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## **Inventory Management of Medical Store in a Selected Tertiary Public Hospital**

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### **ABSTRACT**

**Background:** The inventory management of medical store is needed to protect medicine from damage, loss, theft or wastage and to ensure the availability of necessary medicine for saving patients life in a hospital.

**Materials and Method:** A cross sectional study that carried out in Dhaka Dental College Hospital from January to December 2019. The respondents were all the workers working in the medicine store, from them data were collected through face to face interview by a pre-tested semi-structured questionnaire and observational checklist.

**Result:** About 85.71% respondents said drugs were purchased from Essential Drug Co. Ltd and 14.28% respondents said drugs purchased from Central Medicine Store Depot. All the respondents of medicine store mentioned about maintaining receipts and vouchers during drug purchasing. Also all respondents mentioned about presence of medicine receiving authority after delivery and confirmed expiry date checked during receiving medicine. About 87.71% respondents said record keeping methods were mainly manual in medicine store. Medicine store was well ventilated, air conditioner and refrigerator was present. But there was no humidity and pest control facility seen in medicine store. Inventory analysis was found to be done only by ABC method.

**Conclusion:** Depending on the opinion for challenges of management practice, there was lack of training; insufficient staff and less invest on modern technologies got priority. The study recommends ensuring implementation of modern technologies and 5S concept and arrangement of training program for the inventory personnel to increase their efficiency and improve quality service.

**KEYWORDS:** Essential Drugs, Manual Record, Procurement, BIN card, Stock count.

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### **I. INTRODUCTION**

Inventory management is fundamentally about determining the size and arrangement of loaded products. Inventory management or Stock administration is needed at various areas inside an office or inside different areas of a stockpile organization to ensure the regular and arranged course of creation against the arbitrary unsettling influence of running out of materials or products. Inventory or stock is characterized as a stock or store of goods [1]. These products are kept up available at or almost a business' area with the goal that the firm may satisfy need and satisfy its

Explanation behind presence. Characterizes inventory as "crude materials work in advancement, completed goods and supplies needed for making of an organization's goods and services" [2].

Inventory management is very essential in a developing country like Bangladesh. Bangladesh is a country of scarce resources and it is the primary responsibility of each hospital to ensure optimum utilization of available resources to provide good service or quality patient care. Usually, the hospital management is faced with choosing the alternative

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of either lowering the quality of care or adopting ways and means to reduce the cost of inventories.

An inventory control situation guarantees that the correct product are procured, in the right amounts, screens their quality, and limit the complete variable expense of tasks. A stockroom management framework screens the actual progression of products inside the framework, for example, receipts, stockpiling and issues. A performance observing framework watches that the frameworks are working effectively [3]. Roughly 35.0% of yearly hospital budget spent on purchasing materials and supplies, including medications [4]. This require prudent and effective management of the medical stores.

The medical store is quite possibly the most broadly utilized facilities of the hospital and one of few regions where a lot of cash is spent on buy on a repetitive basis. This accentuates the requirement for arranging, planning and coordinating the medical store in a way that bring about effective clinical and managerial work [5]. The objective of the hospital supply framework is to guarantee that there is satisfactory stock of the necessary things so a continuous supply of all fundamental things is kept up. The data framework should remember information for items entering and leaving the medicine store, items in stock, items on hand and approaches to screen the advancement of requests in the stockpile or supply pipeline. Twenty years back, most public supply or stockpile frameworks depended totally on manual stock records, yet now, numerous projects have changed to modernized frameworks. Indeed, even with computerization, in any case, numerous nations still keep a manual framework, particularly during the change to computerization. There is a broadly held belief that computerization tackles the issue of stock control. This belief is misinformed.

The medical store should keep up effective communication with providers, with procurement and inventory stock control units, with health facilities, and with administrators from the service of health. Intermittent meetings with the staff individuals from customer offices can help guarantee great communication and a more viable supply framework. Drug inventory administration focuses on cost regulation and improved effectiveness [6]. Stock or inventory examination tries to accomplish maximal output with negligible venture input, on the basis of the financial guideline of extending the restricted way to meet limitless end. Everything might be viewed as basic and there is seen need to supply exceptionally elevated levels of administration [7]. The inventory or stock control can achieve generous improvement in patient consideration as well as in the ideal utilization of assets. Therefore, in the present study the researcher interested to assess the state of inventory management of medical store in a tertiary public hospital.

## II. MATERIALS AND METHODS

**Study Design:** Cross sectional with quantitative study was carried out.

**Study Place:** The study was conducted in medicine store of Dhaka Dental College and Hospital, Dhaka.

**Study Period:** This study was conducted from January 2019 to December 2019.

**Study Population:** Staffs working in medicine store in Dhaka Dental College and Hospital, Dhaka.

**Sampling Technique:** Convenient sampling technique was followed for the selection of the respondents. The 7 respondents were achieved within the time frame of data collection.

**Eligibility criteria:** Employees working in medical stores at least six months of Dhaka Dental College Hospital, Dhaka.

**Research Approach:** Data were collected by face to face interview with the help of Semi-structured questionnaire and an observational check-list was used.

**Data Processing and Data analysis:** All the data were checked and edited after collection. Data were then entered in to computer, with the help of SPSS for windows (IBM SPSS, Statistics for Windows version 26). Data analysis initiated with descriptive analysis. Mean and Standard deviation was calculated for continuous variables. Frequencies and percentages were calculated for categorical variables.

### Ethical implication

After receiving ethical approval from the Institutional review board and applied for permission for data collection in Dhaka Dental College and hospital, Dhaka. After getting permission data collection was started. Respondents were briefed properly and motivated to participate. A written informed consent in Bengali was used for taking consent from respondents. Data were collected from those who gave their consent. No intervention was given in this study.

## III. RESULT

The study result has three parts which are- socio-demographic information, inventory management process and opinion for challenges of inventory management practices.

**Table-1** shows that, 42.9% were in the age group between 41-50 years. About 14.2% respondents was in the age group between 21-30 years and Another 14.2% was in the age group between 31-40 years with mean = 44.07 and SD =  $\pm 10.69$ . Among 7 respondents, 85.7% of them were male and other 14.2% respondent was female. Out of total, 42.85% respondents completed Diploma and 14.28% for each respondent completed Post Graduation, Graduation, H.S.C, S.S.C qualification. From the respondents, 57.14% were working in the live for 21-30years, 14.28% was

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working for 1-10 years in life, other 14.28% was working 11-20 years and also 14.28% was working for 31-40 years. Maximum respondent that is 71.42% did not receive any training on inventory management. Rest 28.57%

respondents obtained training and among 7 respondents, there was one Assistant Director 14.28%, One SLLPP 14.28%, Three Pharmacist 42.85%, one Instrument Caretaker 14.28%, and One MLSS 14.28%.

**Table 1. Distribution of respondents according to Socio-demographic information (n=7)**

Age group	Frequency	Percentage (%)
21-30 years	1	14.2
31-40 years	1	14.2
41-50 years	3	42.9
51-60 years	2	28.5
Mean = 44.07 (SD = ± 10.69)		
<b>Gender of the respondents</b>		
Male	6	85.7
Female	1	14.2
<b>Education level</b>		
Post-Graduation	1	14.28
Graduation	1	14.28
Diploma	3	42.85
H.S.C	1	14.28
S.S.C	1	14.28
<b>Total job duration</b>		
1 year - 10 years	1	14.28
11 years - 20 years	1	14.28
21 years - 31 years	4	42.85
31 years – 40 years	1	14.28
<b>Received training</b>		
Yes	2	28.58
No	5	71.42
<b>Respondents took part in the interview</b>		
Assistant Director	1	14.28
SLPP	1	14.28
Pharmacist	3	42.85
Instrument Caretaker	1	14.28
MLSS	1	14.28
Total	7	100

**Table 2** shows that, in medicine store, among 7 respondents 57.14% mentioned list prepared by doctor is the basis of listing for purchase. On the other hand, 28.57% respondents mentioned self-made list is the basis of listing for purchasing drugs and chemicals. And 14.28% respondent mentioned essential drug list for basis of listing of purchasing drugs and chemicals. From the total respondents, 57.14% were mentioned quantity of order determination of medicine needed is done by availability of fund and 42.85%

Were mentioned past consumption. Among 7 respondents 71.42% mentioned annual purchase, other 28.57% mentioned perpetual purchasing of medicine. Maximum of respondents 42.85% receive medicine 1-2 weeks after an order is placed, 28.57% receive medicine within 1 week and 14.28% was received 3-4 weeks and also 14.28% was received medicine after 4 weeks. And about source of medicine, 85.71% were mentioned about EDCL and 14.28% was mentioned about CMSD.

**Table 2. Distribution of respondents according to Inventory Management Processes (n=7)**

Drug listing for purchase in medicine store	Frequency	Percentage
List by prepared doctor	5	57.14
Self-made list	2	28.57
Use essential drug list	1	14.28
<b>Quantity determination of medicine order</b>		
Past consumption	3	42.85

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Availability of Fund	4	57.14	
<b>Purchase timing</b>			
Annual purchase	71.42	5	
Perpetual purchasing	28.57	2	
<b>Time required to delivery</b>			
Within 1 week	2	28.57	
1-2 weeks	3	42.85	
2-3 weeks	0	0	
3-4 weeks	1	14.28	
After 4 weeks	1	14.28	
<b>Source of purchase</b>			
Medicine store	EDCL	6	85.71
	CMSD	1	14.28
<b>Total</b>	7	100	

**Table 3** shows that, 100% of the respondents of medicine store included in this study mentioned about maintaining receipts and vouchers during drugs purchasing, presence of medicine receiving Authority after delivery, expiry date checked during receiving medicine, presence of refrigerator in the medicine store and presence of air conditioner in the medicine store. 85.71% of respondents mentioned about manual record keeping and 14.28% of them mentioned about computerized record keeping pattern. Among respondents, 85.71% of them mentioned about presence of ceiling fan and 14.28% respondents mentioned about presence of both ceiling and exhaust fan in store. 85.71%

mentioned that drugs are kept in shelf and 14.28% said that drugs are kept on floor. 71.42% mentioned that, there is no separate place for cytotoxic and dangerous drug. And 28.57% mentioned about separate place for cytotoxic drug. 85.71% denied presence of any harmful objects in medicine store. 14.28% mentioned that there is presence of cockroach in medicine store. 85.71% respondents said there is no over-stocking, and only 14.28% said presence of over –stocking. Among 7 respondents 57.14% of them mentioned about annual stock counting and another 42.85% respondents mentioned about cyclic stock counting in their store.

**Table 3. Distribution of respondents according to Receipt, Voucher Maintenance and record keeping (n=7)**

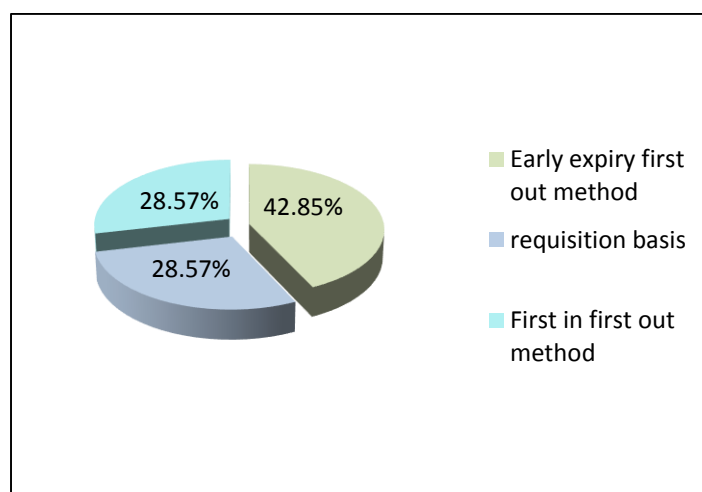
<b>Receipt and Voucher Maintenance</b>	<b>Frequency</b>	<b>Percentage</b>
Maintaining receipts and vouchers during drugs purchasing.	7	100
<b>Receiving process</b>		
Medicine received Authority after delivery	7	100
<b>Expiry date checking</b>		
Expiry date checked during receiving medicine	7	100
<b>Record Keeping pattern in medicine store</b>		
Computerized record keeping	6	85.72
Manual record keeping	1	14.28
Automated software-based record keeping	0	00
<b>Medicine Storage</b>		
Presence of refrigerator	7	100
<b>Ventilation maintenance in medicine store</b>		
Store temperature maintenance	7	100
Presence of ceiling fan	6	85.72
Both ceiling and exhaust fan in store	1	14.28
<b>Drug storage in medicine store</b>		
Drugs are kept in shelf	6	85.72
Drugs are kept on floor	1	14.28
<b>Specific drugs placement in separate place</b>		
No separate place for cytotoxic drug	6	71.43
Separate place for cytotoxic and dangerous drug	2	28.57
<b>Harmful objects in medicine store</b>		
Not presence of any harmful objects in medicine store	6	85.72

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Presence of any harmful objects in medicine store (Cockroach)	1	14.28
<b>Stocking in medicine store</b>		
No over- stocking		85.72
Over- stocking		14.28
<b>Stock Counting</b>		
Annually	4	57.15
Cyclic	3	42.85
<b>Total</b>	<b>7</b>	<b>100</b>

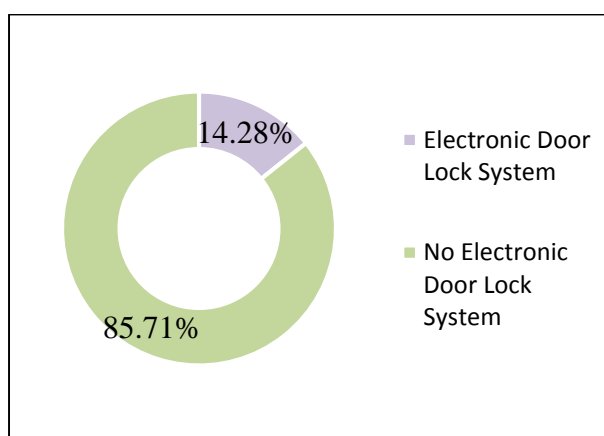
Figure 1 shows that, 28.57% respondents said that drug is distributed from store on requisition basis, 42.85% respondents said that drug distribution is early expiry first

Out method, and 28.57% respondents said that, drug distribution is first in first out method.



**Figure 1. Distribution of respondents on the basis of drug distribution from medicine store (n-7)**

Figure 2 shows, In medicine store, among respondents, 85.71% respondents said electronic door lock system is absent in medicine store, and only 14.28% respondent said electronic door lock system is present in medicine store.



**Figure 2. Distribution of respondents on the basis of electronic door lock system in medicine store (n-7)**

Table 4 shows that, on that point regarding lack of top management commitment, highest 71.42% respondents disagree to this issue and 14.28% respondent remained neutral and other 14.28% respondent agreed with this. None of respondent strongly agreed or strongly disagreed to this issue. On failure of investment in modern technology, highest 71.42% respondent agreed to this and 28.57% respondents strongly agreed to this issue. None of respondent strongly disagreed, disagreed and neutral to this

issue. Insufficient funding issue, highest 57.14% respondents was disagreed and 42.85% respondents agreed. None of respondents strongly agreed or strongly disagreed or neutral to this issue. On insufficient staff issue, highest 57.14% respondents agreed to this issue, 28.57% respondents disagreed to this issue and 14.28% respondent strongly agreed to this issue. None of the respondents strongly disagreed or neutral to this point. On poor record keeping issue, highest 85.71% respondents disagreed to this

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and 14.28% respondent remained neutral. None of the respondents strongly disagree, agree or strongly agree to this point. In case of poor infrastructure issue, highest 71.42% respondents disagreed, 14.28% respondent strongly disagreed on this issue and other 14.28% respondent

strongly agreed to this issue. None of the respondents neutral or agreed to poor infrastructure issue and lack of training issue, highest 85.71% respondents agreed to this, 14.28% respondent strongly agreed. None of the respondent strongly disagreed, disagreed or neutral on this issue.

**Table 4. Distribution of respondents according to opinion for challenges of inventory Management practice (n=7)**

<b>Lack of commitment by top Management</b>	<b>Value</b>	<b>frequency</b>	<b>Percentage</b>
Strongly Disagree	1	0	0.00%
Disagree	2	5	71.42%
Neutral	3	1	14.28%
Agree	4	1	14.28%
Strongly agree	5	0	0.00%
<b>Failure to invest in modern technology</b>			
Strongly Disagree	1	0	0.00%
Disagree	2	0	0.00%
Neutral	3	0	0.00%
Agree	4	5	71.42%
Strongly Agree	5	2	28.57%
<b>Insufficient funding by Government</b>			
Strongly Disagree	1	0	0.00%
Disagree	2	4	57.14%
Neutral	3	0	0.00%
Agree	4	3	42.85%
Strongly Agree	5	0	0.00%
<b>Insufficient stuff</b>			
Strongly Disagree	1	0	0.00%
Disagree	2	2	28.57%
Neutral	3	0	0.00%
Agree	4	4	57.14%
Strongly agree	5	1	14.28%
<b>Poor record keeping</b>			
Strongly Disagree	1	0	0.00%
Disagree	2	6	85.71%
Neutral	3	1	14.28%
Agree	4	0	0.00%
Strongly Agree	5	0	0.00%
<b>Poor Infrastructure</b>			
Strongly Disagree	1	1	14.28%
Disagree	2	5	71.42%
Neutral	3	0	0.00%
Agree	4	0	0.00%
Strongly Agree	5	1	14.28%
<b>Lack of proper training</b>			
Strongly Disagree	1	0	0.00%
Disagree	2	0	0.00%
Neutral	3	0	0.00%
Agree	4	6	85.71%
Strongly agree	5	1	14.28%
	<b>Total</b>	<b>7</b>	<b>100%</b>

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### Observation by Checklist

On basis of location, the medical store was located close to the hospital main building, on ground floor, not in separate building and not in convenient access. Fire extinguisher was present in medical store, but smoke detector and fire alarm system was absent. Presence of flammable trash was observed in medicine store. And also 'No smoking' sign was present there. Security guards were present in medical store for 24 hours. CCTV was also present there and electronic door lock system was absent in medical store. In case of structural design, damp free wall was absent in some place, and non-slippery, non-moist floor was observed in medicine store. Rainfall resistant roof was present and door was not broad enough but the door was well secured. In case of storage system, sufficient space was not observed but temperature and ventilation control system was in medical store. Humidity control system was not observed but the pest control was observed in medical store. It was observed that 5S concept was not implemented. Standby emergency power supply was present in medical store but there was no disposal room. There was absence of bin card and barcode reading facility in medical store. But they maintained ledger system in medical store. Fully computerized record keeping system and integrated automated software based record keeping system were absent in medical store.

### IV. DISCUSSION

Medical store management in hospitals is a tedious and time consuming chore with limited resources. Today in different hospitals in many countries are giving priority on inventory management by efficient personnel. In every steps of inventory management process modern technologies are being implemented. The study, 'Inventory management of medical store in a selected tertiary public hospital' was conducted in medicine store in Dhaka Dental College & Hospital which is a tertiary level hospital in Dhaka Metropolitan with a vision of providing quality health care services to the patient.

To assess the state of management of inventories some criteria were selected. In this condition, variables were selected as socio- demographic characteristics of the respondents, also variables related to physical facilities, procurement method, and storage system and distribution process. The study revealed that maximum respondents from inventory management that is 42.9% belong the age group 41-50 years and the mean age of respondents is 44.07 years,  $SD = \pm 10.69$ . Among respondents 85.7% of them were

Male and other 14.28% respondent was female. Regarding designation of respondents, there was one Assistant Director (14.28%), one SLPP (14.28%), 3 Pharmacist (42.45%), 1 Instrument caretaker (14.28%), 1 MLSS (14.28%). In context of academic qualification, 14.28% respondent was Post-graduate, and 14.28% respondent was graduate,

42.85% respondent completed Diploma and 14.28% was HSC passed, other 14.28% was SSC passed.

The study shows the scenario of inventory management process that is practiced in this hospital. In case of purchase list preparation majority of the respondents that is 57.14% in medicine store, mentioned about prepared by doctor list that they maintain. In case of source of procurement, majority of respondents that is 85.71% in medicine store mentioned about EDCL and 14.28% respondent mentioned about CMSD (Central Medical Store Depot). But our national policy dictates that public sector medicines will be purchased from EDCL (70%), CMSD (25%), and local sources (5%). But this study finding is not quite similar with national policy. Namibia operates a classic Central Medical Stores (CMS) distribution system with a CMS and two regional medical stores [3]. Regarding purchase timing, in medicine store, maximum respondents 71.42% mentioned about annual purchasing and 28.57% mentioned about perpetual purchasing. In case of quantity of order determination of medicine needed, majority of respondents that is 57.12% in medicine store mentioned about availability of fund and 42.85% respondents mentioned about past consumption. The study revealed that, maximum of the respondents mentioned that commodities are received between 1-2 weeks after an order is placed, that is 42.85% in medicine store. In Particular, an assessment of lead times in distribution systems offers numerous opportunities for improvement [8]. It was seen that receipt and vouchers were properly maintained during purchasing. Receiving authority is present there and during receiving delivery, expiry date check is done thoroughly to ensure quality service.

Regarding record keeping, majority of the respondents which is 85.71% in medicine store mentioned about manual record keeping method still being maintained in their store. Whereas 14.28% in medicine store, mentioned about presence of computerized method. It was observed that, Bin card is not maintained in medicine store also there is presence of ledger system. Stock records are therefore used to track down the movements of item from the time they enter the storehouse to the time of issue to users for the intended purpose [9]. Respondents also confirmed that any automated software based integrated inventory management system (IHIS) is still absent there. As we are living in advanced information technology era, inventory authority should give attention to implement computerized system.

There is complete absence of any smoke detector mentioned by 100% respondents. And there is no fire alarm system said all of the respondents 100%. This is a negative finding of this study. Because both smoke detector and fire alarm system is essential for medicine store as these can save valuable medicine and life. Presence of flammable trash that is cartons and boxes are observed in medicine store. There was presence of 'No-Smoking' sign in medicine store. Flammables must be stored in special building or rooms.

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### V. CONCLUSION & RECOMMENDATIONS

Inventory management ensures that the hospital does planning ahead of time to avoid shortages and make sure that right quality of materials are at the right place at the right time. The procurement in hospital is mostly from EDCL and very few from CMSD. It has been seen that, ABC technique of inventory control is being used there, which gives more attention on effective management of inventories. Most of the respondents did not get any training. In case of record keeping system, still they are following manual record but they don't maintain electronic record keeping method. The automated software based integrated hospital inventory system is absent in medicine store. There is no separate place for cytotoxic and dangerous drug. Fire extinguisher is present and they are functioning. But fire alarm and smoke detector is absent, so it may be arises serious situation at any time. As the security system of medicine store is well maintained, there is no theft issue. Along with some negative aspect, this study shows that the inventory management in Dhaka Dental College hospital is enough satisfactory to ensure quality health service to patient.

### RECOMMENDATIONS

1. Fire alarm and smoke detector system should be introduced and work properly
2. As there is no electronic door lock system, it is necessary to implement it. And it will increase security strength.
3. Medicine should not be kept on direct contact of floor, should place in shelves.
4. There is no separate place for cytotoxic and dangerous drug. Because if it is not kept separately it can lead to serious situation.
5. Bin card and bar code reading facility should be introduced in medicine store.
6. Fully computerized and integrated automated software based record keeping system should be implemented to meet the demand of modern technology.
7. Training and refreshed training program should be arranged for inventory personnel, so that they become more efficient in provide quality service.

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### Statement of Informed Consent:

"Informed consent was obtained from all individual participants included in the study."

### Contribution to Authors:

All authors involved in protocol preparation, data collection and literature search up to manuscript writing as well as revision of this manuscript.

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