Research Article

MEDICINE STOCK OUT AND INVENTORY MANAGEMENT PROBLEMS IN PUBLIC HOSPITALS IN TANZANIA: A CASE OF DAR ES SALAAM REGION HOSPITALS

Godeliver A.B. Kagashe[1*] and Terevael Massawe[2]

[1]Department of Pharmaceutics, School of Pharmacy, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania
[2]Dar es Salaam Business School, Mzumbe University, Tanzania

*Corresponding author e-mail: gkagashe@yahoo.co.uk

ABSTRACT

The supply of medicines needs to be managed efficiently in order to prevent all types of wastage including overstocking, pilferage and expiry. This wastage may influence the quality of health care provided to patients. Problems of stock outs or overstocking and expiry of medicines in public hospitals in Tanzania have been reported. Factors contributing to these stock outs on one hand and over stocking on the other are not very clear. This descriptive cross sectional study therefore assessed the logistic skill levels of personnel involved in medicines supply as well as inventory management of medicines in public hospitals in Dar es Salaam region. Data was obtained using questionnaires as well as record review of tracer medicines. Results show that logistic skill level was poor and inventories were not well managed. Lack of funds and poor logistic skills contributed to stock outs. It is recommended that personnel dealing with medicines supply be trained in procurement and inventory management.

Keywords: Inventory management, stock out, medicines, storage

INTRODUCTION

The supply of medicines needs to be managed efficiently in order to prevent all types of wastage including overstocking, pilferage and expiry. This wastage reduces the quantity of medicines available to patients and therefore the quality of health care they receive. Both under stocking or overstocking and expiry of medicines highlight problems within the supply chain activities which include selection, quantification, procurement, storage, distribution and use.

Most of the researches in supply chain areas have been concerned with optimizing the supply chain in terms of its efficiency and competence in the product market, but only limited studies have been done regarding inventory management in supply chains.[1] Effective inventory management in a supply chain can play a vital role in cutting inventory holding costs across the different stages of the supply chain, this is especially so in developing countries like Tanzania where budget for medicines are often tight. In a health facility overstocking of certain items may tie up a substantial portion of the medicine budget, leaving insufficient funds for other important perhaps life saving medicines. For this reason it is very important to control the building up of inventory. In addition to cost holding, excess inventory can lead to obsolescence and reduce an enterprise's flexibility. In case of a health facility excess inventory may lead to expiry of some medicines.[2,3]

A study done by Talafha[4] to assess pharmacy and inventory control in ministry of health hospitals in Jordan showed that medication quantification requirements are not estimated according to actual hospital needs and standard procedures. In addition there were improper stock recording practices in some hospitals. In Tanzania a study done by John

Snow Inc. (JSI), [5] showed that there were stock outs of Antiretroviral drugs especially in those health facilities that depended on Medical Stores Department (MSD) zonal centers for their supply.

Factors contributing to stock outs on one hand and over stocking on the other in Tanzania are not very clear. Lack of proper logistics and inventory management skills have been implicated as contributing factors. This study therefore assessed inventory management and logistics skills level of personnel working at selected heath facilities in Dar es Salaam region.

MATERIAL AND METHODS

This was a descriptive cross sectional study that was done in four public hospitals situated in Dar es Salaam region. A questionnaire to determine logistics skill levels was developed and pretested; it was then administered to personnel involved in the supply of medicines in these hospitals. The personnel were first asked whether they were willing to participate in the study. Those who consented were then asked to fill the questionnaire. Twenty five tracer medicines were used to assess the performance of the facility in terms of inventory management. These tracer medicines were selected from a list of essential medicines according to the Tanzania country list.

The researcher visited a selected hospital and recorded the quantities of selected tracer medicines on the shelves and retrospectively summed up the ordering and issuing history for the same medicines throughout the course of three months. The researcher then ascertained whether the physical stock of tracer medicines was in agreement with the recorded stock by physically counting the tracer medicines on the shelves and then checking whether the figure of the amounts was in agreements with that recorded on the records. For each medicine a number of indicators were assessed using the Inventory Management Assessment Tool (IMAT) developed by MSH.[6] including

- Percentage of recorded balances that is less than physical counts
- Percentage of recorded balances that is greater than physical counts
- Percentage of products available
- Average percentage of time that products are out of stock

A checklist was used to assess the storage area. Data analysis was done using SPSS version 16

RESULTS

Demographic features of personnel involved in the supply of medicines in hospitals under study, are shown in table 1. The majority were in the age between thirty (30) and fifty (50). Sixty six percent of respondents were males. The ratio of male to female was 2:1. About (89%) had third level education and professionally most were pharmacists. Table 2 shows responses of participants on methods used to assess quantities of medicines required annually. Most participants about sixty five percent (65%) were unable to mention the method they were using. About twenty two percent (22%) mentioned the consumption method while twenty seven percent said they quantify the amounts of medicines depending on the funds available. Regarding inventory control methods sixty five percent were unable to mention the methods used.

The responses given by respondents are shown in figure 1. Regarding safety stock levels and time for placing orders, responses are shown in table 3, sixty six percent of respondents said there was no predetermined time for placing orders for different medicines stored. Study on tracer medicines showed that Muhimbili National Hospital (MNH) had all tracer medicines available (100%), but in the three district hospitals about 20 % of tracer medicines were out of stock at the time when this study was carried out. Table 4 shows factors mentioned by respondents as contributing to stock out. Lack of funds was the major reason mentioned by 77% of respondents. All participants acknowledged that some medicines expired within the last six months. The majority of participants (61.1 %) said the major reason was that the items ware received in near their expiry date.

The other reasons are shown in figure 3. Figure 4 shows the percentage of recorded balance that was less than physical count in the four hospitals. MNH had 0% while Mwananyamala and Temeke had the highest (8% each). MNH had 0% of recorded balance that was greater than physical count while Mwananyamala had the highest 72%. This is shown in figure 5. At Muhimbili national hospital besides bin cards all stocks were entered into a computer which was used instead of a ledger book the other three district hospitals did not have any computer. Every record was manual.

All four hospitals had a store with well functioning air conditioners. At Temeke hospital the air conditioner was small compared to the size of the store room. All four hospitals had refrigerators. Medicines were kept on shelves and some in boxes

on pallets as the shelves were not enough. The shelves however were full of dust at Temeke, Amana and Mwananyamala. In all four hospitals there was limited access to non staff persons. But no alarm system for security breaches.

DISCUSSION

When quantifying the amount of medicines required two methods are recommended, the consumption method and the morbidity method.[7] The consumption method takes the average amounts of medicines consumed monthly as the basis for calculations. The morbidity method requires knowledge of disease pattern of the area which the health facility is serving and from that the incidence of common diseases, the expected attendances and standard treatment patterns are considered to estimate the needs. Most participants sixty five percent (65%) were unable to mention the quantification methods used (Table2).This means these pharmacy personnel do not know the methods.

From the results twenty two percent (22%) of the participants mentioned the consumption method but when they were asked to state the monthly consumption of selected tracer medicines they could not mention any amount, which implied that they were also not using this method. The problem of not being able to quantify the medicines needed properly has also been reported in a study done in Uganda by Tumwine et. al.[8] which showed that medicines were not quantified properly because personnel involved in procurement of medicines were not trained in procurement and quantification methods. Not being able to quantify correctly the amount of medicines required can lead to both overstocking and under stocking of medicines.

Overstocking may lead to medicines pilling up at the health facility and eventually expiring while under stocking of life serving medicines may lead to loss of lives. Figure 1 shows inventory control methods as mentioned by participants, from the figure, it can be seen that participants were unaware of the methods used to control inventory, since only about 11% mentioned at least one method. Others about sixty five percent (65%) could not mention any method which again shows lack of knowledge of these personnel. Depending on the nature of the inventories different methods can be used including those that are based on reorder frequency e.g periodic review or perpetual review. On whether medicine stocked by these hospitals had safety stock level maintained. About fifty percent (50%) of the respondents said yes while thirty three (33.3%) said they did not have

safety stock levels set for the different medicines stored. Keeping a safety stock is important as it helps maintain service level and for medicines it is even more important since one would not want to have patients go without medications.

The normal stock level is the maximum quantity of an item that should be stocked to meet recurring demand, safety stock requirement and the replenishment cycle. The reorder point is the inventory level at which replenishment order should be placed to bring the inventory backup to normal stock level. The level should be quantitatively determined for each item based on analysis of usage or demand, safety stock requirements, and the length of time to complete the replenishment cycle. In all four hospitals there was no single item (medicine) whose time for placing order was predetermined. Lead time was variable and not predictable many respondents said it depended on whether the product was available at MSD or not and also whether funds were available on time. Medicines are very important items in a health facility which can save lives of many if used properly, on time in the right quantities and quality and at affordable cost. The present study shows that there is a problem in maintaining inventory or stocks of medicines at the required level. In the three district hospitals about 20% of tracer medicines were out of stock at the time when this study was carried out. A number of factors were sighted as causes of out of stock. Lack of funds was one of the major factors contributing to stock out (table 4). Hospitals would like to buy/order all required items in required amounts but the funds allocated is not enough so the money is distributed in such a way that most of the item are ordered or procured but below the required amounts. Also priority is given to those items that are available only at MSD and can not be purchased from private whole sale pharmacies. Lack of funds has also been reported in other studies conducted in Tanzania[9] (MOHSW2008).

Unavailability of required item at MSD was a second major reason why items were out of stock. These hospitals obtain their supply by ordering from MSD so when the item is not available at MSD then it means the facility can not get the items, especially when it is not manufactured locally. Similar results were reported in Malawi by Lufesi. [10] These hospitals are allowed by law to procure from local manufacturer and other whole sellers but the tendering process takes too long such that it may take several months before medicines are brought in. Bureaucracy and procurement procedure taking too long were also sighted as contributing to stock out. It

was surprising to note that lack of transport was mentioned as one of the factors in these facilities that are located very near to MSD head quarters in Dar es Salaam. All participants acknowledged that some medicines expired within the last six months. More than half of the participants said the major reason was that the item was brought in near its expiry date. About 22% said similar items was preferred meaning that a similar drug was prescribed in preference of the expired one. This can happen especially when prescribers do not prescribe medicines that are in the essential medicine list while those who procure or place orders use the essential medicine list as a guide.

Personnel were asked whether they needed further training in managing the supply of medicines. Most respondent majority of whom were pharmacist said they need additional training in procurement and supply chain management. The IMAT tool was used to assess inventory management assessing several indicators. From the results MNH had 0% meaning that all records for tracer medicines were accurately recorded. No recorded balance was less than the physical count and no recorded balances were grater than the physical counts. The use of computer at MNH may have contributed to good record keeping. For Temeke hospital records showed that recorded balances were greater than physical count which means that recording of issues of supplies was very poor. One of the contributing factors was that there were many record books to be filled in such that a person issuing the medicines does not record directly on the bin card. Some tracer items in Temeke and Amana had no bin cards. Issue voucher and ledger books were used. Records in ledgers however were not well arranged such that it was not easy to trace the records of the items.

Storage conditions for medicines are very critical since some products are heat sensitive and can deteriorate very fast under a slight change of
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temperature. So it is important to maintain the temperature at the required level. All four hospitals had a store with well functioning air conditioners and refrigerators for storing heat sensitive medicines. Medicines were kept on shelves and some in boxes on pallets as the shelves were not enough. The shelves however were full of dust at Temeke, Amana and Mwananyamala. Indicating poor store keeping, some of the dust was from the medicines stored. This is risk for people working in these stores as some dust from medicines can cause allergic reactions. Medicines on the shelves were not well arranged this may lead to mixing up of items especially when the packages of the items are similar. At MNH the shelves were clean. No boxes on the floor.

CONCLUSION

From this study it can be concluded that logistic skills level of personnel involved in medicine supply in the hospitals studied was poor. Inventories of medicines in the three district hospitals were not well managed. Most of the personel did not know methods to be used in controlling inventory and those for quantifying medicines needed. Lack of funds to procure the medicines was one of the major factors contributing to stock outs. Poor knowledge in logistics is also another factor. It is recommended that personnel involved in medicines supply be trained in procurement and supply chain management. Using computer in keeping records instead of manual methods can help in improving inventory management.
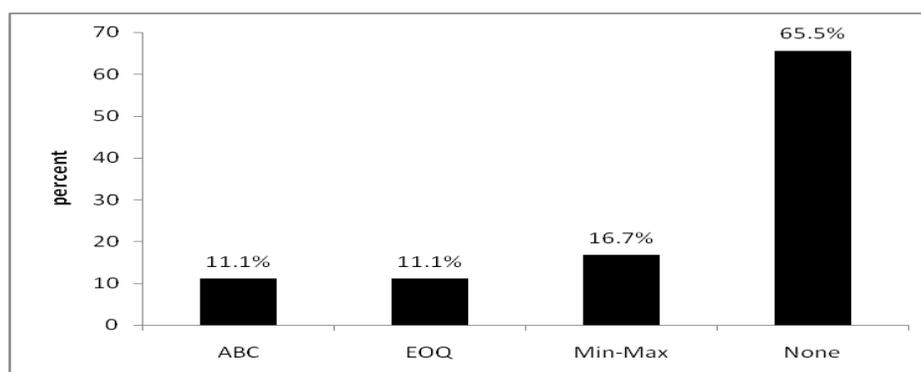
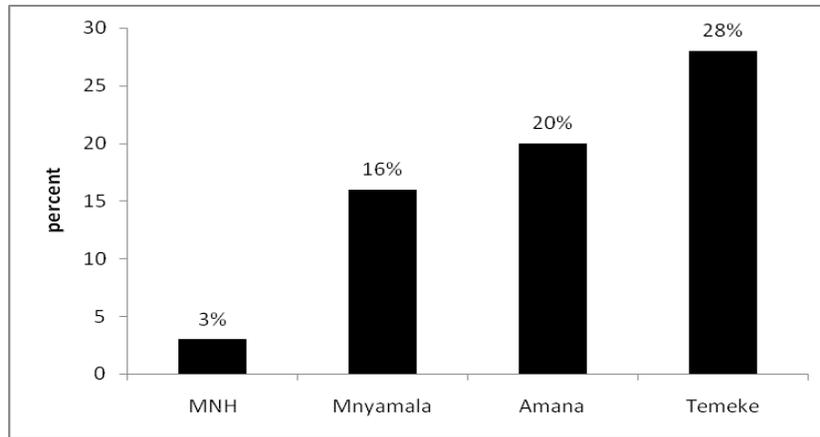Figure 1: Inventory Control methods as mentioned by participants.

Figure 2: Days out of stock of tracer medicines for the different hospitals
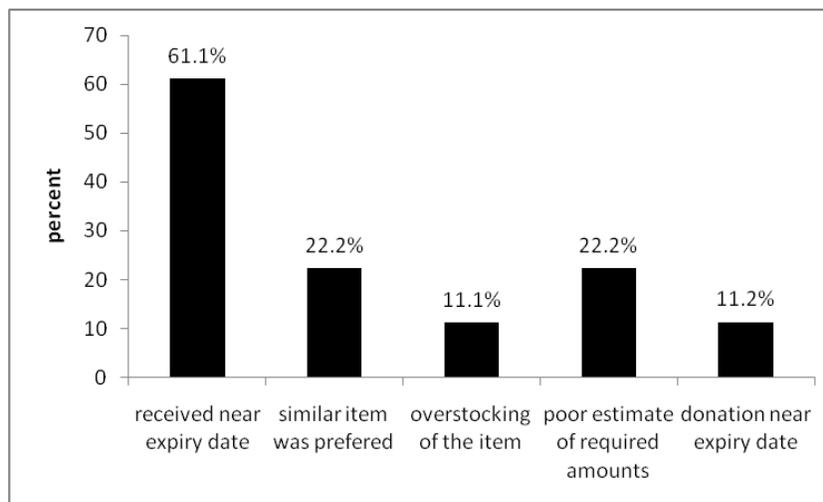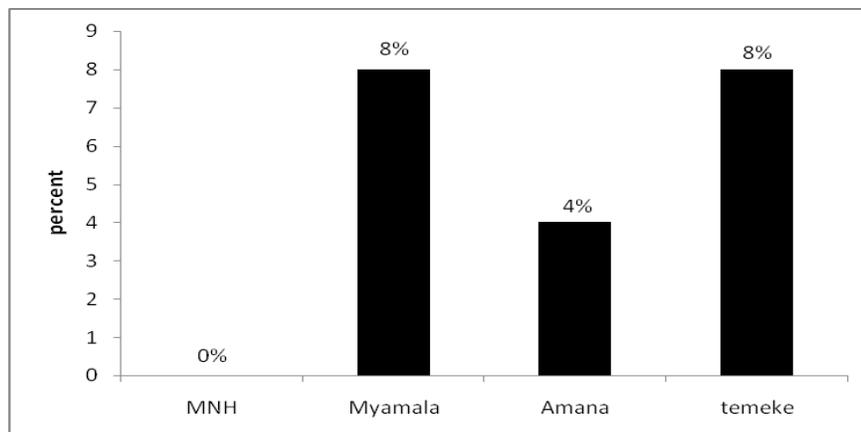

Figure 3: Reasons why medicines expired

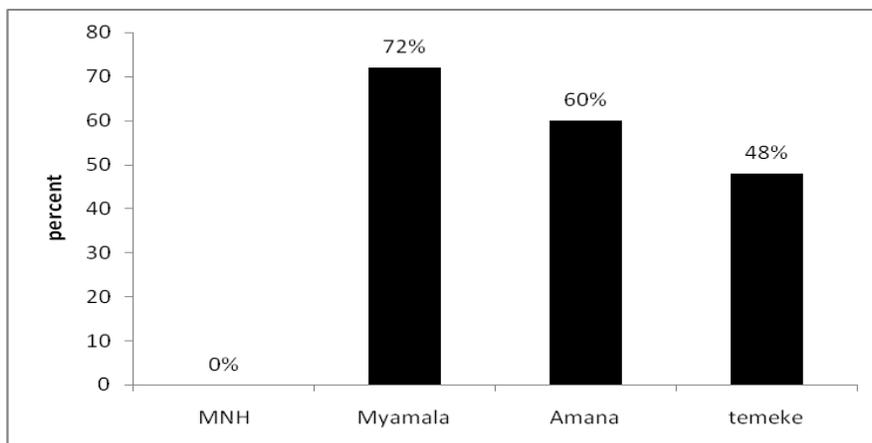Figure 4: Percent of recorded balance that was less than physical count

Figure 5: Percentage of recorded balance that was greater than physical count

Table 1: Demographic features of respondents

Demographic features	Percent (%)
Age	
20-30	11.1
30-40	33.3
40-50	38.8
50-60	27.7
Sex	
Male	66.7
Female	33.3
Education level	
Primary	0
Secondary	11
College/University	89
Profession	
Pharmacist	61.1
Pharmaceutical technician	22.2
Materials management	16.7
Supply chain specialist	0
Work Experience	
1-3 years	11.1
4-6 years	22.2
7-9 years	38.9
over 10 years	27.8

Table 2: Methods used to assess quantities of medicines required annually

Methods used to quantify amounts	Percent (%)
consumption method	22.4
Lager/bin cards	5.6
Top ten diseases	5.6
Report and request form	5.6
Funds available	27.8
Do not know	65.5

Table 3: Setting safety stock and time for placing orders

	Percent
Minimum safety stock set	
Yes	50
No	33.3
Do not know	16.7
Time for placing orders	
No predetermined time	66.7
One month	22.2
Two weeks or less	11.1

Table 4: Factors sighted as contributing to out of stock of medicines

Reasons for out of stock	**Percent**
Lack of funds	77.7
Out of stock at MSD	38.8
Changing treatment guidelines	5.5
Medicines not commonly used	5.5
Unexpected increase of patients	22.2
Small size ware house	5.5
Bureaucracy	27.7
Not paying supplier on time	5.5
Procurement procedure too long	11.1

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