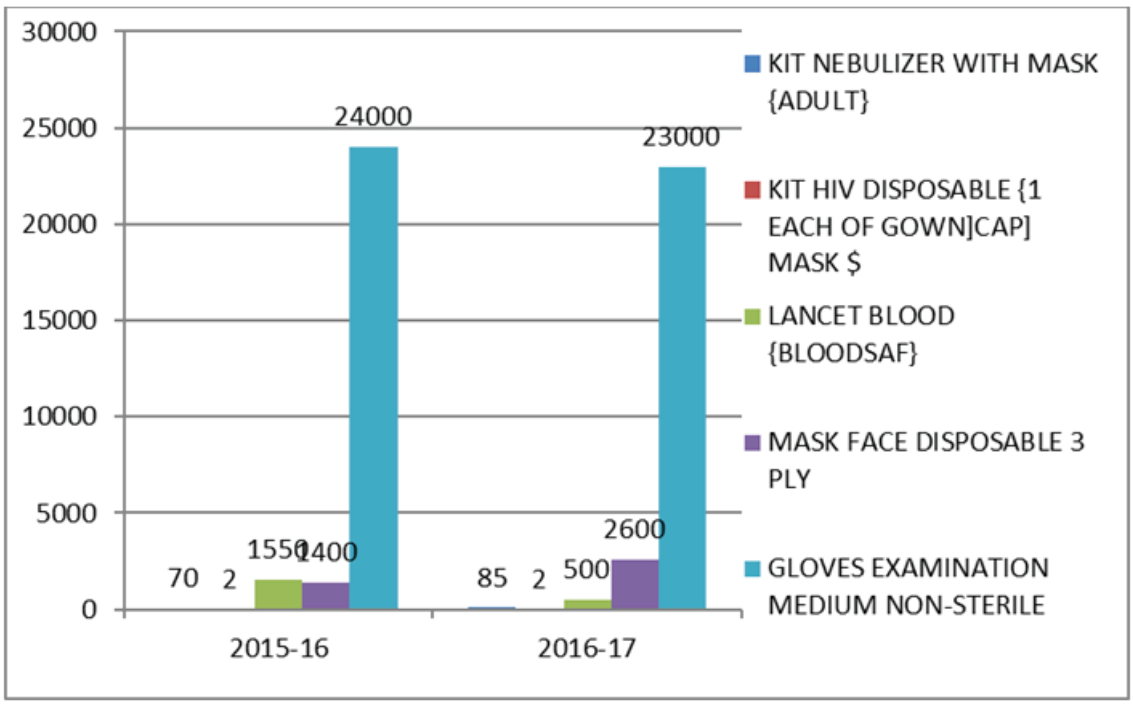
Table 1

CODE	LIST OF ITEMS	AVERAGE OF BOTH	STANDARD DEVIATION
GS CAT531	CATHETER TROCAR 28FG	1	0
GS TUB163	TUBES CAPILLARY NON-HEPARNISED 100*S PKT	35.5	±21.9
GS VAC049	VACUTAINER NEEDLE FBN 21GX1301746(365077)	883.3	430.8
GS CON206	CONTAINER STOOL	48	±37.1
GS CON309	CONTAINER STERILE	110	±20

Table 2: Calculated mean, standard deviation of a sample of consumables along with their unit cost stating the final value after revising MMF

CODE	LIST OF ITEMS	AVERAGE OF BOTH	STANDARD DEVIATION	COST/UNIT	FINAL COST
GS CAT531	CATHETER TROCAR 28FG	1	0	282.6	282.6
GS TUB163	TUBES CAPILLARY NON-HEPARNISED 100*S PKT	35.5	±21.9	1.18	41.89
GS VAC049	VACUTAINER NEEDLE FBN 21GX1301746(365077)	883.3	±430.8	4.62	4081
GS CON206	CONTAINER STOOL	48	±37.1	5.34	256.32
GS CON309	CONTAINER STERILE	110	±20	4.14	455.4

The above table shows the sample of selected consumables of Medicine Male 2 wards, where the consumption rate of Vacutainer needle FBN was highest and Catheter was the lowest among the consumables after taking the average quantity from the respective 3 months. The final value of the vacutainer needle after taking the mean was Rs. 4081/-



Graph 2

The above graph shows sample of the consumables in MF 1 WARD. Variation can be observed in consumption pattern of the respective items and holding stock. The consumption of gloves reduced by 1000 for the year 2016-17 from 24000 in 2015-16. Similarly, the use of lancets also dropped to 500 from 1550. The consumption of face mask had increased by a significant 85.71% for the year 2016-17.

Table 3

CODE	LIST OF ITEMS	AVERAGE	STANDARD DEVIATION	FINAL VALUE
GS KIT064	KIT NEBULIZER WITH MASK {ADULT}	25.83	±8.61	1714.3
GS KIT188	KIT HIV DISPOSABLE {1 EACH OF GOWN] CAP] MASK $	1.33	±0	115.42
GS LAN001	LANCET BLOOD {BLOODSAF}	512.5	±85.39	246
GS MAS018	MASK FACE DISPOSABLE 3 PLY	666.66	±258.1989	824.7
GS GLO084	GLOVES EXAMINATION MEDIUM NON-STERILE	7833.33	±1169.045	12220

Table 3 shows the sample of selected consumables of MF 1 WARD, where the consumption rate of gloves was the highest and the consumption rate of HIV disposable kit was the lowest among the consumables. After taking the average quantity from the respective 3 months, the final value of the Gloves was Rs. 12,220/-

Table 4

WARDS	BEFORE/ RUPEES	AFTER/RUPEES	SAVINGS/RUPEES
MM WARD	224795.8	78862.42	145933
MM 2 WARD	227319.13	80335.5	146983.6
MM 3 WARD	237358.07	94603.22	142754.8
MF 1 WARD	244990.24	80127.4	164862.8
MF 2 WARD	73971.6	19245.6	54726
MF 3 WARD	232311.1	75306.1	157005
SM 1 WARD	104158.2	28572.2	75586
SM 2 WARD	63222	33813.7	29405
SM 3 WARD	47495.5	14658.3	32837
SM 4 WARD	160667.5	46106.5	114561
SF 1 WARD	79496.5	25727	53768.9
SF 2 WARD	81361.8	22738.9	58622.9
SF 3 WARD	45261.8	12560.3	32701.5

Table 4 shows that after revising the MMF (monthly maintenance figure), the control measure was implemented in the surgery and medicine wards. A projected saving of Rs. 11,52,681/- per month and Rs. 45,02,724/- annually was achieved.

Discussion

Materials management is an important issue for healthcare systems because it influences clinical and financial outcomes. Reducing costs in hospital inventory management is always critical for administrators at healthcare institutions. This study attempted to assess two techniques: Monthly maintenance figures and Inventory Index which had contributed to efficient management of inventory at this medical college teaching hospital. A retrospective study was carried out in the general store of this medical college teaching hospital. The study involved perusal of records maintained in the general stores and interviews of staff in general stores, nursing staff and inventory control team. After implementing MMF, it was observed that the stock kept at the store level reduced thereby the holding value of the stock also reduced. Using similar inventory control techniques, considerable savings can be made at the ward level. In today's dynamic environment, it is imperative to manage materials efficiently. It enhances profitability and productivity. The study focuses on improving organizational efficiency and productivity by using this inventory management technique MMF (monthly maintenance figure). It suggests that administrators can use MMF as a control method to have a better control over stock outs or reduce the holding stock while perpetuating sustainability through this inventory management technique.

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Conflict of Interest - None

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