

Study on MMF and Inventory Index on Inventory Management Practices at a Medical College Teaching Hospital

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Abstract: 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 health care institutions. The study attempts to assess two techniques, Monthly maintenance figures and Inventory Index which have contributed to efficient management of Inventory at a large tertiary care teaching hospital.

Aim: To evaluate the best practices in material management at a general stores of a tertiary care teaching hospital.

Objectives:

- 1) To study the inventory management practices at the general store
- 2) To assess the impact of Monthly maintenance figures (MMF) and inventory index on Inventory management.

Methodology: Retrospective study was carried out in a general store of medical college teaching hospital. Period of study for MMF is December 2011 to September 2012 and for Inventory index, it is from April 2008 to October 2014.

Study involved perusal of records maintained at General stores and interview of staff in general stores, Nursing staff and Inventory control team.

Keywords: Inventory Management, Monthly Maintenance Figures, Inventory index

I. Introduction

Supply chain costs consume as much as 40 percent of total operating budget, the second-largest expense for hospitals after labor. Even small improvements in supply chain performance can have an enormous impact on a hospital's bottom line, helping to reduce supply chain costs by as much as 10 to 12 percent. Inventory optimization can account for 10 percent of the overall savings. (Sandy wise, 2010)

The purpose of materials management is to bring about control over the acquisition, storage, retrievability, distribution, use and disposal of supplies and equipment in order to carry out the primary responsibilities of the organization in an efficient, effective and economical manner. Materials management seeks to ensure availability of the right materials, at the right time, to the right place, at the least cost. (Gupta S, 2000)

Most hospitals have a central supply department where equipment and supplies are stored and from which they are distributed throughout the hospital to different units and departments. The timeliness, availability, and safety of the supplies and equipment delivered throughout the organization directly impact the quality of patient care and the revenues and costs associated with that care. (Blake Piro, 2010)

Such a listing of materials in terms of units required and their cost estimates would constitute the materials budget which should be prepared in consultation with nursing staff. Once this is done, it is possible at periodic intervals to carry out a budgetary appraisal and determine the variance between actuals and the budget.

Variances may result from difference in unit cost of materials and/or deviations in their usage. Reduction in variation of usage is the priority of the inventory control team.

The inventory control team is working to reduce the inventory size at the ward level. By minimizing the amount of supplies on hand and accurately tracking the orders, the size of the shipments and frequency can be controlled.

One common problem in all hospitals is nurses taking supplies out of the supply closets and not billing them or not maintaining stock use register. It is important the hospital employees to be educated on the supplies. By informing nurses, that a register has to be maintained to track use of supplies helps to avoid unauthorized usage and supplies "disappearing".

This Study describes one such method to have better inventory control over Consumables at ward level. It is called Monthly Maintenance Figures, which was originally used in Military Hospitals.

Another area of improving efficiency in material management is through improving the turnover of Inventory. The general stores in the hospital under study tracked the consumption of inventory and evolved a new method called Inventory Index.

Problem Statement

Kasturba Hospital, Manipal is a unit of Manipal University, Manipal. It has grown over the years from 950 beds to 2050 beds as on 2014, with the average occupancy touching 1750 and Outpatient Average of 2500 patients per day. It is indeed a challenge to manage materials especially consumables in wards.

Observation:

Based on data of past levels of Bed occupancy and consumption and on anticipated activity/plans, consumables and supplies to be procured can be projected ward wise. One such method was adopted in our hospital, called the Monthly Maintenance Figures (MMF). MMF is a prediction of items/consumables based on past history i.e. consumption pattern of last 6-8 months, trend factor(s), and/or known future usage of items/consumables in various wards of hospital. The inventory Control team in our hospital is responsible to prepare and maintain MMF.

Previously, once the indent was raised at ward level, an inter-office note was prepared which was handed over to general stores by housekeeping staff. The ward nurses would indent without verifying stocks in the ward. More often, this would result in overstocking at the ward level.

At the General stores also, there was no opportunity to verify stocks on real time basis before approving the indent. Also, because, the general stores had to process such indents from various other wards of the hospital, typically the turnaround time would invariably increase.

Once the indent is raised and items issued from general stores, the stock level at general stores would automatically reduce, resulting in purchasing of the said items by the general store. This created an artificial demand due to overstocking of items at ward level. Overstocking of items invariably increases the holding cost.

Also, once the items were used for patients, most of the times, nurses would miss billing the items to the patients. Some of the items which were used for teaching purpose were also not tracked. This would result in revenue leakage.

To overcome the above problem, process re-engineering was done. In the month of December 2011, stock of items present in all wards were collected and sent back to General stores. The total holding cost of items was approximately Rs 1.56 crores.

An inventory control team consisting of 6 clerical staff with experience of working in General stores was formed. The Inventory control team is responsible for the processing of indents received from the wards. Typically they are using an electronic processing method in order to take better control of stocks in ward and when they need to be replenished. This avoids frequent reprocessing and also reduces turnaround time. The goal in distribution is to have a smooth process and to reduce the amount of end-user inventories.

The inventory team will also work closely with the accounting department. The reason behind this is the inventory team wants to make sure that there is a uniform record of supplies usage. They want to monitor and record who is using what supplies in which wards. This allows for the supplies to then be correctly allocated to the correct cost account and billed either to the department(Since it is a teaching hospital, use of items for teaching purpose will be billed under general deductibles) or to the patient depending on the consumable used.

Steps for Calculation of Monthly Maintenance figures:

- Average bed occupancy for a period of 7 months was calculated from the statistics in Medical Records Department. Forecast of Occupancy was made in consultation with Administrative staff and Nursing staff.
- Consumption of items (Consumables) in wards was tracked from the indents raised at different wards and also from records in General stores for the same period. Minimum reorder & Maximum order quantity was fixed in consultation with ward nurses, Area Nursing Supervisor and Nursing Supervisor and in some cases with in charge doctors of departments. (See Table 1).
- Average Consumption of each item was matched with Average Bed occupancy for the same period.
- Implementation of the MMF at 96 wards across 9 blocks of the hospital.
- Monthly Audit of HoldingStock in wards by inventory team.
- Final Monthly compilation of reports on consumption for the ward

STOCK CONSUMPTION

Item code	Name	January	February	March	April	May	June	July	Grand Total	AVG	SD	MIN	MAX
3MI801	3M IV DRESSING 5.1cmX7.6cm ref 3522	253	435	627	809	561	666	331	3682	526.0	196.6	329.4	722.6
3WA801	3 WAY with 150cm Extn (Life Line)	21	66	122	120	260	171	136	896	128.0	76.1	51.9	204.1
3WA802	3 WAY with 10cm Extn (Life Line)	10	6	15	21	3	6	1	62	8.9	7.1	1.8	15.9
3WA804	3 WAY with 50cm Extn (Life Line)	15	10	10	21	45	36	15	152	21.7	13.6	8.1	35.3
ADR801	Adrenaline 0.1%W/V Inj	36	55	45	78	6	45	45	310	44.3	21.6	22.7	65.8
AIR001	AIRWAY PLASTIC NO 0 ROMSON	1		1		10	1	6	19	2.7	4.1	-1.4	6.8
AIR002	AIRWAY PLASTIC NO 00 ROMSON	1	1		1		1		4	0.6	0.0	0.6	0.6
AIR003	AIRWAY PLASTIC NO 1 ROMSON		1	10	21	6	3	1	42	6.0	7.7	-1.7	13.7
AIR004	AIRWAY PLASTIC NO 2 ROMSON	10	28	16	15	36	26	55	186	26.6	15.4	11.2	42.0
AIR005	AIRWAY PLASTIC NO 3 ROMSON	15	21	78	91	120	105	78	508	72.6	40.2	32.4	112.7

Table 1: Sample worksheet created for Statistical Analysis of Occupancy, Average, Standard Deviation, and Minimum & Maximum requirements

Table 1 shows sample worksheet created for Statistical Analysis of Average Bed Occupancy, Average consumption of consumables, Standard Deviation, and Minimum & Maximum requirements of consumables for a period of 7 months in the year 2014.

Inventory Index:

In order to improve the Turnover of Inventory, following methods were adopted:

- 1) Standardization of items, issues rate contract to most of the items and good vendor relationship to ensure minimum external lead time.
- 2) Close monitoring of non-moving items: all items which were not consumed within 3 months of procurement were considered as non-moving items. User departments were notified to consume such items. Negotiations were held with vendors to return the items.
- 3) Orthopedic Implants and other such consumables were procured on Consignment basis.

Inventory index is calculated by:

$$\text{Inventory Index} = \frac{\text{Average Value of Inventory/month}}{\text{Average value of consumption/ day}}$$

Average value of inventory is calculated by the formula:

$$\frac{\text{Value of Opening stock of Inventory} + \text{Value of closing stock of Inventory}}{2}$$

II. Results and Discussion:

SL.No	Months	Stock Holding Values in wards (In lakhs)	Difference in Stock holding Values in wards with MMF (In Lakhs)	ABO (Average Bed Occupancy)	% occupancy Bed
1	Dec 2011	146		1411	72%
2	Jan 2012	123	-23	1348	66%
3	Feb 2012	120	-3	1507	74%
4	Mar 2012	122	-2	1426	70%
5	April 2012	126	-4	1406	69%
6	May 2012	127	-1	1470	72%
7	June 2012	130	-3	1396	69%
8	July 2012	126	-4	1490	72%
9	August 2012	123	-3	1495	73%
10	Sept 2012	116	-7	1595	77.80%

Table 2: Difference in stock holding value in wards after the implementation of MMF

The above table shows the stock holding value in wards after implementing MMF. We can observe that after implementation of MMF, the stock kept at ward level reduced thereby the holding value of the stock is also reduced. This has resulted in considerable savings as shown in the table.

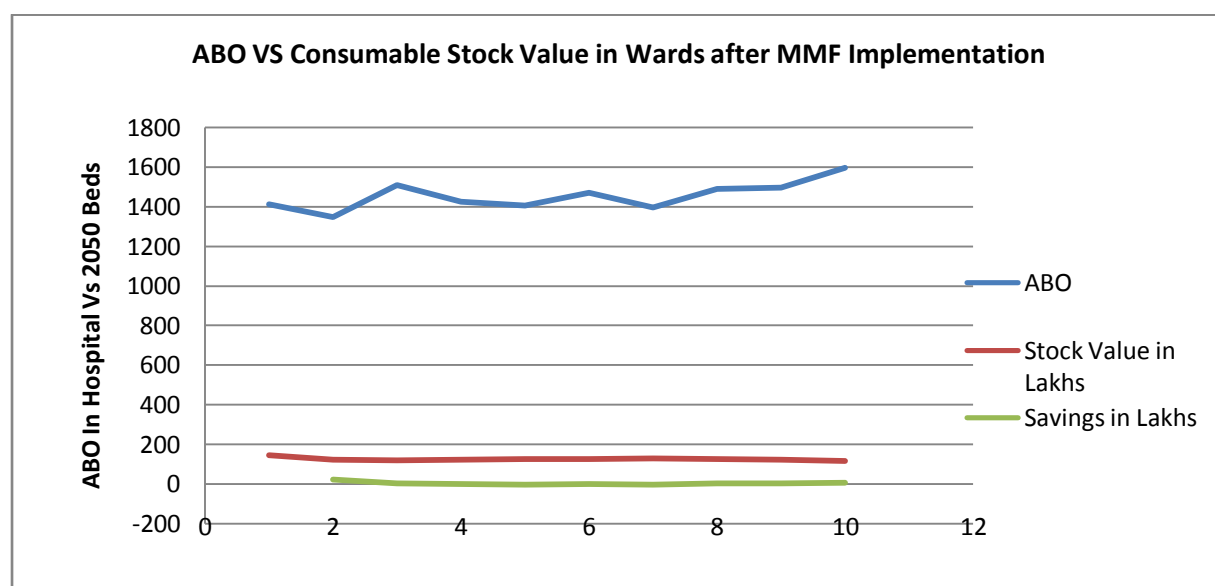


Chart 1: Consumable vs. the Average Bed Occupancy in KH after the Implementation of MMF.

Month & Year	Total opening Stock	Total Closing Stock	Average inventory	Avg.per day consumption	Inventory index.
April 02- March 03	5328671	5127758	5065798	145676.5789	35
April 03- March 04	4607547	4607174	4607360	143539.3698	32
April 04- March 05	4573280	4598368	4585824	185441.7933	25
April 05- March 06	3943784	3856603	3900194	210826.5935	18
April 06- March 07	2587087	2477963	2505660	219627.9353	11
April 07- March 08	1892238	1881871	1887055	224252.4759	8
April 08- March 09	2241476	2292071	2266774	271211.6356	8
April 09- March 10	2989531	3134263	3061897	339396.096	9
April 10- March 11	4710846	4669549	4690197	466666.9755	10
April 11- March 12	4657202	4735612	4696407	517207.609	9
April 12- March 13	4701912	4739792	4720852	628584.0947	7
April 13- March 14	4596600	4491669	4544135	788745.2917	5
April 14- October 14	3823347	3917300	3870323	954543.9579	4

Table 3: Inventory index value from April 2002 to October 2014

The above table shows the Average Inventory per month, Average per day consumption and Inventory Index. We can observe that there is a considerable reduction in Inventory index reflecting on the efficient inventory management practices at our stores.

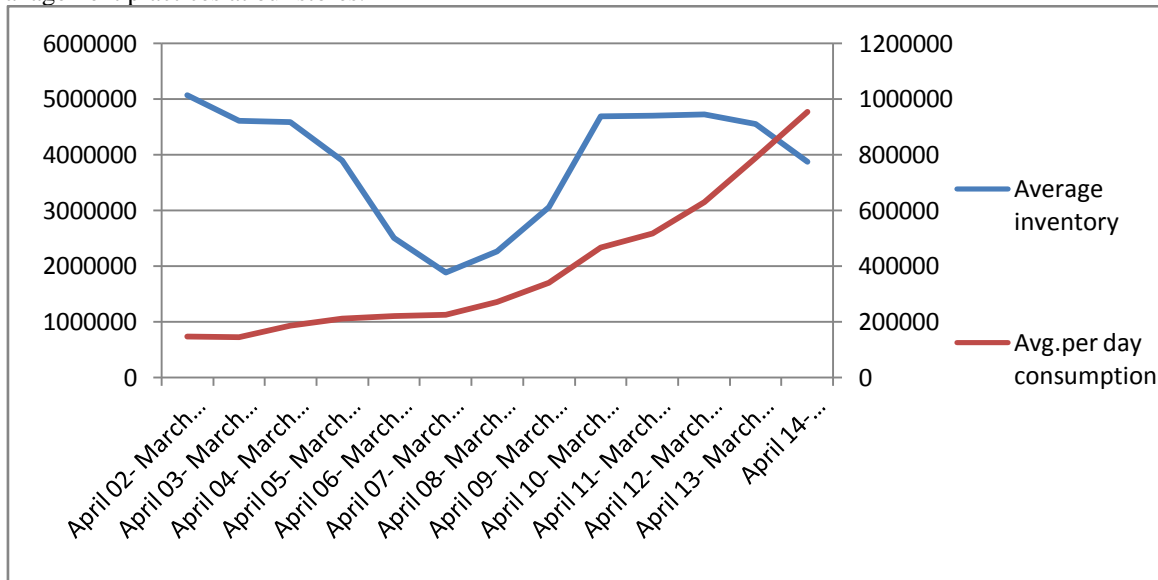


Chart 2: Average Inventory Average per day consumption.

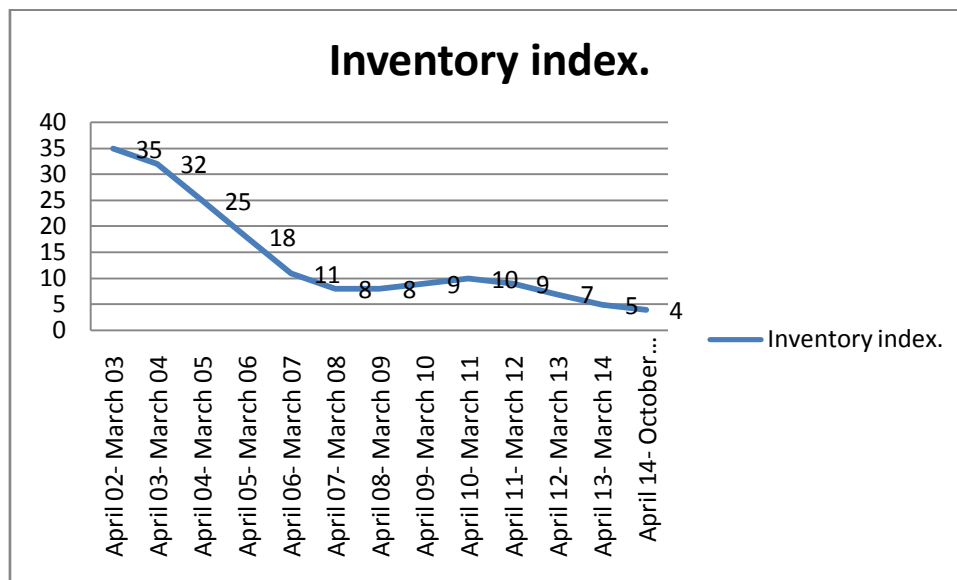


Chart 3: Inventory index from April 2002 to October 2014

The above graph shows there is decrease in average value of Inventory per month. In the year April 07-March 08, there is a drastic fall in Average value of inventory. This is because most of the medical supplies like Stents were moved from general stores to Pharmacy and also because of Consignment basis of procurement of such items. Since the year 2007, the hospital has gradually increased its bed strength to 2030 beds in the year 2011. This correlates with the increase in average inventory per month and average consumption per day.

III. Conclusion:

An efficient management of materials is a prerequisite to maintain the organizational equilibrium in an ever changing environment. It creates conditions for profitability and increased productivity which are important ingredients for survival and growth of any organization.

The study highlights two methods (MMF and Inventory Index) in improving efficiency and thereby productivity for the organization. It can be opined that adopting MMF and Inventory index methods help administrators to overcome challenges of stock outs while maintaining sustainability through cost cutting.

References:

- [1]. Michael darling ,Sandy wise; Not your father's supply chain; Materials Management in Health Care magazine, vol. 19 no. 4.
- [2]. Gupta S, Sunil Kant, Dave.P.K; Hospital Stores Management: An integrated approach;Jaypee bros,1st ed, 2000.
- [3]. <http://www.trinity.edu/eschumac/HCAD5320/Departmental%20Papers/Fall%202010/Materials%20Management%20Inst%20Mgmt.pdf> (accessed on Jan, 2015)